GW INSTEK

Simply Reliable

2023 Good Will Instrument Co., Ltd. GENERAL CATALOG

www.gwinstek.com

World-Class Quality and Performance
Affordable Price
A Wide Range of Selections

Originally known and founded in 1975 as Good Will Instrument, GW Instek is the first professional manufacturer in Taiwan specializing in electrical test and measurement instruments. GW Instek began as a manufacturer of power supplies and quickly expanded into developing high precision electronic test and measurement instruments. After 48 years in the test and measurement industry, GW Instek has grown to become one of the most recognized manufacturers of instruments in the world. Today, GW Instek has more than 300 items ranging from oscilloscopes, spectrum analyzers, signal sources, DC power supplies, AC power sources, digital meters, LCR meters, other specific application meters to video surveillance systems.

Think of the word "innovation" and it's easy to think of R&D, new inventions, faster processing and groundbreaking technologies. At GW Instek, we focus on another type of innovation that is based on flexibility, manageability and efficient performance in real-world test applications. We call this "customer-focused" innovation and we strongly believe in it. By listening to our customers around the world, we are able to anticipate their needs and respond quickly to emerging trends. So when one of our customers introduces an exciting new technology, GW Instek is ready to test it.

Whether our customers are designing products with the ability to change people's lives, educating and training the engineers of tomorrow, or discovering new technologies that solve complex problems, GW Instek can be trusted to perform reliably and accurately in even the most demanding test environments. How can we be sure? We have the numbers to back it up. Actually, we have just one : 40. That's the number of in-house quality and performance verification tests each GW Instek product must pass before it leaves our facilities. This thorough process starts with environmental, safety and durability testing in the product design phase, through to burn-in and shipping tests ahead of final inspection and packing. Furthermore, our two manufacturing facilities in Taiwan and China all adhere to ISO quality and environmental management standards, as well as European CE safety regulations. That's why GW Instek products can be trusted to test.

At GW Instek, quality is reflected not in higher cost, but in greater value. We pride ourselves on the quality, reliability and affordability of our test and measurement instruments. With each of our products often in use for decades, it's not hard to understand the importance of measuring a product's value not by price, but by lifetime cost. This importance is deep-rooted to us; we have consistently produced products with some of the industry's lowest total cost per ownership. Reducing the total cost per ownership of our products allows us to provide exceptional value, reliability and performance with leading service and support over the lifetime of a product. That's why year after year, GW Instek can be trusted to perform reliably.

The industries we serve are as diverse as they are specialized. Our experience and expertise allow us to deliver high-performance test solutions that address the unique requirements of each client. GW Instek provides customized solutions that are backed by reliable products, comprehensive after-sales support, warranty, calibration services, and one of the industry's lowest Total Cost per Ownership.

GW INSTEK

Simply Reliable

We take pride in creating more than 48 years of satisfied customer experiences throughout the world. Today, GW Instek is considered the most reliable brand for professional measurement instruments with supreme quality and the **lowest TCO - Total Cost per Ownership**.
We invite you to be part of GW Instek success story and help perpetuate this value.

With an overriding commitment to provide highly durable products, GW Instek is your most **Reliable choice** when it comes to selecting the best measurement instruments with the **lowest TCO - Total Cost per Ownership**. Highly durable products mean long product lifetime capable of reducing operation & maintenance costs. This is definitely what you need to consider before investing.

Being your most trustworthy and **Reliable Partner**, GW Instek promises to proactively provide insightful business solutions and products with the **lowest TCO – Total Cost per Ownership**, assisting your business to thrive in the highly competitive world. From feasibility evaluation, product selection, solution adaptation to timely after-sales service, we are dedicated to serving each individual customer and making your professional life easier than ever.

Milestones

1975	Good Will Instrument Co., Ltd was established as a Power Supply manufacturer.
1982	The Kaohsiung branch was established.
1985	The Taichung branch was established.
1989	Good Will Southeast Asia (Malaysia) was established.
1991	Instek America Corp. was established.
1993	Taiwan headquarters was ISO-9002 certified. Granted the National Small and Medium Enterprise Award. Granted the Industrial Technology Advancement Award of Distinction.
1996	Good Will Southeast Asia (Malaysia) was ISO-9002 certified.
1998	Taiwan headquarters was ISO-9001 certified.
1999	Taiwan headquarters was ISO-14001 Environmental Management certified. Good Will Instrument Co., Ltd. delivered Initial Public Offer on Taiwan's Over-The-Counter Security Exchange (OTC).
2000	The CMLA Electricity Calibration Laboratory certification was granted. Good Will Instrument was went public on the Taiwan Stock Exchange.
2001	Good Will Instrument Suzhou was established.
2002	Taiwan headquarters was ISO-9001 : 2000 certified.
2003	Suzhou subsidiary was ISO-9001 : 2000 certified.
2004	Instek Electronics Shanghai was established.
2005	Global operational headquarters was established in Taiwan. The brand new CIS (Corporate Identity System) was established.
2006	Instek Japan Corporation was established.
2007	Good Will Instrument Korea was established.
2009	The Group Quality Award of Business Excellence Performance Model from the Chinese Society for Quality was granted.
2010	Marketing office was set up in India.
2011	GW Instek won Taiwan Excellence Award for GDS-1000-U Series, AFG-1000 Series, PEL-3000 Series and PSP-8360.
2012	GW Instek won Technology Innovation Award for GDS-3308 Series and GSP-830. Acquired Japan TEXIO technology corporation.
2013	Instek Digital was merged to become a member of GW Instek business group. GW Instek cooperated with Hitachi and EMIC to establish GW Alliance in Suzhou, China. GW Instek won Technology Innovation Award for PPX-1502 and APC-1525.
2014	GW Instek won Technology Innovation Award (Gold) for GDS-908 full touch screen oscilloscope. European subsidiary was established in the Netherlands.
2015	GW Instek won Taiwan Excellence Award for GDS-900/800 Series and PEL-3000 Series.
2016	GW Instek won Taiwan Excellence Award for GDS-3000G Series and GSP-9330.
2017	GW Instek won Taiwan Excellence Award for C-1108 and GPM-8213.
2018	GW Instek won Taiwan Excellence Award for C-1200 and GDM-9060 Series.
2019	GW Instek INDIA LLP was established. GW Instek won Taiwan Excellence Award for CPT-3000 Series and SPS-5000.
2020	GW Instek won Taiwan Excellence Award for C-1200 and GPM-8310.
2021	GW Instek won Taiwan Excellence Award for GDS-3000A Series, PPX-Series, CPP-3060/4020 and GSM-20H10 and GPM-8310.

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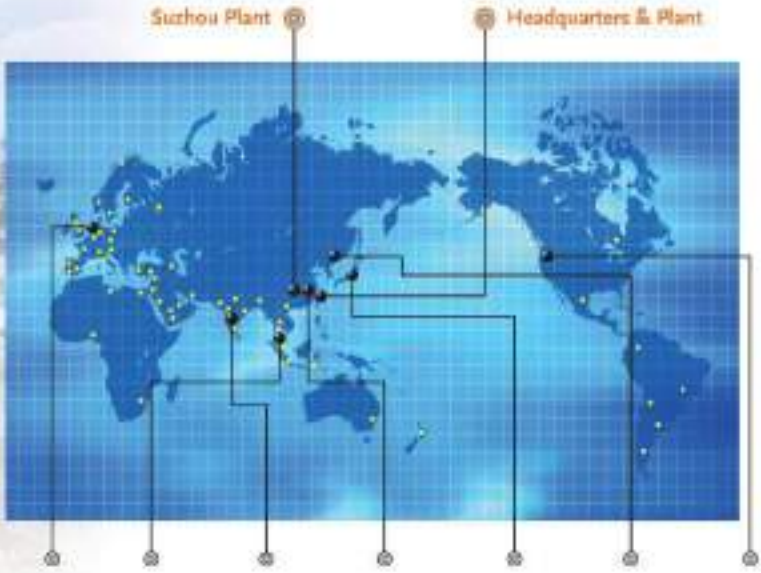
Suzhou Plant
Headquarters & Plant
Europe Subsidiary
Malaysia Subsidiary
India Subsidiary
China Subsidiary
Japan Subsidiary
Korea Subsidiary
U.S.A. Subsidiary

OSCILLOSCOPES

- Digital Storage Oscilloscope
- Mixed-signal Oscilloscope
- Sliced-domain Oscilloscope
- Handheld Digital Storage Oscilloscope
- Oscilloscope Education And Training Kit

SPECTRUM ANALYZERS & DEDICATED TESTER SERIES

- 3.25 GHz Spectrum Analyzer
- 3 GHz Spectrum Analyzer
- 1.5 GHz Spectrum Analyzer
- RF Training System

SIGNAL SOURCES

- Arbitrary Function Generator
- Multi-Channel Function Generator
- DDS Function Generator
- Audio Generator
- RF Signal Generator

DC POWER SUPPLIES

- Programmable & Single Channel DC Power Supply
- Non-Programmable & Single Channel DC Power Supply
- Programmable & Multiple Channel DC Power Supply
- Non-Programmable & Multiple Channel DC Power Supply
- Precision Source Meter

AC POWER SOURCES

- AC + DC Power Source
- AC Power Source

ELECTRONIC LOADS

- Multi-channel Electronic Loads
- DC Electronic Load
- High Power DC Electronic Load
- AC & DC Electronic Load

DIGITAL MULTIMETERS

- Digital Multimeter

SAFETY TESTERS

- AC/DC/IR Electrical Safety Analyzer
- AC Ground Bond Tester
- AC/DC Withstanding Voltage Insulation Resistance/Ground Bond Tester
- Multiple Channel Key
- Leakage Current Tester

LCR METERS

- Benchtop LCR Meter
- Handheld LCR Meter

OTHER METERS

- DC Milli-Ohm Meter
- Automatic Distortion Meter
- Battery Meter
- AC Millivoltmeter
- Digital Power Meter
- Precision Current Shunt Meter

New Products

A 650/350 MHz Digital Storage Oscilloscope

CE | USB High Speed | PC Software | LabView Driver

VPO Visual Persistence Oscilloscope

NEW

台灣精品

- 650/350MHz Bandwidth, 2 or 4 Input Channels
- 5GSa/s Real-time Sampling Rate(half channels); 2.5GSa/s Real-time Sampling Rate(all channels)
- Per Channel 200Mpts Memory Depth
- 200,000 wfm/s of Waveform Update Rate
- 10.2 inch 800 x 480 TFT LCD Display
- 400,000 Segments of Segmented Memory and the Waveform Search Function to Optimize the Efficiency of Record Length
- Zoom Window and Play/Pause Rapidly Navigate the Waveforms
- 38 sets of Automatic Measurement Offer Various Measurement Selections
- High Resolution Acquisition Mode
- I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- Dual Channel Spectrum Analyzer (DC~2.5GHz) with Spectrogram
- Dual Channel 25MHz Arbitrary Waveform Generator
- Optional 13 Sets of Power Analysis Measurements
- Optional 16 Digital Channels with a Logic Analyzer(MSO)
- Flexible Remote Control Connectivity (Standard: USB/LAN/RS-232; Option: GPIB)

GDS-3000A Series

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D Source Measure Unit

CE | RS-232 | USB Host | USB Device | LAN | Digit I/O | GPIB

NEW

台灣精品

- 4.3-inch TFT LCD
- Maximum Output ±210V/±1.05A/22W
- 0.012% Basic Measurement Accuracy with 6½-digit Resolution
- Variable Sampling Rate (Fast/Medium/Normal)
- 2-, 4-, and 6-wire Remote V-source and Measurement Sensing
- Provide SDM (Source Delay Measure) Cycle
- Built-in 4 Sequence Output Modes (Stair, Log, SRC-MEM, Custom), up to 2500 Points
- Built-in Limit Function, Supports 11 Groups of Limit Tests
- Built-in 5 Calculation Functions
- OVP/OTP Protection Function
- Provide Digital Number Keyboard Input
- Interface : RS-232, USBTMC, LAN, GPIB (Optional)

GSM-20H10

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D Programmable High-precision D.C. Power Supply

CE | RS-232 | RS-485 | USB | LAN | Ext I/O | GPIB

NEW

台灣精品

- CV, CC Priority Start Function
- Four Levels of Current Measurement Resolution (min. 0.1μA)/Two Levels of Voltage Measurement Resolution (min. 0.1mV)
- Power Output ON/OFF Delay Function
- Adjustable Voltage and Current Slew Rate
- Bleeder Circuit Control
- Delayed Over-current Protection(OCP Delay)
- Sequential Power Output Function
- Remote Sensing Function & Data Logger
- 10 Sets of Memory Function
- Over Voltage Protection, Under Voltage Limit, Over Current Protection, Over Temperature Protection, AC Alarm Function
- Supports K Type Thermocouple Temperature Measurement
- Interfaces: USB, LAN, RS-232, RS-485, Analog Control; Opt: GPIB

PPX-Series

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D Triple-channel Programmable DC Power Supply

CE | RS-232 | GPIB | USB | LAN | Ext I/O

NEW

台灣精品

- 4.3"TFT LCD Display
- Setting Resolution: 1mV/0.1mA; Read Back Resolution: 0.1mV/0.1mA
- Low Ripple Noise: ≦1mVrms/≦2mArms
- Transient Response Time: ≦100μs
- Load Function (CC, CV, CR mode)
- Tracking Series and Parallel Function without Additional External Wiring
- Utilizing Hardware to Realize Over Voltage Protection/Over Current Protection/Over Temperature Protection
- Delay Function/Output Monitoring Function/Output Recorder Function
- Supports Setting Value, Measurement Value and Output Waveform Display
- Sequential Output Function and Built-in 8 Template Waveforms
- The Output Recorder Function Records the Output Voltage & Current Parameters with a Minimum Recording Interval of 1 Second
- Provides 10 Sets of Memory for Each Sequence/Delay/Recorder/Panel Setting Condition
- GPP-3060/6030 Supports a USB (Type A) Output Terminal
- Intelligent Temperature Control Fan Effectively Reduces Noise
- Standard: RS-232, USB, Ext I/O Optional (manufacturer installed only): LAN, LAN+GPIB

GPP-3060/6030/3650

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Programmable AC/DC Power Source

ASR-3000 Series

- Output Rating: AC 0 ~ 440 Vrms, DC 0 ~ ± 570 V
- Output Frequency up to 999.9 Hz
- DC Output (100% of Rated Power)
- Measurement Items: Vrms, Vavg, Vpeak, Irms, IpkHi/Lo, Iavg, Ipeak, P, S, Q, PF, CF
- Voltage and Current Harmonic Analysis (THDv, THDi)
- Remote Sensing Capability
- OCP, OPP, OTP, AC Fail Detection and Fan Fail Alarm
- Support Arbitrary Waveform Function
- Output Capacity: 2kVA/ 3kVA/4kVA
- Customized Phase Angle for Output On/Off
- Sequence and Simulation Function (up to 10 sets)
- Interface(std): USB, LAN, RS-232, GPIB
- Built-in External Control I/O and External Signal Input
- Built-in Output Relay Control & Memory Function (up to 10 sets)
- Built-in Web Server

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Programmable D.C. Electronic Load

PEL-2000B Series

- Sequence Function to do High Speed Load Simulations
- Flexible Configuration with Mainframes and Plug-in Modules
- Multiple Independent Load inputs up to 8 Channels in a Mainframe
- Parallel Connection of Inputs for Higher Load Capacity
- Program Mode to Create Work Routines for Repetitive Tests
- OPP/OCP/OVP/OTP/RVP/UVP Protections
- External Channel Control/ Monitoring via Analog Control Connector
- Multi Interface - PEL-2000A Series: USB, RS-232, LAN, GPIB (Opt.)
  PEL-2000B Series: USB, RS-232, LAN and GPIB (Opt.)

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High Power DC Electronic Load

PEL-5000C Series

- Maximum Power up to 192kW
- Up to 8 units of Master/Slave Parallel Control
- 5-digit Digital Voltage, Current and Power Meter
- Large LCD Display
- Display Voltage Value, Current Value, Watt Value at the Same Time
- Suitable for Power Factor Regulator (PFC) Testing (with 12kW Models)
- Automatically Perform OCP, OPP Test
- The Power-on State Value Can be Set
- Constant Current, Constant Resistance, Constant Voltage, Constant Power, Constant Current + Constant Voltage, Constant Power + Constant Voltage, Dynamic and Short Circuit Modes
- Short Circuit Time Can be Set During Short Circuit Test
- Over Current, Over Power, Over Temperature Protection and Over Voltage Warning
- Voltage Polarity Display Can be Set to Positive Value ("+") or Negative Value ("-")
- Support Solar Panel MPPT Test
- Optional Interface: GPIB, RS232, USB, LAN

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DC Electronic Load

PEL-500 Series

- 5-digit Digital Voltage, Current and Power Meter
- Simultaneous Display of Voltage, Current, and Watt
- Short-circuit Time Can be Set During Short-circuit Test
- Automatic Test Function of Overcurrent Protection/Overpower Protection
- The Battery Discharge Test Function Can Set the Discharge Stop Voltage(Vbatt), Discharge Capacity(AH, WH) and Stop Discharge Time
- Surge Test Can Simulate Start Overshoot Current and Transient Current From Hot Plugging
- Constant Current, Constant Resistance, Constant Voltage, Constant Power and Dynamic Mode
- Overvoltage, Overcurrent, Overpower, Over Temperature Protection and Reverse Polarity Detection
- Voltage Polarity Display Can be set to Positive Value("+") or Negative Value("-")
- Communications Interface: RS232, USB

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D AC & DC Electronic Load

CE RS-232 GPIB USB LAN

NEW

AEL-5000 Series

- Turbo Mode, Intelligent Mode Can Withstand up to 3 Times the Rating Current and Power of the Electronic Load in a Short Period of Time
- Operating Mode: CC, Sense CC, CR, CV, CP and AC Rectifier Loads
- Measurement Items: Voltage Value(Vrms, Vpeak, Vmax, Vmin), Current Value(Irms, Ipeak, Imax, Imin), Watt Value, VA value, Power Value(PM), Frequency Value, Crest Factor, Power Factor, Voltage Total Distortion(V THD, VHD), Current Total Distortion(I THD, IHD, ITD)
- Eight Units Connected in Parallel up to 1440W for Single-phase and 5440W for Three-phase
- Support Leading and Unloading Angle Control, Loading and Unloading Angle Control Can be Set at the Full Range of 0-359 Degrees
- Support Positive Half Cycle or Negative Half Cycle Load
- Support CCR/FRCC Current Wave Modulation Function, Withstand Trailing Edge and Leading Edge
- Support the Capacitive Load (Crest Current) when the Power Supply is Turned on and the Transient Current (Surge Current) Test when the Load is Suddenly Connected (Hot Plug-in) during Operation
- Crest Factor Range: 1.414~3.0
- Power Factor Range: 0.1~1.0 Leading or Trailing
- Frequency Range: DC, 40~440Hz(AEL-5001/AEL-5150/AEL-5064/AEL-5080: DC, 40~70Hz) , or(5000A) and (5kV) Need to be Customized
- Optional Control Interface: GPIB, RS232, USB, LAN

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D High Power DC Electronic Load

CE RS-232 GPIB USB LAN

NEW

PEL-5000G Series

- **5 Digital V/A/W Meter Can be Displayed on Large LCD Display Simultaneously**
- **Flexible CC, CR, CV, CP, CC+CV, CP+CV, Dynamic and Short Circuit Operation Modes**
- **Can set the Power-on Status Value**
- **Short Circuit Duration Can be set Within Short Circuit Test**
- **Voltage Meter Display Can be Configured as Polarity Positive("+") or Negative("-")**
- **Master/Slave Control Units Maximum up to 1 MASTER, 7 SLAVE**
- **Optional Interface : GPIB,RS232,USB,LAN**
- **Support MPPT CV Test Function For Solar Panel**
- **Protection Against V, I, W, and C**

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E High Frequency LCR Meter

CE USB Device USB Host LAN RS-232 Handler Trigger GPIB Scanner

NEW

LCR-8200(A) Series

- Wide Test Frequency :
  LCR-8200A : DC, 10Hz ~ 30/50/20/10/5 MHz
  LCR-8200 : DC, 10Hz ~ 30/20/10/5/1 MHZ
- 7" LCD color Display
- 0.05% Basic Accuracy
- Displaying Four Measurement Results Simultaneously From 17 Selectable Measurement Parameters Freely
- 16 Steps List Measurement
- Two Curves Sweep Mode
- Equivalent Circuit Model Analysis (LCR-8200A only)
- Internal DC Bias Voltage ±17V
- USB Storage Available
- ALC Function Available
- Standard Interface : RS-232C, USB Host/Device, LAN, GPIB and Handler
- Universal Power Input

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E AC/DC/IR/GB Electrical Safety Analyzer

CE USB Host RS-232 GPIB USB Signal I/O Printer LAN

NEW

GPT-15000 Series

- 500VA AC Test Capacity (short circuit current > 200mA)
- 7" TFT LCD
- Comply with IEC 61010-3-034 Design Requirement
- Manual Test Mode/Auto Test Mode
- RMS Current Measurement
- Zero Crossing Turn-on Operation
- Controllable Ramp-up & Ramp-down Time
- Statistics & Analysis Function
- Capacitive Load Testing Capability up to 4.7μF
- Sweep Function for DUT Characteristic Analysis
- Convenience Listed AUTO Mode Easy to Read Result and Judge
- Internal Storage and USB Storage Available
- Remote Function Available
- Setting Data Export/Import
- Rear Panel Output Available
- Standard Interface : RS-232C, USB host/device and Signal I/O
- Optional Interface : GPIB or LAN
- Universal Power Input

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New Products

E Multi-Channel Hipot Tester

CE | USB Host | USB Device | RS-232 | Signal I/O

NEW

GPT-9500 Series

- 150VA AC Test Capacity
- 3 in 1 Tester : AC, DC, IR
- Built-in 8 Channel Scanner
- 480 x 272 Color TFT LCD
- Test Parameter Export/Import Through USB Host
- Statistics (Counter) Function
- Insulation Resistance Measurement up to 10GΩ
- Open/Short Check (OSC)
- ARC Detection
- Multi-language : Traditional/Simplified Chinese, English
- Interface : RS-232C, USB Host/Device and Signal I/O

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E Leakage Current Tester

CE | RS-232 | GPIB | USB Device | USB Host | LAN | Signal I/O

NEW

GLC-10000

- Suitable for Medical Electrical & General Electrical of Leakage Current Measurement
- 7" Touch Pane with Color LCD
- 11 Different Measurement Network to Simulate the Resistance of Human Body (Including IEC 60601-1:2020 3.2rd)
- The Measurement of Maximum Allowable Leakage Current is Up to 50mA
- External Terminal for Extension MD Connection
- MD OUT Terminal can be Connected to an Oscilloscope for Convenient Comparison of Measured Waveforms
- 30 Sets Memories for Test Parameter; 1000 Sets Memories for Measured Data.
- Test Parameter Export/Import Function Through USB Host
- USB Storage for Measurement Data/Screen Capture
- Various Standard Interfaces: RS-232C, USB Host & Device, LAN, Signal I/O and GPIB (Optional)

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E Digital Power Meter

CE | USB Host | USB Device | LAN | RS-232 | GPIB | DA4

NEW

台灣精品

GPM-8310

- 5" TFT LCD
- Optional Accessory: GPM-001
- DC, 0.1Hz ~ 100kHz Voltage/Current Test Bandwidth
- Two Numerical Display Modes
  General Mode: Displays 2 Main Test Items + 8 Secondary Test Items Simple Mode: Displays the Test Values of 4 Main Test Items
- Waveform Display: V (voltage), I (current), P (power)
- The Current/Voltage can be Measured to a Deformed Wave with CF of 3, and the Half-range CF can Reach 6 or 6A
- Meeting the IEC 61000-4-7 Harmonics Measurement Requirements (50/60Hz)
- 50th Order of Harmonic Measurement and Analysis (value and bar graph)
- Integration Function Supports Automatic Level-changing
- External Current Sensor Input Terminals (EXT1/EXT2)
- Standard Interfaces: RS-232C, USB Device/Host, LAN, GPIB
- Optional Interface: Digital I/O (DA4) (must be installed before leaving the factory)

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Model Number Index

AA

ASN-002	Accessory – DC Shunt 3HC/3F Ohm 150mA to 2.25A	B03
ASN-006	Accessory – DC Shunt 1HT/1F 10 Ohm 150mA to 2.25A	B03
ASN-008	Accessory – DC Shunt 1HM/1F 25 Ohm 0.75mA to 30mA	B03
ASP-001	Accessory – Adapter, 3BU, 3EC(2P) - 1U(3P)	B05
ASP-002	Accessory – Adapter, 3BU, 3MA(3P) - 1U(3P)	B05
ASP-003	Accessory – Adapter, 3BU, 1U(3P) - 1MA(2P)	C04
ASR-001	Accessory – Adapter, 75R 6HC(2P) - 3BH 8NC(3P+N)	B05

AE

AEL-6002-150-10.75	150V/10.75A/1075W AC & DC Electronic Load	D13
AEL-6002-150-20	150V/20A/2000W AC & DC Electronic Load	D13
AEL-6004-150-37.5	150V/37.5A/3750W AC & DC Electronic Load	D13
AEL-6006-150-60	150V/60A/6000W AC & DC Electronic Load	D13
AEL-6008-150-75	150V/75A/7500W AC & DC Electronic Load	D13
AEL-6010-150-112.5	150V/112.5A/11250W AC & DC Electronic Load	D13
AEL-6015-300-112.5	300V/112.5A/15000W AC & DC Electronic Load	D13
AEL-6018-300-150	300V/150A/18000W AC & DC Electronic Load	D13
AEL-6030-300-150	300V/150A/30000W AC & DC Electronic Load	D13
AEL-6060-600-10.75	600V/10.75A/1075W AC & DC Electronic Load	D13
AEL-6060-600-20	600V/20A/2000W AC & DC Electronic Load	D13
AEL-6004-600-37.5	600V/37.5A/3750W AC & DC Electronic Load	D13
AEL-6006-600-60	600V/60A/6000W AC & DC Electronic Load	D13
AEL-6008-600-75	600V/75A/7500W AC & DC Electronic Load	D13
AEL-6010-600-112.5	600V/112.5A/11250W AC & DC Electronic Load	D13
AEL-6015-600-112.5	600V/112.5A/15000W AC & DC Electronic Load	D13
AEL-6018-600-150	600V/150A/18000W AC & DC Electronic Load	D13
AEL-6030-600-150	600V/150A/30000W AC & DC Electronic Load	D13
AEL-6060-600-10.75	600V/10.75A/6000W AC & DC Electronic Load	D13
AEL-6004-600-18	600V/18A/10800W AC & DC Electronic Load	D13

AF

AFG-2005	5MHz Arbitrary Waveform Function Generator	C09
AFG-2012	12MHz Arbitrary Waveform Function Generator	C09
AFG-2025	25MHz Arbitrary Waveform Function Generator	C09
AFD-3100	5MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/PM Modulation & Ext. Counter	C09
AFG-3112	12MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/PM Modulation & Ext. Counter	C09
AFG-3125	25MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/PM Modulation & Ext. Counter	C09
AFG-3225	25MHz True Dual-Channel, Arbitrary Function Generator	C09
AFG-3011	10MHz Single-Channel Arbitrary Function Generator	C9
AFG-3022	20MHz Dual-Channel Arbitrary Function Generator	C9
AFG-3021	20MHz Single-Channel Arbitrary Function Generator	C9
AFG-3022	20MHz Dual-Channel Arbitrary Function Generator	C9
AFG-3051	50MHz Arbitrary Function Generator	C10
AFG-3081	80MHz Arbitrary Function Generator	C10

AP

APE-001	Accessory – CP4E Interface Card	D122
APE-002	Accessory – RS232/USB Interface Card	D122
APE-003	Accessory – Output Voltage/Capacity (0 ~ 600Vrms)	D122
APE-004	Accessory – Output Frequency Capacity (63~500/1,000)	D122
APE-007	Accessory – RS 232 Interface Card	D122
APE-008	Accessory – Air Inlet Filter	D122
APS-7050	500VA Programmable Linear AC Power Source	E01
APS-7100	1000VA Programmable Linear AC Power Source	E01
APS-7100E	1000VA AC Power Source	E01
APS-7150E	1500VA DC Power Source	E01
APS-7200	2000VA Programmable Linear AC Power Source	E01
APS-7300	3000VA Programmable Linear AC Power Source	E01

AS

ASR-001	Accessory – Air Inlet Filter	D122
ASR-003	Accessory – Filtered Three Phase Control Unit	D122
ASR-0500	500VA Programmable AC/DC Power Source	E01
ASR-1000	1000VA Programmable AC/DC Power Source	E01
ASR-6000	6KVA Programmable AC/DC Power Source for 3rd 1/2 Rack Mount	E01
APS-11000	11000VA Programmable AC/DC Power Source for 3rd 1/2 Rack Mount	E01
ASR-0300	30VA Programmable AC/DC Power Source	D67
ASR-1000	90VA Programmable AC/DC Power Source	D61
ASR-3000	4KVA Programmable AC/DC Power Source	D67
ASR-3000-H	4KVA Programmable AC/DC Power Source	D67

AT

ATA-001	Accessory – Antenna, Ground Fill Antenna, BNC(M)	E00
ATA-100	Accessory – Adapter, 3BJB Alternative, 3BJ, 1U(3P)-N(3P)(N)	E00

BB

USG-BB-A	Accessory – 8-Channel Logic Analyzer, Includes Enhanced Logic Analyzer Card(CLA-100) and 8-channel Logic Analyzer Probe(CTL-16A)	A45
DSG-16A	Accessory – 16-Channel Logic Analyzer, Includes 16-channel Logic Analyzer Card(CLA-116) and 16-channel Logic Analyzer Probe(CTL-16A)	A45
DEG-FGN	Accessory – DDS Function Generator, 5MHz Sine/Square/Triangle/Pulse Function	A42
DEG-GPIB	Accessory – IEEE Interface	A42
DEG-LAN	Accessory – Ethernet & SYCH Output	A42
DEG-A-PWR	Accessory – 13 sets of Power Analysis Measurements	A42
DEG-A-GPIB	Accessory – IEEE Interface	A42
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DSG-PWR	Accessory – Power Analysis Software, Power Quality(Harmonics/Ripple/Inrush Current Measurement	A42
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CTP-1000-1	Accessory – Oscilloscope Probe, 1000MHz (10:1/1:1 Switching Passive Probe, BNC(F)/N)	A44
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CTP-0410	Accessory – Oscilloscope Probe, 500MHz (10:1 Passive Probe, BNC(F)/N)	A44
CTP-0510	Accessory – Oscilloscope Probe, 500MHz (10:1 Passive Probe, BNC(F)/N)	A44
CTP-0610	Accessory – Oscilloscope Probe, 200MHz (10:1 Passive Probe, BNC(F)/N)	A44

GUI

GUC-001	Accessory – GPIB-USB Adapter, GPIB to USB Adapter	C12
DUR-001A	Accessory – RS232 USB Cable, 300mm	D12
GUS-001B	Accessory – RS232 to USB Adapter with 9-Pin DMC Slim Port	D12

LCR

LVT-1170	1-Channel A.C. Millivolt Meter	E11
LVT-1270	2-Channel A.C. Millivolt Meter	E11

CWS

CWS-001	Accessory – Wire Rope	A12

LC

LCR-05	Accessory – Test Fixture for Axially Radial Leaded Components	G11
LCR-05A	Accessory – Mainly Test Fixture for Axial & Radial Leaded Components (Including ETC1-0603-R)	G11
LCR-060	Accessory – Test Lead with 4-Pin Clip (4-wire type), Approx. 750mm	G11
LCR-07	Accessory – Test Lead with Alligator Clip (3-wire type), Approx. 750mm	G11
LCR-08	Accessory – Test Fixture (Tweezers) for SMD/Chip Components, Approx. 150mm	G11
LCF-10A	Accessory – 10MHz Test Fixture for Bottom Electrode Components (Including ETD-1.0MD-B)	G11
LCR-10	Accessory – Test Lead with 4-Pin clip (4-wire type), Approx. 600mm	G11
LCR-15	Accessory – Test Fixture for SMD/Chip Components	G11
LCR-15A	Accessory – 15MHz Test Fixture for SMD/Chip Components (Including ETD-0.5MD-B)	G11
LCR-16	Accessory – DC Bias Voltage Box (+/- 40V)	G11
LCR-17	Accessory – DC Bias Current Box (+/- 2.5A)	G11
LCR-6000	10 Hz ~ 2kHz Precision LCR Meter	G31
LCR-6100	10 Hz ~ 5kHz Precision LCR Meter	G31
LCR-6105	10 Hz ~ 100kHz Precision LCR Meter	G31
LCR-6200	10 Hz ~ 200kHz Precision LCR Meter	G31
LCR-6300	10 Hz ~ 300kHz Precision LCR Meter	G31
LCR-6001	10 Hz ~ 1MHz High Frequency LCR Meter	G31
LCR-6002	10 Hz ~ 2MHz High Frequency LCR Meter	G31
LCR-6003	10 Hz ~ 3MHz High Frequency LCR Meter	G31
LCR-6004	10 Hz ~ 4MHz High Frequency LCR Meter	G31
LCR-6005	10 Hz ~ 5MHz High Frequency LCR Meter	G31
LCR-6006	10 Hz ~ 6MHz High Frequency LCR Meter	G31
LCR-6210A	10 Hz ~ 10MHz High Frequency LCR Meter	G31
LCR-6220A	10 Hz ~ 20MHz High Frequency LCR Meter	G31
LCR-6230A	10 Hz ~ 30MHz High Frequency LCR Meter	G31
LCR-6250A	10 Hz ~ 50MHz High Frequency LCR Meter	G31
LCR-916	100Hz/1.02MHz/1MHz/2MHz Handheld LCR Meter	G31
LCR-913	100Hz/1.02MHz/1kHz/1MHz Handheld LCR Meter	G31
LCR-916	100Hz/1.02MHz/1kHz/1MHz/2MHz Handheld LCR Meter	G31

M

MSO-2064(A)	200MHz, 4+16Channel, Mixed-signal Oscilloscope	A21
MSO-2062(A)	200MHz, 2+16Channel, Mixed-signal Oscilloscope	A21
MSO-2034(A)	100MHz, 4+16Channel, Mixed-signal Oscilloscope	A21
MSO-2032(A)	100MHz, 2+16Channel, Mixed-signal Oscilloscope	A21
MSO-2014(A)	70MHz, 1+16Channel, Mixed-signal Oscilloscope	A21
MSO-2012(A)	70MHz, 2+16Channel, Mixed-signal Oscilloscope	A21
MOO-2364(C,D)	200MHz,4Channel,Digital Storage Oscilloscope,Spectrum Analyzer,Dual channel 20MHz AWG	A21
MOO-2362(C,D)	200MHz,2Channel,Digital Storage Oscilloscope,Spectrum Analyzer,Dual Channel 20MHz AWG	A21
MOO-2304(C,D)	100MHz,4Channel,Digital Storage Oscilloscope,Spectrum Analyzer,Dual Channel 20MHz AWG	A21
MOO-2302(C,D)	100MHz,2Channel,Digital Storage Oscilloscope,Spectrum Analyzer,Dual Channel 20MHz AWG	A21
MOO-2074(C,D)	70MHz,4Channel,Digital Storage Oscilloscope,Spectrum Analyzer,Dual Channel 20MHz AWG	A21
MOO-2072(C,D)	70MHz,2Channel,Digital Storage Oscilloscope,Spectrum Analyzer,Dual Channel 20MHz AWG	A21
MFG-2110	10MHz Single Channel Arbitrary Function Generator with Pulse Generator	C11
MFG-2120	20MHz Single Channel Arbitrary Function Generator with Pulse Generator	C11
MFG-2120A	20MHz Single Channel Arbitrary Function Generator with Pulse Generator,Modulation,Power Amplifier	C11
MFG-2130A	30MHz Single Channel Arbitrary Function Generator with Pulse Generator,Modulation	C11
MFG-2130AF	30MHz Single Channel Arbitrary Function Generator with Pulse Generator,Modulation,120MHz RF Signal Generator	C11
MFG-2230AH	30MHz Dual Channel Arbitrary Function Generator with Pulse Generator,Modulation	C11
MFG-2260H	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator,Modulation	C11
MFG-2260HFA	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator,Modulation,300MHz RF Signal Generator, Power	C11
MFG-2260HFH	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator, Power	C11
MFG-2230HH	30MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation	C11

A

PCS-001	Accessory – Rack Accessory Kit	E14
PCS-1000	High Precision Current Shunt Meter	E11

PE

PEL-001	Accessory – GPIB Card	D12
PEL-002	Accessory – Rack Mount Kit, PEL-2000 Series	D12
PEL-003	Accessory – Panel Cover	D12
PEL-004	Accessory – GPIB Card	D12
PEL-005	Accessory – Connect Cu Plate	D12
PEL-006	Accessory – Connect Cu Plate	D12
PEL-007	Accessory – Connect Cu Plate	D12
PEL-008	Accessory – Connect Cu Plate	D12
PEL-009	Accessory – Connect Cu Plate	D12
PEL-010	Accessory – Dust Filter	D12
PEL-011	Accessory – Load Input Terminal Cover	D12
PEL-012	Accessory – Terminal Fixings Kit	D12
PEL-013	Accessory – Flexible Terminal Cover	D12
PEL-014	Accessory – (1.5)1 Paralelism Plug	D12
PEL-015	Accessory – LAN Card	D12
PEL-016	Accessory – LAN Card	D12
PEL-017	Accessory – GPIB Card	D12
PEL-018	Accessory – RS-232 Card	D12
PEL-019	Accessory – LAN Card	D12
PEL-020	Accessory – USB Card	D12
PEL-021	Accessory – Hook Ring	D12
PEL-021-1-A	Accessory – Rack Mount Kit	D12
PEL-022	Accessory – HANDLE(L-U-shaped Handle(Front to the Bracket)	D12
PEL-023	Accessory – HANDLE(L-Rack Accessories	D12
PEL-030	Accessory – GPIB+RS-232 Card	D11
PEL-031	Accessory – Rack Mount Kit	D12
PEL-103-80-50	80V/50A/500W DC Electronic Load	D11
PEL-104-80-01	80V/1A/100W DC Electronic Load	D11
PEL-104-300-15	300V/15A/500W DC Electronic Load	D11
PEL-107-80-140	80V/140A/1120W DC Electronic Load	D11
PEL-107-300-60	300V/60A/1120W DC Electronic Load	D11
PEL-2004(B)	2-Slot Programmable D.C. Electronic Load Mainframe	D09
PEL-2004(B)	4-Slot Programmable D.C. Electronic Load Mainframe	D09
PEL-2026(B)	2026, Dual Channel D.C. Electronic Load Module, (1-80V, 30A, 300W) x 2	D09
PEL-2060(B)	2060, Dual Channel D.C. Electronic Load Module, (1-80V, 5A, 80W) & (1-80V, 40A, 320W)	D09
PEL-2060(B)	2060, Single Channel D.C. Electronic Load Module, (1-80V, 70A, 500W)	D09
PEL-2061(B)	2061, Single Channel D.C. Electronic Load Module, (1-150V, 35A, 500W)	D09
PEL-2001	150W Programmable D.C. Electronic Load	D07
PEL-2002	250W Programmable D.C. Electronic Load	D07
PEL-2003	350W Programmable D.C. Electronic Load	D07
PEL-2011	2-350W Booster Unit for PEL-2003 only	D07
PEL-2012	2-350W Programmable D.C. Electronic Load	D07
PEL-2022	2-250W Programmable D.C. Electronic Load	D07
PEL-2023	2-350W Programmable D.C. Electronic Load	D07
PEL-2024	4-250W Programmable D.C. Electronic Load	D07
PEL-2025	4-350W Programmable D.C. Electronic Load	D07
PEL-2035	350W Programmable D.C. Electronic Load	D07
PEL-2044	4-150W Programmable D.C. Electronic Load	D07
PEL-2054	4-250W Programmable D.C. Electronic Load	D07
PEL-2075(1)	1-750W Programmable D.C. Electronic Load	D07

PEL-3031	300W Programmable D.C. Electronic Load	047
PEL-3111	1000W Programmable D.C. Electronic Load	047
PEL-3111A	1100W Booster Unit for PEL-3111 only	047
PEL-3121	2100W Programmable D.C. Electronic Load	047
PEL-3200	3150W Programmable D.C. Electronic Load	048
PEL-3201	4.5KW Programmable D.C. Electronic Load	048
PEL-3211	4200W Programmable D.C. Electronic Load	048
PEL-3221	6300W Programmable D.C. Electronic Load	048
PEL-3231	9450W Programmable D.C. Electronic Load	048
PEL-3241	12600W Programmable D.C. Electronic Load	048
PEL-3611	150V/600A/3KW Programmable Single-channel D.C. Electronic Load	050
PEL-3622	300V/120A/3KW Programmable Single-channel D.C. Electronic Load	050
PEL-3606C1-60-600	150V/600A/3kW High Power DC Electronic Load	2050
PEL-3606C1-60-800	150V/800A/3kW High Power DC Electronic Load	2050
PEL-3606C1-150-300	150V/300A/6kW High Power DC Electronic Load	2050
PEL-3606C1-150-400	150V/400A/6kW High Power DC Electronic Load	2050
PEL-3606C1-150-1200	150V/1200A/18kW High Power DC Electronic Load	2050
PEL-3606C1-150-1600	150V/1600A/24kW High Power DC Electronic Load	2050
PEL-3606C1-600-150	600V/150A/6kW High Power DC Electronic Load	2050
PEL-3606C1-600-200	600V/200A/8kW High Power DC Electronic Load	2050
PEL-3606C1-600-300	600V/300A/18kW High Power DC Electronic Load	2050
PEL-3606C1-600-400	600V/400A/24kW High Power DC Electronic Load	2050
PEL-3606C2-600-300	600V/300A/18kW High Power DC Electronic Load	2050
PEL-3606C2-600-400	600V/400A/24kW High Power DC Electronic Load	2050
PEL-3606C2-600-600	600V/600A/36kW High Power DC Electronic Load	2050
PEL-3606C2-600-800	600V/800A/48kW High Power DC Electronic Load	2050
PEL-3606C2-600-1200	600V/1200A/72kW High Power DC Electronic Load	2050
PEL-3606C2-600-1600	600V/1600A/96kW High Power DC Electronic Load	2050
PEL-3606C2-600-2400	600V/2400A/144kW High Power DC Electronic Load	2050
PEL-3606C2-600-3200	600V/3200A/192kW High Power DC Electronic Load	2050
PEL-3606C2-1200-150	1200V/150A/18kW High Power DC Electronic Load	2050
PEL-3606C2-1200-200	1200V/200A/24kW High Power DC Electronic Load	2050
PEL-3606C2-1200-300	1200V/300A/36kW High Power DC Electronic Load	2050
PEL-3606C2-1200-400	1200V/400A/48kW High Power DC Electronic Load	2050
PEL-3606C2-1200-600	1200V/600A/72kW High Power DC Electronic Load	2050
PEL-3606C2-1200-800	1200V/800A/96kW High Power DC Electronic Load	2050
PEL-3606C2-1200-1200	1200V/1200A/144kW High Power DC Electronic Load	2050
PEL-3606C2-1200-1600	1200V/1600A/192kW High Power DC Electronic Load	2050
PEL-3606C2-1200-2400	1200V/2400A/288kW High Power DC Electronic Load	2050
PEL-3606C2-1200-3200	1200V/3200A/384kW High Power DC Electronic Load	2050

AC

PPSI-1020	Purifies, Multi-range D.C. Power Supply	039
PPSI-1035	Purifies, Multi-range D.C. Power Supply	039

PT

PPA-2500	600W, 3-Channel, Programmable Linear D.C. Power Supply	054
PPA-1500	450W Programmable High Precision Linear D.C. Power Supply	057
PPA-1502A	450W, 3Phase Programmable High Precision Linear D.C. Power	057
PPA-2502	450W, 3Phase Programmable High Precision Linear D.C. Power	057
PPA-2502A	450W, 3Phase Programmable High Precision Linear D.C. Power	057
PPT-1830	120W, 3-Channel, Programmable Linear D.C. Power Supply	056
PPT-3030	120W, 3-Channel, Programmable Linear D.C. Power Supply	056
PPA-1503	1.5KVA/2.0KW Programmable High-precision DC Power Supply	061
PPA-2003	2KVA/2.6KW Programmable High-precision DC Power Supply	061
PPA-2005	2KVA/3A,0-30KW Programmable High-precision DC Power Supply	061
PPA-3003	3KVA/3A,0.45KW Programmable High-precision DC Power Supply	061
PPA-3005	3KVA/3A,0.8KW Programmable High-precision DC Power Supply	061
PPA-15-H1	1.5KVA/3A,150W Programmable High-precision DC Power Supply	067
PPA-C	Accessory – GPIB Isolation(Factory Installed)	067

PT

PSA-001	Accessory – GPIB Card	033
PSA-003	Accessory – Parallel Connector-kit (for horizontal installation), (Do not include: PSA-007 Joint Kit,Horizontal bus bar x1, PSA-005 Kit)	033
PSA-004	Accessory – Parallel Connector-kit (for vertical installation) (Do not include:(PSA-007 Joint Kit,Vertical bus bar x1,PSA-005kit)	033
PSA-005	Accessory – Parallel Connector-Signal Cable	033
PSA-006	Accessory – Series Connection Signal Cable	033
PSA-007	Accessory – Joint Kit: Include 4 joining plates, (M4 Allen screw x4 ; M4 Allen screw x2	033
PSA-008	Accessory – RS232C Cable (PSA-008 Only)	032
PSA-121	Accessory – Cable for 2 units	027

PSA-122	Accessory – Cable for 4 units	027
PSA-123	Accessory – Cable for 4 units	027
PSA-124	Accessory – Cable for 2 units	027
PSA-141	Accessory – GPIB Card	027
PSA-150	Accessory – Rack Accessory Kit	027
PSB-1405	60V/40A/400W Programmable Multi-Range D.C. Power Supply	017
PSB-1405U	60V/40A/400W Programmable Multi-Range D.C. Power Supply	017
PSB-10005	60V/80A/800W Programmable Multi-Range D.C. Power Supply	017
PSB-10005U	60V/80A/800W Programmable Multi-Range D.C. Power Supply	017
PSB-10405	600W Multi-Range Programmable Switching D.C. Power Supply	023
PSB-10405U	600W Multi-Range, LCI Serial, Programmable Switching D.C. Power Supply	023
PSB-10605	600W Multi-Range Programmable Switching D.C. Power Supply	023
PSB-10805	800W Multi-Range Programmable Switching D.C. Power Supply	023
PSB-10805U	800W Dual (Booster) Unit For Current Extension Only	023
PSB-1205A	180W Programmable Switching D.C. Power Supply	026
PSB-1305A	360W Programmable Switching D.C. Power Supply	026
PSB-13005A	720W Programmable Switching D.C. Power Supply	026
PSB-13605A	1080W Programmable Switching D.C. Power Supply	026
PSM-2010	60W Programmable Multi-Range Linear D.C. Power Supply	022
PSM-2020	120W Programmable Multi-Range Linear D.C. Power Supply	022
PSM-2035	210W Programmable Multi-Range Linear D.C. Power Supply	022
PSP-601	60W Programmable Switching D.C. Power Supply	018
PSP-605	300W Programmable Switching D.C. Power Supply	018
PSP-605	300W Programmable Switching D.C. Power Supply	018
PSP-1005	500W Programmable Switching D.C. Power Supply	018
PSC-2605	150W Programmable Linear D.C. Power Supply	024
PSS-2330	90W Programmable Linear D.C. Power Supply	024
PST-3201	200W Triple Output Programmable D.C. Power Supply	020
PST-3202	110W Triple Output Programmable D.C. Power Supply	020
PSU-T3-150	150W Programmable Switching DC Power Supply	013
PSU-T3-300	330W Programmable Switching DC Power Supply	013
PSU-T3-600	1140W Programmable Switching DC Power Supply	013
PSU-T3-1200	2280W Programmable Switching DC Power Supply	013
PSU-T3-2400	4560W Programmable Switching DC Power Supply	013
PSU-T3-3600	6840W Programmable Switching DC Power Supply	013
PSU-001	Accessory – Front Panel Filler (Millimeter) (Installed)	013
PSU-001A	Accessory – Joins a Vertical Stack of 3 PSU-Units Together. (U-Joint Handles x2, Joining Plates x2	013
PSU-010	Accessory – Bus Bar for 2 units in Parallel Operation	013
PSU-011	Accessory – Cable for 2 units in Parallel Operation	013
PSU-013A	Accessory – Joins a Vertical Stack of 3 PSU-Units Together. (U-joint handles x2, Joining Plates x2	013
PSU-050	Accessory – Bus Bar for 2 units in Parallel Operation	013
PSU-051	Accessory – Cable for 3 units in Parallel Operation	013
PSU-053A	Accessory – Joins a Vertical Stack of 3 PSU-Units Together. (U-Joint Handles x2, Joining Plates x2	013
PSU-059	Accessory – Bus Bar for 4 units in Parallel Operation	013
PSU-061	Accessory – Cable for 4 units in Parallel Operation	013
PSA-151	Accessory – RS232 Cable with DB9 Extension x1	013
PSA-161	Accessory – RS485 Cable with DB9 Extension x1	013
PSA-GPIB	Accessory – PSU GPIB Interface Card (Factory Installed)	013
PSU-RSD-1	Accessory – Isolated Current Remote Control Card (Factory Installed)	013
PSU-VRC-F	Accessory – Isolated Voltage Remote Control Card (Factory Installed)	013
PSW160-30.4	1500W Multi-Range Programmable Switching D.C. Power Supply	09
PSW320-20.4	1500W Multi-Range Programmable Switching D.C. Power Supply	09
PSW360-12	1620W Multi-Range Programmable Switching D.C. Power Supply	09
PSW720-12.2	3060W Multi-Range Programmable Switching D.C. Power Supply	09
PSW720-63	3000W Multi-Range Programmable Switching D.C. Power Supply	09
PSW720-8	1200W Multi-Range Programmable Switching D.C. Power Supply	09
PSW80-108	1080W Multi-Range Programmable Switching D.C. Power Supply	09
PSW80-36	660W Multi-Range Programmable Switching D.C. Power Supply	09
PSW80-72	1320W Multi-Range Programmable Switching D.C. Power Supply	09
PSW40-27	1080W Multi-Range Programmable Switching D.C. Power Supply	09
PSW40-54	2160W Multi-Range Programmable Switching D.C. Power Supply	09
PSW40-72	2880W Multi-Range Programmable Switching D.C. Power Supply	09
PSW360-7.68	1474W Multi-Range Programmable Switching D.C. Power Supply	09
PSW360-15.68	2394W Multi-Range Programmable Switching D.C. Power Supply	09
PSW360-4.51	1080W Multi-Range Programmable Switching D.C. Power Supply	09
PSW80-13.5	1440W Multi-Range Programmable Switching D.C. Power Supply	09
PSW80-27	2880W Multi-Range Programmable Switching D.C. Power Supply	09
PSW80-40.5	4320W Multi-Range Programmable Switching D.C. Power Supply	09
PSB-001	Accessory – Accessory Kit	09
PSW-001	Accessory – Simple I2C Tool	09
PSW-002	Accessory – Current Removal Tool	09
PSW-004	Accessory – Rack Accessory Kit for 080/360/720V Models	09
PSW-005	Accessory – Series Operation Cable for 2 units(for 80V/360/720V)	09
PSW-006	Accessory – Parallel Operation Cable for 2 units	09
PSW-007	Accessory – Parallel Operation Cable for 3 units	09
PSW-008	Accessory – Rack Accessory Kit for 2U(for)080V Models	09
PSW-009	Accessory – Output Terminal Cover for 080/360/720V Models	09

Model Number Index

[illegible]	Accessory - Large Filter (Type II, III)	D9
[illegible]	Accessory - Output Terminal Cover for 150V/300V Models	D9
[illegible]	Accessory - High Voltage Output Terminal for 200V/800V Model	D9
DT		
[illegible]	Accessory - Temperature Probe, Approx. 1500mm	E11
EL		
[illegible]	Accessory - Return Loss Bridge, 50kHz ~ 1.2 Hz, Source/Load: N-(F), Coupling: 14dB/8dB	E21
FP		
[illegible]	14MHz DDS Function Generator	C29
[illegible]	5MHz Dual Display DDS Function Generator	C23
GP		
[illegible]	4-Port, 4-Channel, Programmable Switching & IF - Power Module	D31
[illegible]	600W Switching D.C. Power Supply	D31
[illegible]	600W Switching D.C. Power Supply	D31
[illegible]	600W Switching D.C. Power Supply	D31
[illegible]	600W Switching D.C. Power Supply	D31
[illegible]	600W Switching D.C. Power Supply	D31
GS		
[illegible]	300Khz ~ 1000MHz, USB RF Signal Generator	C11

NOTE

OSCILLOSCOPES

The frequency bandwidth ranges from 50MHz to the high class 600MHz. In addition, up to 5GSa/s realtime sampling rate and 200M points memory depth can pick up and hold the complete signal in order to preserve the accuracy. PC interfaces such as USB, LAN, GPIB, RS-232C, and Printer Port are integrated to the panel to satisfy data transmit/save needs.

The GDS-3000A Series is the flagship product of GW Instek's digital storage oscilloscope. Its highest frequency bandwidth has been elevated to 450MHz, and the 350MHz model is also available. The memory depth of each channel is up to 200Mpts. The sampling rate is 5GSa/s interleaved. The display is 10.2" TFT LCD and the RGB display output is 8bits each, allowing users to clearly analyze the strength distribution of the measured signal.

The MSO-2000E Series is a mixed-signal oscilloscope, which offers dual analog channels/16 digital channels or 4 analog channels/16 digital channels. MSO-2000E has a built-in 16-channel logic analyzer and MSO-2000EA has a built-in 16-channel logic analyzer and a dual channel 25MHz arbitrary function generator. The MDO-2000A series is multifunctional mixed domain oscilloscope. While entering the spectrum mode, MDO-2000A Series will display a full screen of frequency domain. Users can input Center frequency, Span, Start frequency, and Stop frequency based upon test requirements so as to rapidly and intuitively observe required frequency range that allows users to experience the user interface of a real spectrum analyzer. MSO-2000EA, MDO-2000AE and MDO-2000E also provide frequency response analysis function, it allows users to obtain DUT's FRA characteristic curve plot (Bode plot).

PRODUCTS

- **Digital Storage Oscilloscope**
- **Mixed-signal Oscilloscope**
- **Mixed-domain Oscilloscope**
- **Handheld Digital Storage Oscilloscope**
- **Oscilloscope Education and Training Kit**

OSCILLOSCOPE OVERVIEW

Oscilloscopes are considered the most widely used instruments in the Electrical T&M field. With an Oscilloscope, it is possible to understand how an electrical signal changes over a time period graphically. In every electric application, from electronics laboratories, electronics R&D, product development, manufacturing QA, to After-Sales Service, there is a need for waveform representation by an Oscilloscope.

With the rapid advancement of technology, the oscilloscope market has also been shifting from conventional analog oscilloscopes, which displays the electronic waveforms through a CRT, towards Digital Storage Oscilloscopes (DSO). The major function of a DSO not only converts signals from analog to digital, but also stores testing data, allowing remote control and transmitting data through various interfaces. In spite of the strengths of DSOs, analog oscilloscopes still play an important role of providing real-time signal and waveform display.

There has been a growing need for detecting digital signals which are usually presented by 2 discrete voltage levels, a distinction from analog signals presented by continuous voltages. A logic analyzer is better suited for such digital signal measurements compared with an oscilloscope. A logic analyzer also has the benefit of multiple channel input measurements, which is usually limited to 2 or 4 channels in oscilloscopes.

To satisfy various needs of waveform observation in time domain, GW Instek provides an entire series of oscilloscope solutions, consisting of three groups: Digital Storage Oscilloscopes, Analog Oscilloscopes and Real Time/Digital Storage Oscilloscopes.

Bandwidth / Model	Type	100MHz	150MHz	200MHz	350MHz	500MHz	600MHz	1GHz	1.5GHz	2GHz	2.5GHz	Page
GDS-1000A Series	Digital	✓		✓								A9-10
GDS-2000 Series	Digital		✓									A11-12
GDS-2000A Series	Digital				✓		✓		✓	✓		A13-14
MSO-2000E Series	Digital						✓		✓	✓		A15-16
MDO-2000A Series	Digital				✓		✓		✓			A17-18
MDO-2000E Series	Digital						✓		✓	✓		A17-18
GDS-3000 Series	Digital						✓		✓	✓		A11-12
GDS-900/DR Series	Digital						✓		✓	✓		A15-16
GDS-1000 Series	Digital						✓		✓	✓	✓	A15-16

Model	Compatible Oscilloscopes	Page
GDB-03	GDS-1000A/GDS-2000E/GDS-2000A/GDS-2000E/MDO-2000E/GDS-3000 Series	A41

VPO TECHNOLOGY

When using a DSO to measure serial communication signals, address/data/control buses on digital circuits, noise on signal components, composite video signals or modulated signals, the biggest challenge is that these signals have random, rapidly changing, accidental components or have components with non-periodic characteristics. Therefore it is necessary for a DSO to reduce the acquisition processing time (Dead time) to have the opportunity to capture these signal characteristics.

DSOs equipped with VPO (Visual Persistence Oscilloscope)technology uses a high-density IC for hardware acceleration to counter all the acquired data into the displayed waveform image. Figure A shows the compression and quantification of waveform data. GDS-3000 has a waveform display region of 150 frames in width, while the record length is 256 data long. The hardware circuit cuts the waveform data into a number of data frames. The data in each data frame is passed through a count array and then written into a three-dimensional memory array. When all the frames have been quantized, a virtual 3D structure is created, shown in Figure B. The value in the memory array designates the approximate frequency of signal points constructing a waveform.

In Figure A, a count array consists of 256 computing units. Each unit is made of several comparators and counters. When 8-bit data passes through Acquire Memory, and then reaches counter array, comparators select corresponding counter that follows an increment in its value then. After some amount of data is processed, part of input waveform is statistically calculated by counter array.

This process holds only for hundreds of micro seconds even if the calculation implemented by hardware architecture repeats for 150 times. The GDS-3000 Series uses such parallel processing structures to shorten the dead time. Take 4 channel GDS-3000 as an example. It has 1024 counter arrays to simultaneously process input waveform data.

In general it takes approximately 16ms for the LCD panel to read data sequentially from the 3D memory array, display the data on the screen, and to update the counter array. Obviously, if the count array doesn't do any processing and only writes (overwrites) the existing information, the 3D memory array will have changed several times during an LCD update and results in users not seeing these changes. Therefore a mechanism called an Aging timer, as shown in the figure, has been added to the VPO circuit to simulate the persisting and aging property of traditional CRTs. The Aging timer will operate with value in 3D memory array when count array is writing and result in only partial value of the value in the 3D memory array been changed. For example, if the count array is not 0 in value, the 3D memory array will gradually increase in value. On the contrary, if the count array is 0 in value, the 3D memory array will gradually decrease in value until it reaches to 0. In this way the latest waveform data can be updated while the previous waveform can be retained for some time, from 100ms up to several seconds. As a result, we can say that the 3D structure of the memory array is dynamic. Users can change this feature by adjusting the Persist time. The time for the circuit to process this data is too short to be detected by the eyes and the overall effect is that the entire screen is aging all together at the same time.

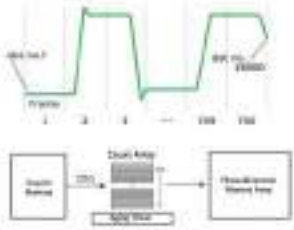


Figure A. The compression and quantization of waveform data

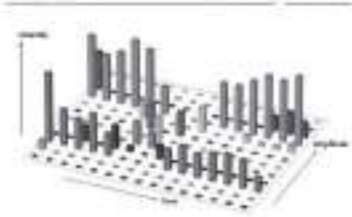


Figure B. Structure of 3D waveform data array

MEMORY DEPTH

Three major factors, including bandwidth, sample rate and memory depth, can dictate the selection of a digital oscilloscope. The number of samples an oscilloscope can store is defined as memory depth. Memory depth can be calculated by Record duration divided by Sample period as shown in the formula below. As indicated, memory depth has a positive relationship with the sampling rate. In other words, waveforms can be recorded over a long period of time when stored in a larger memory depth.

Total Waveform Points Sampled = Record Duration /Sample Period=Record Duration X Sampling Rate
If Total Waveform Points Sampled > DSO Memory Depth, all excessive points sampled need to be abandoned and the effective sampling rate is forced to slow down
Memory Depth= Record Duration X Effective Sampling Rate
Effective Sampling Rate = Memory Depth/ Record Duration
When Record Duration is long, Larger DSO Memory Depth means Faster Effective Sampling Rate

*Sample period is 1/sample rate **Record duration = Time Base X 10 div

DIGITAL STORAGE OSCILLOSCOPES

For relatively slow and repetitive signals, memory depth should be the primary consideration rather than sampling rate. The biggest shortcoming of short memory depth is Aliasing due to the lack of sample rate. Oscilloscope's sample rate should be 2x higher than DUT's frequency in order to restore the original waveforms. The following example is done by providing 1KHz/1V sine wave to TEK TDS2B-EDU(2.5k memory depth) and GDS-1102B (10Mb/ch memory depth)via a GW Instek AFG-3021 function generator.

For TEK TDS2B-EDU under 250ms/div, its 1kSa/s sample rate cannot satisfy the Nyquist theory. Sample rate should be at least 2x higher than input frequency. As a result, TEK TDS2B-EDU produced Aliasing.

For GDS-1102B under 200ms/div, its 5MSa/s can satisfy the requirement of sample rate which is 2x higher than input frequency. As a result, GDS-1102B revealed genuine waveforms without Aliasing.

Aliasing due to the insufficient sample rate

After pressing pause and zooming in, signal is obviously distorted

Waveforms entered roll mode under 500ms/div

After pressing pause and zooming in, signal is restore without distortion

DIGITAL STORAGE OSCILLOSCOPE SELECTION GUIDE

Series	GDS-2000A	GDS-1000	GDS-2000	MDO-2000E	MSO-2000	MDO-2000E	GDS-2000E	GDS-1000B
Bandwidth	300/200MHz	100MHz	300/200/100/70/50MHz	200/100/70/50MHz	200/100/70/50MHz	200/100/70/50MHz	300/200/100/70/50MHz	200/100/70/50MHz
Display	8" TFT LCD WVGA	8" TFT LCD WVGA	8" TFT LCD WVGA	8" TFT LCD WVGA	8" TFT LCD WVGA	8" TFT LCD WVGA	8" TFT LCD WVGA	7" TFT LCD WVGA
VPO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Memory Depth	20Mpts/ch	2Mpts/ch	2M	10Mpts/ch	20Mpts/ch	10Mpts/ch	10Mpts/ch	10Mpts/ch
Real Time Sampling Rate	1GSa/s	1GSa/s	1GSa/s	1GSa/s	1GSa/s	1GSa/s	1GSa/s	1GSa/s
Channel	2 or 4	2 or 4	2 or 4	2 or 4	2	2 or 4	2 or 4	2 or 4 模
Input Impedance	1MΩ/16pF	1MΩ/15pF/50Ω	1MΩ (Bandwidth limit is option)	1MΩ (Bandwidth is option)	1MΩ (Bandwidth is option)	1MΩ (Bandwidth is option)	1MΩ (Bandwidth is option)	1MΩ (Bandwidth is option)
Vertical Resolution	8 bits 1mV~10V/div (@1MΩ) 1mV~1V/div (@50Ω)	8 bits 1mV~10V/div (@1MΩ) 1mV~1V/div 1V/div (@50Ω)	8 bits 1mV~10V/div	8 bits 1mV~10V/div	8 bits 1mV~10V/div	8 bits 1mV~10V/div	8 bits 1mV~10V/div	8 bits 1mV~10V/div
Time Base Range	1ns~1000s/div	1ns~100s/div	1ns~100s/div	1ns~100s/div	1ns~100s/div	1ns~100s/div	1ns~100s/div	1ns~100s/div
Auto Measurement	29	38	36	38	38	38	38	38
Go-NG	Yes	-	-	Yes	Yes	Yes	Yes	Yes
Split Screen	-	Yes	-	-	-	-	-	-
Auto Range	-	Yes	-	-	-	-	-	-
Power Analysis	Optional	Yes	-	-	-	-	-	-
Serial Bus Decode	Yes (I²C,SPI,UART, CAN,LIN)	Optional (I²C,SPI,UART)	Yes (I²C,SPI,UART, CAN,LIN)	Yes (I²C,SPI,UART, CAN,LIN)	Yes (I²C,SPI,UART, CAN,LIN)	Yes (I²C,SPI,UART, CAN,LIN)	Yes (I²C,SPI,UART, CAN,LIN)	-
Waveform Search	Yes	-	Yes	-	Yes	Yes	-	-
Segmented Memory	Yes	-	Yes	-	Yes	Yes	-	-
Logic Analyzer	Optional MSO	-	Optional 8-ch 16 CH	Standard MSO	-	-	-	-
Arbitrary Waveform Generator	Standard (models dual Channel 25MHz)	-	Optional 5-in (models	Standard (models dual channel 25MHz)	Standard (models dual channel 25MHz)	Standard (models dual channel 25MHz)	-	-
Interface	USB host/device; LAN,GPIB,CAN bus(opt.); RS232,DVI,VGA; BNC, GPIB (optional)	USB host/device; LAN,SVGA output; RS232,VGA; BNC GPIB (optional)	USB host/device; LAN,GPIB,CAN bus(opt.); RS232,VGA; BNC GPIB (optional)	USB host/device; LAN,GPIB,CAN bus; BNC	USB host/device; LAN,GPIB,CAN bus; BNC	USB host/device; LAN,GPIB,CAN bus; BNC	USB host/device; LAN,GPIB,CAN bus; BNC	USB host/device; LAN,GPIB,CAN bus; BNC 4GB model only Wi-Fi model
Page	A5-10	A11-13	A13-14	A17-20	A21-26	A27-30	A31-32	A33-48

* 100/70/50 MHz 2CH
150/70/50 MHz 4CH

650/350 MHz Digital Storage Oscilloscope

GDS-3000A Series (650/350 MHz)

NEW

FEATURES

- 616/350MHz Bandwidth, 2 or 4 Input Channels
- 5GSa/s Real-time Sampling Rate(half channels) 2.5GSa/s Real-time Sampling Rate(all channels)
- Per Channel 200Mpts Memory Depth
- 200,000 wfm/s of Waveform Update Rate
- 10.1 inch 800 x 480 TFT LCD Display
- 400,000 Segments of Segmented Memory and the Waveform Search Function to Optimize the Efficiency of Record Length
- Zoom Window and Play/Pause Rapidly Navigate the Waveforms
- 38 sets of Automatic Measurement Offer Various Measurement Selections
- High resolution acquisition mode
- I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- Dual-Channel Spectrum Analyzer (DC~2.5GHz) with spectrogram
- Dual-Channel 25MHz Arbitrary Waveform Generator
- Optional 11 Sets of Power Analysis Measurements
- Optional 16 Digital Channels with a Logic Analyzer(MSO)
- Flexible Remote Control Connectivity (Standard: USB/LAN/RS 232; Option: GPIB)

GDS-3000A digital storage oscilloscope have (350MHz and 150MHz) models with two channel, four channel and 16 channel logic analyzer options. The series features the memory length of each channel up to 200Mpts; the sampling rate of 5GSa/s half channels and 2.5GSa/s on all channels. Its display is 10.1" TFT LCD and it provides the color display mode.

Accurate Signal Acquisition and Analysis

GDS-3000A strengthens many functions and specifications required for oscilloscope measurements including the memory depth of up to 200Mpts per channel. The advantage of long memory is that it allows users to maintain high sampling rate even at low speed time settings; the waveform update rate is up to 200,000wfm/s, and the segmented memory can capture and analyze up to 400,000 segments. For measurement, GDS-3000A incorporates the Fine scale function to allows users to fine tune the vertical scale according to the requirements so as to achieve full scale measurement to improve to measurement accuracy. With a 10.1" large screen display and the acquisition method with the high resolution mode allow low noise signals under high bandwidth measurements.

In addition, the series is equipped with 1M ohm and 50 ohm input impedance selection, which can be set according to different DUT measurement requirements to achieve the effect of impedance matching. The search function can quickly find the signals that meet the conditions according to the needs of the test. The cursor mark function allows users to easily observe the voltage (or current), time and difference of each point measured by the cursor. Via the intuitive function, the measured range is to be shown on the specific section of the waveform.

Dual Domain Measurement

For frequency domain measurement, it is equipped with a dual channel spectrum analyzer, which allows users to measure and analyze the frequency domain signals of two channels at the same time. It is also equipped with Spectrogram function, which allows users to easily observe complex frequency domain fluctuations that are proportionally decomposed into simple superimposed waves so as to understand the signal strength distribution. The roll keys also allow to have more intuitive settings for operation, which can improve the measurement efficiency.

10 Sets of Switching Mode Power Supply Measurements

GDS-3000A provides a rich measurement items for switch mode power supply testing. The provided power supply test items include AC input analysis items: Power Quality, Harmonics, Inrush Current, DC output analysis required test items: Ripple/Noise, Transient Response Analysis, Turn On/Off, Efficiency, Control Loop response(Bode) and PSRR (Power Supply Rejection Ratio). Complete switching components analysis items: Modulation, Switching loss, SOA (Safe Operation Area) and Magnetic analysis. In all cases, On one side of GDS-3000A, a power supply for 50MHz (GCP-1102) and 100MHz (GCP-1104) current probes is provided. This feature can save users the cost of purchasing the power supply for current probes and also the hassle of carrying the power supply when going out. GDS-3000A is standardly equipped with a dual-channel 25MHz arbitrary waveform generator and frequency response analysis functions. The FRA has the load function, which can load multiple FRA measurement results for comparisons. User define shortcut key provides user preferable shortcut keys. The use of the shortcut key can improve measurement efficiency. GDS-3000A provides a rich communication interfaces. In addition to the commonly used USB Host, USB Device port, and LAN port, it also includes a highly stable RS232 interface and an optional GPIB interface.

SPECIFICATIONS

	GDS-3352A	GDS-3154A	GDS-3032A	GDS-3054A
VERTICAL				
Channels	2CH+EXT	4CH+EXT	2CH+EXT	4CH+EXT
Bandwidth	DC~350MHz (-3dB@DC50Ω 1MΩ input impedance)		DC~300MHz (-3dB@DC50Ω 1MΩ input impedance)	
Calculated Rise Time	1ns		1.17ns	
Bandwidth Limit	20MHz (-3dB@DC50Ω)		20MHz (-3dB@DC50Ω)	
Vertical Resolution	8 bits (Max. 10 bits with HR Mode)		1. Resolution of bandwidth limit is 8 bits.	
Vertical Sensitivity(V/div)	1mV/div ~ 10V/div		2. The resolution is 10 bits in HR mode.	
Vertical Resolution(Bits)	8 bits			
Input Coupling	AC, DC, GND			
Input Impedance	1MΩ±1%@ 14pF (typical)			
DC Gain Accuracy	1mV/div ~ 10V/div (full scale): ±3% (±4% full scale)			
Polarity	Normal, Invert			
Maximum Input Voltage(1MΩ)	300Vrms, CAT II			
Maximum Input Voltage(50Ω)	5 Vrms			
Offset Position Range	For 1MΩ input impedance: 1mV/div ~ 99mV/div: ±1.99V; 100mV/div ~ 10V/div: ±100V; For 50Ω input impedance: 1mV/div ~ 99mV/div: ±1.99V; 100mV/div ~ 1V/div: ±10V			
Waveform Signal Process	Hi-Res, Average, Envelope, Roll, XY, Zoom (magnification: by X/Y individually), Persistence (Time: 1sec, 2sec, 5sec, 10sec, 20sec, Infinite), Measurement, Histogram, Color Palette (Temperature, Spectrum, Normal, Monochrome)			
TRIGGER				
Source	CH1, CH2, CH3, CH4, Line, EXT, EXT/5, AC Line			
Trigger Mode	Auto, Normal, Single			
Trigger Type	Edge, Pulse, Video, Slope, Data to Clock, Runt, Window, Interval, Dropout, Pattern, State, Serial Bus (I²C, SPI, UART/RS232, CAN, LIN)			
Trigger Holdoff Range	100ns ~ 10s			
Coupling	AC, DC, LF rej., HF rej., Noise rej.			
Sensitivity	1div			
EXT TRIGGER				
Range	±8V			
Sensitivity	DC ~ 100MHz: 200mVpp; 100MHz ~ 300MHz: 400mVpp			
Input Impedance	1MΩ±2% ~ 15pF			
INTERPOLATION				
Range	1ns/div ~ 100ns/div (1, 2, 4 interleaving); 50ns/div ~ 100ns/div ~ 100ns/div			
Interpolation	Sin(x)/x			
Point Count	10,000 points (sin(x)/x interpolation between points)			
Accuracy	±(peak value×1%+0.4div) (normal or envelope)			
A/V MARKER				
A and B Point Marker	Time, Voltage, 1/Time (Frequency), Time at Voltage, Voltage at Time, Slew Rate			
Phase Shift	±180° at 100kHz			
SIGNAL ACQUISITION				
Real Time Sample Rate	5GSa/s (half channels), 2.5GSa/s (all channels)			
Record Length	10 to 200Mpts			
Acquisition Mode	Normal, Average, Peak detect, High resolution, Single			
Number of Segments	Average, Envelope: from 2 ~ 256; Peak detect: 65536			
	1 ~ 400,000 segments			
CURSORS AND MEASUREMENT				
Cursors	Amplitude, Time, Combined (Δ Time and 1/Δ Time), Histogram, Waveform			
Automatic Measurement	38 sets, with Indicators: Mean, Max, Min, Amplitude, Area, Cycle Mean, Cycle Max, RMS, Cycle RMS, Area, Cycle Area, Max Mean, Min Mean, Peak Mean, Measurement Mean, Measurement RMS, Measurement Area, Overshoot, Preshoot, Rise Time, Fall Time, +Width, -Width, Duty, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, Frequency, Period, Delay, Phase, FRR, FFR, FFF, LRR, LRF, LFR, LFF, Phase			
Cursor Measurement	Voltage, Time, Δ Time, Δ Voltage, 1/Δ Time (Frequency), Δ Voltage at Δ Time, Slew Rate			
Auto Counter	6 digits, range from 0Hz to the bandwidth limit			
CONTROL PANEL FUNCTION				
Autoset	Single button, automatic setup of all channels for optimal, horizontal and trigger settings, with "Undo Autoset", "Fit Screen", "AC Priority" mode, and "Fine Scale" functions			
Save Setup	20 sets			
Save Waveform	20 sets			
Save Reference Waveform	4 sets			
POWER MEASUREMENTS (Option)				
	Power Quality, Harmonics, Ripple, Inrush current, Switching Loss, Modulation, SOA, Transient, Efficiency, & Control Loop Response (FRA), Turn On/Off			

SPECIFICATIONS

	GDS-3352A	GDS-3354A	GDS-3652A	GDS-3654A
ANY)				
Channels	2			
Sample Rate	500 MSa/s			
Vertical Resolution	11 bits			
Max. Frequency	25 MHz			
Waveforms	Dot, Square, Rectangular, Sin, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac			
Output Range	10 mVpp to 5 Vpp, High-Z; 5 mVpp to 2.5 Vpp, 50Ω			
Output Amplitude	1pVp			
Output Accuracy	1% (1 kHz)			
Offset Range	±2.5 V (into High-Z); ±1.25 V (into 50Ω)			
Offset Resolution	1mV			
Misc	Frequency Range (Sine): 20 mHz–[Nominal value up to 1kHz] (+0.1dB) (Typ.), [1dB (25kHz), (1.5kHz)]; Harmonic Distortion: -45 dBc (Sine)(for Nominal Up to 10 MHz Rated Bandwidth or TYP.); (25MHz to 50 MHz); Frequency Range (Square): 1 mHz – [Nominal value] Hz; Duty/Pulse Width: 20ns – 999ns; Rise/Fall Time: 8 ns – 999 ns; Overshoot: < 2%; Jitter (RMS): 1 ns + 1ppm of period; Frequency Range (Ramp): 1 mHz – [Nominal value] Hz; Symmetry: 0 – 100%			
Sweep/Pulse				
Noise				
SPECTRUM ANALYZER				
Frequency Range	DC – 1 MHz (-3 dB, Attenuated with input range set to 100mV/div or lower); DC – [Nominal value] MHz (-3 dB, Attenuated with input range set to 100mV/div or lower)			
Span	Frequency which controls analog from mid bandwidth (1 screen/second)			
Resolution Bandwidth	50Ω – 1 MΩ (Auto)			
Reference Level	1 Hz – 1.5 MHz (Auto)			
Vertical Scale	-80 dBm to +40 dBm in steps of 5dBm			
Vertical Units	1dB/ 2dB/ 5 dB/ 10 dB/ Auto			
Vertical Position	1 Div to +1 Div			
Vertical Scale	1dB/div to 20dB/div in a 1-2-5 Sequence			
Display Average Measured	Peak to Average; Peak; Avg; Min; 10dB/div to +40dBm; Avg; Hz; 1kHz/div to +80dBm; Avg; Hz			
Spurious Response	2nd Harmonic distortion (Radio - 1st harmonic distortion; 60dBc)			
Frequency Points Per Span	Normal; Slow; Med; Fast; Auto; Average (2 – 128)			
Measure Methods	Marker; Center; Peak; Average			
FFT Windows	FFT Points: Hamming; Log; Flat-top; Low-side; Hamming; Hi-Res; Blackman; Hi-Res			
LOGIC ANALYZER (option)				
Sample Rate	Per Channel 1 GSa/s			
Bandwidth	400 MHz			
Record Length	Per Channel 10M bit (max)			
Input Channels	16 Digital (D15 - D0)			
Trigger Type	Edge, Pattern, Pulse Width, Setup/Hold, I²C, SPI, UART/ LIN, CAN, Parallel Bus			
Thresholds Quad	D0, D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15			
Threshold Selections	TTL, CMOS, ECL, PECL, 5V, PECL3V, User Defined			
User Defined Threshold Range	±5V			
Maximum Input Voltage	±40 V			
Minimum Voltage Swing	200 mV			
Vertical Resolution	1 bit			
FREQUENCY RESPONSE ANALYSIS				
Frequency Range	10 Hz – 25 MHz			
Input and Output Sources	Channel 1 – 2 for 2CH models; Channel 1 – 4 for 4CH models			
Resolution of Test Points	10 / 5 / 2 / 1 (Default) per decade selectable for Applitude (+dB) / With points selectable for Base scale			
Dynamic Range	> 60 dB (typical)			
Test Amplitude	Voltage (1 mVpp ~ 10 Vpp, 20mVpp ~ 20Vpp) or Power (-70 dBm ~ +30 dBm)			
Test Results	Bode Plot(s): in Nyquist coordinate gain and phase plot, magnitude vs. frequency plot for cross comparisons. Test results saved in csv format for offline analysis			
Manual Measurements	Floating gain and phase markers			
Pass Testing	Auto-limit during test			
DISPLAY SYSTEM				
TFT LCD Type	10.1" TFT LCD (XVGA color display)			
Waveform Update Rate	100,000 waveforms/ sec			
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)			
Intensity	8 Levels			
Waveform Display	Dots, Vectors, Variable persistence (Short, Mid, Infinite persistence) and color waveforms			
Display Gratings	8 x 10 divisions			
Display Mode	YT/XY			
INTERFACE				
RS-232C	USB B type, supported			
USB Port	USB 2.0 high-speed host ports x 1 / USB high-speed 2.0 device ports x 1			
Ethernet Port	10/100 Mbps, IEEE 802.3 cable, HP Auto-MDIX			
Web Video Port	DB-15 female connector, monitor output, for display on VGA monitor			
Optional GPIB Module	Fully programmable with IEEE 488.2 compliance			
CompactFlash	For future firmware update or service			
Kensington Style Lock	Prevent unauthorized removal of device for standard Kensington style lock			
Power Supply Receptacle	100V-240V AC (+/-10%) (50Hz ~ 60Hz) AC Input Voltage			
MISCELLANEOUS				
Operating	0° – 40°C, Relative Humidity ≤ 80% at 40°C or below; ≤ 45% at 40°C – 50°C			
Line Voltage Range	AC 100V – 240V, 50Hz – 60Hz, auto selection, power consumption < 100W			
Multi-Language Menu	Available			
On-Line Help	Available			
Clock	Time and date, provide the date/time for saved data			
Internal Flash Disk	8GB (Up to 32GB) (not for user data)			
Installed APP	Software Kit (for Data Log, Signal Gen, Advanced Measure Analysis, Mask, Mouse Remote, Dual Views)			
Hard Reset Key	Hardware reset key of the rear panel (Pressed and hold for 5 seconds to reset the unit)			
DIMENSIONS & WEIGHT				
330(W) x 143(H) x 111(D) mm, Approx. 3.4 kg				

Note: *Specifications subject to change without notice.*

ORDERING INFORMATION

GDS-3652A	600MHz, 2-Channel, Digital Storage Oscilloscope
GDS-3654A	600MHz, 4-Channel, Digital Storage Oscilloscope
GDS-3352A	350MHz, 2-Channel, Digital Storage Oscilloscope
GDS-3354A	350MHz, 4-Channel, Digital Storage Oscilloscope

ACCESSORIES

Power cord x 1, Probes: 100:1 x 1

GTP-150A-2 150MHz 10:1 passive probe for GDS-3352A/3354A/3652A/3654A (per channel)

GTP-070A-2 70MHz 10:1 passive probe for GDS-3352A/3354A (per channel)

Option

GDS-PWR Power Analysis Software GDS-DVM DVM Module GDS-LOA 16 Channel Logic Analyzer

Optional Accessories

GTP-035A	35MHz 10:1 Passive probe	GCP-1030	30A/ 50 MHz Current probe
GTP-070A	70MHz 10:1 Passive probe	GTC-040	GPIB Cable, Double Shielded, 400mm
GDP-025	25MHz High-voltage differential probe	GTL-110	Test lead, 50Ω, to BNC connector
GDP-050	50MHz High-voltage differential probe	GTL-232	RS-232C Cable, 9-pin female to 9-pin female, Null modem, for computer
GDP-100	100MHz High-voltage differential probe	GTL-246	USB 2.0 Cable, A-B type Cable (6' 1800mm)
GCP-030	30A/ 1MHz/ DC Current probe	91SR-443-E	Rack Adapter Panel
GCP-045	50A/ 1MHz/ DC Current probe	GKT-100	Deskew Fixture
GCP-1000	1kA/ 1MHz/ DC Current probe		

Free Download

PC Software Open Style software Drivers LabView driver

Rear Panel

DS3A-16LA 16 Channel Logic Analyzer

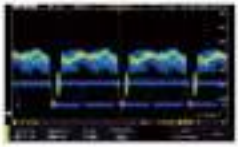
GRA-443-E Rack Adapter Panel

Rack Mounting (19", 4U)

GKT-100 Deskew Fixture

650/350 MHz Digital Storage Oscilloscope

A 10.2 INCH, 8 BITS RGB COLOR GRADIENT DISPLAY



With respect to the waveform display technology, the GDS-3000A series oscilloscope is capable of displaying RGB color gradients with 8 bits each which can delineate the profound gradational fluctuations, as if it can recreate the analog oscilloscope display capability. When a composite signal is input, the GDS-3000A series, has the ability to precisely reveal the colored burst signal and to show details of layers with the brightness. Hence, the dull monochrome waveform is imbued with vitality, it allows users to easily determine and analyze waveforms.

B 20M MEMORY DEPTH PER CHANNEL INDEPENDENTLY

The GDS-3000A series oscilloscope has a powerful and incomparable memory depth for the data retrieving. 20M memory depth per channel independently surpasses the specification of the industry's 3000 series DSO boundary. 20M memory depth allows users to easily seize the waveform detail while conducting fundamental measurement applications.

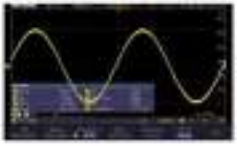
C FINE SCALE

The fine scale function is incorporated to allow users to fine tune the vertical scale according to their needs to achieve full scale measurement and improve the accuracy of the voltage or current measurement.

D HIGH RESOLUTION ACQUISITION MODE

The acquisition method with high resolution mode is provided to effectively remove noise and improve the accuracy of automatic measurement.

E 38 ITEMS OF AUTO MEASUREMENT SELECTION AND THE STATISTICS FUNCTION



The GDS-3000A series soundly provides 38 measurement items. Based upon the parameters such as voltage, current, time, frequency, and delay measurement, users can decide which measurement items to choose. On the single display screen, the GDS-3000A series provides 8 measurement selections.

The statistics mode can also be selected for users to analyze the mean value, the maximum, the minimum, and standard deviation of the retrieved waveforms to ensure signal's integrity and identify abnormal waveforms.

Users can also use the Measure Shortcuts function to select the item to be measured, and then store the selected item in Shortcut 1~4, which can be selected to conduct measurements for the same product next time. Users just select the previously stored Shortcut 1~4 without making new selections from Add measurement, and all the measurement items will be displayed on the screen to improve the measurement efficiency.

F 490,000 SEGMENTED MEMORY

In addition, GDS-3000A incorporates the Mask determination function under Segment, allowing users to quickly analyze abnormal waveforms that exceed the target range.

As the length of the sampling memory increases to 200Mpts, the number of acquisitions that can be set in the GDS-3000A's segmented memory at one time has also increased significantly, and up to 490,000 waveforms can be stored continuously (under the condition of the memory length of 1,000pts).

The segmented memory allows users to capture and observe interesting waveforms. Through the statistical function, it is especially helpful for finding sporadic problems in continuous events.

G WAVEFORM SEARCH FUNCTION

Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, hollow inverted triangles will show the location that the trigger condition. The upper left hand corner Overall will show the total number of waveforms that the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and Bus.

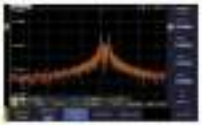
When the trigger condition is met, hollow inverted triangles will appear. Users can save all marks to compare with the next input signal. The front panel of the GDS-3000A Series controls waveform zoom out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save marks for rapid comparison and analysis.

H USER DEFINE KEY

GDS-3000A incorporates a User Define key to allow users to set any one of the ten functions of User Define based upon the measurement requirement, including XY/YT; Reset all positions to 0; Measure all On/Off; Measure statistics On/Off; Segments On/Off; AWG output On/Off; Auto/Normal; Clear persistence; Freeze display and transparent readouts On/Off.

Users can quickly select the function setting by just pressing a key to quickly meet the measurement needs so as to improve the measurement efficiency.

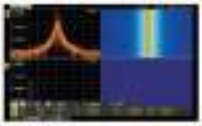
I SPECTRUM ANALYZER FUNCTION



Spectrum Analyzer

Spectrum Analyzer + Spectrogram

Dual Spectrum Analyzer



Dual Spectrum Analyzer + Spectrogram

For frequency domain measurement, dual channel spectrum analyzer is equipped. Users can measure and analyze dual channel frequency domain signals at the same time. It also includes the Spectrogram function, which allows users to easily observe the signal's strength distribution and the relationship of the spectrum distribution over time. The independent numeric key input on the panel makes the operation more convenient for users, thereby improving the measurement efficiency. For promotion selling point, dual Spectrum Analyzer and Spectrogram can test the frequency response of the left and right channels of the Audio Amplifier at the same time.

The above displays are :

1. Spectrum Analyzer
2. Spectrum Analyzer + Spectrogram
3. Dual Spectrum Analyzer
   (Dual channels can set different conditions)
4. Dual Spectrum Analyzer + Spectrogram

J 25MHZ DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR

* The above two displays are load from CH1, and then it was generated by AWG to CH2

GDS-3008A is standardly equipped with a 25MHz dual channel arbitrary waveform generator, and provides built-in Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussi, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac and other waveforms. Users can be directly input the amplitude and frequency of the signal through the numeric keys. Compared with the previous model, the new function is that users can select the arbitrary waveform function of the AWG to store the signal measured by the analog channel of the oscilloscope to the arbitrary waveform of the signal source (UAW file), or it can directly output the signal from the signal generator, which is a new function that allows users to conveniently generate various measured signals to carry out diversified signal outputs.

K PC REMOTE CONTROL (WEB SERVER FUNCTION)

GDS-3008A has a built-in Web Server function to allow users to connect GDS-3008A's Web Server by using a browser in the same network domain via Ethernet connection. System information can be obtained and the oscilloscope screen (.png file) can be observed and captured remotely.

GDS-3008A can be controlled remotely through GUI to download and upload configuration files and test SCPI commands. Users can use this function to obtain oscilloscope information and configuration files, and operate remote control even if they are not on site.

L POWER ANALYSIS FUNCTIONS

15 Sets of Switching Mode Power Supply Measurements

In daily life, switching power supplies have become the mainstream of power supplies. Engineers often have to rack their brains in order to improve product performance and reduce switching loss, and Ripple/Noise.

GDS-3000A has an option of rich measurement items for switching mode power supply testing. To meet engineers' measurement needs for switching mode power supply, rich measurement function can help engineers save a lot of measurement computing time and improve product development efficiency.

Power Quality

For AC voltage and current measurement, its distortion and other abnormal phenomena will affect the power consumption, efficiency and reliability of the power supply.

Measurement items: current/voltage root mean square value, actual power, reactive power, frequency, power factor, phase angle, +/- V Peak, +/- I Peak, AC/DC voltage and current, voltage/current crest factor, impedance, resistance and reactance.

Transient Response Analysis

Output analysis required test items: Ripple/Noise, Transient response analysis, Turn On/Off and Efficiency. It measures the time required for the output DC voltage to reach the stable level expected by users when the output load changes suddenly.

Measurement items: transient response value (s).

Switching Loss

Switching component analysis items: Switching loss, SOA (Safe Operation Area) and Modulation analysis.Analyze the integral of the product of the voltage and current of the switching device (MOSFET or IGBT) in the power supply, and then measure the switching loss of the device, including Turn-on switching loss, Turn-off switching loss and Conduction loss.

The higher the switching frequency, the higher the Turn-on and Turn-off switching loss.

Measurement items: power loss, energy loss & Rds(on)/Vce(on).

Control Loop Response

Control Loop Response and PSRR (Power Supply Rejection Ratio)

PSRR: Power supply rejection ratio (PSRR) analysis, which is used to confirm that power equipment maintains ripple noise in different frequency ranges.

Measurement items: frequency and PSRR (dB).

Magnetics Analysis

Magnetics Analysis(B-H Curve): The characteristics of magnetic materials are divided into magnetic flux density (B), magnetic field strength (H) and material magnetic permeability (μ). The B-H diagram is usually used to verify the saturation of the magnetic components in the switch power supply.

Measurement items: Measure the voltage and current flowing through the magnetic component and draw a B-H diagram.

M OPTIONAL 16-CHANNEL LOGIC ANALYZER

GDS-3000A can be upgraded to a mixed signal oscilloscope (MSO) by selecting an optional 16-channel logic analyzer, which is a plugin. When you have several GDS-3000As, you can plug in an optional logic analyzer to other unit at any time without installing any software.

Users can analyze digital signals, I²C, SPI, UART, CAN, LIN and parallel bus through a logic analyzer.

500 MHz Digital Storage Oscilloscope

GDS-3000 Series (500MHz)

FEATURES

- 500MHz Bandwidth, 2/4 Input Channels
- 4GSa/s Real-time Sampling Rate and 100GSa/s Equivalent Time Sampling Rate
- 25k Points Memory for Each Input Channel
- VPO (Visual Persistence Oscilloscope) Technology to Display Less Frequently Occurred Signals
- 8"/800 x 600 High Resolution TFT LCD Display
- Unique Split Screen System with Independent Setting and Display for Each Input Channel
- Three Built-in Input Impedance Selections : 50Ω/75Ω/1MΩ
- Optional Power Analysis Software for Power Source Measurement and Analysis
- Optional Serial bus Analysis Software for Trigger & Decode of I²C, SPI and UART Interfaces

SPECIFICATIONS		
	GDS-3502	**GDS-3504**
VERTICAL		
Channels	2Ch+EXT	4Ch+EXT
Bandwidth	DC~350MHz (-3dB)	DC~500MHz (-3dB)
Calculated Rise Time	700ps	700ps
Bandwidth Limit	20MHz/100MHz/200MHz	20MHz/100MHz/200MHz/250MHz
Vertical Resolution	8 bits	
Vertical Resolution(Math)	2mV~5V/div	
Total Resolution(Math)	2mV~5V/div	
Input Coupling	AC, DC, GND	
Input Impedance	1MΩ(1) 16pF	
DC Gain Accuracy	±3% full scale	
Polarity	Normal, Invert	
Maximum Input Voltage(1MΩ)	400Vrms, CAT I	
Maximum Input Voltage(50/75Ω)	5 Vrms	
Offset Position Range	2mV/div ~ 100mV/div : ±0.5V ; 200mV/div ~ 5V/div : ±25V	
Waveform Signal Process	Add, Subtract, Multiply and Divide waveforms, 16 Parameters, Integration (Requires installation of optional key), FFT : Spectral magnitude. Set FFT vertical scale to Linear RMS or dBV RMS, and FFT window to Rectangular, Hamming, Hanning or Blackman	
TRIGGER		
Source	2Ch model: CH1, CH2, Line, EXT; 4Ch model: CH1, CH2, CH3, CH4, Line, EXT	
Trigger Mode	Auto (Supports Roll Mode for 50ms/div and slower), Normal, Single	
Trigger Type	Edge, Pulse Width, Video, Runt, Rise & Fall, Alternate, Slope, Logic, Duration Trigger	
Trigger Holdoff Range	30ns~10s	
Coupling	AC, DC, LF rej., HF rej., Noise rej.	
Sensitivity	DC~50MHz: Approx. 1div or 10mV; 50MHz~100MHz: Approx. 1.5div or 15mV; 100MHz~350MHz: Approx. 3div or 30mV; 350MHz~500MHz: Approx. 3.5div or 35mV	
EXT TRIGGER		
Range	±15V	
Sensitivity	DC ~ 150MHz: Approx. 100mV; 150MHz ~ 350MHz: Approx. 150mV; 350MHz ~ 500MHz: Approx. 200mV	
Input Impedance	1MΩ ±3%, ~ 16pF	
HORIZONTAL		
Range	1 2.5 5 increments, 1ns/div ~ 100s/div	
Pre-Trigger	10 div maximum	
Post-Trigger	1,000 div max (depend on time base)	
Accuracy	±20 ppm over any ≥1 ms time interval	
X-Y MODE		
X-Axis Input/Y-Axis Input	Channel 1, Channel 2/Channel 3, Channel 4	
Phase Shift	±3° at 100kHz	
SIGNAL ACQUISITION		
Real Time Sample Rate	4GSa/s	4GSa/s
ET Sample Rate	100GSa/s maximum for all models	
Memory Depth	25k points	
Acquisition Mode	Normal, Average, Peak detect, High resolution, Single Average: 2 ~ 256 waveforms, Peak detect: 2ns	
CURSORS AND MEASUREMENT		
Cursors	Amplitude, Time, Gating and auto	
Automatic	28 sets: Vpp, Vamp, Vavg, Vrms, Vhi, Vlo, Vmax, Vmin, Rise Preshoot, Overshoot, Fall Preshoot, Overshoot	
Measurement	Freq, Period, Rise time, Fall time, Positive width, Negative width, Duty cycle, Phase, and eight different delay measurements (FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF)	
Cursor Measurement	Voltage difference between cursors (ΔV) Time difference between cursors (ΔT)	
Auto Counter	8 digits, range from 2Hz minimum to the rated bandwidth	
POWER MEASUREMENT(OPTION)		
Power Quality Measurements	V RMS, I RMS, True Power, Apparent Power, Reactive Power, Frequency, Power Factor, Phase Angle, V Crest Factor, I Crest Factor, [+/-] V Peak, [+/-] V Peak, [+/-] I Peak, DC Voltage, DC Current, Impedance, Resistance, Reactance	
Harmonics	Frequency(Hz), Magnitude(%), Mag. dB(%), Phase(°), Limit(A), Limit(%), Pass / Fail, Max all, Windows(A), 3-Sec Limit, PDHC Limit, THD-F, THD-R RMS, Detail, PDHL, Input Power, Power Factor, Fundamental Current, Harmonic 1, Harmonic 1	
Ripple Measurements	Ripple, Noise	
In-rush Current	First peak, second peak	
CONTROL PANEL FUNCTION		
Autoset	Single button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo autoset.	
Auto-adapt	When automatically adjust the time base and/or the vertical scale of displayed waveform when the frequency and/or the amplitude of input signal changed.	
Save Setup	20 sets	
Save Waveform	24 sets	
DISPLAY SYSTEM		
TFT LCD Type	8" TFT LCD SVGA color display(LED Back-light)	
Waveform Update Rate	3500 wfms/sec	
Display Resolution	800 horizontal x 600 vertical pixels (SVGA)	
Interpolation	Sin(x)/x & Equivalent time sampling	
Waveform Display	Dots, Vectors, Variable persistence, Infinite persistence	
Display Graticule	8 x 10 divisions	
Display Brightness	Adjustable	

GDS-3000 Series

	GDS-3502	GDS-3504
INTERFACE		
RS-232C	DB-9 male connector	
USB Port	2 sets USB 2.0 high-speed host port / 1 set USB high-speed 3.0 device port	
Ethernet Port	RJ-45 connector, 10/100Mbps	
SVGA Video Port	DB-15 female connector, monitor output for display on SVGA monitors	
GPIB	GPIB-to-USB Adapter (Optional)	
Co/MoCo BNC	5V Max/10mA open collector output	
Internal Flash Disk	64MB	
Kensington Style Lock	Rear panel security slot connects to standard Kensington-style lock	
Line Output	3.5mm stereo jack for Co/MoCo audio alarm	
POWER SOURCE		
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto detection. Power Consumption 86W	
OPERATING ENVIRONMENT		
Temperature	0°C ~ 50°C, Relative Humidity≦80% at 40°C or below ; 5~45% at 41°C~50°C	
MISCELLANEOUS		
Multi-Language Menu	Available	
On-Line Help	Available	
Time-stamp	Time and date, provide the date/time for saved data	
DIMENSIONS & WEIGHT		
480(W) X 280(H) X 130(D)mm, Approx. 4 kg		

*The specifications apply when the instrument is powered on for at least 30 minutes under +25 °C ~ +10 °C.

ORDERING INFORMATION

GDS-3502 500MHz, 2-Channel, Digital Storage Oscilloscope

GDS-3504 500MHz, 4-Channel, Digital Storage Oscilloscope

ACCESSORIES
User manual CD x 1, Power cord x 1
GTP-500B : 500MHz 10:1 passive probe (for GDS-3502/3504 one per channel)

Option

DS3-PWR	Power analysis software. Power quality/harmonics/ripple/inrush current measurements
DS3-SBD	Serial Bus analysis software. I²C/SPI/UART (only 4 channel models support SPI & UART)

Optional Accessories

GUC-001	GPIB to USB adapter	**GDP-025**	25MHz High-voltage differential probe
GTP-035A	35MHz 1:1 Passive probe	**GDP-050**	50MHz High-voltage differential probe
GCP-300	300kHz/30A Current probe	**GDP-100**	100MHz High-voltage differential probe
GCP-570	5MHz/30A Current probe	**GSC-002**	Soft Carrying Case
GCP-530	30kHz/15A Current probe	**GTL-119**	Test lead, BNC to BNC connector
GCP-1000	1MHz/150A Current probe	**GTL-232**	RS-232C cable, 9-pin female to 9-pin female, Null modem for computer
GCA-1000	1MHz/150A Current probe	**GTL-244**	USB 1.0 cable, A-B type cable (P_1500mm)
GCP-030P	Power supply for current probe (1 input channel)	**GRA-411**	Rack Mount Kit
GCP-430P	Power supply for current probe (4 input channel)	**GDS-03**	Oscilloscope Education and Training Kit
GTL-240	GPIB Cable, Double Shielded, 2000mm	**GKT-100**	Deskew fixture

Free Download

PC Software: FlashVue software — Driver: USB driver, LabView driver

Rear Panel

GUC-001 GPIB to USB Adapter

For: GDS-3000 Series, PSW Series

GRA-411 Rack Adapter Panel

Rack Mounting (19", 4U)

GDS-03 Oscilloscope Education and Training Kit

For : GDS-305B/310A/1000B/1000E Series
GDS-2000E Series/2000A/2000B Series

GSC-002 Soft Carrying Case

300MHz/200MHz/100MHz/70MHz Digital Storage Oscilloscope

GDS-2000A Series (300/200/100/70 MHz)

FEATURES

- 300/200/100/70MHz Bandwidth, 2 or 4 Input Channels
- 2GSa/s Maximum Real-Time Sampling Rate and 100GSa/s Equivalent Time Sampling Rate
- 1M points Maximum Record length
- VPO Technology to Display Less-Frequently-Occurred Signals
- Fast Update Rate of 50,000 Waveform Per Second
- Segmented Memory Acquisition and Waveform Search Function
- Standard Model Provides I²C, UART, SPI, CAN and LIN Serial Bus Trigger and Analysis Functionality
- Optional 8 or 16 Additional Digital Channels with Logic Analyzer(MSO)
- Upgradable DVM, H-Expander, Data Log and Advanced Logic Functionality
- Optional 50MHz Function Generator
- Flexible Remote Control Connectivity (Standard : USB ; Optional : LAN/GPIB)

GDS-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000/1000B Series, MSO2000B Series,DSO2-2000/2000E Series

GSC-008 Soft Carrying Case

SPECIFICATIONS

TEST RUN							
	GDS-2074A	GDS-2074A	GDS-2104A	GDS-2104A	GDS-2204A	GDS-2204A	GDS-2304A	GDS-2304A
Channels	2CH+EXT	4CH+EXT	2CH+EXT	4CH+EXT	2CH+EXT	4CH+EXT	2CH+EXT	4CH+EXT
Bandwidth	DC~70MHz (-3dB)		DC~100MHz (-3dB)		DC~200MHz (-3dB)		DC~300MHz (-3dB)	
Calculated Rise Time	5ns		3.5ns		1.75ns		1.17ns	
Bandwidth Limit	20MHz		20MHz		20M/100MHz		20M/100M/200MHz	
Vertical Resolution	8 bits (up to 10 bits with HD)							
Input Coupling	AC, DC, GND							
Input Impedance	1MΩ±1% and 16pF approx.							
DC Gain Accuracy(**)	±3% (Readout) : 5 div > 1 mV/div when 2mV/div or greater is selected ±5% (Readout) : 5 div > 1 mV/div when 1mV/div is selected (**) : The measurement type is average (ACQ's waveforms with vertical position at zero)							
Polarity	Normal, Invert							
Maximum Input Voltage	300Vrms, CAT I							
Offset Position Range	1mV/div ~ 99mV/div : ±2.5V ; 100mV/div ~ 1.99V/div : ±25V ; 2V/div ~ 5V/div : ±125V ; 10 div : 5V/div ~ ±50V							
Waveform Signal Process	Sin(x)/x, (sin x)/x, ∫dx, ∫∫dx ∫dx² FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning , or Blackman							
TRIGGER								
Source	CH1, CH2, CH3*, CH4*, Line, EXT, EXT/5 or CH3*/CH4* ; *Four channel models only **Logic analyzer option only							
Trigger Modes	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single							
Trigger Type	Edge, Pulse Width, Video, Pulse Runt, Rise & Fall, Alternate, Glitch, Logic, Duration, Trigger, Slope, Logic, Time out, Event-Delay (1~65,535 events), Time-Delay (4ns~10s), Logic*, Bus, I²C, SPI, RS232/UART, or RS232 & A option							
Trigger Holdoff Range	10ns ~ 10s							
Coupling	AC, DC, LF rej., HF rej., Noise rej.							
Sensitivity	DC ~ 300MHz: Approx. 1 div or 1.0mV ; 300MHz ~ 500MHz: Approx. 1.5div or 15mV ; 500MHz ~ 800MHz: Approx. 3div or 30mV							
SET TRIGGER								
Range	±15V							
Sensitivity	DC ~ 100MHz: Approx. 10mVp 100MHz ~ 200MHz: Approx. 15mV ; 200MHz ~ 300MHz: Approx. 30mV							
Input Impedance	1MΩ±3%, ~16pF							
HORIZONTAL								
Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); 1ns/div ~ 100ns/div ~ 100s/div							
Pre-trigger	10 div maximum							
Post-trigger	1,000 div max. (depend on time base)							
Accuracy	±20 ppm over any ≥1 ms time interval							
Real Time Sample Rate	Max : 2GSa/s							
ET Sample Rate	100GSa/s maximum for all models							
Record Length	Max : 1M pts							
Acquisition Mode	Normal, Average, Peak Detect, Single							
Roll Detection	1ns (typical)							
Average	Selectable from 2 to 256							
EXT TRIGGER								
5 Axis Input	Channel 1 ; Channel 3* (*: four channel models only)							
1 Axis Input	Channel 2 ; Channel 4* (*: four channel models only)							
Rate 50/1	±0* @ 100MHz							
CURSORS AND MEASUREMENT								
Cursors	Amplitude, Time, Cursor Readouts Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)							
Automatic Measurement	32 auto Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, FOVShoot, FOVPreshoot, RPRShoot, FPFShoot, Frequency, Period, Rise Time, Fall Time, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FFF, FFR, FRF, LRR, LRF, LFR, LFF, Phase							
Control Panel Function	Cursors measurement							
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth							
Autoset	Single button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo function							
Save Setup	20set							
Save Waveform	20set							
DISPLAY SYSTEM								
TFT LCD Type	8.1" TFT (CG SVGA color display), LED Back-light							
Display Resolution	800 horizontal x 600 vertical pixels (SVGA)							
Interpolation	Sin(x)/x & Equivalent time sampling							
Waveform Display	Dots, Vectors, Variable persistence(1ms~10s), Infinite persistence							
Waveform Update Rate	50,000 waveforms per second, maximum							
Display Grid Mode	8 x 10 divisions							
INTERFACE								
RS-232C	DB-9 male connector							
USB Port	USB 2.0 Full-speed hold port, USB 2.0 full-speed device port							
Ethernet Port	RJ-45 connector, 10/100Mbps; with HP Auto-MDIX (option)							
PictBridge Print Port	PictBridge output (option)							
GPIB	GPIB module (option)							
Probe Comp BNC	5V, 1kHz/10mA, open-collector output							
Kensington Style Lock	Rear panel security slot connects to standard Kensington-style lock							

The specifications apply when the oscilloscope is powered on for at least 30 minutes under 10°C to 35°C. Note : Three-year warranty, excluding probes & LCD display panel.

GDS-2000A Series

SPECIFICATIONS

LOGIC ANALYZER (OPTION)	
Sample Rate	1GSa/s
Bandwidth	200MHz
Record Length	2M max
Input Channels	16 Digital (D15 - D0) or 8 Digital (D7- D0)
Trigger Type	Edge, Pattern, Pulse Width, Serial bus (I²C, SPI, UART, CAN, LIN), Parallel
Thresholds	Quad, D0 ~ D3, D4 ~ D7, Thresholds D8~D15, (D12~D15* (*: DS2-16LA only)
Threshold Selections	TTL, CMOS, ECL, PECL, User Defined
Threshold Accuracy	±100mV
User-defined Threshold Range	±13V
Maximum Input Voltage	±40V
Minimum Voltage Swing	±500mV
Input Impedance	101kΩ parallel loading 8 pF
Vertical Resolution	1 bit
OPERATING ENVIRONMENT	
Temperature	0°C ~ 50°C, Relative Humidity≤ 80% at 40°C or below; ≤45% at 41°C~50°C
POWER SOURCE/ MISCELLANEOUS	
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto-selection
Multi-Language Menu	Available
On-Line Help	Available
Time clock	Time and date, provide the date/time for saved data
DIMENSIONS & WEIGHT	
380(W) X 220(H) X 141(D) mm, Approx. 4.2 kg	

ORDERING INFORMATION

GDS-3354A	350MHz, 4 Channel, Digital Storage Oscilloscope
GDS-3352A	350MHz, 2 Channel, Digital Storage Oscilloscope
GDS-3254A	250MHz, 4 Channel, Digital Storage Oscilloscope
GDS-3252A	250MHz, 2 Channel, Digital Storage Oscilloscope
GDS-2104A	100MHz, 4 Channel, Digital Storage Oscilloscope
GDS-2102A	100MHz, 2 Channel, Digital Storage Oscilloscope
GDS-2074A	70MHz, 4 Channel, Digital Storage Oscilloscope
GDS-2072A	70MHz, 2 Channel, Digital Storage Oscilloscope

Accessories:
User manual: CD x 1, Power cord x 1
CYP-1005A 150MHz (DC1:1) Switchable current probe for GDS-3254/2074A(one per channel)
CYP-3504C 500MHz (DC1:1) Switchable current probe for GDS-3354/2104A(one per channel)
CYP-3504A 350MHz (DC1:1) Switchable current probe for GDS-3354/2104A(one per channel)
CYP-3504J 350MHz (DC1:1) Switchable current probe for GDS-3354/2104A(one per channel)

OPTION

DS2-LAN	Ethernet & SVGA output	DS2-GPIB	GPIB interface	DS2-FGN	DDS Function Generator
DS2-16LA	16 Channel Logic Analyzer (includes 16 Channel Logic Analyzer Cable(DL2-16)) 16 Channel Logic Analyzer Probe (P31-16EA)		DS2-08LA	8 Channel Logic Analyzer (includes 8 Channel Logic Analyzer Cable (DL2-8)) 8 Channel Logic Analyzer Probe (P31-08EA)

OPTIONAL ACCESSORIES

GTL-0804	8 Channel Logic Analyzer Probe	GCP-030	30MHz/30A Current probe
GTL-0816	16 Channel Logic Analyzer Probe	GCP-100	50MHz/100A Current probe
GLA-08	8 Channel Logic Analyzer Cable	GCP-570	100kHz/500A Current probe
GLA-16	16 Channel Logic Analyzer Cable	GCP-1030	120MHz/30A Current probe
GTL-105	Test Hook x 10	GCP-1000	1MHz/1KA Current probe
GAD-001	50Ω Feedthrough Adapter	GCP-2047	Power supply for current probe (2 input channel)
CTL-111	RS-232C Cable, 9-pin 'D' Type, (all models, 2000mm)	GCP-4225	Power supply for current probe (4 input channel)
CTL-340	USB Cable, USB (A) to B Type, (1000mm)	GDC-030	Soft Carrying Case
CTL-341	GPIB Cable, Double Shielded, (2000mm)	GDP-005	25MHz High voltage differential probe
GTP-415A	Oscilloscope Probe, 350MHz (1:1 Passive Probe)	GDP-025	50MHz High voltage differential probe
GSM-03	Oscilloscope Education & Training Kit	GDP-100	100MHz High voltage differential probe

FREE DOWNLOAD

PC Software: OpenWave software | Drivers: IVI-COM driver, LabVIEW driver

Rear Panel

DS2-16LA 16-Channel Logic Analyzer

DS2-08LA 8-Channel Logic Analyzer

DS2-LAN Ethernet & SVGA Output

DS2-GPIB GPIB Interface

DS2-FGN DDS Function Generator

200MHz/100MHz/70MHz Mixed-signal Oscilloscope

MSO-2000E Series (200/100/70 MHz)

FEATURES

- 200/100/70MHz Bandwidth Selections | 2 or 4 Channels
- Real Time Sample Rate Per Channel : 1GSa/s (2 Channel Models), Maximum Real Time Sample Rate : 1 GSa/s (4 Channel Models)
- MSO-2000E Equips with a 16 Channel Logic Analyzer
- MSO-2000EA Equips with a 16 Channel Logic Analyzer and a Dual Channel 25MHz Arbitrary Waveform Generator
- Fine Frequency Response Analyzer Software for MSO-2000EA
- Per Channel 10M Memory Depth and VPO Waveform Display Technology
- Waveform Update Rate up to 110,000 wfms/s
- 8.9 " WVGA TFT LCD
- Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
- High Pass, Low Pass and Band Pass Filter Functions
- 20,000 Segmented Memory Sections and Waveform Search Function
- I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- Data Log Function is 40k to Track Signal Changes up to 1200 Hours
- Mask Test Function
- Network Storage Function

SPECIFICATIONS

	MSO-2072E(A)	MSO-2074E(A)	MSO-2102E(A)	MSO-2104E(A)	MSO-2202E(A)	MSO-2204E(A)
VERTICAL SENSITIVITY						
Channels	2Ch+EXT	4Ch	2Ch+EXT	4Ch	2Ch+EXT	4Ch
Bandwidth	DC~70MHz(-3dB)		DC~100MHz(-3dB)		DC~200MHz(-3dB)	
Calculated Rise Time	5ns		3.5ns		1.75ns	
Bandwidth Limit	20MHz		20MHz		20M/100MHz	
Vertical Resolution	8 bits					
Input Coupling	AC, DC, GND					
Input Impedance	1MΩ(1±2%)pF approx.					
DC Gain Accuracy	±(3% when 2mV/div or greater is selected ; ±(5% when 1mV/div is selected					
Polarity	Normal & Invert					
Maximum Input Voltage	400Vrms , CAT I 300Vrms,CAT II with CFA-010E-A / 1000:1/CHB-E, 10 : 1 probe)					
Offset Position Range	1mV/div ~ 20mV/div : ±0.5V ; 50mV/div ~ 200mV/div : ±5V ; 500mV/div ~ 2V/div : ±25V ; 5V/div~10V/div : ±100V					
Waveform Signal Process	+, -, ×, ÷, FFT, User Defined Expression FFT : Vrms , FFT : Spectral magnitude , Set FFT Vertical Scale to Linear RMS or dBV RMS FFT Window Displays : Rectangular, Hamming, Hanning, Blackman Harris					
TRIGGER						
Source	CH1, CH2, CH3, CH4, Line, EXT/5 (*dual channel models only)					
Trigger Mode	Auto (Supports ROLL Mode for 100 ms/div and slower), Normal, Single Sequence					
Trigger Type	Edge, Pulse Width(Width), Video, Pulse Runt, Rise & Fall (Slope), Alternate, Time out, Event-Delay (1~65,535 events), Time Delay(Set time:4ns~10s), Box					
Trigger Holdoff Range	4ns ~ 10s					
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.					
Sensitivity	1div					
EXT TRIGGER						
Range	±11V					
Sensitivity	DC ~ 100MHz: Approx. 100mV/ 100MHz ~ 200MHz: Approx. 150mV					
Input Impedance	1MΩ(±5%) , ~14pF					
HORIZONTAL						
Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); 40ns/div ~ 100ns/div ~ 400s/div					
Pre-trigger	10 div maximum					
Post-trigger	2,000,000 div maximum					
Time Base Accuracy	±50 ppm over any ≥1 ms time interval					
Real Time Sample Rate	Max. 1 GSa/s (Ach models), Per channel 1 GSa/s (2ch model)					
Record Length	10M@1CH					
Acquisition Mode	Normal, Average, Peak Detect, Single					
Roll Detector	2ns @1GS/s					
Portrayal	Selectable from 2 to 256					
X-Y MODE						
X-Axis Input	Channel 1 ; Channel 3* (*4 four channel models only)					
Y-Axis Input	Channel 2 ; Channel 4* (*4 four channel models only)					
Phase Shift	±3° at 100kHz					
CURSORS AND MEASUREMENT						
Cursors	Amplitude, Time, Delay Available Unit : Second(S) , Volt(V), Phase (Degree), Ratio(%)					
Automatic Measurement	38 sets : Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, NPulses, Phase, +Slew Rate, -Slew Rate, Delay(1→2), Delay(1→3), Delay(1→4), Phase(1→2), Phase(1→3), Phase(1→4)					
Control Panel Function	Cursors measurement					
Auto-Counter	6 digits, range from 0Hz minimum to the rated bandwidth					
Autoset	Single button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo feature					
Save Setup	20 set					
Save Waveform	20 set					
DISPLAY SYSTEM						
TFT LCD Type	8.9" TFT LCD WVGA color display					
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)					
Interpolation	Sin(x)/x					
Waveform Display	Dots, Vectors, Variable persistence(16ms, 32s), Infinite persistence					
Waveform Update Rate	110,000 waveforms per second, maximum					
Display mode	YT , XY					
Display Grids/Scale	8 x 10 divisions					
INTERFACE						
USB Port	USB 2.0 Hi-A speed host ports x 1, USB 2.0 High-speed device port x 1					
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps auto HP Auto-MDIX					
Out/RefCo BNC	5V Max/10mA open collector output					
Kensington Style Lock	Rear panel security slot connects to standard Kensington-style lock					
LOGIC ANALYSER SPECIFICATIONS						
Sample Rate	Per Channel 1 GSa/s					
Bandwidth	200MHz					
Record Length	Per Channel 1 M pts (max)					
Input Channels	16 Digital (D15 ~ D0)					
Trigger Type	Edge, Pulse or Pulse Width, Serial bus (I²C,SPI,UART(RS232),I²S,MIL-CAN,) Eq.Parallel bus					
Thresholds Quad	D8~D15, D4~D7,D0~D3 , D15~D7 Thresholds					
Threshold Selections	TTL, CMOS(5V),CMOS(3.3V),ECL, PECL,5V , User Defined					
Undefined Threshold Range	±5V					
Maximum Input Voltage	±40 V					
Minimum Voltage Swing	±250 mV					
Input Impedance	101KΩ probe loading 8pF					
Vertical Resolution	1 bit					

MSO-2000E Series

SPECIFICATIONS

	MSO-2072E(A) MSO-2074E(A) MSO-2102E(A) MSO-2104E(A) MSO-2202E(A) MSO-2204E(A)
ANC SPECIFICATIONS (MSO-2000E only)	
Channels	1
Sample Rate	500 MS/s (1)
Vertical Resolution	14 bits
Max. Frequency	37 MHz
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac
Output Range	20 mVpp to 5 Vpp, High Z; 10 mVpp to 2.5 Vpp, 50 Ω
Output Resolution	1mV
Output Accuracy	2% (1 kHz)
Offset Range	±2.5 V dc, High Z; ±1.25 V dc, 50 Ω
Offset Resolution	1mV
FREQUENCY RESPONSE ANALYSIS	
Dynamic Range	> 90 dB (typical)
Input and Output Sources	Channel 1 or 2 (1 or 4 for four channel model)
Frequency Range	30 Hz to 25 MHz
Number of Test Points	10 to 50 points per decade
Test Amplitude	20 mVpp to 5 Vpp into High Z. Fixed amplitude across entire sweep
Test Results	Logarithmic overlaid gain and phase plot
Manual Measurements	Two pairs of tracking gain and phase readouts
Plot Scaling	Auto-scaled during test
POWER SOURCE MSO(E,LAN)E/DE/XE	
Line Voltage Range	AC 100 ~ 240V, 50 Hz ~ 60Hz, auto-selection
Multi-Language Menu	Available
On-Line Help	Available
Time clock	Time and date, provide the date/time for saved data
Operation Environment	Temperature: 0°C to 50°C, Relative Humidity: < 80%, 40°C or below; < 45%, 41°C ~ 50°C
DIMENSIONS & WEIGHT	
	384 (W) X 208 (H) X 127.3 (D) mm, Approx. 2.3 kg

Note: (1)Real-time sampling, including positive & (2)LCD display panel.

ORDERING INFORMATION

MSO-2204E(A)	200MHz, 4 + 16 Channel, Mixed signal Oscilloscope
MSO-2202E(A)	200MHz, 2 + 16 Channel, Mixed signal Oscilloscope
MSO-2104E(A)	100MHz, 4 + 16 Channel, Mixed signal Oscilloscope
MSO-2102E(A)	100MHz, 2 + 16 Channel, Mixed signal Oscilloscope
MSO-2074E(A)	70MHz, 4 + 16 Channel, Mixed signal Oscilloscope
MSO-2072E(A)	70MHz, 2 + 16 Channel, Mixed signal Oscilloscope

*(A): Arabic version

ACCESSORIES :

Users manual CD x 1, Power cord x 1

CCP-201: Probe Clip, 20PCS **CTL-16E**: 16-Channel Logic Analyzer Probe

CTP-070B-E: 70MHz(10:1/1:1) Switchable passive probe for MSO-2072E(A)/2074E(A)(one per channel)

CTP-100B-E: 100MHz(10:1/1:1)Switchable passive probe for MSO-2102E(A)/2104E(A)(one per channel)

CTP-200B-E:200M Hz(10:1/1:1)Switchable passive probe for MSO-2202E(A)/2204E(A)(one per channel)

OPTIONAL ACCESSORIES

CTL-16E	16-Channel Logic Analyzer Probe	**CCP-100**	10MHz/10A Current probe
CRK-426	Rack Mount Kit	**CCP-500**	50MHz/15A Current probe
CAX-003	50Ω Impedance Adapter	**CCP-1500**	100MHz/15A Current probe
CSC-008	Soft Carrying Case	**CDP-1000**	1M x 5% Current probe
CTL-24E	USB Cable, USB 2.0, A-B Type, 1.8Meters	**CCP-190P**	Power supply for current probe (2 input channel)
CDB-03	Oscilloscope Education & Training Kit	**CCP-420P**	Power supply for current probe (4 input channel)
CTP-035A	Oscilloscope Probe, 35MHz 1:1 Passive Probe, 10M/20pF	**CCP-301**	Probe Clip, 20PCS
CCP-500	50MHz/15A Current probe	**CDP-035**	35MHz High voltage differential probe
		CDP-050	50MHz High voltage differential probe
		CDP-100	100M HZ High voltage differential probe

FREE DOWNLOAD

PC Software	Openhios software	Driver	USB driver, LabView driver

GDB-03 Oscilloscope Education and Training Kit

For : GDS-1000/2000A/2000E/3000E Series
MSO-2000E Series/MSO-2000A/3000E Series

CTL-16E 16-Channel Logic Analyzer Probe

For : MSO-2000E Series

CCP-201 Probe Clip , 20PCS

For : MSO-2000E Series

Rear Panel

200MHz/100MHz/70MHz Mixed-signal Oscilloscope

MSO-2000E SERIES SELECTION GUIDE

MODELS	MSO-2202E	MSO-2102E	MSO-2104E	MSO-2102E	MSO-2074E	MSO-2072E
Bandwidth	200MHz	100MHz	100MHz	100MHz	70MHz	70MHz
Channels	4	2	4	2	4	2
Record Length	10M / ch	10M / ch	10M / ch	10M / ch	10M / ch	10M / ch
Real-time Sampling Rate	Max. 1 GSa/s	Per channel 1 GSa/s	Max. 1 GSa/s	Per channel 1 GSa/s	Max. 1 GSa/s	Per channel 1 GSa/s
Built-in	16 Channel Logic Analyzer					

MSO-2000EA SERIES SELECTION GUIDE

MODELS	MSO-2202EA	MSO-2102EA	MSO-2104EA	MSO-2102EA	MSO-2074EA	MSO-2072EA
Bandwidth	200MHz	100MHz	100MHz	100MHz	70MHz	70MHz
Channels	4	2	4	2	4	2
Record Length	10M / ch	10M / ch	10M / ch	10M / ch	10M / ch	10M / ch
Real-time Sampling Rate	Max. 1 GSa/s	Per channel 1 GSa/s	Max. 1 GSa/s	Per channel 1 GSa/s	Max. 1 GSa/s	Per channel 1 GSa/s
Built-in	16 Channel Logic Analyzer and Dual Channel 25MHz Arbitrary Waveform Generator					

The MSO-2000E series is a mixed signal oscilloscope, which offers dual analog channels + 16 digital channels or 4 analog channels + 16 digital channels. The MSO-2000E series includes MSO-2000E and MSO-2000EA. MSO-2000E has a built-in 16-channel logic analyzer and MSO-2000EA has a built-in 16-channel logic analyzer and a dual channel 25MHz arbitrary waveform generator. The entire series features bandwidth selections of 200MHz, 100MHz, and 70MHz. Dual analog channel models provide 1GSa/s real-time sampling rate per channel, four analog channel models provide 1GSa/s maximum real-time sampling rate. The 8-inch 800*480 TFT LCD and the minimum 1mV/div vertical range allow the MSO-2000E series to measure complex feeble signals and clearly display measurement results.

For analog channels, the MSO-2000E series provides 10M long memory for users to completely retrieve and analyze waveforms. Users, based upon the application requirements, can select 1k, 10k, 100k, 1M or 10M memory depth. Short memory depth collocating with the high sampling rate allows users to observe fast-changing waveforms and, on the other hand, long memory depth aims for continuously changing waveforms. The MSO-2000E series is equipped with waveform search and segmented memory functions to expand the flexible applications of 10M long memory. The segmented memory can be divided the maximum into 28,000 sections for users to bypass any unimportant waveforms so as to swiftly search all required waveforms. With the segmented memory function, more meaningful waveforms can be saved and target waveforms can be displayed rapidly. Users, by using the waveform search function, can rapidly search desired waveforms according to the required trigger conditions.

16-channel logic analyzer has a memory depth of 10Mpts per channel, which can retrieve more and longer digital signals as well as clearly display digital signals to obtain sufficient information for analysis. The minimum input swing of logic analyzer represents the minimum operating voltage of ±250 mV, which demonstrates that digital channels are highly sensitive with respect to input. The standard bus trigger and decoding functions include serial and parallel bus such as I²C, SPI, UART (RS232/422/485) and CAN/LIN bus for automotive communications. The parallel bus function is only for digital channels. Bus waveforms can be triggered and decoded in real time. The MSO-2000E series offers complete analysis and debugging capabilities with the economical pricing.

CAN Bus Trigger and Decode

Dual Channel Arbitrary Waveform Generator

In addition to a 16-channel logic analyzer, MSO-2000EA has a built-in dual-channel 25MHz arbitrary waveform generator with the modulation capability and also features 14-bits vertical resolution; sample rate of 200MSa/s; 13 standard output waveforms Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac ; AM/FM/FSK modulation and sweep function. The user friendly interface is the ideal choice for applications such as circuit simulation and education tests.

FRA of RC high-pass filter

MSO-2000EA also provides the frequency response analysis function (Bode plot). The FRA software can be directly downloaded from GW Instek website. Via arbitrary waveform generator, oscilloscope, and FRA software, users can obtain DUT's FRA characteristic curve plot. FRA has a very wide application range, including product circuit and component performance verification and analysis such as Feedback of Circuit Design, Filter Design, Amplifier Design, Resistant Circuit Design, Cable Frequency Response, and Signal Transformer Performance. Via FRA, users can preliminarily verify product and analyze component's characteristics without the expensive instrument.

Cursor measurement for the determination of -3dB cut-off frequency of the high-pass filter

The frequency range of FRA is from 10Hz to 25MHz; the number of test point can be selected from 10 to 90 points per decade. After completing the Bode plot, users can select measurement curve by Cursor so as to retrieve each point's amplitude and phase on the curve.

A 120,000wfm/s WAVEFORM UPDATE RATE AND VPO WAVEFORM DISPLAY TECHNOLOGY

The MSO-2000E series oscilloscope allows users to easily and completely observe in-rush signals and rare transient waveforms to increase waveform debugging efficiency by using features, including advanced VPO (Visual Persistence Oscilloscope) signal processing technology, waveform update rate as high as 120,000 wfm/s, and multi-layered afterglow display to enhance waveform display efficiency. Oscilloscope with VPO technology displays signals with three dimensional waveforms constructed by amplitude, time and signal strength to show each waveform point. 256 color gradients yield clear waveform changes. Comparing with the conventional digital storage oscilloscope, the MSO-2000E series provides more natural and more genuine signal display effect which is very close to the original analog signal.

B DUAL DISPLAY SCREEN ZOOM-IN AND PLAY/PAUSE FUNCTIONS

The MSO-2000E series provides the dual display screen zoom-in function to simultaneously display waveforms and major target areas. Users can zoom in display area by adjusting time/div. Under zoom-in mode, waveform can be played or paused so as to automatically view all input waveforms on the moving zoom-in screen. User can swiftly identify each desired event. Manual control play speed and direction can be adjusted according to users' requirements. Press "Pause" to stop the play function. With "waveform search", all desired events from different stages can be rapidly identified and examined back and forth. The MSO-2000E series is capable of swiftly searching signals and observing signals' details. 10M long memory depth provides the function of complete waveform retrieval and analysis.

C 1M FFT FREQUENCY DOMAIN DISPLAY FUNCTION

The FFT function of the MSO-2000E Series provides the maximum 1M display for more precision frequency domain display. The function supports four window displays, including Rectangular, Hamming, Hanning, and Blackhanis. Users select window display for frequency domain analysis according to test requirements. The MSO-2000E series not only provides the FFT function but also FFTrms, vertical adjustment, and local zoom-in functions for users to adjust waveforms of frequency domain by their requirements. Via rapid waveform update rate and waveform search functions, users can precisely observe the test results of frequency domain.

38 ITEMS OF AUTO MEASUREMENT SELECTION AND THE STATISTICS FUNCTION

The MSO-2000E series soundly provides 38 measurement items. Based upon the parameters such as voltage, current, time, frequency, and delay measurement, users can decide which measurement items to choose. On the single display screen, the MSO-2000E series provides 8 measurement selections. The statistics mode can also be selected for users to analyze the mean value, the maximum, the minimum, and standard deviation of the retrieved waveforms to ensure signal's integrity and identify abnormal waveforms.

SUPPORT I²C, SPI, UART, CAN, LIN BUS TRIGGER AND DECODING FUNCTION

Decode by Analog Channel

Decode by digital Channel

Display analog waveform converted from digital signal

The serial bus technology has been widely applied in the present embedded application design. To rapidly and correctly trigger and analyze serial bus data has posed a difficult challenge to engineers. The MSO-2000E series provides parallel and serial bus analysis function with 16M long memory depth. Users can select either analog or digital channels to trigger, decode, and analyze frequently used I²C, SPI and UART serial bus and CAN/LIN bus, which is often used by automotive communications. While using digital channels, the analog waveform converted from digital channels can be observed so as to examine and analyze time-related analog and digital signals. The above-mentioned function can verify and analyze the conversion between analog and digital signals. Currently, many embedded designs are digital signals. The MSO series also provides digital channels for parallel bus analysis and decoding. The above standard serial and parallel bus functions are the best test platform for school courses and embedded circuit designs.

WAVEFORM SEARCH FUNCTION

Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, full box inverted triangles will show the location that the trigger condition. The upper left hand corner Overall will show the total number of waveforms met the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and Bus. When the trigger condition is met, hollow inverted triangles will appear. Users can save all marks to compare with the next input signal. The front panel of the MSO-2000E series controls waveform zoom-out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save marks for rapid comparison and analysis.

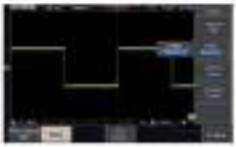
G. DIGITAL FILTER FUNCTION

Unfiltered Waveform with Noise Interference

Filtered Waveform, Noise Removed

Engineers are often troubled by noise interference while measuring signals in the electric circuit tests. This MSO-2000E series features the digital filter function which can be set to high pass or low pass digital filter. Digital filter allows users to independently set filter frequency for each channel. The tracking on function rapidly sets same filter frequency for all channels.

H. DATA LOG FUNCTION



Users, via the data log function, can observe waveform changes in long periods of time to ensure product reliability or measure sporadically appeared signals. The data log function, based on the requirements, can set record time and interval. Record time can be selected from 5 minutes to 1000 hours, and record interval is 1 seconds, the minimum. Waveform type for record data and CSV file format for each channel can also be selected. Data can be stored in USB drive, the MSO-2000E series or the remote computer via LAN.

I. SEGMENTED MEMORY FUNCTION

Users Can Also Select "Analyze Segments" to Conveniently Obtain The Analysis Results.

To achieve the most ideal application for memory depth, the MSO-2000E series has the built-in segmented memory function. The segmented memory function allows users to select the desired important signals for observation. Hence, insignificant signals can be neglected and serial bus decoding, pulse or inrush signals can be identified when retrieving signals. The segmented memory function of the MSO-2000E series allows users to select the number of sections. The maximum sections can be selected are 25,000. After activating the function, users can select and observe waveform for each segment by turning the Variable knob. The ultimate application of memory depth, therefore, is completely realized.

J. MASK FUNCTION

The MSO-2000E series provides the Mask function, which allows users to apply Auto Mask and user-defined Mask to determine whether the quality of the product meets the regulation. Via user-defined mask, users can set up to 8 areas and each area is up to 10 points to meet test requirements. Users can also refer to the examples from user manual to edit Mask by the PC to satisfy all test needs. By setting Save On, users can log and monitor signals, which violate test conditions.

300/200/100MHz Mixed-domain Oscilloscope

MDO-2000A Series (300/200/100 MHz)

FEATURES

- 300/200/100MHz Bandwidth Selections
- 2 Channels
- Maximum Real Time Sampling Rate: 2 GS/s
- MDO-2000A Equips with a Spectrum Analyzer
- MDO-2000AC Equips with a Spectrum Analyzer ; a Dual Channel 25MHz AWG
- Per Channel 20M Memory Depth and VPO Waveform Display Technology
- Waveform Update Rate up to 120,000 wfm/s
- 8.1" WVGA TFT LCD
- MDO-2000AC Provides Frequency Response Analysis Function
- Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
- High Pass, Low Pass and Band Pass Filter Functions
- 20,000 Segmented Memory Sections and Waveform Search Function
- I²C/SMART/CAN/LIN Serial Bus Trigger and Decoding Functions
- Data Log Function is able to Track Signal Changes up to 1000 Hours
- Mask Test Function
- Network Storage Function

SPECIFICATIONS

	MDO-2102A/C	MDO-2202A/C	MDO-2302A/C
VERTICAL SENSITIVITY			
Channels	2CH+EXT	2CH+EXT	2CH+EXT
Bandwidth Calculated Rise Time Bandwidth Limit	DC~100MHz(-3dB) 3.5ns 20MHz	DC~200MHz(-3dB) 1.75ns 20MHz/100MHz	DC~300MHz(-3dB) 1.17ns 20MHz/100MHz/200MHz
Vertical Resolution Input Coupling Input Impedance DC Gain Accuracy Polarity Maximum Input Voltage Offset Position Range Waveform Signal Process	8 bits ; 1mV ~ 10V/div AC, DC, GND 1MΩ ± 1% / 16pF approx. ±(3% when 5mV/div or greater) ± (offset) ; ±(5% when 2mV/div) ± (offset) Normal & Invert 300Vrms , CAT I 5mV/div ~ 200mV/div : ±0.5V ; 205mV/div ~ 500mV/div : ±5V ; 505mV/div ~ 10V/div : ±25V ; 2V/div~5V/div : ±50V ; 5.1V ~ 10V : Zero Shifted Adjustable FFT , Magnify , EXT ; Specified amplitude : for FFT Vertical Units or Sense. RMS or dBV RMS and FFT Windows in Resolution Bandwidth , Warning , or Measurement		
TRIGGER			
Source Trigger Modes Trigger Type Trigger Position/Range Coupling Sensitivity	CH1, CH2, Line, EXT Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence Edge, Pulse Width, Video, Slope, Pulse Runt, Rise & Fall Signal, Alternate, Time out, Data Delay, I²C, SPI, CAN, LIN, FlexRay, Sequential, Parallel, Serial Bus Any ; 10s AC, DC, LF rej. , HF rej. , Noise rej. 1div		
EXT TRIGGER			
Range Sensitivity Input Impedance	±5V DC ~ 100MHz: Approx. 150mV; 100MHz ~ 200MHz Approx. 250mV; 200MHz ~ 300MHz Approx. 350mV 1MΩ ± 1%, ~ 16pF		
HORIZONTAL			
Time Base Range Pre-Trigger Post-Trigger Time Base Accuracy Real Time Sample Rate Record Length Acquisition Mode Peak Detection Format	5ns/div ~ 100s/div (1-2-5 increments) ; 8DIV ; 100ms/div ~ 100s/div 10 div programmable 1,000,000 div maximum ±50 ppm over any ≥1 ms time interval 4Gs/s (1GS/s interval) Per Channel, 20M pts Normal, Average, Peak Detect, Single Yes (optional) Selectable from 1 to 256		
X-Y MODE			
X-Axis Input Y-Axis Input Phase Shift	CH1 and CH2 CH1 and CH2 -2° ~ 2° (50kHz)		
CURSOR AND MEASUREMENT			
Cursors Automatic Measurement	Amplitude, Time, Delay, Available, Bar, Seconds(1/f), Hz(1/T), Phase (Displayed, Waveform) 20 sets : Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, Rise/Fall Time, Pos/Neg Width, Pos/Neg Duty Cycle, Frequency, Period, Pos/Neg Overshoot, Pos/Neg Preshoot, Burst Width, Delay, Phase, Counter, Pulse Count, Edge Violation, Pulse Violation, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase		
CONTROL PANEL FUNCTION			
Auto Counter Autoset Save Setup Save Waveform	6 digits, range from 4Hz minimum to the rated bandwidth Single button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo feature 20 sets 10 sets		
DISPLAY SYSTEM			
TFT LCD Type Display Resolution Interpolation Waveform Display Waveform Update Rate Display Mode Display Overscan	8" TFT LCD WVGA color display 480 horizontal x 480 vertical pixels (WVGA) Sin(x)/x Dots, Vectors, Variable persistence (1 sec to ∞), Infinite persistence 120,000 waveforms per second, maximum YT, XY 5 x 10 divisions		
INTERFACE			
USB Port Ethernet Port (LAN) GPIB Port Centronics Style Port	USB 2.0 High-speed host ports x 1, USB 2.0 High-speed device ports x 1 RJ-45 connector, 10/100Base with HP Auto-MDIX 10 Mbps, 5 mA open collector output Data point sensing, not connected to standard Centronics style host.		
SPECTRUM ANALYZER SPECIFICATIONS			
Frequency Range Span Resolution Bandwidth Reference Level Vertical Units Vertical Position Vertical Scale Display Noise Floor Level Spurious Response Frequency Stability Trace Types Detection Methods FFT Windows	DC ~ Full Scale (also, bandwidth ~ 0.4 x sample rate) 100Hz ~ 100MHz(Max.) 1Hz ~ 1MHz(Max.) 10 dB/div to 1 dB/div in steps of 1dB/div dBV RMS, dBm (user def), dBµ 1 div to +1 div 1dB/div to 20dB/div in 1-2-5 Sequence -75 dBV ~ -95dBV, Avg : 1k ; -105dBV/Hz ~ -115dBV/Hz, Avg : 1k ; -135dBV/Hz ~ -145dBV/Hz, Avg : 1k 2nd harmonic distortion ≤ 65dBc ; 3rd harmonic distortion ≤ 70dBc Stable ; Max Hold ; Min Hold ; Average (2 ~ 128) Sample , ePeak , Peak , Average FFT Factor = Hamming 1.63 ; Rectangular 0.64 ; Hamming 1.36 ; Blackman 1.66		
AWG SPECIFICATIONS (MDO-2000AC only)			
Channels Sample Rate Vertical Resolution Max. Frequency Waveforms Output Range Output Resolution Output Accuracy DAC Range Offset Resolution	2 100 MS/s 14 Bits 25 MHz Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac 20 mVp-p to 5 Vp-p, High-Z; 10 mVp-p to 2.5 Vp-p, 50 Ω 1mV 2% (1 kHz) +2.5 V to -2.5 V, High-Z; +1.25 V to -1.25 V, 50 Ω 1mV		

Rear Panel

MDO-2000A Series

	MDO-2102A/G	MDO-2202A/G	MDO-2302A/G
Sine	Frequency Range: 100mHz–25MHz ~ 25MHz (above to 1Hz), ±0.5dB/ 25MHz ~ 1 dB/ 150Hz, 2.5MHz, Harmonic Distortion: -45dB (Dual Sine Generator), -40dBc (Sine Harmonic Distortion THD, N: Non-dBc)		
Square/Pulse	Frequency Range: 100mHz–15 kHz; Rise/Fall time: ~15ns ; Overshoot: <5% ; Duty cycle Square: 50% ± 1%(s) ; 2.5%–95.0% ; 20ns ; Pulse Width: 20 ns ~ 2ms/ 500 ps		
Ramp	Frequency Range: 100 mHz ~ 1MHz ; Linearity: 1% ; Symmetry: 1 ~ 99%		
FREQUENCY RESPONSE ANALYSIS (MDO-2000AG only)			
Dynamic Range	> 80 dB (typical)		
Input and Output Source	Channel 1 or 2		
Frequency Range	10 Hz to 25 MHz		
Number of Test Points	10 to 30 points per decade		
Test Amplitude	20 mVpp to 2 Vpp into High Z. Fixed but amplitude or custom amplitude for each decade		
Test Results	Logarithmic, user-test gain-limit all on plot		
Marker Measurements	Two pairs of tracking gain and phase markers		
Bus Grading	Auto-scaled during test		
MISCELLANEOUS			
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto-selection		
Multi-Language Menu	Available		
On-Line Help	Available		
Time Clock	Time and date, provide the date/time for saved files		
Operation Environment	Temperature: 0°C to 50°C, Relative Humidity: <80% at 40°C or below; <45% 41°C ~ 50°C		
Dimensions & Weight	384 (W) X 208 (H) x 157.5(D) mm, Approx. 3kg		

Note: Three-year warranty, excluding product & LCD display panel.

ORDERING INFORMATION

MDO-2102AC 100M Hz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2202AC 200M Hz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2102AC 300M Hz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2102A 100MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer
MDO-2202A 200MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer
MDO-2102A 300MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer

Accessories:
User manual CD x 1, Power cord x 1,
CTL-130 BNC-BNC cable x 1 (only at MDO-2000AC)
CTP-100B-4 100MHz(10:1) / (1) Switchable passive probe for MDO-2102A(2102AC)(one per channel)
CTP-200B-4 200MHz(10:1) / (1) Switchable passive probe for MDO-2202A(2202AC)(one per channel)
CTP-300B-4 300MHz(10:1) / (1) Switchable passive probe for MDO-2302A(2302AC)(one per channel)

OPTIONAL ACCESSORIES

CBL-42E Dual Adapter Panel
CAB-003 50Ω Impedance Adapter
CSC-008 Soft Carrying Case
CTL-14H USB Cable, USB 2.0, A-B Type, 1.8Meter
CTY-011A Oscilloscope Probe, 10MHz 1/1 Passive Probe
CDP-025 Differential Probe, 25MHz High Voltage Differential Probe
CDP-050 Differential Probe, 50MHz High Voltage Differential Probe
CDP-100 30MHz/200A Current probe
CCP-150 50MHz/150A Current probe
CDP-500 50MHz/15KA Current probe
CDP-1000 100MHz/50A Current probe
CDP-1500 100MHz/70A Current probe
CCP-1007 Power supply for current probe (2 input channel)
CCP-425P Current Probe, Power Supply 4 Channel Power Supply for CCP-1007/500

FREE DOWNLOAD

PC Software Operation software
Driver USB Driver, LabView driver

300/200/100MHz Mixed-domain Oscilloscope

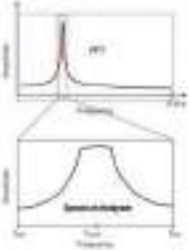
SELECTION GUIDE

MODEL	MDO-2302AG	MDO-2202AG	MDO-2102AG	MDO-2302A	MDO-2202A	MDO-2102A
Bandwidth	300MHz	200MHz	100MHz	300MHz	200MHz	100MHz
Channels	2	2	2	2	2	2
Record Length	20M / ch	20M / ch	20M / ch	20M / ch	20M / ch	20M / ch
Real-time Sampling Rate	Max. 2 GS/s	Max. 2 GS/s	Max. 2 GS/s	Max. 2 GS/s	Max. 2 GS/s	Max. 2 GS/s
Built-in	MDO-2000A : Spectrum Analyzer MDO-2000AG : Spectrum Analyzer, Dual Channel 25MHz Arbitrary Waveform Generator					

MDO-2000A is an advanced version of MDO-2000E. The selectable bandwidth range is upgraded to 300MHz. The full bandwidth ranges include 300MHz, 200MHz and 100MHz. The sampling rate has upgraded to Max. 2GSa/s and the memory depth has also been upgraded to 20M/CH. Hence, the three major specifications of oscilloscopes have been improved. The new models of the series feature 2 channels including MDO-2000A and MDO-2000AG. The entire series offers the functions of oscilloscope and spectrum analyzer. On top of that, MDO-2000AG features a dual-channel 25MHz arbitrary waveform generator. The new generation MDO-2000A series provides better sampling rate and memory depth for users to obtain more realistic signal integrity and higher bandwidth selections meet the measurement requirements of higher frequencies.

In addition to advanced oscilloscope specifications, the MDO-2000A series is also a dual-domain test platform. For frequency domain analysis, the spectrum analyzer measurement mode is provided to allow users to have frequency domain analysis with higher resolution. The FFT operation on the oscilloscope is limited by the horizontal level setting (sampling rate), and most oscilloscopes only provide 1k FFT points, so users often cannot get the correct frequency domain display. The frequency domain provided by MDO-2000A has an operation interface the same as the general spectrum analyzer. Its fast frequency domain update is like a real time spectrum analyzer. While operating the spectrum analyzer of MDO-2000A, users can input Center frequency, Span, Start Frequency, and Stop frequency based upon test requirements so as to rapidly and intuitively observe required frequency range that allows users to experience the user interface of a real spectrum analyzer. While observing frequency domain display, engineers can observe waveform characteristics, which are not easily to be seen from time domain waveforms, for instance, the harmonic composition of a waveform and the frequency characteristics of a modulation signal.

The figure on the right shows why the resolution of the spectrum analysis is better than that of the FFT of the general oscilloscope. Therefore, using the frequency domain signal of the spectrum analysis, the frequency domain peaks and the components of each composition can be correctly captured, which is impossible for the general FFT. Conventional DSO's FFT always calculates the entire signal bandwidth up to half the sampling rate (fs). However, the insufficient calculation capability can't conduct FFT calculation with more points. Users can't have the signal's detailed frequency information due to the insufficient frequency resolution from the calculation result. Whereas MDO-2000A analyzes signal spectrum of interest. The start frequency and stop frequency of the spectrum analyzer can be selected according to the characteristics of the test signal, so that the frequency domain signal can be displayed on the screen. Compared with oscilloscope' FFT, the MDO-2000A series allows engineers to effectively conduct signal measurements on frequency domain. Right illustration shows the conventional DSO's FFT (above figure) VS. MDO-2000A's Spectrum analyzer (below figure).



MDO-2000A's spectrum analyzer's frequency measurement range is from DC to 1GHz, which can meet the requirements of the low frequency test of audio and vibration. The general spectrum analyzer cannot measure the signals below 9kHz. The highest frequency of 1GHz is shown on the right. MDO-2000A uses a BNC Cable to connect to the RF Signal Generator to obtain the maximum 1GHz signal frequency. Although the 1GHz signal has attenuated in the time domain, the input signal can still be obtained in the frequency domain.

The spectrum analyzer of MDO-2000A can automatically adjust to the most appropriate sample rate according to users' input frequency range. The required data for calculation is also from the same sampling. By the tremendous calculation efficiency of Zynq SoC, a large amount of calculation can be done in a very short period of time. Therefore, MDO-2000A can complete a spectrum faster than a conventional spectrum analyzer. The screen display on the right shows the spectrum results of MDO-2000A's spectrum analyzer of FSK signal. The parameters of FSK signal: 500mVpp sine wave, fmax: 18.2MHz, fmin: 10.0MHz, bit rate: 10.0Mbit. Users can directly input Center and Span frequency by an intuitive and swift setting. Fmax and fmin can be clearly identified from the screen display.

When the same signal is tested by FFT (the right display was the result tested by Keysight DSOX2004A), most users do not know the correlation between the sampling rate of the time domain signal and the frequency of the DUT signal, so the FFT waveform display is not easy to adjust correctly. The slow update, time domain waveform overlapping with the frequency domain waveform, and most DSOs do not provide the search function together make it impossible to clearly analyze the frequency domain waveform and simultaneously measure the components of more than two modulated signals. FFT without RBW setting does not allow users to adjust the output waveform with the best resolution according to the characteristics of the actual waveform.

MDO-2000A's Spectrum Analyzer also includes Spectrum Trace Type settings (Normal, Max-hold, Min-hold, and Average). Users can freely select various Spectrum Traces for simultaneous display. Detection method (Sample, +Peak, -Peak, and Average) can be individually set for each Trace. Additionally, users, via Cursor, can manually mark the corresponding positions to reflect frequency and Amplitude. The Search function can also be applied to log spectrum's Peak Table. Amplitude is displayed with dB and Marker can obtain measurement data. Display on the right is a FM signal's spectrum.

Users can use the Search function to search and mark several amplitudes and frequencies. Search methods include Max, peak and threshold. Measurement results can be displayed and saved.

The display on the right shows the frequency domain display of the AM signal. Via the Search function, users can easily capture more than two spectral components.

A 120,000wfm/s WAVEFORM UPDATE RATE AND VPO WAVEFORM DISPLAY TECHNOLOGY

The MDO-3000A series oscilloscope allows users to easily and completely observe in-call signals and rare transient waveforms to increase waveform debugging efficiency by using features, including advanced VPO (Visual Persistence Oscilloscope) signal processing technology, waveform update rate as high as 120,000 wfm/s, and multi-layered afterglow display to enhance waveform display efficiency. Oscilloscope with VPO technology displays signals with three dimensional waveforms constructed to amplitude, time and signal strength to show each waveform point. 256 color gradients yield clear waveform changes. Comparing with the conventional digital storage oscilloscope, the MDO-3000A series provides more natural and more genuine signal display effect which is very close to the original analog signal.

B SUPPORT I²C, UART, CAN, LIN BUS TRIGGER AND DECODING FUNCTIONS

The serial bus technology has been widely applied in the present embedded application design. The IoT devices connecting sensors and the peripheral components are using serial bus such as UART, I²C. To rapidly and correctly trigger and analyze serial bus data has posed a difficult challenge to engineers. The MDO-3000A series provides serial bus analysis function with 20M long memory depth. Users can trigger, decode, and analyze frequently used I²C and UART serial bus and CAN/LIN bus, which is often used by automotive communications.

C WAVEFORM SEARCH FUNCTION

Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, hollow inverted triangles will show the location met the trigger condition. The upper left-hand corner Overall will show the total number of waveforms met the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and Bus. When the trigger condition is met, hollow inverted triangles will appear. Users can save all results to compare with the next input signal. The front panel of the MDO-3000A series controls waveform zoom out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save results for rapid comparison and analysis.

D DATA LOG FUNCTION

Users, via the data log function, can observe waveform changes in long periods of time to ensure product reliability or measure sporadically appeared signals. The data log function, based on the requirements, can set record time and interval. Record time can be selected from 1 minutes to 1000 hours, and record interval is 2 seconds, the minimum. Waveform type for record data and CSV file format for each channel can also be selected. Data can be stored in USB drive, the MDO-3000A series or the remote computer via LAN.

E SEGMENTED MEMORY FUNCTION

Users Can Select "Analyze Segments" to Conveniently Obtain The Analysis Results.

To achieve the most ideal application for memory depth, the MDO-3000A series has the built-in segmented memory function. The segmented memory function allows users to select the desired important signals for observation. Hence, insignificant signals can be neglected and serial bus decoding pulse or invalid signals can be identified when reviewing signals.

The segmented memory function of the MDO-3000A series allows users to select the number of sections. The maximum sections can be selected are 20,808. After activating the function, users can select and observe waveform for each segment by turning the Variable knob. The ultimate application of memory depth, therefore, is completely realized.

F MASK FUNCTION

The MDO-3000A series provides the Mask function, which allows users to apply Auto Mask and user-defined Mask to determine whether the quality of the product meets the regulation. Via user-defined mask, users can set up to 8 areas and each area is up to 10 points to meet test requirements. Users can also refer to the samples from user manual to edit Mask by the PC to satisfy all test needs. By setting Save On, users can log and monitor signals, which violate test conditions.

G 25MHz DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR

* MDO-3000AC only

With respect to signal source, MDO-3000AC features a built-in dual channel 25MHz arbitrary waveform generator with modulation capability and also provides 14 bits vertical resolution, sample rate of 200MSa/s, 13 output waveforms (Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac) and AM/FM/PSK modulation and sweep function. The friendly user interface is the ideal choice for education and applications such as circuit simulation tests. Arbitrary waveform generator provides users with 16k memory length. The arbitrary waveform can be edited through the PC software, and the edited arbitrary waveform (CSV file) can be recalled by the AWG function.

H PROVIDE FREQUENCY RESPONSE ANALYSIS (FRA) FUNCTION

* MDO-3000AC only

FRA (bode plot) has a very wide application range, including product circuit and component performance verification and analysis, such as negative feedback networks of switch mode power supplies design (loop response), feedback of circuit design, filter design, amplifier design, resonant circuit design, cable frequency response and signal transformer performance etc. The diagram above is a RC high pass filter. The -3dB cut off frequency= 1.06kHz(R=1Ω*MΩ*1°C) and the measurement result is 1.1kHz which is quite close to the theoretical value. The frequency test range of FRA and the max. 50 points per decade of test point are higher than that of Keysight InfiniiVision 3000T's option. More points per decade allow users to get higher accurate test results.

200/100/70MHz Mixed-domain Oscilloscope

MDO-2000E Series (200/100/70 MHz)

FEATURES

- 200/100/70MHz Bandwidth Selections
- 2 or 4 Channels
- Real Time Sample Rate Per Channel: 1GSa/s (2 Channel Models); Maximum Real Time Sample Rate: 1 GSa/s (4 Channel Models)
- MDO-2000EG: Equips with a Spectrum Analyzer and a Dual-Channel 25MHz AWG
- MDO-2000EX: Equips with a Spectrum Analyzer and a Dual-Channel 25MHz AWG, DMM and Power Supply
- Per Channel 10M Memory Depth and VPO Waveform Display Technology
- Waveform Update Rate up to 120,000 wfm/s
- 8.1" WVGA TFT LCD
- Fast Frequency Response Analysis Software
- Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
- High Pass, Low Pass and Band Pass Filter Functions
- 20,000 Segmented Memory Sessions and Waveform Search Functions
- I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- Data Log Function is Able to Track Signal Changes up to 1000 Hours
- Mask Test Function
- Network Storage Function
- True RMS Measurement in DMM Function

SPECIFICATIONS

MDO-2072E(G,X) MDO-2074E(G,X) MDO-2102E(G,X) MDO-2104E(G,X) MDO-2202E(G,X) MDO-2204E(G,X)

VERTICAL SENSITIVITY						
Channels	2CH (CH1 CH2)	4CH	2CH (CH1 CH2)	4CH	2CH (CH1 CH2)	4CH
Bandwidth Calculated Rise Time Bandwidth Limit	DC~70MHz(-3dB) 5ns 20MHz		DC~100MHz(-3dB) 3.5ns 20MHz		DC~200MHz(-3dB) 1.75ns 20MHz/100MHz	
Vertical Resolution Input Coupling Input Impedance DC Gain Accuracy Polarity Maximum Input Voltage Offset Position Range Waveform Signal Process	8 bits (with HD: 12 bits) AC, DC, GND 1MΩ ±1% // 16pF approx. ±2% (when Sensitivity ≥ 5mV/div or zoomed in vertical; ±3% when 2mV/div is selected) Normal/Inverted 300Vrms, CAT I 2mV/div ~ 20mV/div: ±0.5 div; 20mV/div ~ 200mV/div: ±10 div; 200mV/div ~ 2V/div: ±100 div; 2V/div ~ 10V/div: ±200 div Envelope, Average, Peak Detect, Hi Resolution FIR (Finite Impulse Response)					
TRIGGER						
Modes Trigger Holdoff Trigger Type Trigger Holdoff Range Coupling Sensitivity	Auto (Supports Roll Mode for 40 ms/div and slower), Normal, Single Sequence Edge, Pulse Width, Slope, Video, Pulse Train, Bus (I²C, SPI, CAN, LIN, FlexRay), Alternate, Time-out, Runt, Logic 1ns ~ 10s AC, DC, LF rej., HF rej., Noise rej. 1div					
EXT TRIGGER						
Range Sensitivity Input Impedance	±10V DC ~ 100MHz: 0.2pp; 100mV/div; 100MHz ~ 200MHz: 0.3pp; 100mV 1MΩ ±3%, ~16pF					
HORIZONTAL						
Time Base Range Fine Trigger Pre-trigger Time Base Accuracy Real Time Sample Rate Record Length Acquisition Mode Roll Mode Average	1ns/div ~ 10s/div (1-2-5 increments); 40ns ~ 10s/div (MDO-2000E) 10 div adjustable 2,000,000 div maximum ±10 ppm over any ≥1 ms time interval Max. 1GSa/s and variable (not for channel 1 GSa/s (2ch model)) 1.25kpts/Ch Sample, Average, Peak Detect, Single Yes (optional) Selectable from 2 to 256					
X-Y MODE						
X-Axis Input Y-Axis Input Phase Shift	Channel 1, Channel 2 (2 CH model only) Channel 3, Channel 4 (4 CH model only) ±3° at 100kHz					
CURSOR AND MEASUREMENT						
Cursors Automatic Measurement	Amplitude, Area, Cycle Area, Cycle RMS, Delay, Fall Time, Frequency, High, Low, Maximum, Mean, Minimum, Negative Duty Cycle, Negative Pulse Width, Peak-to-Peak, Period, Positive Duty Cycle, Positive Pulse Width, Rise Time, RMS, Positive Overshoot, Negative Overshoot, Area, Cycle Area, Burst Width, Phase, Positive Edge Count, Negative Edge Count, Pulse Count, Positive Pulse Count, Negative Pulse Count, Logic Pattern Count, Logic Pattern Width, Logic Pattern Delay, Logic Pattern Setup Time, Logic Pattern Hold Time, Logic Pattern Period, Logic Pattern Duty Cycle, Logic Pattern Frequency, Logic Pattern Phase					
CONTROL PANEL FUNCTION						
Auto Counter Autoset Save Setup Save Waveform	5 digits, range from 1 to 10 counts to 1 to 1 billion counts Single button, automatic setup of all channels for viewing, horizontal and trigger systems, with undo Autoset 20 sets 10 sets					
DISPLAY SYSTEM						
TFT LCD Type Display Resolution Interpolation Waveform Display Waveform Update Rate Display mode Display Dot Styles	8" TFT LCD WVGA color display 800 horizontal x 480 vertical pixels (WVGA) Sin(x)/x Dots, Vectors, Variable persistence, Infinite persistence 120,000 waveforms per second, maximum YT, XY 8 x 10 divisions					
INTERFACE						
USB Host Ethernet (RJ-45) Aux Output - DMM Trigger Out (Aux Out)	1 USB 2.0 High-Speed host port x 1, USB 2.0 High-Speed device port x 1 10/100 BASE-TX, MDI/MDIX with LXI class C 5V, 450mA Multi-level Collector output Pass/Fail, Mask Test, Trigger, Arm, Auxiliary, Line, Command					
SPECTRUM ANALYZER SPECIFICATIONS						
Frequency Range Span Resolution Bandwidth Reference Level Vertical Units Vertical Position Vertical Scale Display Range (dB/div) Spurious Response Frequency Accuracy Detection Methods FFT Windows	DC ~ 200MHz (MDO-2202E); 100MHz (MDO-2102E); 70MHz (MDO-2072E) 50Hz ~ 100MHz (MDO-2202E) 1Hz ~ 100kHz (MDO-2202E) -20 dBm to +10dBm in steps of 1dBm dBm, dBmV, dBuV, dBmA, dBuA, dBm -10div to +10div 1dB/div to 20dB/div in a 1, 2, 5 sequence 1div ~ 10dB/div, Avg: 1 ~ 10dB/div; 1div ~ 20dB/div, Avg: 1 ~ 20dB/div; 1div ~ 50dB/div, Avg: 1 ~ 50dB/div -50dBc (Input Level at -20dBm, Second harmonic distortion) ±(Marker Frequency x Frequency Reference + 10% of Span + 2% of RBW + 1 Hz) Normal, Envelope, Average (2 ~ 256) Sample, Peak, Average FFT Center, Hamming, Hanning, Rectangular, Blackman-Harris, Flat Top					
ARB SPECIFICATIONS						
Channels Sample Rate Vertical Resolution Max. Frequency Waveforms Output Range Output Resolution Output Accuracy Offset Range Offset Resolution Sine Square/Pulse Ramp	2 200 MS/s 14 bits 25 MHz Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential fall, Haversine, Cardiac 20 mVpp to 5 Vpp, High-Z; 10 mVpp to 2.5 Vpp, 50Ω 12 bit 1% (1 kHz) ±2.5 V into High-Z; ±1.25 V into 50Ω 1mV Frequency Range: 100mHz ~ 25MHz; Resolution: 100μHz; 14 bits; 1mHz; 15 bits; 10mHz; 16 bits; 100mHz; 17 bits Harmonic Distortion: -40dBc, 100kHz (Nyquist Bandwidth); -40dBc, 100 kHz (Full Bandwidth); 1% (0.05 - 40)% Frequency Range: 100mHz ~ 10MHz; Duty Cycle Range: 1ns ~ Overload; ±1%; Duty cycle Jitter: 0.2% + 500ps; 0.4% ~ 99.6%; Rise / Fall Time: 10ns ~ 10s; Jitter: 500ps Frequency Range: 100mHz ~ 1MHz; Linearity: 1%; Symmetry: 0 ~ 100%					

MDO-2000E Series

Rear Panel

SPECIFICATIONS

	MDO-2072E(C,D) MDO-2074E(C,D) MDO-2102E(C,D) MDO-2104E(C,D) MDO-2202E(C,D) MDO-2204E(C,D)
FREQUENCY RESPONSE ANALYSIS	
Dynamic Range	>80 dB (typical)
Input and Output Source	Channel1 or 2 (2 or 4 for four channel model)
Frequency Range	20 Hz to 25 MHz
Number of the Points	10 to 80 points per decade
Sort of Sweeps	An cycle by 5 type sine (high-2 fixed amplitude across entire sweep
Test Results	Logarithmic overlaid gain and phase plot
Marker Measurements	Two pairs of tracking gain and phase markers
Pass Masking	Auto create/driving area
DMM SPECIFICATIONS (MDO-2000E only)	
Digit Level	5,000 counts (DC, 4 digit/sec, DC+AC 6 digit/sec)
DC Voltage	100mV, 1000mV, DC 30V, 1000V, 1500V Accuracy
Accuracy	100mV, 1000mV, DC 30V, 1000V, 1500V ±(0.5% reading + 5 digits)
Input Impedance	10MΩ
DC Current	10mA, 100mA, 10A 3 ranges
Accuracy	10mA, 100mA (0.5% reading+0.05mA), 10A (0.8% reading + 30mA)
AC Voltage	100mV, 1000mV, DC 30V, 1000V ±(1.5% reading + 10 digits) at 60Hz~1kHz
	* Input impedance greater than 8.4% of the full scale reading.
AC Current	10mA, 100mA, 10A 3 ranges
Accuracy	10mA, 100mA, ±(1.0% reading +100Hz typ) 30Hz~1kHz, 10A ±(1.0% reading + 40Hz) at 30Hz~1kHz
	* Measure range: >10mA
Resistance	MDO-2072, 2074, 2102, 2104: 1MΩ, 2 ranges
Accuracy	MDO-2072, 2074, 2102, 2104: ±(0.5% reading + 5 digits), 1MΩ: ±(2.0% reading + 5 digits)
POWER SUPPLY SPECIFICATIONS (MDO-2000E only)	
Output Channel	CH1 & CH2
Output Voltage Range	+2V~+32V
Output Current(Max)	1A
Voltage Step	0.01V (continuously Adjustable)
Digital Voltage Accuracy	±1%
Ripple and Noise	350mVrms
POWER SOURCE (MDO-2000E only)	
Line Voltage Range	AC 100V ~ 240V 50Hz ~ 60Hz, auto selection
Multi-language Menu	9 countries
On-Line Help	English
Time Clock	Time and date, provide the date/time for saved data
Operator Environment	Temperature: 0°C to 40°C (Derating at output); Humidity: 20% to 80% at 30°C (Non-condensing); Altitude: 3000m
DIMENSIONS & WEIGHT	
	184.2(H) x 286(W) x 111.3(D) mm, Approx. 3 kg

Note: *Performance warranty, excluding probes & 1/10 display panel.

ORDERING INFORMATION

MDO-2204E(C,D) 200MHz,4 Channel Digital Storage Oscilloscope,Spectrum analysis,dual channel 250kHz AWG

MDO-2202E(C,D) 200MHz,2 Channel Digital Storage Oscilloscope,Spectrum analysis,dual channel 250kHz AWG

MDO-2104E(C,D) 100MHz,4 Channel Digital Storage Oscilloscope,Spectrum analysis,dual channel 250kHz AWG

MDO-2102E(C,D) 100MHz,2 Channel Digital Storage Oscilloscope,Spectrum analysis,dual channel 250kHz AWG

MDO-2074E(C,D) 70MHz,4 Channel Digital Storage Oscilloscope,Spectrum analysis,dual channel 250kHz AWG

MDO-2072E(C,D) 70MHz,2 Channel Digital Storage Oscilloscope,Spectrum analysis,dual channel 250kHz AWG

* "D" suffix is 7.0" touch screen model, "C" suffix is 10.1" touch screen model.

- ACCESSORIES

User manual: CD x 1, Power cord x 1, USB cable x 1, CTL-18A Alligator Clip, 100:1 x 1

(only on MDO-2000E), CTL-30A Banana plug test lead (only on MDO-2000E)

CTP-8250-4	250MHz/8.5 pF, 2.5 meter active passive probe for MDO-2072E,2074E,2102E,2104E (4) (one per channel)
CTP-1000-4	1GHz/0.5pF, 1.5 meter active passive probe for MDO-2202E,2204E (4) (one per channel)
CTP-2000-4	2GHz/0.5pF, 1.5 meter active passive probe for MDO-2202E,2204E (4) (one per channel)

OPTIONAL ACCESSORIES

CBA-430	BNC-4(BNC Plug)	CCP-500	500 MHz/50A Current probe
CHK-004	50Ω Impedance Adapter	CCP-030	30MHz/150A Current probe
CTL-340	BNC Cable, USB 2.0, A-B Type, 3.0Meter	CCP-100	100MHz/20A Current probe
CTL-30A	Terminal set probe adapter with Banana plug (5 pcs)	CCP-1000	1MHz/700A Current probe
		CCP-5000	5 MHz/700A Current probe
QDP-805	25MHz High voltage differential probe	CCP-500P	Power supply for current probe (2 input channel)
QDP-850	50MHz High voltage differential probe	CCP-435P	Current Probe - Power Supply (4 Channel Power Supply for CCP-030/100)
QDP-1000	100MHz High voltage differential probe		
ESC-001	Soft Carrying Case	CTP-035A	Oscilloscope Probe 350MHz 1/1 Passive Probe 800 (P/M)

FREE DOWNLOADS

PC Software	OpenWave Scope	Driver	USB driver, LabView Driver

A. 1000wfm/s WAVEform Update Rate and Visual Persistence Technology

The MDO-2000E series oscilloscope allows users to easily and completely observe unusual signals and rare transient waveforms to increase waveform debugging efficiency by using features, including advanced VPO (Visual Persistence Oscilloscope) signal processing technology, waveform update rate as high as 1,000,000 wfm/s, and multi-layered afterglow display to enhance waveform display efficiency. Oscilloscope with VPO technology displays signals with three dimensional waveforms constructed by amplitude, time and signal strength to show each waveform point. 256 color gradients yield clear waveform changes. Comparing with the conventional digital storage oscilloscope, the MDO-2000E series provides more natural and more genuine signal display effect which is very close to the original analog signal.

B. Support I²C/SPI/UART/CAN/LIN/I²S Trigger and Decoding Functions

The serial bus technology has been widely applied in the present embedded application design. The IoT devices connecting sensors and the peripheral components are using serial bus such as UART, I²C, and SPI. To rapidly and correctly trigger and analyze serial bus data has posed a difficult challenge to engineers. The MDO-2000E series provides serial bus analysis function with 10M long memory depth. Users can trigger, decode, and analyze frequently used I²C, SPI and UART serial bus and CAN/LIN bus, which is often used by automotive communications.

C. Waveform Search Function

Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, hollow inverted triangles will show the location that the trigger condition. The upper left hand corner Overall will show the total number of waveforms that the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and Bus. When the trigger condition is met, hollow inverted triangles will appear. Users can save all marks to compare with the next input signal. The front panel of the MDO-2000E series controls waveform zoom out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save marks for rapid comparison and analysis.

D. Data Log Function

Users, via the data log function, can observe waveform changes in long periods of time to ensure product reliability or measure sporadically appeared signals. The data log function, based on the requirements, can set record time and interval. Record time can be selected from 1 minutes to 1000 hours, and record interval is 1 seconds, the minimum. Waveform type for record data and CSV file format for each channel can also be selected. Data can be stored in USB drive, the MDO-2000E series or the remote computer via LAN.

E. Mask Function

The MDO-2000E series provides the Mask function, which allows users to apply Auto Mask and user-defined Mask to determine whether the quality of the product meets the regulation. Via user-defined mask, users can set up to 8 areas and each area is up to 10 points to meet test requirements. Users can also refer to the examples from user manual to edit Mask by the PC to satisfy all test needs. By setting Save On, users can log and monitor signals, which violate test conditions.

B SEGMENTED MEMORY FUNCTION

Users Can Select "Analyze Segments" to Conveniently Obtain The Analysis Results.

To achieve the most ideal application for memory depth, the MDO-2000E series has the built-in segmented memory function. The segmented memory function allows users to select the desired important signals for observation. Hence, insignificant signals can be neglected and serial bus decoding, pulse or inrush signals can be identified when retrieving signals. The segmented memory function of the MDO-2000E series allows users to select the number of sections. The maximum sections can be selected are 19,000. After activating the function, users can select and observe waveform for each segment by turning the Variable knob. The ultimate application of memory depth, therefore, is completely realized.

C 25MHz DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR

With respect to signal source, MDO-2000E features a built-in dual channel 25MHz arbitrary waveform generator with modulation capability and also provides 14 bits vertical resolution, sample rate of 100MSa/s, 13 output waveforms (Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac), and AM/FM/FSK modulation and sweep function. The friendly user interface is the ideal choice for education and applications such as circuit simulation tests. Arbitrary waveform generator provides users with 16k memory length. Users can upload basic waveforms, including Sine, Square, Pulse, Ramp, and Noise to edit arbitrary waveforms. Normal and Function Edit can edit waveforms. The edited waveforms can be saved as UWW file for data access.

D POWER SUPPLY AND DMM FUNCTIONS (MDO-2000EX only)

MDO-3000EX has expanded its capabilities by incorporating a 5,000 count DMM and a 3V/1A power supply. DMM provides tests for ACV, DCV, ACA, DCA resistance, diode and temperature. The highly accurate DMM can strengthen DSO's capabilities of voltage and current measurement accuracy. Power supply provides 3V/1A, 6.1V incremental adjustment which can supply power for the development board and IoT (Internet of Things) module of the often used 8051/Arduino/ESP8266/MSP430 i.e. Microprocessors and Micro-controllers experiment courses. For education and digital circuit tests, it can satisfy the voltage input requirements of 3V or 5.3V. Each increment is 0.1V and over load protection is available.

200/100/70MHz Digital Storage Oscilloscope

GDS-2000E Series (200/100/70 MHz)

FEATURES

- 200/100/70MHz Bandwidth
- Sampling Rate : Max. 1GSa/s (Ish Model); Per Channel 1GSa/s (Ich Model)
- 10M/CH Memory Depth and VPO Waveform Display Technology
- Waveform Update Rate of 120,000 wfms/s
- 8 " 800 x 480 TFT LCD Display
- Max. 1M pts of TFT to Get Higher Resolution in Frequency Domain
- Digital Filter Function
- Segmented Memory and Waveform Search Functions
- I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Function
- Data Log Function for Waveform Observation in Long Periods of Time
- Network Storage Function

SPECIFICATIONS

VERTICAL SYSTEM

	GDS-2072E	GDS-2074E	GDS-2102E	GDS-2104E	GDS-2202E	GDS-2204E
Channels	2Ch+EXT	4Ch	2Ch+EXT	4Ch	2Ch+EXT	4Ch
Bandwidth	DC~70MHz(-3dB)		DC~100MHz(-3dB)		DC~200MHz(-3dB)	
Calculated Rise Time	5 ns		3.5 ns		1.75 ns	
Bandwidth Limit	20MHz		20MHz		20M/100MHz	
Vertical Resolution	8 bits ; 1mV ~ 10V/div					
Input Coupling	AC, DC, GND					
Input Impedance	1M Ω ± 1% , 16pF approx.					
DC Gain Accuracy	±3% when 2mV/div or greater is selected ; ±5% when 1 mV/div is selected					
Polarity	Normal & Invert					
Maximum Input Voltage	300Vrms , CAT I (300Vrms CAT II with GTP-070B-4/100S-4/200B-4, 10 : 1 probe)					
Offset Position Range	1mV/div ~ 20mV/div : ±0.5V ; 20mV/div ~ 200mV/div : ±10V ; 200mV/div ~ 2V/div : ±125V ; 2V/div ~ 10V/div : ±100V					
Waveform Signal Process	+, -, ×, ÷ , FFT , FFTrms , User-defined expressions FFT : Magn. ; FFT : Spectral magnitude. See FFT Vertical Scale in Linear RMS or dBV RMS. FFT Window Displays : Rectangular, Hamming , Hanning, Blackman-Harris					

TRIGGER

Source	CH1, CH2, CH3, CH4, Line, EXT, *=dual channel models only
Trigger Mode	Auto (Supports RUN Mode for 1.00 ms/div and slower), Normal, Single Sequence
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay(1~10,000 events) , Time-Delay(Duration:4ns~1.5s), Bus
Trigger Holdoff Range	4ns ~ 1s
Coupling	AC, DC, LFrej , HFrej , Noise rej
Sensitivity	1div

EXT TRIGGER

Range	±15V
Sensitivity	DC ~ 100MHz : Approx. 100mV 100MHz ~ 200MHz: Approx. 300mV
Input Impedance	1M Ω ±2%, ~16pF

HORIZONTAL

Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); ROLL : 100ms/div ~ 100s/div
Pre-trigger	10 div maximum
Post-trigger	1,000,000 div maximum
Time Base Accuracy	±20 ppm over any ≥1 ms time interval
Real Time Sample Rate	Max. : 1GSa/s (4ch model); Per channel 1GSa/s (2ch mode)
Record Length	Max. : 20Mpts
Acquisition Mode	Normal, Average, Peak Detect, Single
Peak Detection	2ns (typical)
Average	Selectable from 2 to 256

EXT MODE

1 MΩ Input	Channel 1 , Channel 3* (* : four channel models only)
1 MΩ Input	Channel 2 , Channel 4* (* : four channel models only)
Phase Shift	±2° at 100kHz

CURSORS AND MEASUREMENT

Cursors	Amplitude, Time, Ratio(Available Unit : Second(S), Hz(1/S), Phase (Degree), Ratio (%)
Automatic Measurement	30 sets: Hi-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, Rise Time, Fall Time, Width, Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase
Control Panel Functions	Cursors measurement
Auto Counter	6-digit counter from 2Hz minimum to the rated bandwidth
Autoset	Single button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset
Save Setups	20set
Save Waveforms	20set

DISPLAY SYSTEM

TFT LCD Type	8 " TFT, LCD WVGA color display
Display Resolution	480 horizontal x 480 vertical pixels (WVGA)
Interpolation	Sin(x)/x
Waveform Display	Dots, Vectors, Variable persistence(1ms~10s), Infinite persistence
Waveform Update Rate	120,000 waveforms per second, maximum
Display Mode	YT , XY
Display Graticule	8 x 10 divisions

INTERFACE

USB Port	USB 2.0 Full-speed Host port x 1, USB High-speed 2.0 device port x 1
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX
CAL/PASS/FAIL BNC	5V Max/10mA open collector output
Kensington Style Lock	Use panel security slot connects to standard Kensington cable lock

POWER SOURCE/MISCELLANEOUS

Line Voltage Range	6C 100V ~ 240V, 50Hz ~ 60Hz, auto selection
Multi-Language Menu	Available
On-Line Help	Available
Time clock	Time and date, provide the date/time for saved data
Operation Environment	Temperature: 0°C to 40°C, Relative Humidity: <80%, 40°C or below < 45%, 41°C ~ 50°C

DIMENSIONS & WEIGHT

(W) 260 x (H) 135 x (D) 130 mm, Approx. 2.3 kg

GDS-2000E Series

Rear Panel

ORDERING INFORMATION

GDS-2304E	300MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2302E	300MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2104E	100MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2102E	100MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2074E	70MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2072E	70MHz, 2-Channel, Digital Storage Oscilloscope

Accessories:
User manual: CD x 1, Power cord x 1
CPV-070-1 : 70MHz(10:1/1:1) Switchable passive probe for GDS-2072E/2074E(one per channel)
CPV-100-1 : 100MHz(10:1/1:1) Switchable passive probe for GDS-2102E/2104E(one per channel)
CPV-200-1 : 200MHz(10:1/1:1) Switchable passive probe for GDS-2202E/2204E(one per channel)

OPTIONAL ACCESSORIES	
GRA-406	Rack Adapter Panel
GAR-001	USB-LAN Gender-to-Adapter
GSC-008	Soft-Carrying Case
CTL-246	USB Cable, USB 2.0, A-B Type, 1830mm
GCP-201	30MHz/100A Current probe
GCP-530	50MHz/50A Current probe
GCP-565	100KHz/150A Current probe
GCP-1030	120MHz/30A Current probe
GCP-1000	10MHz/70A Current probe
GCP-2000P	Power supply for current probe (2 input channel)
GCP-400P	Power supply for current probe (4 input channel)
GTP-030A	Oscilloscope Probe, 35MHz 1:1 Passive Probe, 30V(CAT II)
GDP-025	25MHz High voltage differential probe
GDP-050	50MHz High voltage differential probe
GDP-100	100MHz High voltage differential probe

FREE DOWNLOAD	
PC Software	Openlink software
Driver	USB driver / LabVIEW driver

GDB-03 Oscilloscope Education and Training Kit

For GDS-1000/2000A/2000E/3000 Series
MSO-2000E Series/MSO-2000A/4000E Series

200/100/70 MHz Digital Storage Oscilloscope

GDS-200 Series
(200/100/70 MHz)

GDS-300 Series
(200/100/70 MHz)

The portable 7" full touch panel capacitive LCD, featuring multi-point touch panel method which allows engineers to move waveform positions, adjust waveform size, and set trigger conditions easily, subverts the traditional handheld instrument. With this unique feature, engineers can retrieve DUT's signals easily under the complex working environment. Landscape or portrait measurement display not only clearly shows waveforms under full screen status but also combines multi-functional measurement environment to achieve unimaginable measurement results.

Built in, the second to none, the longest bit sample memory depth helps engineers diagnose waveforms in great details. The long memory depth can record detailed waveform data and help engineers reproduce the original waveforms while engineers are conducting long observation or retrieving detailed transient signals. Any delicate changes of analog waveforms can be clearly presented in front of engineers when they adjust time scale from long to short that leaves no measurement problems unanswered.

Built in 50,000 counts (GDS-300) or 1,000 counts (GDS-200) DMM helps engineers accurately measure DUT's electric parameters including not only measurements of D.C. voltage, A.C. voltage, D.C. current, A.C. current, resistance and diode polarity, but also temperature measurement and monitoring. The analysis of trend diagram further completes test and measurement. DMM can simultaneously work with oscilloscope to conduct multi-measurement tasks.

Normally, engineers wish to effectively record intermittent signals while retrieving a series of signals during a long period of time. GDS-300/GDS-200's built-in 30,000 consecutive waveform records logging function not only records 30,000 waveform records in a long period of time but also replays the recorded data that allows engineers to identify intermittent problems occurred during the recorded time. Leave no problems undefined.

Engineers need to isolate power and solve corresponding grounding issue while conducting circuit debugging. One of the criteria engineers must overcome is to maintain system grounding and isolation safety in the circuit test and measurement environment such as no grounding system or no isolation. GDS-300/200 provide optional differential probe to effectively assist engineers in solving isolation and grounding problem that ensures the efficiency and safety of test and measurement.

Engineers often need to use calculation tool software to conduct circuit design and debugging analysis during the R&D process. GDS-300/200 oscilloscopes, with the built-in standard engineering calculator, allow engineers to verify parameters during the test and measurement process. While using unknown resistance, engineers can obtain resistance value via color coding calculation software. If any attenuator was designed in the circuit, GDS-300/200 can also provide corresponding attenuator model and attenuation value calculation.

FEATURES

- 200/100/70MHz Bandwidth Selectable, Two Input Channels
- 1GSa/s Maximum Sample Rate
- Maximum 50k/10k Memory Depth Per Channel
- 7" 800 x 480 Full Touch Panel Capacitive LCD Multi-Point Control, Landscape and Portrait Display
- Built-In 50,000/1,000 Counts DMM
- Two RMS Measurement in DMM Function
- 30,000 Consecutive Waveform Records Logging Function, Replay Measurement Results Any Time
- Temperature Measurement and Logging Function
- Built-In Engineering Calculator, SMD Resistance Coding, Color Coding Info, and Attenuator Calculation Application Software
- Optional Differential Probe to Achieve Isolation Effect

GWS-001 Wrist Strap

	GDS-307	GDS-310	GDS-320	GDS-207	GDS-210	GDS-220
VERTICAL						
Channels	2 (BNC Input)					
Input Impedance	1MΩ±2%, 16.5pF approx.					
Maximum Input	CAT I 300Vrms					
Input Coupling	AC, DC, GND					
Bandwidth	DC-70MHz (-3dB)	DC-100MHz (-3dB)	DC-200MHz (-3dB)	DC-70MHz (-3dB)	DC-100MHz (-3dB)	DC-200MHz (-3dB)
Calculated Rise Time	5ns	3.5ns	1.75ns	5ns	3.5ns	1.75ns
Sensitivity	2mV/div~10V/div (1-2-5 increments)					
Accuracy	±(5% x Readout + 0.1 div + 1mV)					
Bandwidth Limit	20MHz(-3dB)					
Polarity	Normal, Invert					
Offset Position Range	2mV/div~50mV/div: ±2 div / More than 50mV/div~100mV/div: ±40 / 2mV/div~5V/div: ±400; 10V/div: ±200					
Waveform Signal Process	+, -, ×, ÷, FFT, 512pts					
SIGNAL ACQUISITION						
Real-time Sample Rate	1GSa/s					
Memory Depth	50k points per ch			10k points per ch		
Acquisition Mode	Average (2~256 waveforms), Peak detect (10ns resolution)					
Replay Mode	30,000 wfms					
TRIGGER						
Source	CH1 or CH2					
Trigger mode	Auto, Normal, Single, None					
Trigger type	Edge, Pulse Width, Video, Alternate					
Trigger Holdoff	10ns ~ 10s					
Coupling	AC, DC, LFR, HFR, NR					
Sensitivity	DC~20MHz: approx. 0.5div or 5mV; 20MHz~70/100/200MHz: approx. 1.5div or 15mV					
HORIZONTAL						
Range	5ns/div~100s/div (1-2-5 increments)					
Roll	100ms/div ~ 100s/div					
Pretrigger	10 div max.					
Posttrigger	1,000 div max (depend on time base)					
Accuracy	±50ppm over any ≥ 1ms time interval					
XY MODE						
Phase Shift	±3° at 100kHz					
CURSOR AND MEASUREMENT						
Cursors	Voltage difference between cursors (ΔV), Time difference between cursors (ΔT), Frequency measured (1/ΔT)					
Auto-measurement	30 sets					
Auto-counter Autoset	6 digits. Range: 2Hz to rated bandwidth					
TEMPERATURE MEASUREMENT						
	Available			Non-Available		

SPECIFICATIONS

	GDS-107	GDS-110	GDS-120	GDS-207	GDS-210	GDS-220
MISCELLANEOUS						
Multi-Language Menu	Available					
On-line Help	Available					
Time and Clock	Available					
BATTERY						
Battery-power	Li-ion/Polymer 6000mAh, 7.4V (Built-in)					
Charge time	3.5 hour (70%)					
Operation time	4 hour, depending on operating condition					
PROBE COMPENSATION						
	2V, 1kHz, 50% Duty cycle					
INTERFACE						
USB Internal Flash Disk	USB Device (Isolation) 128MB					
DISPLAY						
Type	7 inch					
Display Resolution	480 x 800 pixels					
Display Direction	Landscape & Portrait					
Backlight Control	Manual adjustable, LCC mode					
Touch Panel	Capacitive					
DMM						
Digit Level	18,000 counts			6,000 counts		
DC Voltage[1] Range Accuracy	1M Ω, 300Vrms CAT II, 600Vrms CAT I 300mV, 3V, 30V, 300V, 1000V, 4 ranges GDS-3251/3151/3071: 50mV, 500mV, 5V, 50V, 500V: ±(0.8%+0.1%); 1000V: ±(0.1%+0.1%) GDS-2251/2151/2071: 50mV, 500mV, 5V, 50V, 500V: ±(0.8%+0.1%); 1000V: ±(0.1%+0.1%) (23±5°C)					*Basic accuracy +0.1% per 10°C/18°F change
Input Impedance	10M Ω, 100pF					
DC Current Range Accuracy	50mA, 500mA, 10A, 5 ranges GDS-3251/3151/3071: 50mA, 500mA: ±(0.1%+0.1%); 10A: ±(2%+0.2%) GDS-2251/2151/2071: 50mA, 500mA: ±(0.2%+0.1%); 10A: ±(2%+0.2%)					
AC Voltage[2] Range Accuracy	300mV, 3V, 30V, 300V, 1000V, 5 ranges 300mV, 3V, 30V, 300V: ±(1.2%+1.5%) at 50Hz~1kHz					*Basic accuracy +0.1% per 10°C/18°F change
AC Current Range Accuracy	50mA, 500mA, 10A, 3 ranges 50mA, 500mA: ±(1.5%+0.1%) at 50Hz~1kHz; 10A: ±(2%+0.2%) at 50Hz~1kHz					
	*Includes current probe error					
RESISTANCE Range Accuracy	500Ω, 5kΩ, 50kΩ, 500kΩ, 5MΩ, 50MΩ, 5 ranges 500Ω, 5kΩ, 50kΩ, 500kΩ: ±(0.3%+0.3%); 5MΩ: ±(0.3%+0.5%); 50MΩ: ±(2.0%+0.5%)					*Basic accuracy +0.1% per 10°C/18°F change
Diode Test	Maximum forward voltage: 3.3V, Open voltage: 3.8V					
Temperature Range (thermocouple) Resolution Tolerance	-50°C ~ +1000°C 0.1°C K, E, J, N, R, S, T ±(1.0% of reading + 1.5°C)					*Not including the error of thermocouple probe
Continuity Beep	50Ω					
Functions	Auto Range, Max, Min, Hold, Trend plot					*Min/max hold, Relative, Auto range
POWER ADAPTOR						
Line Voltage	AC 100V~240V, 50~60Hz, Power Consumption 48W, DC Output: 12V/3A, Double Shield					
OPTION						
Differential Probe	Dual-channel, 40MHz, CAT II 600V					
DIMENSIONS & WEIGHT						
	348.2(W) x 180.0(H) x 99.1(D) mm, Approx. 1.5 kg					

ORDERING INFORMATION

GDS-320	200MHz, 2 Channels, Digital Storage Oscilloscope
GDS-310	100MHz, 2 Channels, Digital Storage Oscilloscope
GDS-307	70MHz, 2 Channels, Digital Storage Oscilloscope
GDS-220	200MHz, 2 Channels, Digital Storage Oscilloscope
GDS-210	100MHz, 2 Channels, Digital Storage Oscilloscope
GDS-207	70MHz, 2 Channels, Digital Storage Oscilloscope

ACCESSORIES			
User manual CD x 1			
GTP-150B-2	150MHz Probe; Suitable for GDS-307/207, GDS-210/110	GSC-010	Soft Carrying Case
GTP-250B-2	250MHz Probe; Suitable for GDS-320/220	GSC-011	Soft Carrying Bag
GTL-3076	Multimeter Test Lead x 1	GAP-001	AC-DC Adaptor
		GWT-001	Wrist Strap

Optional Accessories			
GDP-040D	40MHz Dual-Channel Differential Probe	GCC-007	Vertical Calibration Cable
GTL-019	USB Cable, USB 2.0, A-male to B Type, 1.48Meter	GPF-700	Protective Film for 7" Touch Screen
GTL-131	Test Lead, Suitable for GDP-040D	GTL-111	USB Cable, USB 2.0 A-male to B type, Approx. 1.48Meter
GTL-246	Test probe kit,one included with Channel cable (B type)		

Free Download	
OpenBox 300	Software

SELECTION GUIDE

MODEL	GDS-107	GDS-110	GDS-120	GDS-207	GDS-210	GDS-220
Bandwidth	70MHz	100MHz	200MHz	70MHz	100MHz	200MHz
Sample Rate	1GSa/s	1GSa/s	1GSa/s	1GSa/s	1GSa/s	1GSa/s
Memory Length	1M pts	1M pts	1M pts	1M pts	1M pts	1M pts
DMM Count	30,000	30,000	30,000	6,000	6,000	6,000
Temperature Measurement	✓	✓	✓	–	–	–

GDS-300 Series Rear Panel

GDS-200 Series Rear Panel

GSC-010 Soft Carrying Case

GSC-011 Soft Carrying Bag

GPF-700 Protective Films

GAP-001 AC-DC Adaptor

200/100/70/50MHz Digital Storage Oscilloscope

GDS-1000B Series

The GDS-1000B Series features four bandwidth selections: 200MHz, 100 MHz, 70 MHz, 50MHz and equips with analog signal input terminals by four or two channels. The maximum sampling rate for each single channel is 1GSa/s, and the memory depth is 16Mpts per channel independently. The GDS-1000B Series has a waveform update rate of 50,000wfms/s, which helps users to precisely observe the detailed waveform variation. Additionally, 7" WVGA color LCD display and the 256 color gradient display function together allow waveforms to be observed with the senses of transparency and gradation. With respect to the horizontal time scale adjustment knob and trigger level adjustment knob, GW Instek provides a very thoughtful design--the zoom key function, which allows engineers to work more effectively. For mathematical analysis mode, it helps FFT signal display makes the dull frequency domain signal analysis more delicate.

Moreover, the innovative exterior design and compact design also bring much convenience to users. Other diversified and charming GW's functional operation demonstrates the concept of complete technology integration.

FEATURES

- 200/100/70/50MHz Bandwidth Selections, 2ch or 4ch input
- 1GSa/s Maximum Sampling Rate
- 16M Maximum Memory Depth For Each Channel
- 7" 800 x 480 WVGA LCD Display
- 256 Color Gradient Display Function to Strengthen Waveform Performance
- 16bits FFT Frequency Domain Signal Display
- I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- Zoom Key Function For Horizontal Time, Vertical Voltage and Triggering
- Compact And Innovative Exterior Design

	GDS-1054B	GDS-1072B	GDS-1074B	GDS-1102B	GDS-1104B	GDS-1202B
VERTICAL						
Channels	4	2 + Ext	4	2 + Ext	4	2 + Ext
Bandwidth	DC-50MHz (-3dB)	DC-70MHz (-3dB)	DC-70MHz (-3dB)	DC-100MHz (-3dB)	DC-100MHz (-3dB)	DC-200MHz (-3dB)
Calculated Rise Time	7ns	5ns	5ns	3.5ns	3.5ns	1.75ns
Bandwidth Limit	20MHz	20MHz	20MHz	20MHz	20MHz	20MHz
Vertical Sensitivity	1mV~10V/div					
Resolution	8 bit					
Input Coupling	AC, DC, GND					
Input Impedance	1MΩ ± 1% pF approx.					
DC Gain Accuracy	±3%					
Polarity	Normal & Invert					
Maximum Input Voltage	300Vrms, CAT I (1000Vrms CAT II with GTP-070B, GTP-100B, 2000 V PDI probe)					
Offset Position Range	1mV/div ~ 1.25V; 2mV/div ~ 100mV/div: ±2.5V; 200mV/div ~ 10V/div: ±125V					
Waveform Signal Process	+, -, ×, ÷, FFT, FFTrms, User Defined Expression, FFT 16bits FFT Spectral magnitude, Set FFT Vertical Scale to Linear RMS or dBV RMS, FFT Window Display: Rectangular, Hamming, Hanning, or Blackman-Harris					
TRIGGER						
Source	CH1, CH2, CH3*, CH4* (Line, EXT*) *four channel models only					
	Three channel models only					
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence					
Trigger Type	Edge, Pulse Width, Video, Pulse Runt, Rise & Fall, Timeout, Alternate, Event-Delay (1~9999 events), Time-Delay (Duration, 4ns~10S)					
Holdoff Range	4ns to 10s					
Coupling	AC, DC, LF rej., HF rej., Noise rej.					
Sensitivity	1div					
EXTERNAL TRIGGER						
Range	±2.5V					
Sensitivity	DC ~ 100MHz: Approx. 100mV; 100MHz ~ 200MHz Approx. 150mV					
Input Impedance	1MΩ ± 2% ~ 16pF ~ (GDS-1072B: 1MΩ ± 2% ~ 14pF)					
HORIZONTAL						
Time base Range	2ns/div ~ 100s/div (1-2-5 increments)					
Roll	100ms/div ~ 100s/div					
Pre-trigger	10 div maximum					
Post-trigger	2,000,000 div maximum					
Timebase Accuracy	±50 ppm over any ≥1 ms time interval					
Real Time Sample Rate	1 GSa/s max.					
Record Length	Max. 16Mpts					
Acquisition Mode	Normal, Average, Peak Detect, Single					
Peak Detection	2ns (500DP)					
Average	selectable from 2 to 256					
X-Y MODE						
X-Axis Input	Channel 1, Channel 3* (*four channel models only)					
Y-Axis Input	Channel 2, Channel 4* (*four channel models only)					
Phase Shift	±3° at 100KHz					
CURSORS AND MEASUREMENT						
Cursors	Amplitude, Time, Gating available Unit: Seconds(s), Hz(1/s), Phase(degree), Ratio(%)					
Automatic Measurement	28 items: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, Rise Time, Fall Time, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase					
Cursor Measurement	Voltage difference between cursors (ΔV), Time difference between cursors (ΔT), 1/ΔT					
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth					
CONTROL PANEL FUNCTION						
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger conditions, with undo Autoset					
Save Setup	20set					
Save Waveform	20set					

GDS-1000B Series

	GDS-1054B	GDS-1072B	GDS-1074B	GDS-1102B	GDS-1104B	GDS-1202B
DISPLAY						
TFT LCD Type	7" TFT WVGA color display					
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)					
Interpolation	Sin(x)/x					
Waveform Display	Dots, vectors, variable persistence (16ms-4s), infinite persistence					
Waveform Update Rate	50,000 waveforms per second, maximum					
Display Contrast	16 levels (Variable)					
Display Mode	YT, XY					
INTERFACE						
USB Port	USB 2.0, high-speed host port x1 , USB High-Speed 2.0 device port x1					
Ethernet Port(LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX (only for 4 channel models)					
Co-inCo BNC	TV trig / Risk cable connector output					
Kensington-Style Lock	Rear-panel security slot connects to standard Kensington-style lock					
POWER SOURCE						
	AC 100V ~ 240V , 50Hz ~ 60Hz , Auto selection , Power consumption: 80 Watts					
MISCELLANEOUS						
Multi-Language Menu	Available					
Operation Environment	Temperature: 0°C ~ 50°C, Relative Humidity: < 80% at 40°C or below < 45% at 41°C ~ 50°C					
Online Help	Available					
DIMENSIONS & WEIGHT						
380(W) x 208 (H) x 127.3 (D)mm, Approx. 3.8kg						

Note: The specifications apply when the GDS-1000B is powered on for at least 30 minutes under ±10°C ~ ±40°C.

ORDERING INFORMATION

GDS-1202B	200M Hz, 2 channels, Digital Storage Oscilloscope
GDS-1104B	100MHz, 4 channels, Digital Storage Oscilloscope
GDS-1102B	100MHz, 2 channels, Digital Storage Oscilloscope
GDS-1074B	70MHz, 4 channels, Digital Storage Oscilloscope
GDS-1072B	70MHz, 2 channels, Digital Storage Oscilloscope
GDS-1054B	50MHz, 4 channels, Digital Storage Oscilloscope

ACCESSORIES:

User manual CD x 1, Power cord x 1

CP-070A : 70MHz(10:1 / 1:1) Switchable passive probe for GDS-1074B,GDS-1072B,GDS-1054B(one per channel)

CP-100A : 100MHz(10:1/1:1) Switchable passive probe for GDS-1104B, GDS-1102B (one per channel)

CP-200A : 200MHz(10:1/1:1) Switchable passive probe for GDS-1202B(one per channel)

OPTIONAL ACCESSORIES

GRA-426	Rack Adapter Panel
GAK-001	GPIB Interface Adapter
GSC-003	Soft Carrying Case
CTL-240	USB Cable, USB 2.0, A-B Type, 1200mm
GCP-900	30MHz/30A Current probe
GCP-530	100KHz/30A Current probe
GCP-930	50MHz/150A Current probe
GCP-1000	100MHz/30A Current probe
GCP-1030	1MHz/70A Current probe
GCP-2060	Power supply for current probe (2 input channel)
GCP-830P	Power supply for current probe (3 input channel)
CTP-010A	Oscilloscope Probe, 10MHz 1:1 Passive Probe, BNC(F)-to
GDP-025	25MHz high voltage differential probe
GDP-050	50MHz high voltage differential probe
GDP-100	100MHz high voltage differential probe

FREE DOWNLOAD

Software	GainWave Software
Driver	USB Driver, LabVIEW Driver

Rear Panel

GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/3000A/2000/1000B Series
MSO-2000E Series

1. WAVEFORM UPDATE RATE UP TO 50,000wfms/s AND VPO DISPLAY TECHNOLOGY

The GDS-10008 Series oscilloscope is under the category of general and fundamental oscilloscope by the market segmentation. Nevertheless, the series arms itself with the waveform update rate up to 50,000wfms/s and VPO waveform display technology. Users can input a rapid frequency modulation carrier signal as shown on the diagram. An unsmooth temporarily holding phenomenon will occur while using conventional digital oscilloscopes to measure this signal. As a result, the conventional digital oscilloscopes could not clearly yield the modulation variation process of frequency modulation signals. With the GDS-10008 Series oscilloscope, the measurement result will produce not only a smooth waveform modulation variation, but also detailed changes by distinct layers. Engineers could easily grasp the root cause of electric circuits while measuring the unexpected and fast changing signals. The GDS-10008 Series is indeed an excellent debugging weapon for the test and measurement industry.

2. 256 COLOR GRADIENT DISPLAY & 10M MEMORY DEPTH PER CHANNEL INDEPENDENTLY

With respect to the waveform display technology, the GDS-10008 Series oscilloscope is capable of displaying 256 color gradients which can delineate the profound gradational fluctuations; as if it can recreate the analog oscilloscope display capability. When a multi-layer video signal is input, the GDS-10008 Series, with 256 color gradient display, has the ability to precisely reveal the colored burst signal and to show details of layers with the brightness. Hence, the dull monochrome waveform is imbued with vitality, which is precisely the unlimited measurement fascination the GDS-10008 Series intends to bring to the general purpose oscilloscope arena.

The GDS-10008 Series oscilloscope has a powerful and incomparable memory depth for the data retrieving. 10M memory depth per channel independently surpasses the specification of the industry's 1000 Series boundary. 10M memory depth allows users to easily seize the waveform detail while conducting fundamental measurement applications. If a long serial sequent sine waveforms input and the time scale is adjusted to 1ms/div, other GDS-1000 Series oscilloscopes for lack of sufficient memory depth will appear a distorted waveform while enlarging the waveform for its details. The GDS-10008 Series while enlarging the waveform to 20ns/div reveals a very clear sine waveform detail which is precisely the true value of the GDS-10008 Series oscilloscope.

3. SUPPORT I²C, SPI, UART,CAN, LIN BUS TRIGGER AND DECODING FUNCTIONS

The serial bus technology has been widely applied in the present embedded application design. The IoT devices connecting sensors and the peripheral components are using serial bus such as UART, I²C, and SPI. To rapidly and correctly trigger and analyze serial bus data has posed a difficult challenge to engineers. The GDS-10008 series provides serial bus analysis function with 10M long memory depth. Users can trigger, decode, and analyze frequently-used I²C, SPI and UART serial bus and CAN/LIN bus, which is often used by automotive communications.

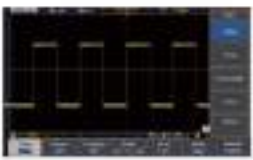
D. 1M FFT MATHEMATICAL SAMPLING ANALYSIS MODE

The GDS-1000B Series oscilloscope, under the Fast Fourier Transform mathematical analysis mode, is equipped with the 1M memory depth retrieving mode. For the conventional digital oscilloscopes, the FFT mode often has only 1000 point retrieving length; therefore, they can not show the strength distribution of each spectrum quantity under the frequency domain mode. The GDS-1000B Series oscilloscope leads the industry to provide the display mode of 1M retrieving points, which can clearly show the detail of each spectrum quantity. On top of that, the 50,000 wfms/s waveform update rate augments the FFT analysis mode to be fast and precise as if a real time spectrum analyzer is used. These features substantially elevate oscilloscope's signal processing capability for the frequency domain analysis. The diagram illustrates a 200 kHz carrier waveform to be modulated as a standard FM signal with 40 kHz and 5 kHz frequency deviation. Since the GDS-1000B Series is equipped with 1M memory depth, a 5 kHz frequency deviation interval can be clearly revealed that allows engineers to fully grasp the measurement details.

E. ZOOM IN/PLAY AND PAUSE FUNCTION

The GDS-1000B series provides engineers with partial waveform zoom in function to observe waveform in great details. The display screen can be split into two windows: the upper window shows waveform data log in a long period of time and the marked vicinity of the waveform needed to be zoomed in; the lower window shows the enlarged partial waveform. This function not only allows engineers to make a comparison but also grasp waveform details in the different time frame. Additionally, the GDS-1000B series also features the play/pause function. For the long waveform observation, the play/pause function facilitates engineers to rapidly skim through the whole section of UUT's waveforms as well as to swiftly identify waveform's problems.

F. DIVERSIFIED TRIGGER FUNCTIONS



The GDS-1000B series oscilloscope is equipped with diversified trigger functions, including Edge Trigger, Delay Trigger, Pulse Width Trigger, and Video Trigger. Engineers, based upon different waveform measurements, can select different trigger functions to lock waveforms in order to identify the root cause of the complicated circuit design to save development time and to accomplish tasks.

G. X-Y MODE DISPLAY

The GDS-1000B series oscilloscope provides the educational market with some powerful measurement functions. Among them, the X-Y mode display is an excellent example. Teachers and students can use X-Y mode display to conduct Lissajou diagram teaching, which allows users to easily understand the relation between waveforms and frequency while measuring sine waveforms with different frequency by dual channels. For engineers working for the industries, the X-Y mode display can be used to conduct yield rate tests for basic components' electric conduction and non-conduction. Therefore, the X-Y mode display plays an important role in basic oscilloscopes.

GO/NOGO FUNCTION

For the industries, the yield rate determination is very important to mass production. The GDS-1000B series oscilloscope provides the Go/NoGo analysis function to accelerate the yield rate analysis. From the right diagram, the Go/NoGo function provides a standard waveform template for examining DUT's waveforms. The function can freely adjust the size of the plate. A defect message will be shown if the DUT's waveform is abnormal and touches the template. The function is not only very useful measurement tool for production lines but also a very convenient tool for engineers to observe waveforms in a long period of time.

DIGITAL VOLTAGE METER FUNCTION

For electric circuit measurement and debugging, R&D engineers require oscilloscopes as well as basic voltage meters. The GDS-1000B series oscilloscope equips with a digital voltage meter with three-digit voltage value and five-digit frequency value. Engineers, by pressing the option key, can select the digital voltage meter function from the menu to measure DC/AC voltage, duty cycle, and frequency. Engineers can not only measure waveforms but also monitor the electric parameters of each component on the circuit board. The function is a very convenient tool.

* Users need to download this application from GW Instek website

DATA LOG FUNCTION

The GDS-1000B Series oscilloscope has the data log function option, which allows users to observe and record waveform changes in a long period of time to ensure product's reliability and stability. The data log function can set data storage time and interval based on the test requirements. Record time can be set from 5 minutes to 100 hours and the interval can be set as 5 seconds the shortest. Data log formats include waveform and point data in CSV file. Data can be saved to USB, GDS-1000B or remote computer via LAN. It is very user-friendly and also an advanced measurement management tool.

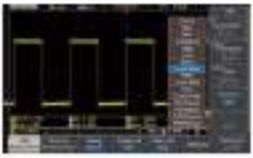
* Users need to download this application from GW Instek website

K DIGITAL FILTER FUNCTION

In electric circuitry, engineers are often troubled by noise interference while measuring signals. The GDS-1000B series oscilloscope provides the digital filter function option, which can be set as high pass or low pass filter. The filter frequency can be adjusted according to the requirements. The filter parameters of each channel can also be set. The tracking on function can be used to set same filter frequency for all channels.

* Users need to download this application from GW Instek website

L 16 MEASUREMENT PARAMETER SELECTIONS



The GDS-1000B series oscilloscope is equipped with 16 different automatic measurement parameter functions. Users, after obtaining measured waveforms, can select different measurement parameters from Measure key according to different measurement requirements. The GDS-1000B Series shows simultaneously eight sets of different measurement parameters on the bottom of the display screen. Users can also select to show all parameters if the preset eight sets are insufficient. Once the selection is made, all 16 measurement parameters will be shown on the center of the display screen. This is a very convenient measurement tool for students writing dissertations or engineers writing reports.

M OPENWAVE CONNECTION SOFTWARE

The GDS-1000B Series oscilloscope, via the OpenWave connection software developed by GW Instek, can connect with the PC. Users, after install eg USB driver under Windows interface, can connect GDS-1000B with the PC through USB cable and OpenWave software. Waveform interpretation and retrieval can be done from the PC end. Data retrieval and storage can better facilitate users in processing analysis. OpenWave connection software is indeed a very powerful tool for engineers to compile reports or to integrate systems.

Oscilloscope Education And Training Kit

The GDB-03 training kit allows you to learn both the basic and the advanced functions of the GDS-1000 Series, GDS-2000A Series, GDS-2000E Series, MSO-2000 Series and GDS-1000B Series Digital Storage Oscilloscope (DSO). Following the training procedures of this training kit, you will quickly understand the basic operations of a DSO, and the unique features, which represents a typical hands-on DSO today.

The training kit is a signal generator board capable of producing waveforms, which contain various real-life scenarios you might encounter. With the GDB-03 training kit and the included curriculums, you are able to acquire adequate knowledge in using a DSO with advanced features.

GDB-03

SPECIFICATIONS

SIGNAL OUTPUT

The GDB-03 provides:
9 basic and 19 advanced oscilloscope training signals

BASIC OSCILLOSCOPE TRAINING

Lab 1 Connect and view a waveform
Lab 2 Compensate the probe (1MHz square wave)
Lab 3 Adjust waveform scale and position (square wave)
Lab 4 Measure the waveform by manual (square wave, frequency counter, cursor measure)
Lab 5 Automatic measurement (GDB-03 including basic function, auto measure, cursor getting measure)
Lab 6 VPO (VPO signal, color, gray mode)
Lab 7 Autoset function (FFT screen, AC priority)
Lab 8 Automatic range
Lab 9 Save data using Bandpass function

ADVANCE OSCILLOSCOPE TRAINING

Lab 1 Automatic measurement (gating measurement)
Lab 2 Using peak detect mode
Lab 3 Low speed signal measurement
Lab 4 Noisy signal measurement
Lab 5 Using wave combine function
Lab 6 Transient signal measurement
Lab 7 Lissajous waveform & phase measurement
Lab 8 Runt trigger
Lab 9 Video trigger
Lab 10 Rise & fall trigger
Lab 11 Pulse width trigger
Lab 12 Hold off function
Lab 13 Split window 1
Lab 14 Split window 2
Lab 15 UART signal
Lab 16 I²C signal
Lab 17 SPI signal
Lab 18 CAN signal
Lab 19 LIN signal

POWER SUPPLY

5V DC, USB or auxiliary power input

ORDERING INFORMATION

GDB-03 Oscilloscope Education And Training Kit

ACCESSORIES:
CD x 1
Original demo board with instructions
GTL ONE USB 2.0 A-B Type cable

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
[illegible]	8-Channel Logic Analyzer, Includes 8-Channel Logic Analyzer Cord(D1-8) and 8-Channel Logic Analyzer Probe(D1-8 Wide)	[illegible] Series
DSO-16LA	16-Channel Logic Analyzer, Includes 16-channel Logic Analyzer Cord(D1-16) and 16-channel Logic Analyzer Probe(D1-16 Wide)	DSO-2000A Series
DSO-FGN	DDS Function Generator, Sine, Sine/Square/Triangle/Ramp Waveform	DSO-2000A Series
DSO-CAN	CAN Interface	DSO-2000A Series
DSO-LIN	LIN Interface	DSO-2000A Series
DSO-LAN	Ethernet & WEB Control	DSO-2000A Series
DSO-A-PWR	12 Items of Power Analysis Measurement	DSO-2000A Series
DSO-I2FM	I2FM Interface	DSO-2000A Series
DSO-16LA	16 Channel Logic Analyzer	DSO-2000A Series
DSO-PWR	Power Analysis Software, Power analysis and compliance test software	DSO-2000 Series
DSO-EMB	Serial bus Analysis Software for SPI/I2C/UART (RS-232) & Manchester/NRZ	DSO-2000 Series
CAB-BNC	Adapter, BNC Termination, BNC(M/M)	DSO-2000A Series, MSO-2000A Series, MSO-5000 Series, MSO-8000 Series, DSO-5000 Series, DSO-8000 Series
CAP-001	AC/DC Inductor	DSO-X6/S00 Series
DCC-001	Vertical Calibration Cable	DSO-X6/S00 Series
DCP-1000	Current Probe, DC ~ 100MHz, 30Arms	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DCP-050P	Current Probe - Power Supply, 2 Channel Power Supply Kit for DCP-030/100	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DCP-300	30Arms/300A Current probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DCP-030P	Current Probe - Power Supply, 2 Channel Power Supply for DCP-030/100	DSO-2000A Series, MSO-2000A Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DCP-030	30Arms/100A Current probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DCP-060	60Arms/200A Current probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DCP-150	150Arms/500A Current probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DCP-400	400Arms/1000A Current probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DPB-01	Digital Bridge Box(Bridge Box-01)	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DDP-025	25MHz High Voltage Differential Probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DDP-050	50MHz High Voltage Differential Probe	DSO-X6/S00 Series
DDP-100	100MHz High Voltage Differential Probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DDP-200	200MHz High Voltage Differential Probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DAT-100	Battery Pack	DSO-2000A Series, DSO-5000 Series
DLA-08	Logic Analyzer Card, 8-Channel Logic Analyzer Card for DSO-5LA	DSO-2000A Series
DLA-16	Logic Analyzer Card, 16-Channel Logic Analyzer Card for DSO-5LA	DSO-2000A Series
DPP-001	Protocol Pro	DSO-X6/S00 Series
DBA-01	Rackmount Kit	DSO-2000 Series
DBA-02	Rackmount Kit	DSO-2000A Series
DBA-03	Rackmount Kit	MSO-5000 Series, MSO-8000 Series, MSO-5000 Series, DSO-8000 Series, DSO-5000 Series
DBA-04-S	Rackmount Kit	DSO-5000A Series
DSC-001	Soft Carrying Case	DSO-2000 Series, MSO-5000 Series, MSO-5000A Series, MSO-8000 Series, DSO-5000 Series, DSO-5000A Series, DSO-8000 Series
DSC-002	Soft Carrying Case	DSO-X6/S00 Series
DSC-003	Soft Carrying Bag	DSO-X6/S00 Series
DTE-8KLA	Logic Analyzer Probe, 8-Channel Logic Analyzer Probe for MSO-8 X	DSO-2000A Series
DTE-16L	16-Channel Logic Analyzer Probe	MSO-2000A Series
DTE-100A	Test Lead, 100μA/div to Measure Test Lead Max. Current 60, 100MHz	MSO-5000 Series, MSO-8000 Series
DTE-11K	Test Clip, Kelvin Clip for SMD, 0.5~2.5V DC, 10MHz	DSO-2000A Series, DSO-5000 Series, DSO-8000 Series, DSO-5000 Series, DSO-8000 Series
DTE-3H	Test Clip, Kelvin Clip for SMD, 0.5~2.5V DC, 10MHz	DSO-X6/S00 Series
DTE-16LA	Logic Analyzer Probe, 16-Channel Logic Analyzer Probe for Mixed Signal	DSO-2000A Series
DTE-MSP	Temperature Probe Adapter Set, Thermocouple Sensor	MSO-2000 Series
DTE-2M5	Test Lead, Banana to Probe Tip Lead, 800mm	DSO-X6/S00 Series, MSO-5000 Series
DTE-100	BNC(M) Cable, 4-pin, 1/2 Type, coil rotation, 1000mm	DSO-2000A Series, DSO-5000 Series, DSO-8000 Series
DTE-240	USB 2.0 cable, A/B type, 1.5000mm	All DSO Series
DTE-241	CAN Cable, Double Shielded, 2000mm	DSO-2000A Series, DSO-5000 Series, DSO-8000 Series
DTE-242	CAN Cable, Double Shielded, 500mm	DSO-2000A Series, DSO-5000 Series, DSO-8000 Series
DTE-243	LIN Cable, LIN 2.0 Extend type, Approx. 1100mm	DSO-X6/S00 Series
DTP-2025	Oscilloscope Probe, 250MHz 1:1 Passive Probe	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DTP-2500A	Oscilloscope Probe, 250MHz 1:100 Switching Passive Probe, BNC(F/M)	MSO-5000 Series, MSO-8000 Series, DSO-5000 Series, DSO-8000 Series, DSO-5000 Series, DSO-8000 Series
DTP-1000A	Oscilloscope Probe, 100MHz, 1:100/1:10 Switching Passive Probe, BNC(F/M)	MSO-5000 Series, MSO-8000 Series, DSO-5000 Series, DSO-8000 Series, DSO-5000 Series, DSO-8000 Series
DTP-1001	Oscilloscope Probe, 100MHz, 1:100/1:10 Switching Passive Probe, BNC(F/M)	DSO-2000A Series
DTP-1002	Oscilloscope Probe, 100MHz, 1:100/1:10 Switching Passive Probe, BNC(F/M)	DSO-X6/S00 Series
DTP-510	Oscilloscope Probe, 100MHz, 10:1 Passive Probe, BNC(F/M)	DSO-X6/S00 Series
DTP-1000	Oscilloscope Probe, 100MHz, 1:100/1:10 Switching Passive Probe, BNC(F/M)	DSO-2000A Series, DSO-5000 Series, MSO-5000 Series, MSO-8000 Series, DSO-8000 Series, DSO-2000 Series, DSO-5000 Series, DSO-8000 Series
DTP-1001	Oscilloscope Probe, 100MHz, 1:100/1:10 Switching Passive Probe, BNC(F/M)	DSO-2000A Series
DTP-1002	Oscilloscope Probe, 100MHz, 1:100/1:10 Switching Passive Probe, BNC(F/M)	DSO-X6/S00 Series
DTP-510	Oscilloscope Probe, 100MHz, 10:1 Passive Probe, BNC(F/M)	DSO-2000A Series, DSO-5000 Series
DTP-520	Oscilloscope Probe, 200MHz, 10:1 Passive Probe, BNC(F/M)	DSO-2000A Series, DSO-5000 Series
DTP-530	Oscilloscope Probe, 300MHz, 10:1 Passive Probe, BNC(F/M)	DSO-2000A Series, DSO-5000 Series
DUC-001	CAN USB Adapter, CAN to USB Adapter	DSO-X6/S00 Series
DWD-001	Wrist Strap	DSO-X6/S00 Series

ACCESSORIES

GTP-070B-4

For: GDS-105/106/107/115/116, GDS-207/208/209/210, GDS-207/208/209/210

GTP-070B-4 is a 4 ch. 70 MHz passive voltage probe (compatible use with DC to 70MHz oscilloscope with input impedance of 1MΩ). The probe consists of following separate units:
1. BNC male connector and compensation box.
2. Probe body, probe tip and R.C. assembly.
3. Approx. 1.2M cable.

Item	1:1	1:1
Bandwidth	DC~70MHz (-3dB)	DC~6MHz (-3dB)
Input R	~1MΩ	1MΩ (Oscilloscope)
Input C	13.5~17.5pF	85~115pF
Att. Ratio	1:10	1:1
Max. Input Voltage	1.4KV DC+AC peak	1.4KV DC+AC peak
Accessories	1. Probe tip 2. Ground lead 3. Color circles 4. Screwdriver 5. IC clip 6. Adjusting tool 7. Earthing	

GTP-100B-4

For: GDS-2102/2104A, GDS-2102E/2104E

The GTP-100B-4 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 5~45pF (DC). The probe incorporates a two position slide switch for the input which selects attenuation of 1:1 or 10 position.

Item	10:1	1:1
Bandwidth	DC~100MHz (-3dB)	DC~10MHz (-3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	14~17.5pF	85~115pF
Att. Ratio	1:10	1:1
Max. Input Voltage	1000Vpk	1000Vpk
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tip 5. IC tip 6. Adjusting tool 7. Earthing	

GTP-150A-2

For: GDS-2104A/2104E

The GTP-150A-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 16pF. However, it may be compensated for use with instruments having an input capacitance of 10~35pF. The probe incorporates a two position slide switch on the head which selects attenuation of 1:1, 10 position.

Item	10:1	1:1
Bandwidth	DC~150MHz (-3dB)	DC~35MHz (-3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	15pF	16pF
Att. Ratio	1:10	1:1
Max. Input Voltage	600V CAT I, 300V CAT II (DC + peak AC)	150V CAT I, 100V CAT II (DC + peak AC)
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tip 5. IC tip 6. Adjusting tool 7. Earth tip	

GTP-150B-2

For: GDS-300/308 Series

The GTP-150B-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 10~35pF. The probe incorporates a two position slide switch on the head which selects attenuation of 1:1, 10 position.

Item	10:1	1:1
Bandwidth	DC~150MHz (-3dB)	DC~35MHz (-3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	15pF	16pF
Att. Ratio	1:10	1:1
Max. Input Voltage	300V CAT II, 600V CAT I	150V CAT II, 300V CAT I
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tip 5. IC tip 6. Adjusting tool 7. Earth tip	
Compensation Range	—	10~35pF

GTP-200B-4

For: GDS Series

The GTP-200B-4 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 5~45pF. The probe incorporates a two position slide switch on the head which selects attenuation of 1:1, 10 position.

Item	10:1	1:1
Bandwidth	DC~200MHz (-3dB)	DC~35MHz (-3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	13.5~17.5pF	85~115pF
Att. Ratio	1:10	1:1
Max. Input Voltage	600V peak	300V peak
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tip 5. IC tip 6. Adjusting tool 7. Earthing	
Compensation Range	5~15pF	—

GTP-250A-2

For: GDS-2202A/2204A

The GTP-250A-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 16pF. However, it may be compensated for use with instruments having an input capacitance of 10~35pF. Connect the combiner to the end of the previous probes.

Item	10:1	1:1
Bandwidth	DC~250MHz (-3dB)	DC~40MHz (-3dB)
Input R	~1MΩ	1MΩ (Oscilloscope)
Input C	~15pF	~45pF
Att. Ratio	1:10	1:1
Max. Input Voltage	300V CAT I, 300Vrms CAT II	150V CAT I, 150Vrms CAT II
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tip 5. IC tip 6. Adjusting tool 7. Earth tip	

Ordering Guide:

If an accessory is ordered separately from the main product, please indicate the name/nature of the accessory when placing order.
Example: GTP-308 Soft Carrying Case for GDS-308A Series

If an accessory is ordered along with the main product, please indicate the option number of the accessory when placing order.
Example: GDS-3352 (With Opt. 3 Channel Visual Persistence DSO, GTP-308 Soft Carrying Case)

ACCESSORIES

GTP-151R

For : GDS-3000 Series

The GTP-151R is compatible with oscilloscope functions that automatically detect and display the attenuation factor of the probe.

Item	151
Bandwidth	DC ~ 150MHz (-3dB)
Input R	~1MΩ
Input C	~15pF
Att. Ratio	1 / 10
Max. Input Voltage	≤ 150V CAT I
Accessories	1 Channel identifier clip 2 Spring hook 3 Ground lead 4 Insulating cap 5 IC tip 6 Adjusting tool 7 Measuring tip 8 Spring earthing tip

GTP-251R

For : GDS-800 Series

The GTP-251R is compatible with oscilloscope functions that automatically detect and display the attenuation factor of the probe.

Item	251
Bandwidth	DC ~ 250MHz (-3dB)
Input R	~1MΩ
Input C	~12pF
Att. Ratio	1 / 10
Max. Input Voltage	DC 300V CAT I, 300V CAT II
Accessories	1 Channel identifier clip 2 Spring hook 3 Ground lead 4 Insulating cap 5 IC tip 6 Adjusting tool 7 Measuring tip 8 Spring earth tip

GTP-250B-2

For : GDS-800/1000 Series

The GTP-250B-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 15~35pF. To match the variance in the end of the process variance.

Item	250-2	250-2
Bandwidth	DC ~ 250MHz (-3dB)	DC ~ 100MHz (-3dB)
Input R	~1MΩ	1MΩ (DC/50Hz/60Hz)
Input C	~12pF	40pF
Att. Ratio	1/10	1/1
Max. Input Voltage	300V CAT I, 400V CAT II	150V CAT I, 150V CAT II
Accessories	1 Channel identifier clip 2 Hook 3 Ground lead 4 Insulating tip 5 IC tip 6 Adjusting tool 7 Earth tip	

GTP-300B-4

For : MSO-2000 Series

The GTP-300B-4 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 10~35pF. The probe incorporates a temperature probe sheath on the head which assists attenuation of all compensation.

Item	151	111
Bandwidth	DC ~ 300MHz (-3dB)	DC ~ 100MHz (-3dB)
Input R	~1MΩ	1MΩ (DC/50Hz/60Hz)
Input C	11.5~17.5pF	40~50pF
Att. Ratio	1/10	1/1
Max. Input Voltage	600V DC+AC pk	200V DC+AC pk
Accessories	1 Channel identifier clip 2 Hook 3 Ground lead 4 Insulating tip 5 IC tip 6 Adjusting tool 7 Earth tip	

GTP-351R/352R

For : GDS-3000 Series

Both GTP-351R and GTP-352R are passive high impedance oscilloscope probes designed and calibrated for use on instrument. GTP-351R has an input impedance of 1.5MΩ shunted by 20pF while GTP-352R has an input impedance of 1MΩ shunted by 15pF. However, GTP-351R may be compensated for use with instruments having an input capacitance of 10~35pF while GTP-352R has an input impedance of 10~40pF.

	GTP-351R	GTP-352R
Item	351	352
Bandwidth	DC ~ 350MHz	DC ~ 350MHz
Input R	~1MΩ	~1MΩ
Input C	~12pF	~15pF
Att. Ratio	1/10	1/10
Max. Input Voltage	600V CAT I, 300V CAT II	150V CAT II
Accessories	1 Channel identifier clip 2 Spring hook 3 Ground lead 4 Insulating cap 5 IC tip 6 Adjusting tool 7 Grabbing tip 8 Spring earthing tip	

GTP-350A-2

For : GDS-2000A/2104A

The GTP-350A-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 15pF. However, it may be compensated for use with instruments having an input capacitance of 10~35pF. Consult the technician in the end of the process variance.

Item	351	111
Bandwidth	DC ~ 350MHz	DC ~ 100MHz
Input R	~1MΩ	~1MΩ
Input C	~12pF	~40pF
Att. Ratio	1/10	1/1
Max. Input Voltage	300V CAT I, 600V CAT II	150V CAT I, 150V CAT II
Accessories	1 Channel identifier clip 2 Spring hook 3 Ground lead 4 Insulating cap 5 IC tip 6 Adjusting tool 7 Measuring tip 8 Spring earth tip	

GXT-100 Deskew Fixture

The GXT-100 deskew fixture is used to compensate for the propagation delay between a passive voltage probe and current probe. It is used with the GDS-3000 Series. Required tools:

1.GDS-3000 x 1 or GDS-2000A x 1
2.GXT-100 x 1
3.USB type A-B cable x1 - used for deskew fixture
4.Standard passive probe x1
5.Current probe x1 (GCP-030 or GCP-1000)

ACCESSORIES

GTP-501B

For: GDS-3000A Series
GDS-3000 Series

The GTP-501B is a passive high impedance oscilloscope probe designed and calibrated for use on instruments having an input impedance of 1MΩ (nominal by 13pF (nominal). It may be compensated for use with instruments having an input capacitance of 9~30pF. Compare the numbers in the end of the probe cable.

Type	1:1
Bandwidth	DC~500MHz
Input R	~1MΩ
Input C	~13.5pF
Att. Ratio	1:1
Max. Input Voltage	150V CAT II, 300V CAT II
Accessories	1 Channel identifier clip, 1 Spring hook, 1 Ground lead, 1 Hook tip, 1 IC clip, 1 Soldering lead, 1 Grey wrap kit, 6 Spring sets/kit

GTP-053A

For: GDS-1000 Series

GTP-053A is a 1:1 attenuator oscilloscope probe. Designed for use with DC to 250MHz oscilloscope with input impedance of 1MΩ. The probe consists of following separate parts: 1. BNC male connector and compensation box 2. Approx. 1.2m cable

Type	1:1
Bandwidth	DC~250MHz (-3dB)
Input R	1MΩ (Oscilloscope)
Input C	40pF
Att. Ratio	1:1
Max. Input Voltage	150V CAT I
Accessories	1 Channel identifier Clip, 1 Spring Hook, 1 Conventional ground lead, 1 Hook Tip, 1 IC Clip

GTL-101

GTL-110

GTL-301A

GTL-232

GTL-246

GTL-248

GTL-259

GTL-253

GTL-305A

GRA-411 Rack Mount Kit

For: GDS-3000 Series

GRA-420 Rack Mount Kit

For: GDS-1000A Series

GRA-406 Rack Mount Kit

For: MSO-2000 Series, MSO-2000E Series
RSO-2000, series, DS-1000E Series, DS-1000 Series

GRA-443-E Rack Mount Kit

For: GDS-1000A Series

ACCESSORIES

Current Probe and Differential Probe Selections

Oscilloscope Differential Probe

CCP-030/100/1000 | CCP-010/050/CCP-006P/020P | CCP-025 | CCP-050/150 | CDP-040D for DSO Oscilloscope

In addition to the standard passive probes, the optional current or differential probes can be used to perform additional tests or power analysis.
The differential probes come in three bandwidths: 25MHz, 50MHz and 100MHz. The current probes come in a broad variety of bandwidth and current ranges ranging from 100mA/div, 10MHz to 30A, 300kHz; 1mA/div, 200kHz to 1000A, 50MHz to 700A, 10MHz, to cover any number of power supply testing applications.

* The CCP-030/100/1000 must be used in conjunction with the CCP-060P/420P current probe power supply.
* The CCP-006P is capable of powering 2 units of DCP-030 or CCP-100B and the CCP-420P is capable of powering 4 units.

CURRENT PROBE

	CCP-300	CCP-500	CCP-530	CCP-1000	CCP-1630
Probe Bandwidth	DC~30MHz	DC~50MHz	DC~30MHz	DC~10MHz	DC~100MHz
Rise Time	11.7ns(Typ.)	8.7ns(Typ.)	14.5 ns (typ.)	35.0ns (Typ.)	3.5ns (typ.)
Maximum Continuous Input Range	30A(70Vrms)/A) 30A (100Vrms)/A)	11A(@20mV/A) 15A(@50mV/A)	30Apeak	1A(@10mV/A) 70A(@50mV/A)	30Apeak
Maximum Peak Current Value	DC ~ 30A AC ~ 50Apeak	DC ~ 15A AC ~ 50Apeak	50A	DC ~ 70A AC ~ 70Apeak	50A
Output Voltage Rate	100mV/A(@1Ω/1/A)	200mV/A(@50mV/A	0.1V/A	100mV/A,@5mV/A	0.1V/A
DC Amplitude Accuracy	±3% (±25 mA at 100 mV/A (10 mA ~ 20A peak range) ±3% (±50 mA at 10 mV/A (200 mA ~ 100 Apeak range) ±10% max at 10 mV/A (100A peak ~ 150A peak range)	±3% (±20 mA at 200 mV/A (30 mA ~ 10 A peak range) ±3% (±500 mA at 20 mV/A (500 mA ~ 80 A peak range) ±10% max at 20 mV/A (@50 peak ~ 150A peak range)	±1.0% (@1kHz Sine) (5 ~ 10A rms/DC, 45~66Hz) ±2.0%(@ 20kHz sine 10A peak (DC, 45~66Hz))	±3% (±20 mA at 100 mV/A (@ 10A ~ 3A peak range) ±3% (±200 mA at 10 mV/A (@20 mA ~ 30 A peak range) ±10% max at 10 mV/A (20A peak ~ 70A peak range)	±1.0%(@1kHz Sine) (0 ~ 30Arms/DC, 45~66Hz) ±2.0%(@ 20kHz sine 30A peak (DC, 45~66Hz))
Noise	~	~	2.5mArms or less	~	2.5mArms or less
Probe Supply Voltage	~	~	±15V± 0.5V	~	±12V± 0.5V
Maximum Rated Power	~	~	3.0VA	~	3.0W
Maximum Rated Voltage	CAT III 300V/CAT II 600V	CAT III 600V	300V CAT I	CAT III 600V	300V CAT I

CURRENT PROBE POWER SUPPLY

	CCP-206P	CCP-425P
Compatible Current Probe	CCP-030/CCP-1000	CCP-030/CCP-1000
Number of Power Supply Connectors	2	4
Output Voltage	±12V± 0.5V	±12V± 0.5V
Rated Output Current	±450mA	±2.3A
Rated Supply Voltage(@50Hz)	110V/120V, 220V/240V AC/50%	100V~240V AC±10%
Maximum Rated Power	20VA	110VA
Dimensions & Weight	72.5(W)×77.5(H)×198.2(D mm), Approx. 1.1kg	430(W)×77.5(H)×285(D) mm, Approx. 3.1kg
Accessories	Power cord, User	Power cord, User

HIGH VOLTAGE DIFFERENTIAL PROBE

	GDP-025	GDP-050	GDP-100
Probe Bandwidth	DC ~ 25MHz (attenuation 100, ±200) DC ~ 15MHz (attenuation ±10)	DC ~ 50MHz (attenuation ±200, ±500, ±1000) DC ~ 25MHz (attenuation ±100)	DC ~ 100MHz (attenuation ±200, ±500, ±1000) DC ~ 50MHz (attenuation ±100)
Attenuation	±20, ±50, ±200	±100, ±200, ±500, ±1000	±100, ±200, ±500, ±1000
Accuracy	±3%	±3%	±3%
Voltage Input Range (DC+AC peak Value)	±140Vpp for x 20 ±350Vpp for x 50 ±1400Vpp for x 200	±700Vpp for x 100 ±1400Vpp for x 200 ±3500Vpp for x 500 ±7kVpp for x 1000	±700Vpp for x 100 ±1400Vpp for x 200 ±3500Vpp for x 500 ±7kVpp for x 1000
Permitted Max Input Voltage	Maximum differential voltage (sum of voltage between input terminal and ground) ±1400Vpk	Maximum differential voltage (sum of voltage between input terminal and ground) ±7000Vpk	Maximum differential voltage (sum of voltage between input terminal and ground) ±7000Vpk
Input Impedance	(differential mode) 8 MΩ ± 1 MΩ (between each input and ground) 4 MΩ ± 1 MΩ	(differential mode) 8 MΩ ± 1 MΩ (between terminals and ground) 4 MΩ ± 1 MΩ	(differential mode) 8 MΩ ± 1 MΩ (between terminals and ground) 4 MΩ ± 1 MΩ
Output	1.0V	1.0V	1.0V
Output Impedance	50Ω	50Ω	50Ω
Rise Time	14ns (±20, ±50 attenuation) 21.4ns (±200 attenuation)	7ns (±100, ±200, ±500 attenuation) 14ns (±100 attenuation)	3.5ns (±200, ±500, ±1000 attenuation) 7ns (±100 attenuation)
Rejection Ratio on Common Mode (ratio)	50Hz~1MHz : 80dB or more 1~5MHz: 60dB	50Hz~1MHz : 80dB or more 1~5MHz: 60dB	50Hz~1MHz : 80dB or more 1~5MHz: 60dB
Power Supply	External DC adapter	External DC adapter	External DC adapter
Consumption	Maximum 15mA (5.4mW)	Maximum 15mA (5.4mW)	Maximum 15mA (5.4mW)

SMALL CHANNEL DIFFERENTIAL PROBE

	CDP-040D
Channel	1
Bandwidth (-3dB)	DC ~ 40MHz (±200)
Attenuation	100X
Voltage Input Range	600Vpp Max. CAT III
Output	1V ±1V
Maximum Input Voltage to Earth	600Vpp for ±200
Typical CMRR	40dB@60Hz, 40dB@1MHz, 30dB@5MHz
Input Impedance	(x Terminal - 4MΩ±1.5pF, Ground 1M Ω±1.5pF)
Output Impedance	50Ω
Rise Time	8.75ns for ±200
Power Supply	5V DC from USB, BNC/BNC Series
Accuracy	±3%
Dimension	83.2(H) x 135.6(W) x 18.0(D) mm

SPECTRUM ANALYZERS & DEDICATED TESTER SERIES

GW Instek's spectrum analyzer product line consists of two series, which are spectrum analyzer and dedicated tester. Both series are ideal for a wide range of test applications, including R&D, service, maintenance, manufacturing, education and other RF application fields.

Spectrum Analyzer Series

There are four spectrum analyzer products featuring frequency ranges from 9 kHz to 1.8 GHz / 3 GHz / 3.25 GHz and providing various measurement application functions such as ASK/FSK/AM/FM demodulation analysis, SEM, ACPR/OCBW/CHPW, TOI, harmonic, CNR/CTB/CSO, frequency counter, and communications interfaces such as USB, RS-232, LAN, MicroSD, GPIB, etc.

GSP-9330 and GSP-930B are applied spectrum analyzers. GSP-9330's built-in EMI dedicated feature is one of a kind and it collocates with dedicated test accessories to allow engineers to quickly and accurately identify EMI issues. In order to provide more stable measurement and better signal analysis, GSP-9330 and GSP-930B has built-in Spectrogram and Topographic display modes to display signal persistence and energy changes via color images. The built-in Sequence function allows users to create and execute the required test procedures directly on spectrum analyzer without using a PC.

GSP-818, a basic spectrum analyzer, features a measurement range up to 1.8 GHz, a 10.4" large display, and an easy-to-upgrade software option ideal for general RF measurement applications. GSP-730 is developed for the educational market and it can collocate with the dedicated RF communications modules GRF-1380/GRF-1380A/USG to conduct courses.

PRODUCTS

- **3.25 GHz Spectrum Analyzer**
- **3 GHz Spectrum Analyzer**
- **1.8 GHz Spectrum Analyzer**
- **RF Training System**

SPECTRUM ANALYZER OVERVIEW

Spectrum analyzer is the most widely applied measuring instrument for wireless communications devices, components or systems. It measures and displays the frequency spectrum distribution of an RF signal. Spectrum analyzer can measure and read both frequency and amplitude information. Nowadays, digital communications dominate wireless communications systems. Despite the dominance of digital communications, measuring a frequency spectrum by a spectrum analyzer is still considered an important process.

To choose the right spectrum analyzer, several key specifications should be considered, which are explained below.

FREQUENCY RANGE

Selecting a spectrum analyzer for a measurement requires selecting its frequency range, like 1GHz, 2.4GHz, and so on. Therefore the frequency range is the first consideration for most applications.

Figure 1, Frequency Range

NOISE FLOOR

Noise floor is the bottom noise level when no signal is fed into spectrum analyzer. It represents the lowest signal level that spectrum analyzer can measure. The noise floor usually depends on Resolution Bandwidth (RBW).

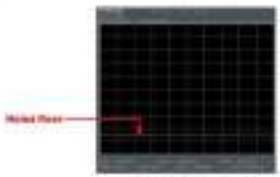


Figure 2, Noise Floor

SPURIOUS NOISE

Circuit noise or interference that looks like a signal occurs even without an input signal due to spurious noise of spectrum analyzer. Unlike noise floor, spurious noise presents itself like a signal with a specific frequency.

Figure 3, Spurious Noise

HARMONICS

Spectrum analyzer itself also generates harmonics from an input signal. Therefore if the harmonics generated by a spectrum analyzer are greater than the harmonics from an input signal, the harmonic measurement will result in an error as Figure 4 presents.

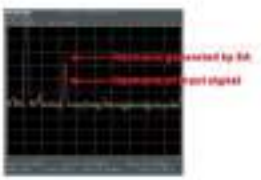


Figure 4, Harmonics

PHASE NOISE

Phase noise shows the purity of a signal. In Figure 5a, there are two signals with different levels of phase noise. The lower one is purer than the upper one, and therefore it has better phase noise performance.

a Signals with different phase noises b Definition of phase noise

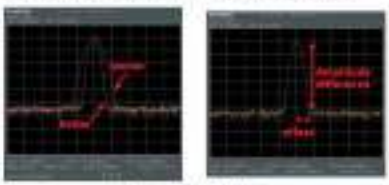


Figure 5, Phase Noise

Figure 5b shows the definition of phase noise. It is usually defined as dBc with a frequency offset. For example, "-50dBc at 100kHz offset with 30kHz RBW".

THIRD ORDER INTER-MODULATION

Third order inter-modulation occurs with a two-tone input signal. A signal with two frequencies or two signals with different frequencies that are fed into a spectrum analyzer at the same time. When the input signal frequencies are f1 and f2, the harmonics are as follows.

Input	output	
f1, f2	fundamentals	f1,f2
	2nd order harmonics	2f1, 2f2, f1±f2,
	3rd order harmonics	3f1, 3f2, 2f1±f2, 2f2±f1
	...	...

The third order harmonics are the primary concerns in a system. If the frequencies of f1 and f2 are very close, then 2f1-f2 and f1-2f2 will also be very close to the original signal. It will be difficult for the subsequent filters to filter out the harmonics accordingly. The concepts are illustrated in Figure 6.

Figure 6: Third Order Harmonics of 2f1-f2 and 2f2-f1

An example is expressed in Table 1.

	Harmonics	f1	f2	...
Input Frequency	100, 110	100, 110	...	300, 320, 210, 320, 90, 130
	100, 101	100, 101	...	300, 302, 301, 302, 99, 102
	100, 100.1	100, 100.1	...	300, 300.2, 300.1, 300.1, 99.8, 99.9

Table 1 : Two-Tone Signal Harmonics

In case the input signal frequencies are 100 and 100.1, their 3rd order harmonics will be 99.9 (2f1-f2) and 100.2 (2f2-f1). Using this example it is easy to see that the third order harmonics are close to the original signals, which will pose challenges for designing the subsequent filters. Therefore, the inter-modulation distortion of spectrum analyzer itself might limit the ability of two-tone signal measurements.

DYNAMIC RANGE

Different companies use different definitions for dynamic range, but actually they all point to the same thing, the ability to accurately measure amplitude. Considering the specifications introduced above, the dynamic range might actually include more than one term. For example, if a two-tone signal is under measurement, the inter-modulation distortion needs to be considered. If the input signal frequency falls onto the spectrum noise, it will limit the dynamic range. But generally speaking, dynamic range is defined as the level between noise floor and the maximum measurable level. Alternatively, sometimes the display range (80 or 100dB) is called dynamic range. It describes the range within the display without shifting the reference level. The entire concept is illustrated in Figure 7.

Figure 7 : Dynamic Range

APPLICATION

SPECTRUM ANALYZERS

MODEL	GSP-9330	GSP-930B	GSP-818	GSP-730
Frequency Range	9kHz ~ 3.2GHz	9kHz ~ 3GHz	9kHz ~ 1.8GHz	100kHz ~ 3GHz
Frequency Stability	±1 ppm max. (per year)	±1ppm max. (per year)	1ppm max. (per year)	-
Over Temperature Frequency Stability	±0.005 ppm (0 ~ 50 °C)	±0.005 ppm (0 ~ 50 °C)	±0.5ppm (32°F to 95°F)	-
RBW Range	1Hz~1MHz in 1-3-10 sequence 200Hz, 9kHz, 120kHz, 1MHz for EMI Filter	1Hz~1MHz in 1-3-10 sequence 200Hz, 9kHz, 120kHz, 1MHz for EMI Filter	10Hz to 500kHz (~16 steps in sequence), 1MHz, 3MHz (for 1Hz~1MHz(-3dB), 200Hz, 9kHz, 120kHz, 1MHz (Optional)	30kHz, 100kHz, 300kHz, 1MHz (200kHz Range is not adjustable)
VBW Range	1Hz~3MHz in 1-3-10 sequence	1Hz~1MHz in 1-3-10 sequence	10Hz~1MHz in 1-3-10 sequence	-
Phase Noise	-86dBc/Hz @1GHz, 10kHz offset	-86dBc/Hz @1GHz, 10kHz offset	-80dBc/Hz @1GHz, 10kHz offset	-83dBc/Hz @1GHz, 10kHz offset
Noise Floor	-139dBm @1GHz, 1Hz, 0.5W, pre-amp on	-139dBm @1GHz 30Hz RBW, pre-amp on	-148dBm @1GHz 1Hz RBW, pre-amp on	-100dBm @1GHz, 10kHz RBW
Overload Protection	+30dBm, ±50VDC	+30dBm, ±50VDC	+30dBm, ±50VDC	+30dBm, ±27VDC
Reference Level Range	-130dBm ~ +30dBm	-130dBm ~ +30dBm	-80 dBm to +30 dBm	-80dBm ~ +20dBm
Input Attenuator	0 ~ 50dB, in 1 dB steps	0 ~ 50dB, in 1 dB steps	0 ~ 45dB, in 1 dB steps	-
Preamplifier	9dB in 1MB nominal	Built-in 30dB nominal	Built-in 20dB nominal	-
Measurement Function	STM, ACPR, OCBW, CHPW, N-dB BW, Phase Jitter, Harmonic, TOI, CNR, CSO, CTB, PHB, TDF	STM, ACPR, OCBW, CHPW, N-dB BW, Phase Jitter, Harmonic, TOI, CNR, CSO, CTB, PHB, TDF	ACPR, OCBW, CHPW, N-dB BW	ACPR, OCBW, CHPW
Demodulation	Yes, with AM/FM/ASK/FSK analysis	Yes, with AM/FM analysis	Yes, with AM/FM analysis	-
Cable Sweep	Yes	Yes	-	-
Frequency Counter	Support, RBW resolution 1Hz	Support, Min. resolution 1Hz	Support, Min. resolution 1Hz	-
Sequence	Yes	Yes	-	-
Limit Line	Yes	Yes	Yes	Yes
Correction Table	Yes	Yes	-	-
Trace Number	4 Traces	4 Traces	3 Traces	3 Traces
Trace Detect Mode	Positive peak, negative peak, sample, normal, RMS(rms Video), Quasi-Peak, Average	Positive peak, negative peak, sample, normal, RMS(rms Video), Quasi-Peak, Average	Positive peak, negative peak, sample, normal, RMS(rms Video), (Optional) Quasi-Peak/Average	-
Marker Number	6	6	3	3
Internal Memory	16MB	16MB	256MB	3 memories
Display Modes	Spectrogram, Topographic, Spectrum	Spectrogram, Topographic, Spectrum	Time Span, Bandwidth Zoom, Spectrum	Spectrum
Split Window	Yes	Yes	-	Yes
Tracking Generator	100kHz ~ 3.2GHz (optional)	100kHz ~ 3GHz (optional)	100kHz ~ 1.8GHz (optional)	-
IF Output	V, 886MHz, -25dBm	V, 886MHz, -25dBm	-	-
Interface	USB Host/Device, RS-232, LAN(Build-in standard), Micro SD, GPIB(Optional)	USB Host/Device, RS-232, LAN(Build-in standard), Micro SD, GPIB(Optional)	USB Host/Device, LAN	USB Host/Device, RS-232
Screen Size	8.4 Inchs Color TFT LCD with SVGA (800 x 600)	8.4 Inchs Color TFT LCD with SVGA (800 x 600)	10.4 Inchs Color TFT LCD with SVGA (800 x 600)	3.8 Inchs Color TFT LCD with VGA (640 x 480)
Rack Adapter Panel	V, GRA-413	V, GRA-413	-	-
Power Operation	AC	AC	AC	AC
Power Source	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz
Page	B5-12	B13-15	B16-18	B19-24

RF & SPECTRUM ANALYZER TRAINING SYSTEM

MODEL	GRF-1300A	GRF-1300
Collocation Instrument	GSP-730	GSP-730
Necessary Optios	USG-LF44	-
RF Cable	SMA Cable	SMA Cable
RF Connector	SMA Female	SMA Female
Interface	USB Device	USB Device
Power Source	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz
Page	B20	B20

3.25GHz Spectrum Analyzer

GSP-9330, a high test speed spectrum analyzer with 3.25 GHz, provides the fastest 204 μs sweep speed. Users, via high speed sweep time, can easily handle and analyze modulation signals. The keys to handling modulated signals are fast sweep time and signal demodulation functions. In addition to the analog AM/FM demodulation and analysis function, GSP-9330 also provides digital signal ASK/FSK, and 2FSK demodulation and analysis capabilities. Nowadays, EMC issues are very crucial to product's design processes. Therefore, GSP-9330 has incorporated the EMC pretest solution to facilitate EMC tests. The simple and easy EMC pretest procedures from GSP-9330 can tremendously shorten users' product launch timeline.

GSP-9330

CE | USB | LAN | DVI Output | RS-232 | GPIB | PC Software

FEATURES

- Frequency Range : 9kHz ~ 3.25GHz
- 0.03ppm Frequency Stability and 1ppm/ Aging Rate
- RBW : 1Hz ~ 1MHz (5dB, 6dB EMI Filter : 200Hz, 9kHz, 120kHz, 1MHz)
- Fastest Sweep Time : 204μs
- Sensitivity : -141dBm/Hz (@PreAmp on)
- Built-in Preamplifier, 50dB Attenuator, and Sequence Function
- Built-in EMC Pretest Function
- Built-in 2FSK Analysis, AM/FM/ASK/FSK Demodulation & Analysis
- Built-in PGIB Point, Harmonic, Channel Power, N dB Bandwidth, OCBW, ACPR, ETSI, TOI, CNR, CTB, CSO, Noise Marker, Frequency Counter, Time Domain Power, Gated Sweep
- Built-in Spectrogram, Topographic and Split-window Display Modes
- Remote Control EMI Measurement Software : SpectrumShot
- Remote Control Interface : LAN, USB, RS-232
- Options : Tracking Generator, CPIB Interface

GSC-009 Soft Carrying Case

For GSP-830/930/932

SPECIFICATIONS		
FREQUENCY		
FREQUENCY		
Range	9 kHz ~ 3.25 GHz	
Resolution	1 Hz	
FREQUENCY REFERENCE		
Accuracy	± (aging rate for last adjustment × aging time) + stability over temperature + supply voltage stability	
Aging Rate	± 1 ppm /year	1 year after last adjustment
Frequency Stability Over Temperature	± 0.005 ppm	0 ~ 50 °C
Supply Voltage Stability	± 0.02 ppm	
FREQUENCY READOUT ACCURACY		
Start, Stop, Center, Marker Trace Points	± (marker frequency indication × frequency reference accuracy + 15% × RBW + frequency resolution) Max. 801 points, Min. 4 points	
MARKER FREQUENCY COUNTER		
Resolution Accuracy	1 Hz, 10 Hz, 100 Hz, 1 kHz ± (marker frequency indication × frequency reference accuracy + counter resolution)	RBW≥1ppm : ~0.02 ; Mkr level is 10dBc~40 dB
FREQUENCY SPAN		
Range Resolution Accuracy	0 Hz (zero span), 100 Hz ~ 3.25 GHz 1 Hz ± frequency resolution	RBW : Auto
PHASE NOISE		
Offset from Carrier 10 kHz 100 kHz 1 MHz	 < -88 dBc/Hz < -95 dBc/Hz < -113 dBc/Hz	Fc: 1 GHz/RBW: 1 kHz/VBW: 10 Hz/Average:3 HP Typical Typical Typical
RESOLUTION BANDWIDTH (RBW) FILTER		
Filter Bandwidth Accuracy Shape Factor	1 Hz ~ 1 MHz in 1-3-10 sequence 200 Hz, 9 kHz, 120 kHz, 1 MHz ± 8%, RBW = 1 Hz to 1 ; ± 3%, RBW > 1 MHz (-60) : (-3)	1dB bandwidth 6dB bandwidth Nominal Nominal Bandwidth ratio: 60dB: 3dB
VIDEO BANDWIDTH (VBW) FILTER		
Filter Bandwidth	1 Hz ~ 1 MHz in 1-3-10 sequence	3dB bandwidth
[illegible]		
AMPLITUDE		
AMPLITUDE RANGE		
Measurement Range	100 kHz ~ 1 MHz 1 MHz ~ 10 MHz 10 MHz ~ 3.25 GHz	DANL ~ +10 dBm DANL ~ +7 dBm DANL ~ +3 dBm
ATTENUATOR		
Input Attenuator Range	0 ~ 50 dB, in 1 dB steps	Auto or manual setup
MAXIMUM SAFE INPUT LEVEL		
Average Total Power DC Voltage	≤ +33 dBm ± 50 V	Input attenuator ≥ 10 dB
1 dB GAIN COMPRESSION		
Total Power at 1st Mixer Total Power at the Preamp	> 0 dBm > -20 dBm	Typical ; Fc ≥ 30 MHz, preamp off Typical ; Fc ≥ 30 MHz, preamp on (Input power level (dBm) + Input power (dBm) = 20 dBm) (or less)

GSP-9330

Rear Panel

GRA-415 Rack Adapter Panel

For : GSP-9308/9308B, Rack Mounting (19", 4U)

GKT-001 General Kit Set

Include :
ADP-002
ATN-100
CTL-363
GTC-001
For GSP-Series

GKT-002 CATV Kit Set

Include :
ADP-003
ADP-130
CTL-364
GAC-001
For GSP-Series

GKT-003 RLB Kit Set

Include :
GAR-001
GAR-002
CTL-002
GTC-004
For GSP-Series

GKT-068 EMI Probe Kit Set

Include :
ADP-002
CTL-003
DRO-01
PB-02
ANH-04
ANH-08
For GSP-Series

SPECIFICATIONS

DISPLAYED AVERAGE NOISE LEVEL (DANL)		
Preamp off	0 dB attenuation, RF input is terminated with a 50Ω load, RBW 10 Hz, VBW 10 Hz, span 100 Hz, reference level = -50 dBm, trace average 50	
9 kHz – 100 kHz	< -95 dBm	Nominal
100 kHz – 1 MHz	< -90 dBm + 3 x (f/100 kHz) dB	Nominal
1 MHz – 10 MHz	< -122 dBm	Nominal
3.7 – 3.25 GHz	< -115 dBm	Nominal
Preamp on	0 dB attenuation, RF input is terminated with a 50Ω load, RBW 10 Hz, VBW 10 Hz, span 100 Hz, reference level = -50 dBm, trace average 50	
100 kHz – 1 MHz	< -108 dBm + 3 x (f/100 kHz) dB	Nominal
1 MHz – 10 MHz	< -142 dBm	Nominal
10 MHz – 3.25 GHz	< -161 dBm + 3 x (f/1 GHz) dB	Nominal
LEVEL DISPLAY RANGE		
Scales	Log, Linear	
Units	dBm, dBmV, dBuV, V, W	
Marker Level Readout	0.01 dB 0.01 % of reference level	Log scale Linear scale
Level Display Modes	Trace, Topographic, Spectrogram	Single/Split (Multi-trace)
Number of Traces	4	
Detector	Positive peak, negative peak, sample, normal, Wide pulse Video), Quasi-Peak, Average	
Trace Functions	Clear & Write, Max Hold, Min Hold, View, Blank, Average	Can be setup for each trace separately
ABSOLUTE AMPLITUDE ACCURACY		
Absolute Point	Center=100 MHz, RBW 10 kHz, VBW 1 kHz, span 100 kHz, log scale, 1 dB/div, peak detector, 20°C~+1°C, signal as Reference Level	
Preamp Off Preamp On	± 0.3 dB ± 0.4 dB	Ref level 0 dBm, 10 dB RF attenuation Ref level -30dBm, 0dB RF attenuation
FREQUENCY RESPONSE		
Preamp Off 100 kHz – 2.5 GHz 2GHz – 3.25 GHz Preamp On 1 MHz – 2 GHz 2 GHz – 3.25 GHz	Reference=-10 dB, Reference 100 MHz, 20 ~ 30°C ± 0.3 dB ± 0.7 dB Reference=-0 dB, Reference 100 MHz, 20 ~ 30°C ± 0.4 dB ± 0.8 dB	
ATTENUATION SWITCHING UNCERTAINTY		
Attenuator Setting Uncertainty	0 ~ 50 dB in 1 dB step ± 0.2 dB	Reference : 10 dB, 10dB attenuation
RBW FILTER SWITCHING UNCERTAINTY		
1 Hz ~ 1 MHz	± 0.2 dB	Reference : 1 Hz, RBW
LEVEL MEASUREMENT UNCERTAINTY		
Overall Amplitude Accuracy	± 1.5 dB ± 0.3 dB	20 ~ 30°C, Frequency = 1 MHz, Signal level: 0 ~ -50 dBm, Reference level: 0 ~ -50 dBm, Input attenuation: 10 dB, RBW 1 kHz, VBW 1 kHz, After Cal, Preamp Off Typical
SPURIOUS RESPONSE		
Second Harmonic Intercept	-55 dBm -68 dBm	Preamp off, signal input -30dBm, 0dB attenuation Typical: 10 MHz ~ 1.6 GHz Typical: 1.71 MHz ~ 1.785 GHz
Third-order Intercept	> 10dBm	Preamp off, signal input -30dBm 0dB attenuation 800 MHz ~ 3.25 GHz
Input Related Spurious	< -60 dBc	Input signal level -30 dBm, Att. Mode, Att=0dB, 20 ~ 30°C
Residual Response (Referred)	< -90 dBm	Input terminated, 0 dB attenuation, Preamp off

3.25GHz Spectrum Analyzer

SPECIFICATIONS

SWEEP		
SWEEP TIME		
Range	20ms ~ 1000 s 20 μs ~ 1000 s	Span > 0 Hz Span = 0 Hz, RBW resolution=10μs
Sweep Mode	Continuous, Single	
Trigger Source	Free run, Video, External	
Trigger Slope	Positive or negative edge	
RF PREAMPLIFIER		
Frequency Range	1 MHz ~ 3.25 GHz	
Gain	18 dB	Nominal (installed as standard)
FRONT PANEL INPUT/OUTPUT		
RF INPUT		
Connector Type	N-type, female	
Impedance	50Ω	Nominal
VSWR	< 1.6 : 1	100 kHz ~ 3.25 GHz, Input attenuation ≥ 10 dB
POWER FOR OPTION		
Connector Type	BNC-type	
Voltage/Current	DC +5 V/200 mA max.	With short-circuit protection
USB HOST		
Connector Type	A plug	
Protocol	Ver 2.0 / 1.1	Supports Full/High/Low speed
MICRO SD SOCKET		
Protocol	SD 1.1	
Supported Cards	Micro SD, Micro SDHC	Up to 32GB capacity
REAR PANEL INPUT/OUTPUT		
REFERENCE OUTPUT		
Connector Type	BNC female	
Output Frequency	10 MHz	Nominal
Output Amplitude	3.3V CMOS	
Output Impedance	50Ω	
REFERENCE INPUT		
Connector Type	BNC female	
Input Reference Frequency	10 MHz	
Input Amplitude	0 dBm ~ +10 dBm	
Frequency Lock Range	Within ± 5 ppm of the input reference frequency	
ALARM OUTPUT		
Connector Type	BNC female	Open collector
TRIGGER INPUT/GATE/SWEEP INPUT		
Connector Type	BNC female	
Input Amplitude	3.3V CMOS	
Switch	Auto selected by function	
LAN TCP/IP INTERFACE		
Connector Type	RJ-45	
Rate	10Base-T, 100Base-TX, Auto-MDIX	
USB DEVICE		
Connector Type	B plug	For remote control only, supports USB TMC
Protocol	Version 2.0	Supports Full/High/Low speed
IF OUTPUT		
Connector Type	SMA female	
Impedance	50Ω	Nominal
IF Frequency	660 MHz	Nominal
Output level	-10 dBm	10 dB attenuation, RF input : 0 dBm @ 1 GHz
EARPHONE OUTPUT		
Connector Type	3.5 mm stereo jack, w/out for mono operation	
VIDEO OUTPUT		
Connector Type	DVI-I (integrated analog and digital), Single Link Compatible with VGA or HDMI standard through adapter	
RS-232C INTERFACE		
Connector Type	9 pin D-sub female	TX, Rx, RTS, CTS
CAN INTERFACE (OPTIONAL)		
Connector Type	9 pin D-sub male connector	
AC POWER INPUT		
Power Source	AC 100 V ~ 240 V, 50/60 Hz	Auto range selection
GENERAL		
Internal Data Storage	10 MB internal	
Power Consumption	< 45 W	
Warm-up Time	< 15 minutes	
Temperature Range	+5 °C ~ +40 °C (0 °C ~ +5 °C) -20 °C ~ +60 °C	Operating Storage IEC 61010-1 (Basic + TC; +5°C ~ Ambient)
Dimensions & Weight	330 (W) x 132 (H) x 180 (D) mm, Approx. 4.2kg 13.0 (W) x 5.2 (H) x 7.1(D) inch, Approx. 9.3lb	
Calibration Cycle	The recommended calibration cycle is one year. Calibration services are available through the nearest authorized calibration service.	
TRACKING GENERATOR (OPTIONAL)		
Frequency Range	100 kHz ~ 3.25 GHz	
Output Power	-30 dBm ~ +0 dBm in 0.5 dB steps	
Absolute Accuracy	± 2.5 dB	@100 MHz, 10 dBm, Source attenuation = 10 dB, 25 ± 10°C
Output Flatness	Referenced : 100 MHz, -10 dBm	
	100 kHz ~ 2 GHz	± 1.5 dB
	2 GHz ~ 3.25 GHz	± 2 dB
Output Level Switching Uncertainty	± 1.0 dB	Referenced to -10 dBm
Harmonics	< -20 dBc	Typical, output level = -10 dBm
Reverse Power	+35 dBm max.	
Connector Type	N-type, female	
Impedance	50Ω	Nominal
Output VSWR	< 1.4:1	100 kHz ~ 3.25 GHz, source attenuation >10 dB

(1) For minimum RBW filter, a source attenuation of 10 dB or more is required.

Note : The specifications apply when the GSP-9330 is powered on for at least 45 minutes to settle up to a temperature of ±5°C to 40 °C, unless specified otherwise.

ORDERING INFORMATION

GSP-9330 3.25 GHz Spectrum Analyzer

EMC Pretest Solution :

GFF-105	EMC Near Field Probe Set
GLN-5040A	Line Impedance Stabilization Network
GIT-5060	Isolation Transformer
GPL-5010	Transient Limiter

ACCESSORIES :

Power Cord, Certificate of Calibration, CD-ROM (with Quick Start Guide, User Manual, Programming Manual, SpectrumStar Software, SpectrumStar Guide & AVI Driver)

OPTION

GSP-007	Tracking Generator (Factory installed option)
Option 05	Battery Pack
GSP-5001	GPIB Interface (Factory installed option)

OPTIONAL ACCESSORIES

GSC-009	Soft Carrying Case
GRA-015	Rack Adapter Panel

FREE DOWNLOAD

Spectrum Star PC Software for Windows System (available on GW Instek website)
PC Driver Supports LabVIEW, LabWindows/CVI Programming (available on GW Instek)

GLN-5040A Two Line V-Network
For GSP-9330

GPL-5010 Transient Limiter
For GSP-9330

GIT-5060 Isolation Transformer
For GSP-9330

A. FAST SIGNAL MONITOR

FM Signal Monitoring

Taiwan Telecom Signals

For spectrum analyzer, speed is the most important specification. GSP-9330 provides sweep speed up to 284 µs. Users, via high speed sweep time, can identify and analyze various fast or transient signals such as frequency/amplitude modulation signals, Bluetooth frequency hopping signals, tuned receiver or other interfering signals under FHV Band.

B. MODULATED SIGNAL ANALYSIS

2FSK Signal Analysis

ASK/FSK Signal Demodulation & Analysis

AM/FM Signal Demodulation & Analysis

2FSK FSK ASK FM AM

2FSK modulation, for its features of low design cost and low electricity consumption, is widely used by RF communications applications with low power and low data transmission speed characteristics. Nowadays, 2FSK modulation technology has been applied in various products and systems such as consumer electronics, automotive electronics, RFID, auto reading electricity meter, and industrial control devices, etc. 2FSK signal analysis measures parameters including carrier power, FSK frequency deviation, carrier frequency, and carrier frequency offset. Users can set the criterion in frequency deviation and carrier offset for fast test result determination.

RFID and optical communications systems often use Amplitude Shift Keying (ASK). Applications such as wireless telephone, paging systems, and RFID, etc. utilize Frequency Shift Keying (FSK). ASK/FSK demodulation and analysis measures parameters including ASK depth, frequency deviation, carrier power, carrier frequency offset, symbol, and waveform. Users can set ASK depth, frequency deviation, carrier power and carrier offset for Pass/Fail testing result. Data message is provided to determined preamble & sync function.

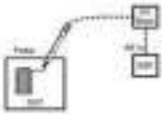
AM/FM Signal Analysis measures parameters including AM depth, frequency deviation, modulation rate, carrier power, carrier frequency offset and SINAD. Users can set the criterion in AM depth, frequency deviation, carrier power and carrier offset for fast test result determination. The GSP-9330 has a convenient AM/FM demodulation function to tune into AM or FM broadcast signals and listen to the demodulated signals.

3.25GHz Spectrum Analyzer

EMC PRETEST SOLUTION

ANT-04/ANT-05

PR-01



PR-02

GSP-9330 has the built-in EMI dedicated 200/9k/120k/1MHz Rbw; 20dB low noise amplifier and Quasi-Peak/Average detection mode to conduct radiation and conduction tests after collocating with the probe set.

GKT-008, the radiation test probe set, provides a complete near field test probe set to simplify the complex measurement procedures and to simulate the far-field tests from the labs. Using GKT-008 can greatly save engineers' debugging time and the anxiety for going back and forth to the labs. GKT-008 can collocate with the Tracking Generator function of GSP-9330 to conduct EMS tests.

For conduction tests, GSP-9330 can collocate with LISN and Isolation Transformer to conduct electromagnetic conduction tests. If users concern EUT's large voltage variation or complexity, applying a Transient Limiter will make test equipment safer.

EMC Pretest Instruments Provided by GW Instek Are as Follows:		
GSP-9330	Spectrum Analyzer	Built-in complete EMC pretest solution
GKT-008	EMI Near Field Probe Set	Provide probe set for near field signals, including: ANT-04/ANT-05 Field sensor PR-01 AC high voltage probe PR-02 Source contact probe
GLIN-10MBA	LISN	LISN required by EMI conduction tests and it meets CISPR16-1-2:2006 regulations.
GIT-9000	Isolation Transformer	Different routes have different current leakages that will cause systems to have short circuit. Isolation transformer prevents short circuit by isolating current loop.
GTL-301B	Transient Limiter	Transient Limiter will make test equipment safer if EUT has large voltage variation or complexity.

For more detailed information about EMC Pretest Solution, please visit "DETAILED EMC PRETEST SOLUTION" document.

GRAPHIC PROCESSING OF SIGNAL MONITORING

Observe FM Signals by Spectrogram

Observe WiFi Signals by Topographic

Observe 4G LTE Signals by Split-Window Display

Spectrogram can simultaneously display power, frequency, and time. Frequency and power variation according to time changes can also be tracked. Especially, the intermittently appeared signals can be identified. Users, by using Spectrogram, can analyze the stability of signal versus time or identify the intermittently appeared interference signals in the communications system. Users can also use two markers to find out the relation of power to frequency and time.

Topographic uses color shade to show the probability distribution of signal appearance. This function allows users to directly understand the process of signal variation according to time changes that is beneficial to observe intermittent flexible signals or electromagnetic interference signals. Users can also use two markers to find out the relation of power to frequency and percentage.

Split-Window allows two independent observations that are very convenient for monitoring two different frequency bandwidths.

Channel Power Measurement

ACPR OCBW

Telecommunications and broadcasting service carriers will encounter distorted signals caused by adjacent channels' inter-modulation while transmitting modulated signals using communications channels. If the distorted signals are too large the communications quality of adjacent channels will be affected. The ACPR measurement can examine the leakage status that is conducive to identifying interference sources.

The OCBW measurement can simultaneously display OCBW, channel power and PSD. OCBW's unit is shown by percentage. A measurement limit consisting bandwidth will be shown when OCBW is in use.

Spectrum Emission Mask

SEM

SEM measures out-of-channel emission which is defined by corresponding to channel power. Users can set main channel's parameters, out-of-channel range, and limit line, etc.

GSP-9330 has the built-in SEM settings of 3 GPP, WLAN 802.11b/g/n, WiMax 802.16 and self-defined communications system. SEM supports the Pass/Fail test function and lists frequency range for surpassing each out-of-channel limit. An alarm signal will be triggered if any measurement results that are not matched with SEM.

CATV System Parameter Tests

CNR/CSO/CTB

The built-in CNR/CSO/CTB functions of GSP-9330 are ideal for measuring performance of CATV amplifier and system.

Note: General CATV is 75Ω. For GSP-9330, a 50 ~ 75 ohm adapter is needed.

TOI (Third Order Intercept)

Users can measure the linearity of receiver systems and components such as mixers, low noise amplifier and more by TOI which automatically tests effective carrier and measures inter-modulation sidebands.

Harmonic

Harmonic can easily measure the amplitude of fundamental frequency and as high as ten orders of harmonic frequency. This function can also measure amplitude (dBc) which is the ratio of harmonic and corresponding fundamental carrier. Total harmonic distortion (THD) can also be calculated by this function. The best harmonic information can be obtained by adjusting RBW.

Time Domain Power

Users can go to zero span setting and open marker to observe burst signals when measuring burst signal in time domain is required.

Phase Jitter

The Phase Jitter function can rapidly measure phase noise produced by RF signal sources and oscillator's carrier deviation. This function can directly convert signal jitter to phase (rad) and time (ns).

Marker Noise

The marker noise function calculates the average noise level over a bandwidth of 1Hz, referenced from the marker position.

Gated Sweep

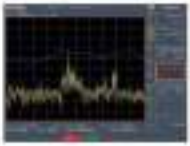
Radar or TDMA communications systems, via intermittently turning On/Off output power, control transmission signals. In order to monitor the power spectrum during the transmission process, the Gated Sweep function can initiate measurement only when signal is appear. This function is ideal for measuring burst signals such as GSM or WLAN.

PRODUCTION LINE APPLICATIONS

Sequence Function

The sequence function allows users to edit a sequence formulated by a series of steps directly from the instrument. Pause and delay can be inserted in the sequence to observe the test results. There are five sets of sequence for selection. Each sequence of has editing of 20 steps. Different sequence can be interactive and support each other. This function provides automatic editing without using the PC that is very convenient for assembly lines in which execute routine test procedures.

Limit Line Function



The limit line function, based upon the preset criteria of passing the test, can be used to directly determine whether the DUT passes the test. Test result not only can be shown on the LCD screen, but also an alarm signal output indication from the rear panel which is done by connecting a speaker or light device to show the test result.

Shorten Warm-Up Time

CSP-9330 utilizes the patented design of high efficient heat dissipation and feedback temperature control. After the instrument is turned on, the internal instrument can rapidly maintain a stable temperature so as to provide accurate amplitude measurement and deliver the frequency measurement with 0.05 ppm frequency stability.

Wake-Up Clock

Users can set up automatic wake-up time for each day of the week. By so doing, the purpose of CSP-9330 pre-wake-up can be achieved. Pre-wake-up is ideal for the lower temperature environment to conduct tests in the preset time.

USER FRIENDLY DESIGN

Status Icons

Status icons show the interface status, power status, alarm status and etc of CSP-9330. Users can easily understand the setting status and test results of the instrument.

Definition Help

The built-in Definition Help function allows users to immediately understand the parameters of Channel Power, OCBW, ACPR, SEM, Phase Jitter, N dB Bandwidth & FFdB items so as to save time on reading user manual.

COMMUNICATIONS INTERFACE

Various Interface

Provide USB Host, RS-232, LXI C(LAN), and GPIB optional, instrument control interface. Supported programs comply with IEEE488.2.

File Storage and Video Output

DVI Interface **USB Device/MicroSD**

Provide USB Device, MicroSD interface for file storage. Quick Save function is also available for users to quickly retrieve display. Support DVI with 800 x 480 resolutions.

SOFTWARE SUPPORT

PC Software - SpectranShot

EMI Preset Mode

Cat Trace Mode

Remote Control Mode

Users can use the external software SpectranShot for EMI preset report management and assessment, remote control and waveform data recording for long periods of time.

Under the EMI Pre-test Mode, users can select the required CISPR EMI regulation for conduction and radiation measurement.

Under Cat Trace mode, users can record the waveform data for long periods of time. It can be applied to spectrum monitoring for detecting any abnormal radio signals. The software will send out e-mail to inform users if any abnormal situation occurs.

Under the Remote Control mode, users can monitor wireless interference signals or observe signals for long periods of time.

VI Driver & LabVIEW Support

VI Driver Supports LabView & LabWindows/CVI Programming.
It is available on MI website.

VARIOUS AUGMENTING OPTIONS

Tracking Generator

Scalar Network Analysis

3dB Frequency Bandwidth

Reflection Loss

P1dB Point Measurement

TG option provides 9 kz -3G dBm synchronized sweep output, conducts scalar network analysis (S11, S21) function as well as P1dB.

The built-in tracking generator can swiftly and easily measure frequency response of cable loss, filter bandwidth, amplifier gain, mixer conversion loss, etc. The R-dB Bandwidth function measures 3dB bandwidth of Bandpass filter. With bridge should be connected with tracking generator to measure the return loss of antenna or filter.

All active components have linear dynamic range for power output. Once output power reaches the maximum level, active component will enter the non linear saturated area of P1dB point and cause amplifying signal intensity as well as produce harmonic distortion. It is very useful for P1dB point measurement in active components such as low noise amplifier, mixer and active filter.

Soft Carrying Case

Optional soft carrying case(GSC-009) provides convenience and protection to the instrument. GSP-9330 is equipped with 8.4 inches 800 x 600 pixels LCD display which yields clearer display results for outdoor operations.

3GHz Spectrum Analyzer

GSP-9308B (9kHz~3GHz)

FEATURES

- Frequency Range : 9kHz ~ 3 GHz
- 0.03ppm Frequency Stability and 1ppm Aging Rate
- Built-in Preamplifier, 30dB Attenuator, and Sequence Function
- RBW : 1Hz ~ 1MHz
- Sensitivity : -149dBm/Hz (@PreAmp on)
- Built-in AM/FM Demodulation & Analysis
- Built-in P1dB point, Harmonic, Channel Power, N-dB Bandwidth, OBW, ACPR, IBW, TOI, CNR, CTB, CSO, Noise Marker, Frequency Counter, Time Domain Power, Gated Sweep
- Built-in Spectrogram, Topographic and Dual-View Display Modes
- Remote Control Software : SpectrumBot
- Remote Control Interface : LAN, USB, RS-232
- Options : Tracking Generator, GPIB Interface

GSP-9308B is a 3GHz spectrum analyzer which meets general RF measurement requirements. It provides a frequency stability of 0.03ppm and collocates with a built-in preamplifier, which has a minimum noise floor of -149dBm / Hz. More than 20 measurement applications are also available, including AM/FM modulation analysis, ACPR, OCBW/CHPW, CATV parameters etc.

For signal monitoring and processing, GSP-9300B provides Topographic and Spectrogram display modes to analyze the signal through the change of color temperature. The split-window display mode can set parameters for both displays and measure two different frequency bands at the same time. Friendly user interface provides functions such as status icon display, online help, multi-language support, and sequence setting. The patented heat-conducting design can greatly shorten the time for the machine to power up. The preset power-on function can improve the efficiency when it is used in the production line. Communications interfaces include USB, RS-232, LXI, MicroSD, GPIB interface, and DVI output.

In summary, GSP-9300B is a stable, lightweight and suitable test equipment for various applications. It is very ideal for the education market, production line, general signal monitoring, and more importantly, its price is beyond your imagination. It is the preferred product for limited budgets.

SPECIFICATIONS

FREQUENCY		
FREQUENCY		
Range	9 kHz ~ 3 GHz	
Resolution	1 Hz	
FREQUENCY REFERENCE		
Accuracy	±(aging rate x time after last adjustment + stability over temperature + supply voltage stability)	
Aging Rate	< 1 ppm / year	1 year after last adjustment
Frequency Stability over Temperature	< 0.005 ppm	0 ~ 50 °C
Supply Voltage Stability	< 0.01 ppm	
FREQUENCY READOUT ACCURACY		
Start, Stop, Center, Marker	±(marker frequency indication x frequency reference accuracy + span x RBW / frequency resolution)	
Trace Points	1501, 601 points, user defined points	
MARKER FREQUENCY COUNTER		
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	
Accuracy	±(marker frequency indication x frequency reference accuracy + counter resolution)	RBW/Span ≥ 0.01 : 1kHz level to 0dBm, >30 dB
FREQUENCY SPAN		
Range	0 Hz (zero span), 100 Hz ~ 3 GHz	
Resolution	1 Hz	
Accuracy	± frequency resolution*	RBW ≥ 1kHz
PHASE NOISE		
Offset from Carrier		Fc=1 GHz@RBW=1 kHz, VBW=10 Hz, Average@ 20
10 kHz	< -90 dBc/Hz	Typical
100 kHz	< -90 dBc/Hz	Typical
1 MHz	< -110 dBc/Hz	Typical
RESOLUTION BANDWIDTH (RBW) FILTER		
Filter Bandwidth	1 Hz ~ 1 MHz in 1-3-10 sequence 200 Hz, 9 kHz, 120 kHz, 1 MHz	6dB bandwidth 6dB bandwidth
Accuracy	± 5%, RBW ≥ 1kHz; ± 5%, RBW<1kHz	Nominal
Shape Factor	< 5 : 1	Nominal Bandwidth ratio : 60dB / 3dB
VIDEO BANDWIDTH (VBW) FILTER		
Filter Bandwidth	1 Hz ~ 1 MHz in 1-3-10 sequence	3dB bandwidth

(1) Frequency Resolution = Span/(Trace Points - 1)
(2) Typical specifications are for reference only. Under the conditions of: 23 ± 5°C, 0 ~ 40°C, 70% relative humidity, and 30 minutes warm-up time. All specifications are subject to change without notice.
(3) Nominal values indicate expected performance. They are not guaranteed or warranted.

AMPLITUDE		
AMPLITUDE RANGE		
Measurement Range	100 kHz ~ 1 MHz	DANL -15 dBm DANL to -21 dBm DANL to -30 dBm
	1 MHz ~ 10 MHz	
	10 MHz ~ 3 GHz	
ATTENUATOR		
Input Attenuator Range	0 ~ 30 dB, in 1 dB steps	Auto or manual setup
MAXIMUM SAFE INPUT LEVEL		
Average Total Power	0 ~ +23 dBm	Input attenuator ≥ 10 dB
DC Voltage	± 50 V	
1 dB GAIN COMPRESSION		
Total Power at 1st Mixer	> 0 dBm	Typical : fc=0.1GHz to 3GHz, preamp. off Typical : fc=0.1GHz to 3GHz, preamp. on Mixer power level (dBm) = input power (dBm) - attenuation (dB)
Total Power at the Preamp	> -20 dBm	

GSC-009 Soft Carrying Case

Part: GSP-9330/9308

GSP-9300B

SPECIFICATIONS

DISPLAYED AVERAGE NOISE LEVEL (DANL)		
Preamp-off	0 dB attenuation, RF input is terminated with a 50Ω load, RBW 10 Hz, VBW 10 Hz, span 500 Hz, reference level = -60 dBm, trace average 100	
9 kHz–100 kHz	< -92 dBm	Nominal
100 kHz–1 MHz	< -105 dBm + 1 x (f/100 kHz) dB	Nominal
1 MHz–10 MHz	< -122 dBm	Nominal
10 – 3 GHz	< -136 dBm	Nominal
Preamp-on	0 dB attenuation, RF input is terminated with a 50Ω load, RBW 10 Hz, VBW 1 Hz, span 500 Hz, reference level = -60 dBm, trace average 100	
100 kHz–1 MHz	< -108 dBm - 2 x (1/100 kHz) dB	Nominal
1 MHz–10 MHz	< -142 dBm	Nominal
10 MHz–3 GHz	< -142 dBm + 3 x (f/7 GHz) dB	Nominal
(1) RBW, span and video bandwidth dependent.		
LEVEL DISPLAY RANGE		
Scales	Log, Linear	
Units	dBm, dBmV, dBuV, V, W	
Marker Level Readout	0.01 dB 0.01 % of reference level	Log scale Linear scale
Level Display Modes	Trace, Topographic, Spectrogram	Single/Split Windows
Number of Traces	6	
Detector	Max/Average/Min, Sample, Normal, RMS (CP Video), Quasi-Peak, Average	
Trace Functions	Clear-R, View, Max/Min Hold, View, Blank, Average	Can be setup for each trace separately
ABSOLUTE AMPLITUDE ACCURACY		
Absolute Point	Span ≤ 100 kHz, RBW 10 kHz, VBW 1 kHz, span 100 kHz, log scale, 1 dB/div, peak detector, 23°C±5°C, signal at reference Level	
Preamp-Off Preamp-On	± 0.3 dB ± 0.4 dB	Ref level 0 dBm, 10 dB RF attenuation Ref level -20 dBm, 0dB RF attenuation
FREQUENCY RESPONSE		
Preamp-Off 100 kHz – 2.9 GHz (RBW ≥ 1 kHz) Preamp-On 1 MHz – 2 GHz 2 GHz – 3 GHz	Attenuation=10dB,Reference:50MHz,23~25℃ ± 0.3 dB ± 0.7 dB Attenuation=0dB,Reference:50MHz,23~25℃ ± 0.5 dB ± 0.8 dB	
ATTENUATOR SWITCHING UNCERTAINTY		
Attenuator Setting Linearity	0 – 30 dB in 1 dB step ± 0.2 dB	Reference : 10 dB, 50 MHz
RBW FILTER SWITCHING UNCERTAINTY		
1 kHz – 1 MHz	± 0.2 dB	Reference : 30 kHz RBW
LEVEL MEASUREMENT UNCERTAINTY		
Overall Amplitude Accuracy	± 1.2 dB ± 0.3 dB	20~30℃, frequency = 50MHz, Signal input 0~-50dBm, RBW≤1MHz, Input Attenuator 10dB, RBW 1kHz, Video BW=RBW, Peak detector, Preamp Off, Span≤2kHz
SPURIOUS RESPONSE		
Second Harmonic Intercept	Preamp off, signal input -30dBm, 0dB attenuation	
	< 0 dBm < 40 dBm	Typical, 10MHz ≤ f < 1.5 GHz Typical, 1.5GHz ≤ f ≤ 3.0 GHz
Third-order Intercept	Preamp off, signal input -30dBm, 0 dB attenuation	
Input Related Spurious	< -70dBm < -60 dBc	300 kHz ~ 3 GHz Input signal level -30 dBm, RBW 10 kHz, 80 ~ 0 dB, 23 ~ 30℃
Residual Responses(Internal)	< -90 dBm	Input terminated,0dB attenuation,Preamp off
SWEEP		
Sweep Time		
Range	100 μs ~ 1000 s 50 μs ~ 1000 s	Span ≥ 10 Hz Span = 0 Hz, Min resolution = 10ns
Sweep Mode Trigger Source Trigger Slope	Continuous, Single Free run, Video, External Positive or negative edge	
RF PREAMPLIFIER		
1.6GHz Type		
Frequency Range Gain	100 kHz ~ 1.6 GHz 20 dB	Nominal (installed as standard)

Rear Panel

GRA-415 Rack Adapter Panel

For : GSP-930B/930BL Rack Mounting (19", 4U)

GKT-001 General Kit Set

Include :
ADP-002
ATN-100
CTL-383
CSC-004
For GSP Series

GKT-002 CATV Kit Set

Include :
ADP-001
ADP-118
CTL-384
CSC-005
For GSP Series

GKT-003 RS-8 Kit Set

Include :
CAB-001
CAB-002
CTL-383
CSC-004
For GSP Series

GKT-088 EMI Probe Kit Set

Include :
ADP-002
CTL-383
PRB-01
PRB-02
ANT-04
ANT-08
For GSP Series

3GHz Spectrum Analyzer

SPECIFICATIONS

FRONT PANEL INPUT/OUTPUT		
RF INPUT		
Connector Type	N-type female	
Impedance	50Ω	
VSWR	<1.5:1	Nominal 300 kHz ~ 3 GHz, input attenuator ≥ 10 dB
POWER/USB OPTION		
Connector Type	Single male	
Voltage/Current	DC +5 V/500 mA max.	With short-circuit protection
USB HOST		
Connector Type	A plug	
Protocol	Host to 2.0	Support full/high/low speed
MICRO SD SOCKET		
Protocol	SD 3.0	
Support Cards	Micro SD, Micro SDHC	Up to 32GB capacity
REAR PANEL INPUT/OUTPUT		
REFERENCE OUTPUT		
Connector Type	BNC female	
Output Frequency	10 MHz	Nominal
Output Amplitude	3.3V CMOS	
Output Impedance	50Ω	
REFERENCE INPUT		
Connector Type	BNC female	
Input Reference Frequency	10 MHz	
Input Amplitude	1 dBm ~ +10 dBm	
Frequency Lock Range	Within ± 3 ppm of the input reference frequency	
ALARM OUTPUT		
Connector Type	BNC female	Open-collector
TRIGGER INPUT/GATED SWEEP INPUT		
Connector Type	BNC female	
Input Amplitude	3.3V CMOS	
Switch	User-selectable by function	
LAN TCP/IP INTERFACE		
Connector Type	RJ-45	
Rate	10Base-T, 100Base-TX, Auto-MDI/X	
USB DEVICE		
Connector Type	B plug	For remote control with support to USB TMC
Protocol	Version 2.0	Supports full/high/low speed
IF OUTPUT		
Connector Type	SMA female	
Impedance	50Ω	Nominal
IF Frequency	686 MHz	Nominal
Output Level	-15 dBm	10 dB attenuation at input, 0 dBm @ 1 GHz
HARMONIC OUTPUT		
Connector Type	3.5mm stereo jack, mixed for mono operation	
MIXED OUTPUT		
Connector Type	DVI-I (integrated analog and digital), single link, compatible with VGA or HDMI standard through adapter	
RS-232C INTERFACE		
Connector Type	9-pin D-sub, male	Tx, Rx, CTS, GND
CAN INTERFACE (OPTIONAL)		
Connector Type	1x5 2.00 mm connector	
AC POWER INPUT		
Power Source	AC 100 V ~ 240 V, 50/60 Hz	Auto range selection
GENERAL		
Internal Data Storage	15 MB nonvolatile	
Power Consumption	< 65 W	
Warm-up Time	< 30 minutes	
Temperature Range	-5 °C ~ +45 °C -20 °C ~ +70 °C	Operating Storage
Dimensions & Weight	330(W) x 132(H) x 380(D) mm, Approx. 4.3 kg 13.0(W) x 5.2(H) x 15.0(D) inch, Approx. 9 lbs	With all options (Track + TG + CPIB + Battery)
Calibration Cycle	The recommended calibration cycle is one year. Calibration services are available through GW Instek's authorized calibration service.	
TRACKING GENERATOR (OPTIONAL)		
Frequency Range	100 kHz ~ 3 GHz	
Output Power	-30 dBm ~ 0 dBm in 0.1 dB steps	
Attenuation Accuracy	± 3.0 dB	@ 50 MHz, 10 dBm, Source attenuation 10 dB, 20 ~ 30°C
Output Flatness	Reference = 300 MHz, 10 dBm 100 kHz ~ 3 GHz 2 GHz ~ 3 GHz	± 3.0 dB ± 2 dB
Output Level Switching Uncertainty	± 0.5 dB	Referenced to -10 dBm
Harmonics	< -20 dBc	Typical, output level = -10 dBm
Reverse Power	+30 dBm max.	
Connector Type	N-type female	
Impedance	50Ω	Nominal
Output VSWR	< 1.5:1	300 kHz ~ 3 GHz, source attenuation >= 10 dB

Note: The specifications apply when the GSP-9300B is powered on for at least 30 minutes in environments with a temperature of 20 °C to 30 °C, unless specified otherwise.

ORDERING INFORMATION

GSP-9300B 3 GHz Spectrum Analyzer

ACCESSORIES

Power Cord, Certificate of Calibration, CD-ROM (with Quick Start Guide, User Manual, Programming Manual, SpectreViint Software, SpectreViint Guide & Drivers)

OPTION

Opt.-01 Tracking Generator Opt.-30 CPIB Interface

OPTIONAL ACCESSORIES

GSC-009 Soft Carrying Case **GBA-470** Rack Adapter Panel

FREE DOWNLOAD

SpectreViint PC Software for Windows System (available on GW Instek website) VI Driver Support Labview (LabVIEW Windows/CVI Programming available on GW website)

1.8GHz Spectrum Analyzer

GSP-818

1.8GHz Spectrum Analyzer

CE | WEEE | LAN | SVGA

GSP-818, a 1.8GHz basic spectrum analyzer launched by GW Instek, comes standard with a 20dB preamplifier and a resolution bandwidth (RBW) of 10Hz to 3MHz. With respect to measurement functions, GSP-818 provides AM / FM signal demodulation, ACPR / OCBW / CHPW, Counter, Limit Line and other functions. The built-in Time Span function can be used to view the correlation between power, frequency and time. The bandwidth Zoom In / Out function can view the details of the signal in different spans. With these functions, users can perform a wider range of measurement applications.

In order to easily observe signals, GSP-818 utilizes a large 10.4-inch screen and supports a resolution of 800 * 600. Communications interfaces include USB and LAN. In addition, GSP-818 provides two options, including TG and EMI Kit. Customers only need to purchase the corresponding software key (Software Keycode) to directly activate the option without having to send the equipment back to GW Instek, which greatly improves the operational efficiency.

FEATURES

- Frequency Range: 9kHz ~ 1.8GHz
- RBW: 10Hz ~ 3MHz, 10Hz ~ 100kHz in 1-10 steps
- Sensitivity: -140dBm @RBW 10Hz, Preamp On
- Built-in AM/FM Demodulation
- Bandwidth Zoom Function
- Measurement Function: ACPR/OCBW/CHPW, Noise Bandwidth, Freq. Counter, Noise Marker, Limit Line
- Built-in 20dB Preamplifier Standard
- Interface: LAN, USB
- Screen: 10.4" SVGA Output (800x600)
- Options: Tracking Generator, EMI Filter & Detector (via software keycode)

SPECIFICATIONS		
FREQUENCY		
FREQUENCY		
Range	9 kHz ~ 1.8 GHz	
Resolution	1 Hz	
FREQUENCY SPAN		
Span Range	0 Hz, 100 Hz to max. frequency of instrument	
Span Uncertainty	±(span / (number of points - 1))	
INTERNAL FREQUENCY REFERENCE		
Span Range	10.000000 MHz	
Reference Frequency	±(Span Rate Uncertainty + Freq. aging rate) ×	
Uncertainty	(instrument stability + initial uncertainty)	
Temperature Stability	±1 ppm/°C	
Aging Rate	± 1 ppm/year	0 °C ~ 40 °C
SSB PHASE NOISE		
Offset From Carrier	1 kHz, 10 kHz, 100 kHz, 1 MHz, 10 MHz, Average 4~16, 25°C ~ 30°	
10 kHz	< -82 dBc/Hz (1)	Typical
100 kHz	< -102 dBc/Hz (1)	Typical
1 MHz	< -119 dBc/Hz (1)	Typical
RESOLUTION		
Resolution Bandwidth	1 kHz ~ 3 MHz (1-3-10 steps for sequence), 10 kHz, 100 kHz, 200 kHz, 9 kHz, 120 kHz, 1 MHz	
RBW Uncertainty	± 5%	200 Hz/300 kHz, Optional
	± 10%	100 Hz ~ 1 kHz
	± 30%	9 kHz ~ 3 MHz
Resolution Filter Shape	4.1 : 1	Typical, digital and close to gaussian shape
Video Bandwidth (VBW)	10 Hz ~ 3 MHz	
AMPLITUDE		
AMPLITUDE AND LEVEL		
Amplitude Measurement Range	DANL ~ + 10 dBm	1 dB/div, 2 dB/div, 5 dB/div, 10 dB/div, Preamp Off
	DANL ~ + 20 dBm	1 dB/div ~ 5 dB/div, Preamp On
Reference Level	-80 dBm ~ +10 dBm	10 dB Steps
Preamp	20 dB	1 dB/div ~ 10 dB/div
Input Attenuation	0 ~ 40 dB, in 1 dB steps	
Max Input DC Voltage	50 VDC	
Max Continuous Power	+20 dBm	Average continuous power
DISPLAY AVERAGE NOISE LEVEL (DANL)		
Preamp Off	Input Attenuation: 0dB, RBW: 10 Hz, VBW: 10 Hz, Span: 100 Hz, ref level: -50dBm, Sweep average > 10	
100 kHz ~ 1.0 MHz	< -101 dBm	
1 MHz ~ 10 MHz	< -116 dBm	
10 MHz ~ 1 GHz	< -117 dBm	
1 GHz ~ 1.8 GHz	< -115 dBm	
Preamp On	Input Attenuation: 0dB, RBW: 10 Hz, VBW: 10 Hz, Span: 100 Hz, ref level: -50dBm, Sweep average > 10	
100 kHz ~ 1.0 MHz	< -121 dBm	
1 MHz ~ 10 MHz	< -140 dBm	
10 MHz ~ 1 GHz	< -141 dBm	
1 GHz ~ 1.8 GHz	< -138 dBm	
FREQUENCY RESPONSE		
Filter Bandwidth	3 dB ~ 10 Hz, 3 dB ~ 100 kHz options, Normal, Input Attenuation 10 dB, reference frequency 100 MHz	
Preamp Off, 9 kHz ~ 100 kHz	±3.0 dB	10 °C ~ 40 °C, Typical
Preamp On, 9 kHz ~ 100 kHz	±3.0 dB	0 °C ~ 10 °C, 40 °C ~ 50 °C, Typical
AMPLITUDE ACCURACY AND RESPONSE		
RBW Switching Uncertainty	Reference: 10 kHz RBW, at 50 MHz	
	±0.2 dB	Typical
Input Attenuation Uncertainty	0 dB, 2 dB, 5 dB, 10 dB to 40 dB, Preamplifier Off, 10 dB RF attenuation, 0 ~ 40 dB, 40.1 dB	
Absolute Amplitude	100 MHz, 0 dBm, 0 ~ 40 dB RF, Span 10 kHz to 1 MHz, 10 kHz VBW, 1 MHz Peak detector, 10 dB RF attenuation, 25°C ± 5°C Reference level	
Preamp Off	±0.5 dB	Input signal level -10 dBm
Preamp On	±0.5 dB	Input signal level -40 dBm
Uncertainty	±1.5 dB	Input signal range 0 dBm ~ -40 dBm, 10 dB RF attenuation
Linearity	0.5 dB, Maximum	100 kHz ~ 1 GHz

1.8GHz Spectrum Analyzer

Rear Panel

GSP-818

SPECIFICATIONS		
FUNCTIONS AND SIGNALS & BYPASS		
Second Harmonic Distortion	-65 dBc	0.1 to 50 MHz, RF step off, signal input -30 dBm, 0 dB RF attenuation, 25°C ~ 30°C
Third-order Intermodulation	-70 dBc	0.1 to 50 MHz, input double tone test -30 dBm, frequency interval 100 kHz, input attenuation 0 dB, preamplifier off, 25°C ~ 30°C
1 dB Gain Compression	>+5 dBm	From 0.1 (100 k) to 1.8 GHz, Preamp off, 25°C ~ 30°C
Residual Response	Terminated 50 Ω input or input port, 0 dB input attenuation, 25°C ~ 30°C	
	<-85 dBm	Span 100 kHz ~ 1.5 GHz
	<-90 dBm	Span 1.5 GHz ~ 1.8 GHz
Input Related Spurious	<-70 dBc	-30 dBm signal at input mixer, 25°C ~ 30°C
SWEEP		
SWEEP Time		
Range	1.0 ms to 3000 s 1 ms to 3000 s	Zero span type FFT Span
Span Mode	Continuous, Single	
TRACKING GENERATOR (OPTION-01)		
TRACKING GENERATOR OUTPUT		
Frequency Range	100 kHz to 1.8GHz	
Output Power Level Range	-30 dBm to 0 dBm	
Output Power Level Resolution	1 dB	
Output Flatness	± 1 dB	
Maximum Safe Reverse Level	Average input power: 50 dBm, DC: ±50 VDC	
Impedance	50 Ω	Nominal
Connector	N-Type Female	
FREQUENCY COUNTER		
FREQUENCY COUNTER		
Resolution	1 Hz, 10 Hz, 100Hz, 1kHz	
Accuracy	±(frequency reference x frequency reference accuracy + counter resolution)	
INPUTS AND OUTPUTS		
RF INPUT		
Impedance	50 Ω	Nominal
Connector	N-Type Female	
REFERENCE INPUT		
Connector	BNC Female	
10MHz Reference Amplitude	0 dBm to +10 dBm	
USB		
USB Host	Connector Protocol	A Plug USB 2.0 (Full Speed)
USB Device	Connector Protocol	B Plug USBTMC-USB488
VGA		
VGA	Connector Resolution	D-sub, 15-Pin (Female) 800*600, 60 Hz
GENERAL		
Display	8 Bit Resolution Size Color	211 x 132 800*600 (SVGA) 10.4 inch(s) 65536 colors
Remote Control	USB Device LAN TCP/IP Interface	B Plug, supports USB TMC RJ-45, supports 10Base-T/100Base-TX
Data Memory	Internal Memory	4 MB NAND
Temperature	Operating Temperature Storage Temperature	0 °C ~ 40 °C -20°C ~ 70°C
Dimensions & Weight	413 (W) × 221.6 (H) × 113.5 (D) mm, Approx. 3.9 kg (without package)	
AC Power Source	100V ~ 240V, 50/60 Hz	

ORDERING INFORMATION

GSP-818 1.8 GHz Spectrum Analyzer
Opt. 01 Tracking Generator (Factory Installed)
Opt. 02 EMI Filter and EMI Detector (Factory Installed)

ACCESSORIES
Power cord, Calibration Certificate, CD (including quick start guide, user manual, programming manual, PC software)

OPTIONAL ACCESSORIES
GSP-817T1 Tracking Generator (via software keycode)
GSP-817E1 EMI Filter and EMI Detector (via software keycode)

FREE DOWNLOAD
PC Software Dedicated Remote Control PC Software

A TRACE AND MARKER FUNCTIONS

Five traces are provided, and the Marker function can be assigned to different traces.

B 10Hz RBW

GSP-818 provides a minimum 10Hz RBW resolution and provides a 1-10 steps setting below the 100kHz RBW to allow a flexible signal detection.

C AM / FM DEMODULATION

GSP-818 provides AM and FM demodulation and supports demodulated audio output.

D ACPR, OCBW, CHPW

The ACPR function can set up to three sets of adjacent channel tests.

The power density of the signal can be measured through the OCBW function.

CHPW is used to measure the power strength of the signal in a user-defined channel.

E BANDWIDTH ZOOM

The Bandwidth Zoom function is used to view the spectral performance of the signal under different Spans.

F TIME SPEC

This function can simultaneously view the correlation between display power, frequency and time, and it can also track frequency and power with the variation of time.

G LIMIT LINE

It can directly judge whether the test result of the DUT is qualified according to the preset test qualification conditions. GSP-818 offers two Limit Line measurements: Windows Measure and Limit Line Measure.

3GHz Spectrum Analyzer & RF and Communications Trainer

GSP-730

3GHz Spectrum Analyzer

GW Instek GSP-730 is a 3GHz Spectrum Analyzer developed mainly to fulfill the demands of RF Communication educations. Budget constraint and insufficient teaching tools are normally the two hurdles for schools to provide high-quality courses for RF communication experiments. GSP-730, featuring full functions, a moderate spectrum analyzer should provide, along with GRF-1300/1300A RF communication trainer possesses a unique position in the field as an economical turn-key solution for 3GHz RF Communication Experiment courses.

GRF-1300/1300A

RF and Communication Trainer

GSP-730 FEATURES

- Frequency Range : 150kHz ~ 3GHz
- Adaset Function
- Noise level : ≤ -108dBm
- RBW Range : 10kHz, 100kHz, 300kHz, 1MHz
- ACPR/CHPR/OCBW Measurement
- 3 Traces in Different Colors
- Split Window Function
- Limit Line Function
- Remote Control Software
- Presentation Material for Training Courses
- Support Interface : USB Device/Host, RS-232C
- 5.6" TFT LCD with VGA Output

GRF-1300/1300A FEATURES

- Waveform Support :
  Sine Wave : 0.1 ~ 3MHz
  Square Wave : 0.1 ~ 1MHz
  Triangle Wave : 0.1 ~ 1MHz
- RF Frequency : 870 ~ 920MHz
- AM Modulation & FM Modulation
- 5 On/Off Switches and 5 Test Points to Simulate 5 Failure Conditions for Learning Outcome Test
- USB Interface to Provide Remote Control
- Mixer & 2.4GHz Bandpass Filter (Only GRF-1300A)

GSP-730 SPECIFICATIONS		
FREQUENCY		
Frequency Range		
Range	150kHz ~ 3GHz	
Center Frequency		
Setting Resolution Accuracy	0.1kHz ±(Set x Ref)	Frequency span : 0 (Zero) ~ 2.8GHz, 30 ± 5°C
Frequency Span		
Range Accuracy	0 Hz (Zero Span), 1kHz ~ 3GHz ±2%	Frequency span : 0 (Zero) ~ 2.8GHz, 30 ± 5°C
Resolution Bandwidth (RBW)		
Offset from Center	10kHz, 100kHz, 300kHz, 1MHz	Nominal, -3dB bandwidth
SSB Phase Noise		
Offset from Center	< -83 dBc/Hz (100kHz offset)	Typical, RBW : 30kHz, Span 1MHz@1GHz
Spurious Response & Harmonics		
	less than -50dBc	Reference at -10dBm input
AMPLITUDE		
Reference Level		
Input Range Accuracy Unit	+20 ~ -60dBm 40 dB/ div (10dB) dBm, dBV, dBμV	Reference at 1GHz, SPAN 500Hz
Average Noise Level		
	≤ -100dBm	Typical, center frequency 1GHz RBW 10kHz
Frequency Characteristics		
	@ 300MHz ~ 1.8GHz @ 80 ~ 300MHz, 1.8 ~ 3GHz	±2.0dB ±3.0dB
SWEEP		
Sweep Time		
Range Accuracy	10ms ~ 5 sec. (auto) ±2%	Port adjustable Frequency span : full span
RF INPUT		
Impedance VSWR Max Damage Level Connector	50 ohms less than 2.0 (input set ≥ 10dB) +30dBm (CW average power), 25VDC N-type female	Nominal
INTERFACE		
RS-232C USB Connector VGA Output Display	Sub-D female D-9 pins USB Host/Device full speed supported Sub-D female 15 pins 5.6" TFT LCD with LED	
GENERAL		
Temperature Range Operating Humidity Dimensions & Weight Power Source	Operating: 5 ~ 45°C Storage: -20 ~ 60°C less than 45°C / 90%RH 256 (W) × 153 (H) × 130 (D) mm Approx. 2.2kg AC 100~240V, 50/60Hz	Guaranteed at 23 ±5°C, without self-carrying case Less than 60°C / 90%RH

CSP-730

Rear Panel

GRF-1300 Front Panel

GRF-1300A Front Panel

CSP-730/GRF-1300A SPECIFICATIONS		
	GRF-1300A	GRF-1300
BASE BAND		
Waveforms Frequency Range Amplitude Harmonic Distortion	Sine, Square, Triangle 0.1~1MHz, Step : 1Hz 21.5Vpp 20.75Vpp into 50 Ohm ≤-30dBc	Sine, Square, Triangle 0.1~1MHz, Step : 1Hz 21.5Vpp ≤-30dBc
RF/FM ANALYZER		
Frequency Accuracy Adjustable Range Power Range	±0.15MHz ±45MHz @70M ~ 920MHz(L) Step : 1MHz ≤-15dBm	±0.15MHz ±45MHz @70M ~ 920MHz(L) Step : 1MHz ≤-15dBm
FM		
Max Frequency Deviation	>3MHz	>3MHz
AM		
Peak Difference	≤-18dBm	≤-18dBm
MIXER		
LO + IF LO - IF	≤-15dBm ≤-15dBm	-
MIXER + MODULATION		
	≤-60dBm	-
BANDPASS FILTER		
Frequency Centre: 2.4GHz	Switched 8 : ±20MHz	-
INTERFACE		
USB Device	USB Type B	USB Type B
DIMENSIONS & WEIGHT		
160(W) x 153(H) x 98(D)mm, 0.5(W) x 0.3(H) x 3.5(D)in, Approx. 1.2kg/2.6lb		

ORDERING INFORMATION

CSP-730 3GHz Spectrum Analyser
GRF-1300/1300A RF and Communication System Trainer

ACCESSORIES :
CSP-730 : Quick start manual x 1, User manual CD x 1, Power cord x1
GRF-1300/1300A : Experiment text book of student version, Power cord and remote control software CD, GRF-1300 : RF cable x 2, Antenna x 1, GRF-1300A : RF cable x 6, Antenna x 2, N to SMA adapter connector x 1, Power cord x 1

OPTION

GRA-401 : GRF-1300 Experiment text book of teacher version
GRA-402 : GRF-1300A Experiment text book of teacher version

OPTIONAL ACCESSORIES

ADP-001 : BNC to N TYPE Adapter
ADP-002 : SMA to N-TYPE Adapter
ATA-001 : Antenna, Dipole FM Antenna, BNC(M)
CFL-003 : RF Cable, RG316 Assembly, 300mm, SMA(M/M)
CFL-040 : USB Cable, USB 2.0, A-B Type, 1000mm

FREE DOWNLOAD

PC Software : Training system remote control software

3GHz Spectrum Analyzer

A TURN-KEY SOLUTION TO CLEAR AWAY TWO OBSTACLES

GSP-730, carrying 3GHz bandwidth and measurement functions including Autoset, Split Window, Limit Line, ACPR and OCBW etc., is regarded as the advanced educations of Mobile Communications (GSM, 3G, 4G/LTE...), Wi-Fi, Zigbee and RFID in the Electronic or the communications classes. The USB ports, the RS-232 interface and the VGA video output facilitate the teaching efficiency. The combination of GSP-730 and GRF-1300/1300A RF communications training is a turn-key system for both lecture and hands-on training purposes.

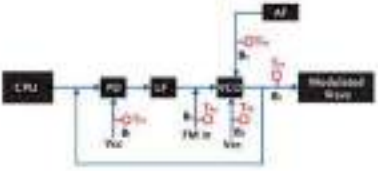
GRF-1300/1300A RF communications trainer, as the counterpart of GSP-730 for the basic RF communications experiment system, is capable of generating a baseband signal and a RF carrier signal for the built in AM and FM communications operations. The baseband signal output contains the selections of Sine, Triangle, and Square waveforms in the frequency range of 100kHz ~ 3MHz, whereas the RF signal output is a frequency-variable Sine wave in the range of 870 ~ 920 MHz. Connecting the baseband signal output with AM or FM inputs on the panel, GRF-1300/1300A produces AM or FM signal output respectively by using the internal RF signal as the modulation carrier according to users' selected frequency.

The GRF-1300A RF training kit features not only all functions of GRF-1300 RF training kit but also augments itself with Mixer and Bandpass Filter. Users can better understand the characteristics of Mixer and Bandpass Filter by operating scalar network analyzer measurement which is produced by combining GSP-730 spectrum analyzer, GRF-1300A RF Communications Trainer, and USG signal generator. The combination of USG signal generator and GRF-1300A Mixer function can produce 2.4GHz AM and FM modulation signals. GRF-1300A Bandpass Filter can purify the output signals by filtering out harmonic and spurious produced by Mixer output signals.

An Experiment Textbook (student's book) is available as the standard accessory of GRF-1300/1300A to provide experiment courses. The curriculum of the textbook includes the introduction of the frequency domain and the time domain concepts, the operation theories of a spectrum analyzer, and nine experiments to perform hands-on training for the learning of basic RF communications theories and the RF measurement techniques using a spectrum analyzer. A CD, containing power-point slides for course presentation and the remote-control software for experiment, is attainable with GRF-1300/1300A, allowing teachers to give lecture of experiment theories and perform experiment simultaneously.

Another Experiment Textbook (teacher's book) is accessible as an optional accessory of GRF-1300/1300A. In addition to the same contents in the student's book, this book provides the experiment results to the questions and as well as some advanced experiment theories. Thus, a section of test for learning outcomes can also be seen in the lecturers' material in order to guide the students from the faulty diagnosis to the correct one in a RF communication circuits. On the GRF-1300/1300A panel, there are five test points set at different points of circuit blocks. Through turning on or off the corresponding relays of the five test points enables the teachers to simulate the faults and teach students diagnosis technique.

The economical solution of GSP-730 and GRF-1300 greatly lowers the budget barriers for providing fundamental RF Communications Educations and facilitates the establishment of RF communication experiment labs with more training stations in schools.



Test Points on GRF-1300 for Fault Diagnosis

- **Introductions of Frequency Domain , Time Domain , and Spectrum Analyzer Basics**
- **9 Experiments Include**
  - Operations of Spectrum Analyzer
  - Quasi-band and RF signal measurements
  - AM and FM signal measurements
  - Communication system and product measurements
- **Learning Outcome Tests**
- **Auxiliary Tools**
  - PPT files including all experiments contents
  - Remote control software to control GRF-1300, GSP-730 simultaneously
  - Experiment text books including the student version and the teacher(optional)

CURRICULUM CONTENTS

GSP-730+GRF-1300 Solution

GSP-730+GRF-1300A+
USG-Series Solution

Fully-electronic RF Training System

In class, teachers can connect GSP-730 and GRF-1300 with a PC via a USB or RS-232 interface. First of all, all the contents of experiment has been converted into power-point slides and provided as the in-class materials. During lecturing the power-point slides, both GSP-730 and GRF-1300 can be remotely set by GRF Training System Control Software. Moreover, the signal shown on GSP-730 can be transferred to PC screen for further research. As a result, GSP-730 and GRF-1300 form an inclusive electronic teaching material package which efficiently simplifies lecturers' tasks before classes and shortens the process of the material preparation, and meanwhile, enhances the quality of the lecture. If the PC can only offer one USB interface, an extra purchase of USB hub* may solve the problem of insufficient USB interfaces. With proper installation, PC can manage the conjunction of GSP-730 and GRF-1300.

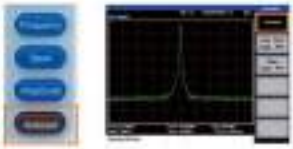
* USB hub is excluded from the product standard accessories.

Properly connect Spectrum Analyzer, GRF-1300A RF and Communications Trainer, USG-LF44 RF Signal Generator and a PC to perform ongoing experiments while the lecture is being given. Using a PC, teacher can present teaching material with Power Point slides and simultaneously control GSP-730, GRF-1300A and USG-LF44 to perform experiments and get spectrum displays parameter readings on the PC screen. GSP-730, GRF-1300A and USG-LF44 easily transfer the current teaching materials including the PowerPoint slides, textbook and the remote control software into electronic teaching system.

B. PC SOFTWARE FOR GSP-730 and GAP-1300 REMOTE CONTROL

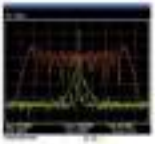
The dedicated PC software, Primary RF, is provided to support the remote control of GSP-730 and GAP-1300 simultaneously. The control includes base band signal waveform, frequency and RF signal frequency for GAP-1300 and Frequency, Span, Amplitude, RBW and spectrum transferring of GSP-730.

C. AUTOSET FUNCTION



The Autoset function automatically captures the signal and configures an appropriate setting for the optimum spectrum display at just one press of the button. With the Autoset function, using a spectrum analyzer like GSP-730 is no longer an annoying and complicated task.

D. THREE TRACE DISPLAY WITH THREE COLOR IDENTITY

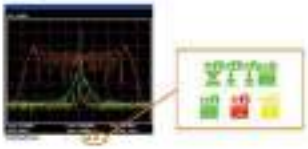


GSP-730 can illustrate a signal with three colors simultaneously under various display modes, including Clear/Write, Max Peak Hold, Min Peak Hold, View, Blank and Average. Other useful trace functions such as trace math operations are also accomplishable.

E. MARKER FUNCTION

Five Markers can be used to obtain the measurement readings of specified points. Each marker has a counterpart ΔMarker, the amplitude difference can be measured and indicated by setting the frequency of marker and the interval frequency of ΔMarker between two signals. While several pairs of Markers are used for marking more than one pair of signals at the same time, the Marker Table can be turned on and it can process all the tests and demonstrate the reading figures.

F. SETTING STATUS PRESENTED BY ICONS



The intuitive icons help users grasp the current setting conditions all the time. As all status icons are clearly shown at the screen of the screen, there is no need to worry about the unknown settings, which may cause confusion and lead to measurement errors.

G. SPLIT-WINDOW DISPLAY IN LXI MODE

Under Split Window Display Mode, the monitor will display two independent screens, which can respectively have separated settings. For instance, if processing the test between fundamental and harmonic signals, the separated screens can respectively set at different frequencies at the same time in order to process the measurement.

4. PASS/FAIL JUDGMENTS

This function may run the "Pass" and "Fail" inspection with efficiency. Firstly, a limit line or upper and lower limit lines should be edited as the judgment criterion, then the LCD will display "Pass" or "Fail" according to whether the input signal meets the condition defined by the limit lines to indicate the examined outcome.

5. POWER MEASUREMENT FUNCTION

ACPR

OCBW

GSP-730 provides measurement functions such as ACPR, OCBW, and Channel Power. These items are regulated to be tested in most communication systems, such as CDMA system. GSP-730 will illustrate channels by various colors so that the operation may become more precise and may minimize errors.

6. FLEXIBLE INTERFACE

The USB host interface on GSP-730 front panel allows the measuring diagrams to be saved in the memory stick. The USB Device and RS-232C interfaces on the rear panel are capable of connecting with a PC for remote control. VGA output can transfer whatever demonstrated on the LCD display to other display device or projector, which will strengthen the impression while giving the lectures.

ACCESSORIES

MODEL	DESCRIPTION	CATEGORY	APPLICABLE DEVICE
ADP-001	Adapter, SMA(J/JF) - N(P/SK)	Adapter	GSP Series
ADP-002	Adapter, SMA(J/JF) - N(P/SK)	Adapter	GSP Series
ADP-107	Adapter, 75Ω BNC(J/JF) - 50Ω BNC(P/M)	Adapter	GSP Series
ATN-100	Adapter, 10dB Attenuator, 50Ω, N(JF)-N(P/M)	Adapter	GSP Series
CAB-001	Adapter, 50Ω Termination, N(P/M)	Adapter	GSP Series
CAB-002	Adapter, Cap with Chain, N(P/SK)	Adapter	GSP Series
CSC-009	Soft Carrying Case	Bag	GSP-830, GSP-930B
CTL-245	USB Cable, USB 2.0, A-B Type, 1000mm	Communication Cable	GSP Series
CTL-248	CP18 Cable, Double Shielded, 2000mm	Communication Cable	GSP-830, GSP-930B
CTL-250	CP18 Cable, Double Shielded, 500mm	Communication Cable	GSP-830, GSP-930B
CTL-118	BNC Cable, BNC(P/M)-BNC(P/M), 1000mm	General Lead	GSP Series
CTL-301	RF Cable, RG223 Assembly, 1000mm, N(P/SK)	General Lead	GSP Series
CTL-303	RF Cable, RG213 Assembly, 1000mm, N(P/SK)	General Lead	GSP Series
CTL-305	RF Cable, RG316 Assembly, 1000mm, SMA(P/M)	General Lead	GSP Series, GSP-1309/13300
CTL-314	RF Cable, RG223 Assembly, 200mm, N(P/SK) - N(JF)	General Lead	GSP Series
GRA-415	Rack Mount Kit, 19", 4U Size	Rack	GSP-830, GSP-930B
ADB-002	Adapter, DC Block, BNC(P/M)-BNC(J/K), 50W, 10MHz~3.3GHz	EMI Application	GSP Series
ADB-006	Adapter, DC Block, N(P/M)-N(J/K), 50W, 10MHz~4GHz	EMI Application	GSP Series
ADB-008	Adapter, DC Block SMA(P/M)-SMA(J/K), 50W, 0.1MHz~8GHz	EMI Application	GSP Series
CAT-008	EMI Probe Kit Set, Including AAT-04, MAT-30, PR-01, PR-02, ADP-005, CTL-305	EMI Application	GSP Series
CLN-5040A	Line Impedance Stabilization Network (LISN), AC Single Phase, 50Hz~30MHz	EMI Application	GSP Series
CIT-5060	Isolation transformer, 500VA Capacity	EMI Application	GSP Series
CPL-0810	Transient Limiter, Input: BNC(J/JF), Output: N(P/M), 9kHz~2000MHz	EMI Application	GSP Series
ATA-401	Antenna, General EMI Antenna, BNC(P/M)	Special Application	GSP Series
CBT-001	CBT-1100 Experiment Text Book of Teacher Version	Special Application	GRT-300
CBT-002	CBT-1300A Experiment Text Book of Teacher Version	Special Application	GRT-300A
CAT-001	General Kit Set, Including ADP-002, ATN-100, CTL-301, CSC-003	Special Application	GSP Series
CAT-002	CATV Kit Set, Including ADP-001, ADP-107, CTL-304, CSC-003	Special Application	GSP Series
CAT-003	RLB Kit Set, Including CAN-001, CAN-002, CTL-302, CSC-004	Special Application	GSP Series
RLB-001	Return Loss Bridge, 10MHz ~ 1GHz, Source/Load: N(J/JF), Coupling: N(P/SK)	Special Application	GSP Series

CTL-118 BNC Cable, BNC(P/M)-BNC(P/M), 1000mm

CTL-246 USB Cable, USB 2.0, A-B Type, 1200mm

GRA-415 Rack Adapter Kit

CTL-248 CP18 Cable, Double Shielded, 2000mm

CTL-250 CP18 Cable, Double Shielded, 500mm

GPL-9010 Transient Limiter, Input: BNC(J/JF), Output: N(P/M), 9kHz~2000MHz

CLN-5040A Line Impedance Stabilization Network (LISN), AC Single Phase, 50Hz~30MHz

CIT-5060 Isolated transformer, 500VA Capacity

RLB-001

Return Loss Bridge
10MHz ~ 1GHz

Frequency Range	10MHz ~ 1GHz
Directivity	30dB typ. (10MHz ~ 400MHz) / 26dB typ. (400MHz ~ 1GHz)
Insertion Loss	6dB±1.5 (DC ~ 1GHz) / 7dB±1.5 (DC ~ 1GHz)
Return Loss	Source Return Loss : 17dB / Load Return Loss : 17dB Coupled Return Loss : 41dB
Characteristic Impedance	50 Ohm
Connector	N Type / Source and Load : Female / Coupled : Male
Dimension & Weight	80 x 50 x 32 (mm) / 130 g

ATA-081

BAE Antenna
For : CSP Series
(An additional ADP-001 is needed
for fitting CSP spectrum analyzers)

CKT-006 EMI Probe Kit Set

ADP-002 : Adaptor SMA(J/F) – N (F/M) x 1
STL-308 : RF Cable SMA(P)/NE – SMA(P/M) x 1
PR-01 : AC Voltage Probe x 1
PR-02 : Touch Resistor RF Probe x 1
ANT-04 : H-field Probe x 1
ANT-05 : H-field Probe x 1

CKT-091 General Kit Set

ADP-002
ATN-100
CTL-051
CSC-003

CKT-092 CATV Kit Set

ADP-001
ADP-101
CTL-054
CSC-008

CKT-093 RLB Kit Set

CAK-001
CAK-002
CTL-107
CSC-004

ADP-001

Adapter
BNC(J/F)–N(F/M)

ADP-002

Adapter
SMA(J/F)–N(F/M)

CAK-001

Termination 50Ω
N (F/M)

CAK-002

Cap with Chain
N (F/M)

CTL-101

RF Cable (RG-223
N(P/P/M)...
1000mm)

CTL-102

RF Cable Assembly
(RG223, N(P/M)...
300mm)

CTL-103

RF Cable Assembly
(SMA(P/M), RG316,
600mm)

CTL-106

RF Cable Assembly
(N(J)/5, N(P/M)
...A(J/F),1200mm)

ADS-002

DC Block BNC SMA 10MHz-2.2GHz

ADS-006

DC Block N-TNC SMA 10MHz-4GHz

ADS-005

DC Block SMA 0603 0.1MHz-4GHz

CAK-005

50Ω Impedance Adapter

ADP-101

BNC(J/F) 75Ω –
BNC(P/M) 50Ω

ATN-100

10dB Attenuator
N(J/F) – N(F/M)

SIGNAL SOURCES

GW Instek has been one of the major signal source suppliers for worldwide users by providing the advanced-featured products for decades. The wide product lines including MFG (Multi-Channel Function Generator), AFG (Arbitrary Function Generator), RF Signal Generator and DDS (Direct Digital Synthesized) Function Generators are well provided. The MFG-2000 Series is a essential function generator and its special feature is that you can output maximum five channels simultaneously. One of the five channels is RF Generator and its frequency is from 1μHz to 160MHz/320MHz. The isolated channel design is an important feature of GW Instek function generators. Output Channels, synchronization and modulation input/output connector grounding are isolated from instrument chassis. The MFG-2000 Series is designed for scientific research and educational applications by the RF Generator and the isolated design. The AFG-3000 Series is designed for industrial, scientific research and educational applications by the high sample rate and the long waveform length. The AFG-2000 Series are designed to accommodate the educational and basic industrial requirements. The USG-Series is a pocket-sized, and USB interface-compatible RF signal generator. The SFG-Series is a DDS based design for entry level engineering and educational applications. To fit versatile applications, each product line features different frequency ranges and/or specifications to meet the demands. Last but not least, Audio Generators are also provided for the specific fields.

PRODUCTS

- **Arbitrary Function Generator**
- **Multi-Channel Function Generator**
- **DDS Function Generator**
- **Audio Generator**
- **RF Signal Generator**

ARBITRARY FUNCTION GENERATOR OVERVIEW

Arbitrary function generator (ARB) is a digital synthesized technique based signal generator which generates both arbitrary and function waveforms. For the arbitrary waveform, the demanded waveform data can be edited by different means, saved into the memory, and sent out thru a digital to analog converter as a stimulus source. For the function waveform generation part in arbitrary function generator, the commonly used function waveforms like sine, square, triangle, ramp, pulse ... etc. are built into the memory for selection, which is referred to DDS (Direct Digital Synthesized) type function generator. The AM, FM, FSK, PWM and Sweep function, etc are usually optional features.

One major difference of the circuit structure between ARB and DDS function generator is that a low pass filter is used at the digital-to-analog converter (DAC) output to smooth out the quantization steps in DDS function generator. Therefore when a function waveform is demanded, in order to obtain low-distortion waveform, the signal generated from function section is suggested instead of ARB section.

The major specifications for arbitrary waveform generation are described as follows.

Sample Rate, Repetition Rate and True-Point-by-Point Arbitrary Waveform

The profile of arbitrary waveform is composed of a series of data. The frequency of arbitrary waveform is derived from sampling rate divided by the number of points constructing a complete waveform, i.e. frequency = sampling rate/number of points in waveform. Based on the equation, the higher the sampling rate, the higher the arbitrary waveform frequency can be available.

The ultimate case of composing an arbitrary waveform is the waveform made of two points. The frequency of the two-points waveform is supposed to be half of the sample rate according to the above equation. But many ARB waveform generators do not follow this rule. The Repetition Rate is used to describe the limitation of highest frequency can be composed for the arbitrary waveform. It could be one third, one forth... etc of the sample rate. In case of the repetition is half of sample rate, it is true point-by-point arbitrary waveform generator.

Vertical Resolution

The vertical resolution in arbitrary waveform represents the quantization distortion level, which the bit number of DAC plays the main role to decide it.
The higher bit DAC generates the output levels in finer steps, the output signal is less distorted and with less noise.

Memory Length

The waveform data is stored in the memory for sending out. More memory allows more waveform data to be stored, which is convenient for users to create a complex or lasting long waveform.

ARBITRARY FUNCTION GENERATOR SELECTION GUIDE OF AFG-3000 Series

MODEL		AFG-3021	AFG-3011	AFG-3022	AFG-3012	AFG-3081	AFG-3082
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	2	1	2	1	1	1
SOURCE CHECH	Isolated	0	V	0	V	-	-
RF	RF Conversion Frequency	-	-	-	-	-	-
FREQUENCY	Frequency Range	1μHz ~ 25MHz	1μHz ~ 25MHz	1μHz ~ 50MHz	1μHz ~ 50MHz	1μHz ~ 80MHz	1μHz ~ 80MHz
	Frequency Resolution	1μHz	1μHz	1μHz	1μHz	1μHz	1μHz
ARB	Sample Rate	250MSa/s	250MSa/s	250MSa/s	250MSa/s	250MSa/s	250MSa/s
	Repetition Rate	125MHz	125MHz	125MHz	125MHz	125MHz	125MHz
	Memory Length	8M Points	8M Points	8M Points	8M Points	16 Points	16 Points
	Vertical Resolution	14bit	14bit	14bit	14bit	14bit	14bit
OUTPUT	Amplitude Range [@50Ω]	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp
	DC Offset [@50Ω]	±5mV (AC+DC)	±5mV (AC+DC)	±5mV (AC+DC)	±5mV (AC+DC)	±5mV (AC+DC)	±5mV (AC+DC)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output(Sync Output)	0	V	0	V	0	V
SQUARE	Square Rise/Fall Time	<8ns	<8ns	<8ns	<8ns	<8ns	<8ns
CHARACTERISTIC	Square Duty Cycle	20% ~ 80%	20% ~ 80%	20% ~ 80%	20% ~ 80%	20% ~ 80%	20% ~ 80%
PULSE CHARACTERISTIC	Pulse Width	20ns~1000Sec	20ns~1000Sec	20ns~1000Sec	20ns~1000Sec	8ns~1000Sec	8ns~1000Sec
	Duty Cycle	0.01% (8.8kHz)	0.01% (4.4kHz)	0.01% (8.8kHz)	0.01% (4.4kHz)	-	-
	Leading and Trailing Edge Time	8.5ns~1000Sec	8.5ns~1000Sec	8.5ns~1000Sec	1.5ns~1000Sec	<8ns	<8ns
BASIC WAVEFORM	Sine	0	V	0	V	0	V
	Square	0	V	0	V	0	V
	Triangle/Ramp	0	V	0	V	0	V
	Pulse	0	V	0	V	0	V
	Noise	0	V	0	V	0	V
	Arbitrary	0	V	0	V	-	-
	Exp	0	V	0	V	0	V
	DC	0	V	0	V	0	V
SWEEP FUNCTION	Sweep	0	V	0	V	0	V
MODULATION	AM	0	V	0	V	0	V
	FM	0	V	0	V	0	V
	PM	0	V	0	V	-	-
	FSK	0	V	0	V	0	V
	ASK	-	-	-	-	-	-
	PSK	-	-	-	-	-	-
	PWM	0	V	0	V	0	V
	PLSE	0	V	0	V	-	-
COUNTER FUNCTION	Counter	-	-	-	-	-	-
I/O SIGN	Ext. Trigger Input	0	V	0	V	0	V
	Ext. Modulation Input	0	V	0	V	0	V
	Trigger Output	-	-	-	-	0	V
	Modulation Output	-	-	-	-	0	V
	Marker Output	-	-	-	-	0	V
POWER AMPLIFIER	Power Amplifier(Amplifier Output)	-	-	-	-	-	-
INTERFACE	GPIB(Including option)	0	V	0	V	0	V
	USB Host	0	0	0	V	0	0
	USB Device	0	V	0	V	0	V
	LAN	V	0	0	V	-	-
	RS-232	-	-	-	-	0	V
DISPLAY	Display	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD
	Voltage Display	0	0	0	0	0	0
KEY LOCK	Key Lock	0	V	0	V	0	V
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LANGUAGE	Language Select	V	V	V	V	0	V
POWER	Power Source	AC90 ~ 240V	AC90 ~ 240V	AC90 ~ 240V	AC90 ~ 240V	AC90 ~ 240V	AC90 ~ 240V
	Power Consumption	60VA	60VA	60VA	60VA	60VA	60VA
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ARBITRARY FUNCTION GENERATOR SELECTION GUIDE OF MFG-2000 Series

MODEL													
	Technology												
CHANNEL	Analog Channel												
SOURCE CHECK	Isolated												
RF	RF Generator Frequency												
FREQUENCY	Frequency Range												
	Frequency Resolution												
ARB	Sample Rate												
	Waveform Size												
	Memory Length												
	Vertical Resolution												
OUTPUT	Amplitude Range (@50Ω)												
	DC Offset (@50Ω)												
	Amplitude Unit												
	Impedance Switch												
PWM OUT	TTL Output/Sync Output												
SQUARE	Square Rise/Fall Time												
CHARACTERISTIC	Square Duty Cycle												
PULSE CHARACTERISTIC	Pulse Width												
	Duty Cycle												
	Leading and Trailing Edge Time												
BASIC WAVEFORM	Sine												
	Square												
	Triangle/Ramp												
	Pulse												
	Noise												
	Harmonic												
	Burst												
	DC												
SWEEP FUNCTION	Sweep												
MODULATION	AM												
	FM												
	PM												
	FSK												
	ASK(Of Channel)												
	PSK(Of Channel)												
	PWM												
	BUM												
COUNTER FUNCTION	Counter												
CH MORE	Ext. Trigger Input												
	Ext. Modulation Input												
	Trigger Output												
	Modulation Output												
	Marker Output												
POWER AMPLIFIER	Power Amplifier(Inside/Output)												
INTERFACE	LAN(Controlling system)												
	USB Host												
	USB Device												
	LAN(By Model)												
	RS232												
DISPLAY	Display												
	Voltage Display												
DSO LINK	DSO Link												
STORAGE MEMORY	Internal Storage Memory												
LABVIEW	LabView Drive												
POWER	Power Source												
	Power Consumption												
Page													

ARBITRARY FUNCTION GENERATOR SELECTION GUIDE OF AFG-2000 Series

	MODEL	AFG-2225	AFG-2125	AFG-2112	AFG-2105	AFG-2012	AFG-2005	AFG-2001
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	2	1	1	1	1	1	1
RF	RF Generator Frequency	-	-	-	-	-	-	-
FREQUENCY	Frequency Range	1μHz ~ 25MHz	1 mHz ~ 25MHz	1 mHz ~ 12MHz	0.1 Hz ~ 5MHz	0.1 Hz ~ 25MHz	0.1 Hz ~ 12MHz	0.1 Hz ~ 5MHz
	Frequency Resolution	1 μHz	1 mHz	1 mHz	0.1 Hz	0.1 Hz	0.1 Hz	0.1 Hz
ARB	Sample Rate	125MSa/s	80MSa/s	60MSa/s	20MSa/s	80MSa/s	60MSa/s	20MSa/s
	Repetition Rate	80MHz	10MHz	10MHz	1MHz	10MHz	10MHz	1MHz
	Memory Length	16 Points	16 Points	16 Points	16 Points	16 Points	16 Points	16 Points
	Vertical Resolution	10bit	10bit	10bit	10bit	10bit	10bit	10bit
OUTPUT	Amplitude Range (@50Ω)	1mVpp ~ 10Vpp (≤ 20MHz) 1mVpp ~ 5Vpp (≤ 25MHz)	1mVpp ~ 10Vpp (≤ 20MHz) 1mVpp ~ 5Vpp (≤ 25MHz)	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp (≤ 20MHz) 1mVpp ~ 5Vpp (≤ 25MHz)	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp
	DC Offset (@50Ω)	±5Vpk (AC+DC) (≤ 10MHz) ≤2.5Vpk (AC+DC) (≤ 25MHz)	±5Vpk (AC+DC) (≤ 10MHz) ≤2.5Vpk (AC+DC) (≤ 25MHz)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC) (≤ 10MHz) ≤2.5Vpk (AC+DC) (≤ 25MHz)	±5Vpk (AC+DC)	±5Vpk (AC+DC)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance (Ω)	50Ω (±1Ω)	50Ω (±1Ω)	50Ω (±1Ω)	50Ω (±1Ω)	50Ω (±1Ω)	50Ω (±1Ω)	50Ω (±1Ω)
FAN OUT	TTL Output/Sync Output	-	V	V	V	V	V	V
SQUARE	Square Rise/Fall Time	<20ns	<20ns	<20ns	<20ns	<20ns	<20ns	<20ns
CHARACTERISTIC	Square Duty Cycle	1% ~ 99%	1% ~ 99%	1% ~ 99%	1% ~ 99%	1% ~ 99%	1% ~ 99%	1% ~ 99%
PULSE CHARACTERISTIC	Pulse Width	16ns ~ 1000s	-	-	-	-	-	-
	Duty Cycle	-	-	-	-	-	-	-
	Leading and Trailing Edge Time	-	-	-	-	-	-	-
BASIC WAVEFORM	Sine	V	V	V	V	V	V	V
	Square	V	V	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V	V	V
	Pulse	V	V	V	V	V	V	V
	Noise	V	V	V	V	V	V	V
	Burst	V	-	-	-	-	-	-
SWEEP FUNCTION	Sweep	V	V	V	V	-	-	-
MODULATION	AM / Modulation	V	V	V	V	-	-	-
	FM	V	V	V	V	-	-	-
	PM	V	-	-	-	-	-	-
	FSK	V	V	V	V	-	-	-
	ASK	-	-	-	-	-	-	-
	PSK	-	-	-	-	-	-	-
	PWM	-	-	-	-	-	-	-
	BPSK	V	-	-	-	-	-	-
COUNTER FUNCTION	Counter	V	V	V	V	-	-	-
I/O PORT	Ext. Trigger Input	V	V	V	V	-	-	-
	Ext. Modulation Input	V	V	V	V	-	-	-
	Trigger Output	V	-	-	-	-	-	-
	Modulation Output	-	V	V	V	-	-	-
	Marker Output	-	-	-	-	-	-	-
INTERFACE	GPIB(Including option)	-	-	-	-	-	-	-
	USB Host	V	V	V	V	V	V	V
	USB Device	V	V	V	V	V	V	V
	LAN	-	-	-	-	-	-	-
	RS232C	-	-	-	-	-	-	-
DISPLAY	Display	3.5" TFT LCD	3.5" 3 Color LCD	3.5" 3 Color LCD	3.5" 3 Color LCD	3.5" 3 Color LCD	3.5" 3 Color LCD	3.5" 3 Color LCD
	Voltage Display	V	V	V	V	V	V	V
DSO LINK	DSO Link	V	V	V	V	X	X	X
STORAGE MEMORY	Internal Storage Memory	16 Groups	16 Groups	16 Groups	16 Groups	16 Groups	16 Groups	16 Groups
LabVIEW	LabView Driver	V	V	V	V	V	V	V
POWER	Power Source	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V
	Power Consumption	25W	20VA	20VA	20VA	25VA	25VA	20VA
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30MHz/20MHz Arbitrary Function Generator

AFG-303X/302X

CE LAN GPIB USB PC Software

FEATURES

- 1 μHz ~ 30 or 30MHz, 20Vpp, 1 or 2 Channel (s)
- Arbitrary Waveform 250MSa/s, 16-bit Resolution, 8M Memory Depth
- Isolation Channel-Circuit Design
- Synchronized Phase Operation up to 4 Units and 10 Channels
- Harmonic Signal Generator
- Dual Channel Models Support SUM Modulation, Coupling, Tracking, and Phase Functions
- Pulse Waveform Parameters Can be Set Independently
- Built-in AM/FM/PM/FSK/PWM/ASUM Modulation, Sweep and Burst Functions
- Built-in Medical and Automotive Electronic Waveforms
- Built-in I/Q baseband Waveform on AFG-3032/3022
- Provide USB/LAN/GPIB (Optional) Instrument Control Interface

CW models AFG-303X/302X series function generators include 30MHz/20MHz single-isolated channel and 25/50 MHz dual-isolated channel models, designed to meet industry, scientific research, and education applications. Not only output channel is each ground isolation, dual channel models are also independent earth ground isolation, which is suitable for floating circuits (up to ±42V). Without taking grounding reference into consideration, each channel of dual channel models can be operated independently and multi-AFG units can output synchronously. Applications are, for instance, the ignition control or transmission device of automotive electronics. The series features sample rate of 250MSa/s, 14-bit resolution, and 8M point memory depth arbitrary waveform characteristics. Users can obtain maximum 8M memory depth waveforms through using a CW mode digital storage oscilloscope with the built-in USB/LAN function of the AFG-303X/302X.

The series supports synchronized phase for multi-channel operation and the maximum phase synchronization operation is up to 4 units and 10 channels. 10 MHz external clock/ frequency doubled can be input via external signal source to elevate precision for frequency output. The series supports frequency sweep and amplitude sweep that can also integrate functions, including Sweep (up/down, one-way (saw tooth)/two-way (triangle) waveforms, continuous/single trigger/gated trigger to meet various application requirements by applying different sweep methods. Frequency sweep tests the frequency response of electronic components such as filter and low-frequency amplifier. Amplitude sweep simulates vibration tests (requires a vibration tester), and it also conducts aging tests of various materials and linearity tests of low frequency amplifier.

The main features of the AFG-303X/302X include output amplitude from 1mVpp to 10Vpp accompanied with a 50 ohm load; frequency range from 1 μHz to 30MHz or 20MHz; 1μHz frequency resolution; and built-in sine, square, pulse, triangle, ramp, DC voltage, harmonic and noise. The waveform width, rise/edge time and fall/edge time of pulse waveform can be adjusted flexibly. Pulse waveform, with duty cycle from 0.01% to 99.99%, can be applied as trigger signals. Users can conduct arbitrary editing via 8M built-in function waveforms. The series supports AM/FM/PM/FSK/PWM modulation, frequency sweep, amplitude sweep and burst to satisfy industrial application requirements. Dual channel models provide SUM modulation, coupling, tracking, and phase to meet the test requirements of differential signal, phase control and amplifier distortion. Built-in 8th harmonic signal generator simulates harmonic signal of switching power supplies and it also tests EMI power filter characteristics. The AFG-303X/302X provides free arbitrary waveform editing software (ArbXP) for users to quickly edit waveforms from the built-in diagrams so as to execute measurements.

SPECIFICATIONS

	AFG-3031	AFG-3012	AFG-3021	AFG-3022
CHANNELS				
	1	2	1	2
FEATURES				
I/O Signal Ground for the Instrument Chassis	Connectors shafts for channel output (s), Sync output, 10MHz REF input, Mod. input and Mod output are isolated from the instrument's chassis. Maximum allowable voltage on isolated connector shells is ±42 VpK. (DC + AC Peak)			
Each of the Signal Ground of CH1 /CH2	no	isolated	no	isolated
Standard Waveforms	Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic, DC			
ARBITRARY WAVEFORMS				
Sample Rate	250MSa/s			
Repetition Rate	125MHz			
Waveform Length	8M points			
Amplitude Resolution	16 bits			
Non-Volatile Memory	Ten 8M waveforms (*)			
User-define Output Section	Any section from 2 ~ 8M points			
Trigger	Internal/manual/external			
Built-in Arbitrary Waveforms	Sine, Square, Ramp, Sinc, Exp. Rise, Exp Fall, DC, Pulse, Multi-tone, Harmonics, Gauss, Abbris, Haversine, Sqr. Root, Knee, Rectangle, 11 cycle, Sqr. Sin, Amplet, Negramp, Sinc. up, Amp3, Backpull, Gaspeak, Dirac, Hum, Baumhalt, Trapezia, Dsm_add, Sentinel, Npulse, Gaussian's, Sinetra, Dlorentz, Lo, Sqrt, Sinus, Cosmic, Xsquare, Gauss, Arccos, Arctan, Bach, Arccos, Arcsinh, Bell, Arccot, Icon, Tan, Arctan, Cot, Tanh, Arccos, Csc, Arccot, Sec, Bat Function, Chebyshev, Kaiser, Bartlett, Rectangular, Flattop, Blackman, Hamming, Taylorwin, Bohmanwin, Hann, Cardiac, ECG, ETC, EMG, PLETH, BEER, ECG1, ECG2, ECG3, ECG4, ECG5, ECG6, ECG7, ECG8, ECG9, ECG10, ECG11, ECG12, ECG13, ECG14, ECG15, ECG16, LFPULSE, TERE1, TERE2, TERE3, SUMTERE, SPI_IR, TPT_TYPEA, TYPEB, TYPEA, TYPEB, TPT_TYPEA, TYPEB			
I/Q WAVEFORMS				
Source	Random, Fixed Pattern			
Type	ASK, 4ASK, FSK, 2FSK, 4FSK, BASK, BPSK, QASK, OQPSK, OQPSK, pi/4-QPSK, pi/4-DQPSK, BPSK, TMPTSK, 32APSK, 16QAM, 32QAM, 64QAM			
FREQUENCY CHARACTERISTICS				
Sine/Square Pulse	1μHz ~ 30MHz 1μHz ~ 15MHz	1μHz ~ 20MHz 1μHz ~ 15MHz	1μHz ~ 20MHz 1μHz ~ 10MHz	1μHz ~ 20MHz 1μHz ~ 10MHz
Triangle/Ramp Resolution Accuracy Quality Aging Tolerance	1μHz ~ 100kHz 1μHz +/- (ppm of ~ 50°C + ±0.5 ppm/°C ~ 28°C) +/- (ppm, per 1 year +/- 1 μHz			

30MHz/20MHz Arbitrary Function Generator

AFG-3032/3022

SPECIFICATIONS

		AFG-3031	AFG-3032	AFG-3021	AFG-3022
OUTPUT CHARACTERISTICS (3)					
Amplitude	Range	1 mVpp ~ 10 Vpp (into 50Ω) / 2 mVpp ~ 20 Vpp (into open-circuit)			
	Accuracy	±1% of setting ±1 mVpp (at 1 kHz, into 50Ω attenuator, DC offset)			
	Resolution	0.1 mV or 4 digits			
	Flatness	0.1dB (10 Hz to 0.2 dB (10 kHz ~ 20 MHz (pressure relative : 1 kHz/into 50Ω))			
	Units	Vpp, Vrms, dBm			
Offset	Range	±5 Vpk ac + dc (into 50Ω) , ±10Vpk ac + dc (into open circuit)			
	Accuracy	1% of setting + 2 mV + 0.1% of amplitude			
Monitor Output	Impedance	50Ω typical (Test@1 ~ 1 MHz) (output enabled)			
SYNC Output	Polarities	Short-circuit protected / Overload relay automatically disables main output			
	Ground Isolation	42 VDC max			
	Level	TTL compatible into 1 kΩ			
	Impedance	50Ω typical			
SINE WAVE CHARACTERISTICS					
Harmonic Distortion(1)		<-60 dBc (DC ~ 1 MHz, Ampl.>3 Vpp; -50 dBc (DC ~ 1 MHz, Ampl.<3 Vpp ; -45 dBc 1 MHz ~ 7 MHz, Ampl.>3 Vpp ; -30 dBc 1MHz ~ 30 MHz, Ampl.<3 Vpp			
Total Harmonic Distortion		<0.2% + 0.1mVrms, DC ~ 20 kHz			
Spurious(non-harmonic)(2)		<-60 dBc (DC ~ 1 MHz); -50 dBc (1MHz ~ 20MHz); -30dBc (20MHz ~ 30MHz, Ampl.<3 Vpp ; -50 dBc + 6 dB/octave (1MHz ~ 10MHz (AFG-3021/3022))			
Phase Noise		<-110dBc/Hz typical (10 kHz offset, fc = 100 MHz			
SQUARE WAVE CHARACTERISTICS					
Rise/Fall Time		<8 ns (3)			
Overshoot		< 5%			
Asymmetry(@50% duty)		1% of period+7 ns			
Variable Duty Cycle		20.0% ~ 80.0%, @ 25 MHz		20.0% ~ 80.0%, @ 20 MHz	
		40.0% ~ 60.0%, @ ~ 30MHz			
Jitter		0.01% + 2.5 ps (@ 10 Hz ~ 6.5% + 75 ps, @ 5 MHz			
RAMP CHARACTERISTICS					
Linearity		< 0.1% of peak output			
Variable Symmetry		0% ~ 100% (0.1% resolution)			
PULSE CHARACTERISTICS					
Pulse Width		30ns ~ 999,000s (Extended mode: 0.00ns ~ 1,000s(*)) Width = 0.01% x [Rise Time (Sec)] + [Fall Time (Sec)] + 0.1 x Period (* Width = 0.01% x [Rise Time (Sec)] + [Fall Time (Sec)]			
Duty Setting Range		0.01% ~ 99.99% (Extended mode: 0.0000% ~ 100.0000%(*))			
Period		40ns ~ 1,000,000s			
Rise Time and Fall Time(3)		8.5ns ~ 999.99s			
Resolution		6 DIGITS			
Overshoot		<5%			
Jitter		100 ppm + 20 ps			
Noise					
Noise Type		Gaussian			
Noise Bandwidth		100MHz equivalent bandwidth			
HARMONIC					
Harmonic Order		1~8			
Harmonic Type		Even, Odd, All, User; Amplitude and Phase can be set for all harmonics			
AM and AM(FM,PM)					
Carrier Waveforms		Sine, Square, Triangle, Ramp, Pulse, Noise, Arb			
Modulating Waveforms		Sine, Square, Triangle, Up/Dn Ramp			
Modulating Frequency		2 mHz ~ 20 kHz			
Depth		0% ~ 120.0%			
Source		Internal / External			

AFG-3031/3021

SPECIFICATIONS

	AFG-3031	AFG-3032	AFG-3021	AFG-3022
FM				
Carrier Waveforms	Sine, Square, Triangle, Ramp			
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
Modulating Frequency	2 mHz ~ 20 kHz			
Peak Deviation	DC ~ 16 MHz (1 mHz resolution)		DC ~ 8 MHz (1 mHz resolution)	
Source	Internal / External			
PM				
Carrier Waveforms	Sine, Triangle, Ramp			
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
Phase Deviation	0° ~ 360°, 0.1° resolution			
Modulating Frequency	2 mHz ~ 20 kHz			
Source	Internal			
PWM				
Carrier Waveform	Square			
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
Modulating Frequency	2 mHz ~ 20 kHz			
Deviation	0% ~ 100.0% of pulse width, 0.1% resolution			
Source	Internal / External			
PSK				
Carrier Waveforms	Sine, Square, Triangle, Ramp			
Modulating Waveforms	50% duty cycle square			
Internal Rate	2 mHz to 1 MHz			
Frequency Range	DC ~ 25 MHz		DC ~ 20 MHz	
Source	Internal / External			
ADDITIVE MODULATION (SUM)				
Carrier Waveforms	Sine, Triangle, Ramp, Pulse, Noise			
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
Ratio	0% ~ 100% of carrier amplitude, 0.01% resolution			
Modulating Frequency	2 mHz ~ 20 kHz			
Source	Internal / External			
FSK				
Carrier Waveforms	Sine, Square, Triangle, Ramp			
Modulating Waveforms	50% duty cycle square			
Internal Rate	2 mHz ~ 1 MHz			
Frequency Range	DC ~ 25 MHz		DC ~ 20 MHz	
Source	Internal / External			
SWEEP				
Waveforms	Frequency Sweep : Sine, Square, Triangle, Ramp, Amplitude Sweep : Sine, Square, Triangle, Ramp, Pulse, Noise, ARB			
Type	Frequency, Amplitude			
Forwhom	Linear or Logarithmic			
Direction	Up or Down			
Start/Stop Frequency	Any frequency within the waveform's range			
Sweep Time	1 ms ~ 500 s (1 ms resolution)			
Trigger Mode	Single, External, Internal			
Trigger Source	Internal / External			
BURST				
Waveforms	Sine, Square, Triangle, Ramp, Pulse, Noise			
Frequency	1 μHz ~ 25 MHz (AC)	1 μHz ~ 25 MHz (R)	1 μHz ~ 20 MHz	1 μHz ~ 25 MHz
Burst Count	1 ~ 1,000,000 cycles or infinite			
Start / Stop Phase	-360.0 ~ +360.0 , 0.1° resolution			
Internal Period	1 μs ~ 500 s			
Gate Source	External Trigger (pulse waveforms can only be used in gate mode)			
Trigger Source	Single, External or Internal Rate			
Trigger Delay	0 Cycle (offset : 0 μs ~ 1Ms (1ns resolution))			

Note: 1. A total of ten waveforms can be stored (any waveform can consist of 8M points maximum).
2. Add 1/10 dc of output amplitude and offset specification per °C for operation outside of 0~18~28°C range(1 year specification).
3. Edge time decreased at higher frequency.
4. Sine and square waveforms above 25 MHz are allowed only with an "INFINITE" count.
5. Harmonic distortion and spurious noise of the amplitudes is limited to (- 70 dBm floor.
6. Jitter may occur if the pulse width is beyond the setting range of the normal mode. The pulse may vanish at times.
7. Rise time and Fall time should be 8ns(10 % of period).

30MHz/20MHz Arbitrary Function Generator

AFG-3032/3022 Rear Panel

AFG-3031/3021 Rear Panel

SPECIFICATIONS

	AFG-3031	AFG-3032	AFG-3021	AFG-3022
EXTERNAL MODULATION INPUT				
Type	AM, [illegible]			
Voltage Range	±5 V full scale			
Input Impedance	10kΩ			
Frequency	DC ~ 20 kHz			
Modulation Output	Yes	—	Yes	—
Type	AM, [illegible]			
Amplitude Range	2 Vpp			
Impedance	50Ω typical			
EXTERNAL TRIGGER INPUT				
Type	For FSK, Burst, Sweep, Burst Cycle #n#			
Input Level	TTL Compatible			
Slope	Rising or Falling (Selectable)			
Pulse Width	> 100 ns			
Input Rate	DC ~ 1 MHz			
Input Impedance	10kΩ, DC coupled			
LATENCY				
Sweep	< 1 μs (typical), Burst : < 500 ns (typical), BER : <27.1 (sample rate=250ns			
JITTER				
Sweep	2.5 ps, Burst : 1 ns, except pulse, BW ps			
10MHz REFERENCE OUTPUT				
Output Voltage	1 Vpp (50 Ω square wave			
Output Impedance	50 Ω, AC coupled			
Output Frequency	10MHz			
10MHz REFERENCE INPUT				
Input Voltage	0 Vpp ~ 5Vpp			
Input Impedance	1kΩ, unbalanced, AC coupled			
Input Frequency	10MHz ±10Hz			
Waveform	Sine or Square (50±5% duty)			
Ground Isolation	42Vpk max.			
EXTERNAL SYNC				
Phase Delay (max.)	Series Connection : 19 + 29.2 x 10 -6 x 2[ns] , Parallel connection : 29.1 + 6 x 2 ns (where N = number of connected units)			
Maximum Number of Connected Units	Series Connection : 4 , Parallel Connection : 4			
Applicable Functions	Sine, Square, Triangle, Pulse, Ramp, Harmonic, ARB, Sweep, Burst			
Bias/Offset	10-C bias of Swing Maximum			
Interface	GPIB (Optional) , LAN , USB			
Display	4.3 inch TFT LCD, 480 x 3 (RGB) x 272			
GENERAL SPECIFICATIONS				
Power Source	AC100 ~ 240V , 50 ~ 60Hz			
Power Consumption	30VA	80VA	30VA	80VA
Operating Environment	Ten operations to satisfy the specification : 18 ~ 28 °C, Operating temperature : 0 ~ 40 °C, Relative humidity : < 80%, 0 ~ 40°C (< 70%, 35 ~ 40°C) Installation category (CAT. I)			
Operating Altitude	2000 meters			
Pollution Degree	IEC 61 010 Degree 2, Indoor Use			
Storage Temperature	-10 ~ 70 °C , Humidity : C 0 0%			
Dimensions & Weight	261 (W) x 107 (H) x 311 (D) mm, Approx. 4kg			

Note : The specifications apply when the function generator is powered on for at least 30 minutes under <23°C ~ 25°C.

ORDERING INFORMATION

AFG-3031 30MHz Single channel Arbitrary Function Generator
AFG-3032 30MHz Dual channel Arbitrary Function Generator
AFG-3021 20MHz Single channel Arbitrary Function Generator
AFG-3022 20MHz Dual channel Arbitrary Function Generator

ACCESSORIES
Quick Start Guide x 1, CD-ROM with AFG software and user manual x 1
GTL-110 BNC Cable, BNC(P/M) - BNC(P/M) , 1000mm x 1 (only AFG-3031/3021)
GTL-110 BNC Cable, BNC(P/M) - BNC(P/M) , 1000mm x 2 (only AFG-3032/3022)

OPTIONAL
AFG-3G1 GPIB Interface CRA-432 Rack Adapter Kit

OPTIONAL ACCESSORIES
GTL-246 USB Type A to Type B cable

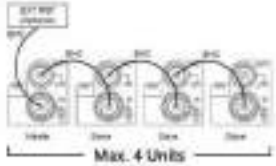
FREE DOWNLOAD
PC Software : Arbitrary Waveform Editing Software

A CIRCUIT DESIGN FOR GROUND ISOLATION AMONG OUTPUT/INPUT TERMINAL, INSTRUMENT CHASSIS, AND DUAL CHANNELS

Channel 1, channel 2, reference 10 MHz input, synchronization and modulation input/output connector grounding are isolated from instrument chassis. The output channels of dual-channel models are independently isolated. These connectors can sustain maximum isolation voltage up to ±42Vpk (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi units output can be achieved without factoring in grounding reference issue. Applications include ignition controller or transmission devices of automotive electronics. The built-in DC bias voltage of the AFG-3000 Series can be applied on various waveforms. The DC bias voltage is ±5V under 50Ω load. For automotive electronic applications require higher DC bias voltage such as ignition controller or transmission devices, the external power supplies can be used to bring up the DC bias voltage to ±40Vpk (DC+ AC peak value).

B MULTI CHANNEL SYNCHRONIZED PHASE OPERATION

Method one uses reference frequency output (REF OUT) and reference frequency input (REF IN), 50 ohm BNC cable (RG-58A/U) and T type BNC connector to connect up to 6 units to conduct synchronized phase operation.



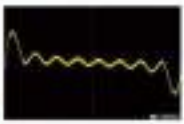
Method two uses reference frequency output (REF OUT) and reference frequency input (REF IN), 50 ohm BNC cable (RG-58A/U) to connect up to 4 units to conduct synchronized phase operation.

Users can implement multi channel synchronized phase operation up to 6 units and 12 channels (AFG-3012/3022). There are two methods to execute synchronized phase applications. Under different frequency, master unit can synchronize each channel and modulate individual phase.

At 10 MHz reference frequency input (REF IN) connector, users can input 10 MHz atomic clock frequency standard as external signal source to enhance precision for frequency output.

C HARMONIC SIGNAL GENERATOR

Harmonic Signal Generator



Harmonic Signal

Harmonic signal generator simulates the harmonic signal of switching power supplies and conducts characteristics test on EMI power filter. Users can set order number and phase for harmonic signals to obtain desired signals. The above diagrams show 3th harmonic signal.

D PULSE GENERATOR

Pulse Generator

Pulse Signal

The output frequency for pulse reaches 25 MHz and its duty cycle is from 0.017% to 99.983%. Users can set pulse width, duty cycle, rise edge time, fall edge time and edge time to support trigger signal. The following diagrams show settings for pulse signal.

1 VERSATILE OUTPUT WAVEFORM SELECTIONS

Sine

Square

Triangle

Ramp

Pulse

Noise

DC Voltage

Arbitrary Waveform

MEDICAL APPLICATION WAVEFORMS (AFG-2225/50 excluded)

Cardiac

ECG1

ECG2

ECG3

AUTOMOTIVE ELECTRONIC WAVEFORMS (AFG-2225/50 excluded)

Ignition

ISO16532 TP1A

ISO16532 TP1B

ISO16532 TP2B

There are standard waveforms for the series such as sine, square, triangle, ramp, pulse, noise, DC voltage. In addition, 100 built-in waveforms, including medical application waveforms and commonly used automotive electronic waveforms allow users to easily select desired waveforms.

2 IQ BASEBAND WAVEFORM OUTPUT FUNCTION FOR AFG-3032/3022

FSK

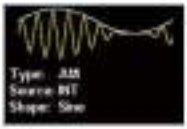
MSK

PSK

QAM

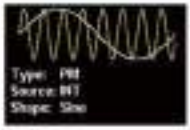
The CH1 and CH2 of AFG-3032/22 provide the IQ baseband waveform outputs, which include ASK, MSK, FSK(2FSK, 4FSK, 8FSK), PSK(BPSK,QPSK,DQPSK,QQPSK,pi/4 QPSK,pi/4DQPSK, 8PSK), APSK(16APSK, 32APSK), QAM(16QAM, 32QAM, 64QAM), etc. New IQ waveform commands are also available in the user manual.

MODULATION FUNCTION



Amplitude Modulation

Frequency Modulation



Phase Modulation

Frequency-shift Keying Modulation

Pulse Width Modulation

Sum Modulation

The series supports AM, FM, PM, FSK, PWM and SUM modulation. Modulation source can be from inside or outside. Applications include the baseband of communications systems, motor control and light adjustment, etc.

SWEEP FUNCTION

Amplitude Sweep Setting

Amplitude Sweep Signal

Frequency Sweep Setting

Frequency Sweep Signal

The series supports frequency sweep and amplitude sweep that can also integrate functions, including linear/logarithm, one-way (saw tooth)/two-way (triangle) waveforms, continuous/single trigger/gated trigger to meet various application requirements by different sweep methods. Frequency sweep carries out tests on the frequency response of electronic components such as filter and low frequency amplifier. Amplitude sweep simulates vibration tests (requires a vibration tester), and it also conducts aging tests of various materials and linearity tests of low frequency amplifier.

BURST FUNCTION

Burst Setting

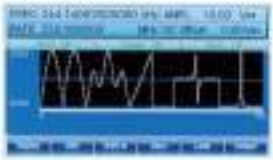
Burst Signal

The series supports N-period or gated trigger. Phase angle, duration time, frequency, wave form, infinite can be adjusted to meet non-continuous output applications.

FLEXIBLE ARBITRARY WAVEFORM EDITING

four methods to obtain arbitrary waveforms

- Front Panel Operation



Via single unit's panel, arbitrary waveforms can be selected, edited, stored, recalled, output, triggered from 65 built-in waveforms.

- CSV file Upload

Supports CSV file

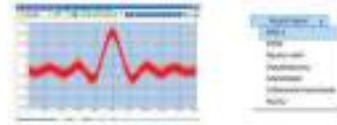
Support CSV file upload produced by MATLAB and Excel.

- Direct Waveform Reconstruction (DWR)

Direct Waveform Reconstruction from the DSO

Collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction.

- Arbitrary Waveform Editing PC Software



2.5ns Waveform with Gaussian Noise | Digital Signal

Use AWES to edit complex waveforms. The software supports waveform mathematical operation. The waveform source includes Uniform Noise, Gaussian Noise, Rayleigh Noise, various digital codes such as non-zero code, Manchester and RS-232, etc.

CORRELATED FUNCTIONS OF DUAL CHANNEL OUTPUTS

Differential Signal | Sine and Cosine Signal | Square Signal Phase Adjustment

AFG-3032/3022 models support independent channel or correlated channel applications. Four correlated functions are provided including SUM modulation, coupling, tracking, and phase.

- SUM modulation combines two signals and outputs the signal via one single channel. Combining noise and sine waveform to execute speaker's distortion test is one of the applications.
- Coupling function arbitrarily sets ratio and difference for frequency and amplitude between two channels to realize a simultaneous offset for all parameters of dual channel. The example is amplifier using third order interpolation point (IP3) measurement to simulate signal output of two different frequency oscillators.
- Tracking function produces differential signal with same frequency, same amplitude, and 180 degree phase difference.
- Phase function arbitrarily sets phase parameters between two channels such as simulating sine/cosine/square signal phase adjustment.

80MHz/50MHz Arbitrary Function Generator

AFG-3081/3051

The AFG-3081/3051 is an Arbitrary Waveform and Digital Synthesized Function Generator designed for industrial, scientific research and educational applications. The series comes with bandwidth of 80MHz for AFG-3081 and 50MHz for AFG-3051. The AFG-3081/3051, featuring 250MSa/s sample rate, 100MHz repetition rate by true point-by-point edit, 16-bit vertical resolution and 1M point waveform length, is a very useful and flexible signal source to meet diversified applications needs in the market today.

The user friendly operation, the On-Screen Help, and the multiple ways of arbitrary waveform editing make AFG-3081/3051 just a plug-and-play equipment. The point by point waveform data entry or standard waveforms cut-n-pasting through front panel operation, the CSV file waveform data download, the direct waveform reconstruction through DSO waveform data import, and the PC software edited waveform download are the 4 methods available for arbitrary waveform editing.

A 4.3-inch high resolution TFT LCD in the AFG-3081/3051 front panel is used to display waveform and set parameters. The large and high-resolution screen is especially useful when the arbitrary waveform construction is done through front panel operation. The impedance of AFG-3081/3051 can be selected between 50 Ohm and 1 MOhm via front panel operation. The impedance corresponds to between 50 Ohm and 1 MOhm.

FEATURES

- Wide Frequency Range From 1 μ Hz~80/50MHz
- 1a Hz Frequency Resolution Throughout Full Range
- Standard Waveform : Sine, Square, Triangle, Ramp, Pulse, Noise
- Built-In AM, FM, PWM, FSK, Sweep, Burst Functions
- 14bit, 250MSa/s, 16K-Point Deep Arbitrary Waveform
- DATT (Direct Waveform Reconstruction) Capability
- Arbitrary Waveform Editing PC Software
- 4.3" High Resolution LCD Display
- GPIB, RS-232C, USB Host/Device Standard Interfaces

SPECIFICATIONS

		AFG-3081	AFG-3051
WAVEFORMS			
Standard Waveform		Sine, Square, Ramp, Pulse, Noise, DC, Sin(x)/x, Exponential Rise, Exponential Fall, Negative Ramp	
ARBITRARY WAVEFORM			
ARB Function		Built-in	
Sample Rate		250 MSa/s	
Repetition Rate		100MHz	
Waveform Length		16K points	
Amplitude Resolution		14 bits	
Non-Volatile Memory		Ten 16K waveforms *1	
User-Define Output Section		Any section from 2 to 16K points	
User-Define Mark Output		Any section from 2 to 16K points	
FREQUENCY CHARACTERISTICS			
Range	Sine, Square	80MHz	50MHz
	Triangle, Ramp	1MHz	
Resolution		1μHz	
Accuracy	Stability	±3 ppm (0 ~ 50℃)	
	Aging	±1 ppm, per 1 year	
	Tolerance	±1 μHz	
OUTPUT CHARACTERISTICS			
Amplitude	Range	10 mVpp to 10 Vpp (into 50Ω), 20 mVpp to 20 Vpp (open circuit)	
	Accuracy	±3% of setting (1 kHz sine, 0 Vdc offset, 10 Vpp into 50Ω)	
	Resolution	0.1 mV or 4 digits	
	Flatness	±1%@1 kHz (<10 MHz), ±2%@1 kHz (10 MHz ~ 20 MHz), ±10%@1 kHz (20 MHz ~ 80 MHz), ±3%@1 kHz (80 MHz previous version to 1 kHz)	
	Units	Vpp, Vrms, dBm	
Offset	Range	±5 Vdc (into 50Ω), ±10 Vdc (open circuit)	
	Accuracy	1% of setting + 2 mV + 0.5% of amplitude	
Waveform Output	Impedance	50Ω typical (Fixed), >1MΩ (Output disabled)	
	Protection	Short-circuit protected, turned off by user, automatically disables main output	
SYNC Output	Level	TTL compatible into 50Ω	
	Impedance	50Ω nominal	
SINE WAVE CHARACTERISTICS			
Harmonic Distortion		-40dBc DC ~ 1M Hz, Ampl<10Vpp -30dBc DC ~ 1M Hz, Ampl>10Vpp -40dBc 1MHz~30MHz, Ampl<10Vpp -30dBc 1MHz~30MHz, Ampl>10Vpp -30dBc 30MHz~80MHz, Ampl<10Vpp	
Total Harmonic Distortion		<0.2% (0.1 mVpp to DC ~ 20 kHz,	
Spurious (non-harmonics)		-60dBc DC ~ 1M Hz, -50dBc 1MHz~30MHz, -40dBc 30MHz~80MHz	
Phase Noise		-65dBc typical, 35MHz, 10kHz band ~ -47dBc typical, 80MHz, 10kHz band	
SQUARE WAVE CHARACTERISTICS			
Rise/Fall Time		<8ns *1	
Duty Cycle		20%~80%	
Overshoot		≤ 2%	
Asymmetry		1% of period + 1ns	
Variable Duty Cycle		20.0%~80.0% @ 12.5MHz, 40.0%~60.0%, 20~30MHz, 50.0% (Fixed), 30~80MHz	
Jitter		0.8 ns ~ 12ps + 0.2ppm x 0.1s ~ 75ps + 2ppm	
RAMP CHARACTERISTICS			
Linearity		< 0.1% of peak output	
Variable Symmetry		0% ~ 100%	
PULSE CHARACTERISTICS			
Period		20ns ~ 2000s	
Pulse Width		8ns ~ 1999.8s Minimum Pulse Width: the values=FREQ×0.01% for setting period values FREQ≤5.5MHz Resolution: Two others FREQ≤80MHz the 10% of setting period values FREQ≥80.5MHz	
Overshoot		<5%	
Jitter		100 ppm + 50 ps	
AM MODULATION			
Carrier Waveforms		Sine, Square, Triangle, Ramp, Pulse, Arb	
Modulating Waveforms		Sine, Square, Triangle, Up/Dn Ramp	
Modulating Frequency		2mHz ~ 20kHz	
Depth		0% ~ 120.0%	
Source		Internal, External	
FM MODULATION			
Carrier Waveforms		Sine, Square, Triangle, Ramp	
Modulating Waveforms		Sine, Square, Triangle, Up/Dn Ramp	
Modulating Frequency		2mHz ~ 20kHz	
Peak Deviation		DC ~ 40MHz	DC ~ 30MHz
Source		Internal, External	
PSK			
Carrier Waveforms		Square	
Modulating Waveforms		Sine, Square, Triangle, Up/Dn Ramp	
Modulating Frequency		2mHz ~ 20kHz	
Deviation		0% ~ 180.0° of pulse width	
Source		Internal, External	

80MHz/50MHz Arbitrary Function Generator

AFC-3081/3051

Rear Panel

1. A total of ten waveforms can be stored. Every waveform can composed of 1M points maximum.

2. Add 1/100 of output amplitude and offset specification per °C for operation outside of 0°C~28°C range (User specification).

3. Edge time decreased at higher frequency.

4. Sine and square waveforms above 30MHz are allowed only with an "Infinite" count.

5. Harmonic distortion and Spurious noise at low amplitudes or below by a 70 dBc floor.

6. Info Download Times:

	Binary Code		ASCII Code	
Typical	8192Points (512×16bit)	USB (Device)	USB (Host)	
512 points	156 Sec	14 Sec	70 Sec	
1024 points	39 Sec	7 Sec	35 Sec	
2048 points	40 Sec	4 Sec	15 Sec	
4K points	14 Sec	2 Sec	8 Sec	
8K points	7 Sec	850mS	3.9 Sec	
16K points	3 Sec	450mS	1.9 Sec	
32K points	2 Sec	300mS	1.2 Sec	
64K points	1 Sec	200mS	0.6 Sec	

SPECIFICATIONS

	AFC-3081	AFC-3051
SINE		
Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse	
Modulating Waveforms	AM, FM, PM, PWM, Sweep, Burst	
Internal Rate	1 mHz ~ 100 MHz	
Frequency Range	DC ~ 80MHz	DC ~ 50MHz
Source	Internal, External	
SWEEP		
Waveforms	Sine, Square, Triangle	
Type	Linear or Logarithmic	
Source	Internal/External	
Sweeping Time	100mS ~ 40 Sec	100μS ~ 40mS
Sweep Time	1% ~ 99%	
Trigger	Single, External, Internal	
Marker	Falling edge of Start signal (Programmable frequency)	
Source	Internal/External	
BURST		
Waveforms	Sine, Square, Triangle, Ramp	
Frequency	1μHz ~ 80MHz[1,4]	1μHz ~ 50 MHz[1,4]
Burst Count	1 ~ 1048575 cycles or infinite	
Start/Stop Phase	-360.0 ~ +360.0	
Internal Period	1 mS ~ 500s	
Gate Source	External Trigger	
Trigger Source	Single, External or Internal Rate	
Trigger Delay	50 Cycle ~ Infinite ~ 65 ~ 85s	
EXTERNAL MODULATION INPUT		
Type	for AM, FM, Sweep, PWM	
Voltage Range	± 10 Volt peak	
Input Impedance	10kΩ	
Frequency	DC ~ 20 kHz	
EXTERNAL TRIGGER INPUT		
Type	for FSK, Burst, Sweep	
Input Level	TTL Compatible	
Slope	Rising or falling selectable	
Pulse Width	> 100 ns	
Input Impedance	10kΩ DC coupled	
Latency	Sweep: <50ns typically, Burst: <100ns typical	
Jitter	Sweep: 2.5ns, Burst: 1ns, except pulse: 500ps	
MODULATION OUTPUT		
Type	for FSK, Burst, Sweep, PWM	
Amplitude	Range of 1Vpp, Impedance: 1MΩ typical (5mΩ)	
TRIGGER OUTPUT		
Type	for Burst, Sweep	
Level	TTL Compatible into 50Ω	
Pulse Width	> 40ns	
Maximum Rate	1 MHz	
Fan-out	8 LS TTL load	
Impedance	50Ω typical	
MARKER OUTPUT		
Type	for AM, Sweep	
Level	TTL Compatible into 50Ω	
Fan-out	8 LS TTL load	
Impedance	50Ω typical	
Store/Recall		
	10 Groups of Setting Memories	
Interface		
	USB, 10/100 LAN, RS232, GPIB	
Display		
	4.3 inch TFT LCD, 480 x 3(RGB) x 272	
SYSTEM CHARACTERISTICS		
Configuration Times (Typical)	Function Change: Standard<150ms, Pulse<600ms, Built in Arb<240ms Frequency Change: 20ms, Amplitude Change: 20ms, Offset Change: 30ms Store User Arb: 1.2s for 16 points, Modulation Change: <200ms	
Arb Download Times (Typical)	Binary Code: USB 8192 (512×16bit): 39 Sec, GPIB (Device) ASCII Code: USB (Host): 35 Sec	
GENERAL SPECIFICATIONS		
Power Consumption	25W	
Operating Environment	Temperature to satisfy the specification: 18 ~ 28° C, Operating temperature: 0 ~ 40°C Relative Humidity: <80%, 0 ~ 40°C, <70%, 35 ~ 40°C, Installation category: CAT II	
Operating Altitude	2000 meters	
Pollution Degree	For indoor use only	
Storage Temperature	-10 ~ 70°C, Humidity: <90%	
POWER SOURCE		
AC 100 ~ 240V, 50 ~ 60Hz		
POWER CONSUMPTION		
25W		
DIMENSIONS & WEIGHT		
260 (W) x 107 (H) x 314 (D) mm, Approx. 4kg		

ORDERING INFORMATION

AFC-3081 80MHz Arbitrary Function Generator
AFC-3051 50MHz Arbitrary Function Generator

ACCESSORIES
GTL-232 RS-232C Cable, GTL-246 USB Cable, GTL-248 USB 2.0 A-B Type Cable, 4ft, GTL-047 GPIB Cable (2 Mtr.), GTL-253 GPIB Cable, Double Shielded, 300mm, EBK-A11 Rack Adaptor Kit

OPTIONAL ACCESSORIES

FREE DOWNLOAD
PC Software Arbitrary Waveform Editing Software

MFG-2000 Series

FEATURES

- Maximum Five Output Channels
  - 2 Equivalent Performance Arbitrary Channels (Frequency : 1μHz, 10/20/30/60/80MHz)
  - RF Channel Frequency (FG): 100kHz(AM) ~ 160/320MHz
  - Pulse Generator Frequency : 25MHz
  - Power Amplifier : Low Frequency, 5Hz~100kHz,36dB /20W(limited to current setting)
- True Point by Point Output Arbitrary Waveform Function: MFG-2220HM Sample Rate: 250MSa/s, Repetition Rate: 125MHz; Other models Sample Rate: 200MSa/s, Repetition Rate: 100MHz, 14-bit Resolution, 16k Points Memory Depth
- Earth Ground Isolation Design Among I/O Terminals and Instrument Chassis (MFG-2220HM Excluded)
- Frequency Counter : 150MHz, 8bit Frequency Resolution
- AM/FM/PM/ASK/FSK/PSK/SUM/PWM Modulation
- Built-in Modbus and Automotive Electronic Waveforms
- USB Host/USB Device/LAN (MFG-2200 only)
- 4.3 Inch TFT Color Display

The MFG-2000 series is a multi-channel function generator which has up to 5 simultaneous output channels, including CH1 and CH2 equivalent performance dual channel arbitrary function generator with the maximum 200MHz for both channels; RF signal generator; a standard AFG, which produces the maximum 320MHz sine wave and various modulation RF signals; pulse generator, whose frequency reaches 25MHz; power amplifier, which is ideal for audio range. The above-mentioned five different functionality channels are separately or totally allocated on 11 models, which extend from the basic single-channel AFG with pulse generator models to five-channel models so as to satisfy various educational and industrial applications.

The AFG channel of the MFG-2000 series outputs sine, square, and triangle, etc. The series features true point by point output arbitrary waveform characteristics of 200 MSa/s sample rate, 100MHz waveform repetition rate, 14-bit resolution, and 16k points memory depth. The MFG-2220HM offers up to 250MSa/s sample rate and 125MHz repetition rate. Some models provide various modulation methods such as AM/FM/PM/FSK/PWM, Sweep, Burst, Trigger, 100MHz Frequency Counter and 25MHz pulse generation are also available for some models. Synchronized dual channel models provide correlated functions, including synchronization, delay, sum, and coupling. RF signal generator, a complete AFG signal source (including AM/FM), features various modulations, Sweep, and digital modulations such as ASK and PSK and its sine wave frequency is up to 320MHz. A full function pulse generator with 25 MHz is equipped to all models and its pulse width, rise edge time, fall edge time are adjustable that can be applied as trigger signals. Independent input/output power amplifier with 20W/36dB, 5Hz~100kHz bandwidth, and distortion less than 0.1% can be applied to the audio application.

The overall design of the MFG-2000 series (MFG-2220HM excluded) is earth ground isolation among output/input terminals and instrument chassis that can only be found in high-level signal sources. The output channels can sustain maximum isolation voltage up to ±42Vpk (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit outputs can be executed without battering in grounding reference issue. There is no additional isolation requirement for experiments such as "full wave rectification" and "voltage doubler" which are easy and safe. An external power supply can bring up the DC bias voltage to ±42Vpk to meet the requirements of higher DC bias voltage such as automotive and educational applications.

The AFG of the MFG-2000 series collocating with ARSS (Arbitrary Waveform Editing Software) allows users to easily and quickly edit arbitrary waveforms. DWR (Direct Waveform Reconstruction) allows users to collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction. 100 built-in waveforms allow users to edit arbitrary waveforms and to output the whole segment or divided segments.

With the multi-functionality channels, the MFG-2000 series provides different industrial sectors with special dual channel waveforms, IQ modulation signals, low-frequency vibration simulation, automotive sensors, medical applications (MFG-2220HM excluded), AM/FM broadcast signals, PWM motor or fan control signals, pulse synchronized signals, pulse wave, audio circuit or devices such as speaker tests. The series is ideal for various fields, including scientific research, education, research and development, production and quality control.

MFG-2220HM Rear Panel

MFG-2260MRA Rear Panel

The MFG-2000 series can maximally and simultaneously output five functional channels. The functionalities of each channel are as follows:

Multi-Channel Function Generator

SPECIFICATIONS

	CH1 (Function With AM)	CH2 (Function With AM)	250MHz Pulse Generator	RF Generator (Function With AM)	Power Amplifier	Modulation/Sweep/ Burst/Frequency Counter
MFG-2110	• 10MHz		•			
MFG-2120	• 20MHz		•			
MFG-2120MA	• 20MHz		•		•	•
MFG-2130M	• 30MHz		•			•
MFG-2160MF	• 60MHz		•	• 160MHz		•
MFG-2160MR	• 60MHz		•	• 220MHz		•
MFG-2230M	• 30MHz	• 30MHz	•			•
MFG-2260M	• 60MHz	• 60MHz	•			•
MFG-2260MFA	• 60MHz	• 60MHz	•	• 160MHz	•	•
MFG-2260MRA	• 60MHz	• 60MHz	•	• 220MHz	•	•
MFG-2220HM	• 200MHz	• 200MHz	•			•

CH1/CH2

WAVEFORMS	Standard	Sine, Square, Triangle, Ramp, Pulse, Noise
ARBITRARY FUNCTIONS	Add Function Sample Rate Repetition Rate Waveform Length Amplitude Resolution Non-volatile Memory User-defined Output Series	Built-in 100 MSa/s (MFG-2220HM/220MFA/R) 1 MHz (MFG-2220HM) 60MHz 16k points 14 bits 4 Sets (16k points /) From point 2 ~ 16384
FREQUENCY CHARACTERISTICS	Range Resolution Accuracy (Daily) Aging Tolerance	MFG-2220HM (Sine, Square/Pulse/Ramp/Noise, Square/Pulse/Ramp/Noise) 1 μHz ±10 ppm +/- 2ppm per 1 year ±1 ppm
OUTPUT CHARACTERISTICS (1)	Amplitude Range Accuracy Resolution Flatness Units	1mVpp ~ 10 Vpp (into 50Ω) ; 2mVpp ~ 20 Vpp (open circuit) MFG-2220HM : 1mVpp ~ 11Vpp (220MHz) ; 1mVpp ~ 10vpp (160MHz) ; 1mVpp ~ 20pp (100MHz) ; 1mVpp ~ 10pp (200MHz) (into 50Ω) ±2% of setting +1 mVpp (at 1 kHz sine, 50Ω without DC offset) 0.1 mV or 4 digits < 1dB (0.5dB) ~ 60MHz ; < 2dB (0.5dB) ~ 120 MHz ; < 3dB (0.5dB) ~ 160MHz (sinewave relative to 1 kHz sine, 50Ω), MFG-2220HM < 1dB (0.5dB) ~ 60MHz, < 2dB (0.5dB) ~ 120 MHz < 4dB (0.5dB) (220MHz) ; < 8dB (0.5dB) (200MHz) (sinewave relative to 1 kHz sine, 50Ω) Vpp, Vrms, dBm
OFFSET	Range Accuracy	±5 Vpk AC + DC (into 50Ω) ; ±10Vpk AC + DC (open circuit) ±(1% of setting + 5mV + 0.5% of amplitude)
WAVEFORM OUTPUT	Impedance Protection Ground Isolation	50Ω typical (Fixed) ; < 100Ω (output disabled) Short-circuit protected. Overload relay automatically disables main output 42Vpk max (MFG-2220HM not isolated)
SYNC OUTPUT	Range Impedance Ground Isolation	TTL-compatible into 50Ω 50Ω nominal 42Vpk max (MFG-2220HM not isolated)
SINE WAVE CHARACTERISTICS (1)	Harmonic Distortion Total Harmonic Distortion	-40 dBc (DC ~ 20MHz, Ampl > 0.1 Vpp -35 dBc (20MHz ~ 1 MHz, Ampl > 0.1 Vpp) ; -45 dBc (1MHz ~ 19 MHz, Ampl > 0.1Vpp -30 dBc (10MHz ~ 30MHz, Ampl > 0.1 Vpp ; -20 dBc (30MHz ~ 60MHz, Ampl > 0.1Vpp MFG-2220HM <-40 dBc (>200MHz) ; <-30 dBc (200MHz ~ 1 MHz) ; <-45 dBc (1MHz ~ 10 MHz <-30 dBc (10MHz ~ 30MHz) ; <-20 dBc (30MHz ~ 120MHz (at 1Vpp/1kHz 50Ω without DC offset) < 0.1% (typical 1Vpp, DC ~ 100 kHz
SQUARE WAVE CHARACTERISTICS	Rise/Fall Time Overshoot Asymmetry Variable Duty Cycle Jitter	< 5ns (MFG-2220HM) 60ns ≤5% 1% of period + 5 ns 0.01% to 99.99% (limited by the current frequency setting) 50ppm +100ps(rms)
RAMP CHARACTERISTICS	Linearity Variable Symmetry	< 0.1% of peak output 0% ~ 100%
PULSE CHARACTERISTICS	Frequency Pulse Width Variable duty Cycle Leading and Trailing Edge Time(T) Overshoot Jitter	1 μHz ~ 25MHz > 20ns (MFG-2220HM > 10ns) (limited by the current frequency setting) 0.1% ~ 99.9% (limited by the current frequency setting) 10ns ~ 28[s] (not resolution) (limited by the current frequency and pulse width settings) ≤5% 100ppm + 100ps(rms)

PULSE GENERATOR

PULSE GENERATOR	Amplitude Offset Frequency Pulse Width Variable duty Cycle Leading and Trailing Edge Time(T) Overshoot Jitter	1mVpp ~ 2.5 Vpp (into 50Ω) ; 2mVpp ~ 5 Vpp (open circuit) +/- 1pk AC + DC (into 50Ω) ; +/-2pk AC + DC (open circuit) 1 mHz ~ 25MHz 20ns ~ 999.9s (limited by the current frequency setting) 0.1% ~ 99.9% (limited by the current frequency setting) 10ns ~ 28[s] (not resolution) (limited by the current frequency and pulse width settings) ≤5% 100ppm + 100ps(rms)

RF GENERATOR

ARBITRARY FUNCTIONS	Add function Sample Rate Repetition Rate Waveform Length Amplitude Resolution User-defined output series Jitter	Built-in 200 MSa/s 120MHz 16k points 14 bits From point 2~ 16384 20ppm +1ns

SPECIFICATIONS

FREQUENCY CHARACTERISTICS	**Range**	Sine: 1 μHz–160MHz (DDS); 0.1 Hz–60M Hz (AM); for MFG-2000MF: 1 μHz–330MHz (DDS); 1 mHz–60MHz (AM); for MFG-3000MF Square: 200MHz (max), Triangle, Ramp: 1MHz
	Resolution	1 μHz
	Accuracy /Stability	10 ppm
	Aging	1 ppm/ per 1 year
	Tolerance	±1 μHz
OUTPUT CHARACTERISTICS(1)	**Amplitude(into 50Ω)**	1 mVp-p to 2 Vpp (MFG-2000MF); 1 mVp-p to 1 Vpp (MFG-3000MF)
	Accuracy	10% of setting ±1 mVp-p (≤ 1 MHz, into 50Ω without DC offset)
	Resolution	1 mV or 3 digits
	Flatness	≤ 0.1% (0.1 dB) @ 1 MHz, ≤ 0.5% (0.5dB) @ 10 MHz, ≤ 0.8% (0.8dB) @ 160MHz to ≤ 0.5% (0.5dB) @ 330MHz (Sinewave relative to 1 MHz into 50Ω)
OFFSET WAVEFORM OUTPUT SINE WAVE CHARACTERISTICS(2)	**Impedance**	≤ 1 Vpk at ≤ DC (into 50Ω); ≤ 10 Vpk at ≤ DC (Open circuit)
	Harmonic Distortion	50Ω (typical fixed); ≤ 10kΩ (output disabled)
	Total Harmonic Distortion	-40 dBc ≤ 100kHz; -35 dBc 100kHz to 1 MHz; ≤ -45 dBc 1 MHz to 10 MHz; ≤ -30 dBc 10MHz to 330MHz
		< 0.1% (Amp> 1Vpp) DC–100 kHz
SQUARE WAVE CHARACTERISTICS	**Rise/Fall Time**	≤ 10ns
	Overshoot	≤ 10%
	Asymmetry	1% of period +5 ns
	Variable Duty Cycle	0.01% to 99.99% (limited by the current frequency setting)
	Jitter	20ppm+500ps(rms)
RAMP CHARACTERISTICS	**Linearity**	≤ 0.1% of peak output
	Variable Symmetry	0% to 100%
MODULATION/ SWEEP	**Modulation Type**	AM/FM/PM/PWM/SUM/FSK (For detail refer to CH1 modulation specification)
	Sweep type	Frequency
	Source	INTERNAL (INT only for AM, FM, PM, PWM)
	Modulating Frequency	Sine DDS: 1μHz–837.5MHz, Resolution 0.01; Sine AWB 2mHz–20MHz (Resolution 1mHz)
PSK (MFG-2220MH also provided)	**Carrier Waveforms**	Sine DDS
	Modulating Waveforms	50% duty cycle square
	Internal Frequency	2 mHz to 1 MHz
	Phase Range	0° – 360.0°
	Source	Internal / External
ASK (MFG-2220MH also provided)	**Carrier Waveforms**	Sine DDS
	Modulating Waveforms	50% duty cycle square
	Internal Frequency	2 mHz to 1 MHz
	Amplitude Range	1 mVpp to 10Vpp
	Source	Internal / External
POWER AMPLIFIER		
POWER AMPLIFIER	**Input Impedance**	10kΩ
	Input Voltage	1.25Vp-p
	Working Mode	Constant Voltage
	Gain	26dB
	Output Power (R=8Ω)	20W (Square)
	Output Voltage	12.5Vp-p
	Output Current	1.5Ap-p
	Rise/Fall Time	≤1.2μs
	Full Power Bandwidth	5Hz – 100kHz
	Overshoot	5%
	Total Harmonic Distortion	< 0.1% (Amp1 = Vpp); 20Hz – 20 kHz
	Ground Isolation	400Vdc max
ADVANCED FUNCTIONS		
AM MODULATION	**Carrier Waveforms**	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2mHz – 20kHz ; MFG-2220MH : 2mHz – 50kHz (int) ; DC – 20kHz ; MFG-2220MH : DC – 50kHz (Ext)
	Depth	0% – 120.0%
	Source	Internal / External
FM MODULATION	**Carrier Waveforms**	Sine, Square, Triangle, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2mHz – 20kHz ; MFG-2220MH : 2mHz – 50kHz (int) ; DC – 20kHz ; MFG-2220MH : DC – 50kHz (Ext)
	Peak Deviation	DC to max Frequency ; MFG-2220MH: DC – 8 times Frequency
	Source	Internal / External
PM	**Carrier Waveforms**	Sine, Square, Triangle, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2mHz – 20kHz ; MFG-2220MH : 2mHz – 50kHz (int) ; DC – 20kHz ; MFG-2220MH : DC – 50kHz (Ext)
	Phase Deviation	0° – 1800°
	Source	Internal / External
SUM	**Carrier Waveforms**	Sine, Square, Triangle, Ramp ; MFG-2220MH: Sine, Square, Triangle, Pulse, Ramp, Noise
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2mHz – 20kHz ; MFG-2220MH : 2mHz – 50kHz (int) ; DC – 20kHz ; MFG-2220MH : DC – 50kHz (Ext)
	SUM Depth	0% – 120.0%
	Source	Internal / External
PWM	**Carrier Waveforms**	Square
	Modulating Waveforms	Sine, Square, Triangle/Upramp, Dnramp
	Modulation Frequency	2mHz – 20kHz ; MFG-2220MH : 2mHz – 50kHz (int) ; DC – 20kHz ; MFG-2220MH : DC – 50kHz (Ext)
	Phase/Deviation	0% – 100.0% pulse width
	Source	Internal / External
FSK	**Carrier Waveforms**	Sine, Square, Triangle, Ramp, Pulse
	Modulating Waveforms	50% duty cycle square
	Internal Frequency	2 mHz to 1 MHz
	Frequency Range	1 μHz to max frequency
	Source	Internal / External
SWEEP	**Waveforms**	Sine, Square, Triangle, Ramp
	Type	Linear or Logarithmic
	Sweep Direction	Sweep up or Sweep down
	Start/Stop Freq	1 μHz to max frequency
	Sweep Time	1ms to 500s

Multi-Channel Function Generator

SPECIFICATIONS

	Source	Internal / External
	Trigger	Single, External, Internal
	Marker	Marker Point or Rising Edge (programmable)
	Source	Internal / External
BURST	Waveforms	Sine, Square, Triangle, Ramp
	Frequency	(Max Frequency 25MHz (sine, square) / 1MHz (triangle, ramp))
	Pulse Count	1~1000000 Cycles or Infinite
	Start/Stop Phase	000.0 ° ~ +360.0°
	Internal Frequency	1 Hz ~ 1MHz
	Gate Source	External Trigger
	Trigger Source	Single, External, Internal
TRIGGER DELAY	Width, Infinite	8n ~ 100 s
EXTERNAL TRIGGER INPUT	Type	Fall, Rise, Gate, Sweep
	Input Level	TTL Compatibility
	Slope	Rising or Falling (selectable)
	Pulse Width	> 100 n
	Input Impedance	1MΩ, DC coupled
EXTERNAL MODULATION INPUT	Type	FM, ΦM, PM, AM, SUM, PWM
	Voltage Range	±1V full scale
	Input Impedance	10kΩ
	Frequency	DC ~ 10MHz(AFG-2225H) : DC ~ 25MHz)
	Ground Isolation	42Vpk max(AFG-2225H/A excluded)
TRIGGER OUTPUT	Type	For ARB, Burst, Sweep
	Level	TTL Compatible into 50Ω
	Pulse Width	>40ns(AFG-2125/P/M : >140ns)
	Maximum Rate	1MHz
	Fan-out	>4 TTL Load
	Impedance	50Ω Typical
REFERENCE INPUT (AFG-2225H/M only)	Input Voltage	0.5Vp-p to 7Vpp
	Output Impedance	1kΩ, unbalanced, AC coupled
	Input Frequency	26.5435MHz±50PPM
	Waveform	Sine or Square (Sine:5% duty)
REFERENCE OUTPUT (AFG-2225H/M only)	Output Voltage	0.7Vpp square wave
	Output Impedance	50Ω, AC coupled
	Output Frequency	26.2435MHz
FREQUENCY COUNTER	Range	1Hz ~ 150MHz
	Accuracy	Time Base accuracy±1count
	Time Base	±20ppm (25° C ±1° C)
	Resolution	7digit/sec(min. resolution is 1.1ppm by 10s, 0.1ppm by 100s)
	Input Impedance	1MΩ//1pF
	Sensitivity	25mVrms (~ 20MHz), 35mVrms (20MHz ~ 150MHz)
	Ground Isolation	42Vpk max(AFG-2225H/A excluded)
Dual Channel Function (CH1,CH2)	Phase	180 ~ +180 : Synchronize phase
	Track	CH1&CH2
	Coupling	Frequency : Basic or Differential, Amplitude & DC Offset
	Deskew	∨
OTHER	Save/Recall	10 Groups of Setting Memories
	Interface	LAN (AFG-2225H Series only), USB
	Display	5.0 inch TFT LCD, 480 × 272(WQVGA)
GENERAL SPECIFICATIONS	Power Source	AC 100~240V, 50~60Hz
	Power Amplifier Source	Built-in unit : AC 100/120VAC/220/240V, 50/60Hz (AFG-2125/P/M, AFG-2225H/A, AFG-2225H/M only)
	Power Consumption	50W or 80VA(with power amplifier)
	Operating Environment	Temperature to satisfy the specification : 18 ~ 28 °C, Operating temperature : 0 ~ 40 °C, Relative humidity : ≤ 80% R.H. (0 °C ~ 30°C), ≤ 70% R.H. (31 °C ~ 40 °C), Installation (Category) : CAT. II
	Operating Altitude	2000 Meters
	Pollution Degree	IEC 61010 degree 2, Indoor use
	Storage Temperature	-10 ~ 70° C, Humidity : <90%
	Dimensions & Weight	264(W) x 107.5(H) x 370.2(D) mm, Approx. 2.5kg

The specifications apply when the function generator is powered on for at least 30minutes within (23°C ~ 28°C).
Note : (1) A total of ten waveforms can be stored. Every waveform can be composed of a maximum of 16k points.
(2) Add (1/10)% of output amplitude and offset specification per °C for operation outside of 0°C to 18°C range.
(3) 1 year specification.
(4) DC offset adjustability.
(5) 2nd specification for AC Coupled 20ppm / Year.
(6) With Phase-Lock-In supplied.

ORDERING INFORMATION

AFG-2115	15MHz Single Channel Arbitrary Function Generator with Pulse Generator
AFG-2125	25MHz Single Channel Arbitrary Function Generator with Pulse Generator
AFG-2125/A	25MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, Power Amplifier
AFG-2125/M	25MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation
AFG-2160/M	60MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160MHz RF Signal Generator
AFG-2160/MF	60MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator
AFG-2215H	15MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation
AFG-2225H	25MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation
AFG-2260H/A	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160MHz RF Signal Generator, Power Amplifier
AFG-2260H/A	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator, Power Amplifier
AFG-2225H/M	25MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation

ACCESSORIES

Quick Start Guide x 1, CD-ROM with AFG Software and User Manual x 1

CTL-101	BNC-M Cable 1m (AFG-2115/2125/2125/P/M/2160H/2160HF/2215H/2225H)
CTL-102	BNC-M Cable 1m (AFG-2125/M, 2160M, 2260M/A, 2225H/M)
CTL-113	BNC cable x 2 (AFG-2225H/M)

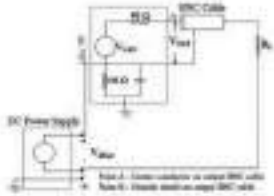
EXTERNAL ACCESSORIES

CTL-USB	USB Type A to Type B cable

FREE DOWNLOAD

PC Software	Arbitrary Waveform Editing Software

A CIRCUIT DESIGN FOR GROUND ISOLATION AMONG OUTPUT/INPUT TERMINALS AND INSTRUMENT CHASSIS



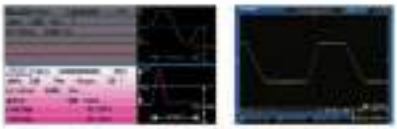
Connection diagram for MFG connecting with a power supply to increase D.C. bias voltage to ±42Vpk (DC+ AC peak value).

Output channels, synchronization and modulation input/output connector grounding are isolated from instrument chassis. These connectors can sustain maximum isolation voltage up to ±42Vpk (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit outputs can be executed without factoring in grounding reference issue.

The built-in DC bias voltage of the MFG-2000 series can be applied on various waveforms. The DC bias voltage is ±5V under 50 ohm load. An external power supply can be used to bring up the DC bias voltage to ±42Vpk (DC+ AC peak value) for higher DC bias applications.

(* MFG-2320H-M excluded)

B PULSE GENERATOR



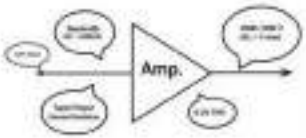
Each model of the series has a built-in pulse generator and its output frequency reaches 25 MHz. Users can set pulse width, duty cycle, rise edge time, and fall edge time to support trigger signal.

The pulse width can be fine-tuned to the minimum of 20ns and the leading/trailing edge times can be set independently to the minimum of 10ns.

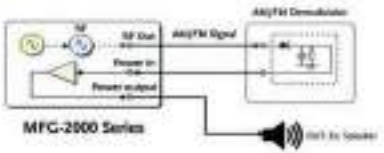
C RF SIGNAL GENERATOR

RF signal generator is a full function AFG signal source, identical to CH1/CH2, it can output sine, square, ramp, pulse, noise, etc. Its sine wave frequency reaches 160MHz or 320MHz. And its true point by point output arbitrary waveform function supports 200 MHz sample rate, 180MHz waveform repetition rate, 14 bit resolution, 16k point memory depth, frequency sweep and various modulation methods such as AM/FM/PM/FSK/PWM/PSK/ASK. RF signal generator can be applied as a high frequency arbitrary waveform generator, simulated signals of analog or digital broadcast stations or carrier signals of local oscillator.

D POWER AMPLIFIER

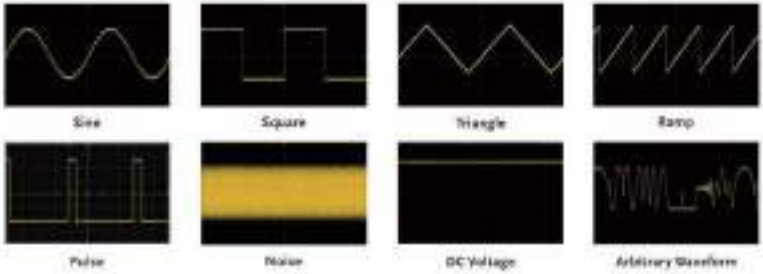


20W/20dB power amplifier, which has a bandwidth of DC~100kHz and less than 0.1% distortion. The low frequency power amplifier can be applied as an audio amplifier or a driver amplifier for piezoelectric components (collocating with an impedance transformer, 20W output) and conducts power component characteristics tests, magnetization characteristics tests (B-H curve) of magnetic materials such as ferrite and amorphous materials (collocating with an impedance transformer, 20W output).



Users can connect a speaker with the low frequency power amplifier of the MFG-2000 series to realize various physics experiments.

1 VERSATILE OUTPUT WAVEFORM SELECTIONS

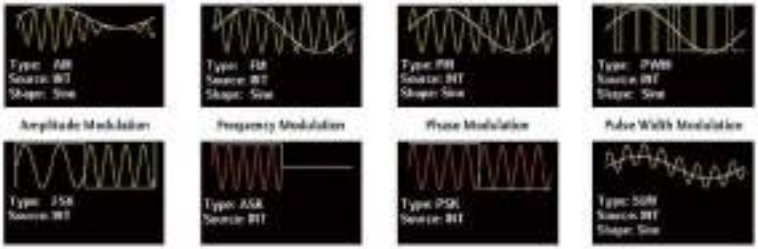


MEDICAL APPLICATION WAVEFORMS (MFG-2220HM Excluded)

AUTOMOTIVE ELECTRONIC WAVEFORMS (MFG-2220HM Excluded)

There are standard waveforms for the series such as sine, square, triangle, ramp, pulse, noise, DC voltage. In addition, 101 built-in waveforms, including medical application waveforms and commonly used automotive electronic waveforms allow users to easily select desired waveforms.

2 VARIOUS MODULATION FUNCTION



The series supports AM, FM, PM, FSK, PWM and SUM modulation. RF channel not only has the above-mentioned modulation capabilities but also supports advanced modulations such as ASK and PSK Modulation. The most modulation sources can be internal or external. Applications include communications systems' base band, motor control and light adjustment.

SWEEP FUNCTION

The series supports frequency sweep that can also integrate other functions, including linear/logarithm and INT (EXT) Manual trigger to meet various application requirements. Frequency sweep carries out tests on the frequency response of electronic components such as filter and low frequency amplifier.

BURST FUNCTION

The series supports N period or gated trigger. Phase angle, duration time, frequency, waveform, idle can be adjusted to meet non-continuous output applications.

THE OUTPUT CORRELATED FUNCTIONS OF EQUIVALENT PERFORMANCE DUAL CHANNEL

Differential Signal

Sine and Cosine Signal

Square Wave Phase Setting

The CH1 and CH2 of MFG-2220HM/2250M/2260M/2260MFA/2260MRA can be applied separately. These two channels provide four correlated functions, including sum, coupling, tracking and phase.

* The coupling function allows users to freely set ratio and offset values for frequency and amplitude of both channels to realize that all parameters are simultaneously effective for both channels. The measurement of the Third-Order Intercept Point for an amplifier and the simulations of two different frequency oscillators outputting signals are two applied examples for coupling function.
* The tracking function can produce 180 degree phase offset differential signals with same frequency and amplitude.
* The phase function allows users to freely set phase parameters for both channels such as sine wave, cosine wave, and square wave signals.
* The sum modulation function can sum up two signals into one and output this signal via one channel. One of the related applications is to sum up sine waveform and noise to execute tolerance tests.

FOUR METHODS TO OBTAIN ARBITRARY WAVEFORMS

Front Panel Operation

Via single unit's panel, arbitrary waveforms can be entered, edited, stored, recalled, output, triggered from 180 built-in waveforms.

CSV File Upload

Support CSV file upload produced by MATLAB and Excel.

Direct Waveform Reconstruction

Collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction (DSO Link is only for MFG-2200 Series).

Arbitrary Waveform Editing PC Software

Use AWGS to edit complex waveforms. The software supports waveform mathematical operation. The waveforms series including Uniform Noise, Gaussian Noise, Rayleigh Noise, various digital codes such as non-zero code, Manchester and RS-232, etc.

MULTI-CHANNEL SYNCHRONIZED PHASE OPERATION

MFG-2220HM features reference input and reference output interfaces. Users can drive up to four MFG-2220HM units through the reference input and reference output interfaces to achieve eight-channels of phase synchronous outputs.
(*MFG-2220HM only)

25MHz True Dual Channel Arbitrary Function Generator

AFG-2225

AFG-2225 is the first basic level dual channel arbitrary function generator, which provides superior features in its class. Both channels are equipped with same characteristics to adapt dual-signal applications such as differential signaling or IQ modulation. The outstanding cost performance value makes the AFG-2225 a practical instrument to accelerate the development process.

The major features for both channels include 180Vpp output amplitude, 25MHz frequency bandwidth with 1μHz resolution, built-in waveforms of Sine, Square, Ramp, (Triangle) and Noise. As to the 1%~99% adjustable duty cycle of Square waveform can be used as pulse signal sources. For the arbitrary waveforms, user can edit the 16k built-in waveforms or create a whole new one. Moreover, AFG-2225 carries features of AM/FM/PM/FSK/SUM Modulations, Sweep, Burst and Frequency Counter, which can be applied to various communication fields.

In addition to the intuitive and user friendly, the 3.5-inch color LCD displays the comprehensive operation information including the true waveform presented at the output. USB Host and Device interfaces are equipped to link the AFG-2225 with other devices, which provide the flexibility of waveform generation for more practical usages. With link to GW Instek GDS series Digital Storage Oscilloscopes (DSOs), the waveforms of interest can be captured and reconstructed. User can also use the arbitrary waveform PC software to edit the waveform and then send to AFG-2225 directly, or save the waveform into Flash drive and then transfer to AFG-2225.

FEATURES

- Wide Frequency Ranges From 1μHz ~ 25MHz (Sine wave)
- 1μHz Resolution in Full Range
- Built-in Standard 128MSa/s, 16bit, 4k Points Arbitrary Function for Both Channels
- True Dual-Channel Output, CH2 Provides the Same Characteristics as CH1
- Dual-Channel Supports Couple, Tracking, Phase Operations
- 1% ~ 99% Adjustable Duty Cycle for Square Waveform
- User Friendly for Easy Parameter Setting and Parameters Display
- Multiple Editing Methods to Edit Arbitrary Waveform Easily
- Built-in Standard AM/FM/PM/FSK/SUM/ Sweep/Burst and Frequency Counter
- USB Host/Device Interfaces for Remote Control and Waveform Editing

SPECIFICATIONS

		CH1	CH2
WAVEFORMS			
		Sine, Square, Ramp, Pulse, Noise, ARB	
ARBITRARY FUNCTION			
Sample Rate		120MSa/s	
Repetition Rate		6MHz	
Waveform Length		4k points	
Amplitude Resolution		12 bits	
Non-Volatile Memory		4 points	
FREQUENCY CHARACTERISTICS			
Range	Sine/Square	1μHz ~ 25MHz	
	Ramp	1MHz	
Resolution		1μHz	
Accuracy	Stability	±10ppm	
	Aging	±1ppm, per 1 year	
	Tolerance	4% (typ.)	
OUTPUT CHARACTERISTICS			
Amplitude	Range	1mVpp~10Vpp(into 50Ω), 2mVpp~20Vpp(open circuit) 1mVpp~5Vpp(into 50Ω)for 20MHz~25MHz 2mVpp~10 Vpp(open circuit)for 20MHz~25MHz	
	Accuracy	±2% of setting at 1kHz(into 50Ω or 100Ω without DC offset)	
	Resolution	1mV or 3digits	
	Flatness	±1% (0.1 dB) <100kHz, ±3% (0.3 dB) 1MHz, ±5% (0.6 dB) 10MHz, ±15% (1.5 dB) 20MHz ±(1%+0.1dB)(10kHz sine wave relative to 1kHz sine 50Ω)	
	Units	Vpp, Vrms, dBm	
Offset	Range	±2Vdc (dc-dc into 50Ω), ±10Vpk (dc-dc open circuit) ±2.5Vpk (dc-dc into 50Ω) for 20MHz~25MHz ±5Vpk (dc-dc open circuit) for 20MHz~25MHz	
	Accuracy	2% of setting +20mV ±0.5% of amplitude	
Waveform Output	Impedance	50Ω (typical) (Fixed), >10MΩ (output disabled)	
	Protection	Short-circuit protected, Overload relay automatically disables main output	
SINE WAVE CHARACTERISTICS			
Harmonic Distortion		-35 dBc (DC~20kHz, Ampl > 1Vpp; -30 dBc 20kHz~1MHz, Ampl > 0.1Vpp -35 dBc 1MHz~5MHz, Ampl > 0.1Vpp; -30 dBc 1MHz~25MHz, Ampl > 0.1Vpp	
SQUARE WAVE CHARACTERISTICS			
Rise/Fall Time		≤ 25ns at maximum output (into 50Ω load)	
Overshoot		5%	
Asymmetry		1% of period + 5 ns	
Variable Duty Cycle		1.0%~99%(5.10MHz) ; 10.0%~90.0%(5~15MHz) ; 50.0%(5.25MHz)	
RAMP CHARACTERISTICS			
Linearity		<0.1% of peak output	
Variable Symmetry		0%~100%(0.1% resolution)	
PULSE CHARACTERISTICS			
Period		40ns ~ 2000s	
Pulse Width		20ns ~ 1999.9s	
Overshoot		<2%	
Jitter		30ppm + 5ns	
AM MODULATION			
Carrier Waveforms		Sine, Square, Ramp, Pulse, Arb	Sine, Square, Ramp, Pulse, Arb
Modulating Waveforms		Sine, Square, Triangle, Up Ramp, Down Ramp, Noise, Arb	Sine, Square, Triangle, Up Ramp, Down Ramp, Noise, Arb
Modulating Frequency		2mHz ~ 20kHz (int)	2mHz ~ 20kHz (int)
Depth		DC ~ 120% (int) 0.0% ~ 120.0%	DC ~ 120% (int) 0.0% ~ 120.0%
Source		Internal / External	Internal / External

AFG-2225

SPECIFICATIONS

	CH1	CH2
FM MODULATION		
Carrier Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
Modulation Frequency	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)
Peak Deviation	DC ~ Max Frequency	DC ~ Max Frequency
Source	Internal / External	Internal / External
PM		
Carrier Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
Modulation Frequency	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)
Phase Deviation	0° ~ 360°	0° ~ 360°
Source	Internal / External	Internal / External
PSK		
Carrier Waveforms	Sine, Square, Ramp, Pulse	Sine, Square, Ramp, Pulse
Modulating Waveforms	50% duty cycle square	50% duty cycle square
Modulation Frequency	2mHz ~ 100 kHz (INT); DC ~ 100kHz (EXT)	2mHz ~ 100 kHz (INT); DC ~ 100 kHz(EXT)
Phase Deviation	1µHz ~ Max Frequency	1µHz ~ Max Frequency
Source	Internal / External	Internal / External
BURST		
Carrier Waveforms	Sine, Square, Ramp, Pulse, Noise	Sine, Square, Ramp, Pulse, Noise
Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
Modulation Frequency	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)	2mHz ~ 20kHz (INT); DC ~ 20kHz (EXT)
Phase Deviation	0% ~ 100.0%	0% ~ 100.0%
Source	Internal / External	Internal / External
SWEEP		
Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
Type	Linear or Logarithmic	Linear or Logarithmic
Start/Stop Freq	1µHz to Max Frequency	1µHz to Max Frequency
Sweep Time	1ms ~ 500s	1ms ~ 500s
Source	Internal / External (Manual	Internal / External/Manual
BURST		
Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
Frequency	1µHz ~ 15M Hz(sine, square); 1µHz ~ 1M Hz (ramp)	1µHz ~ 120MHz(sine, square); 1µHz ~ 1MHz(ramp)
Burst Count	1 ~ 65535 cycles or Infinite	1 ~ 65535 cycles or Infinite
Start/Stop Phase	-360 ~ +360	-360 ~ +360
Internal Period	1ms ~ 500s	1ms ~ 500s
Gate Source	External Trigger	External Trigger
Trigger Source	Single, External or Internal Rate	Single, External or Internal Rate
N-Cycle, Infinite	1s ~ 655350s	1s ~ 655350s
FREQUENCY COUNTER		
Range	1Hz ~ 150MHz	
Accuracy	Time Base accuracy (+ count)	
Time Base	±20ppm @ 0 ~ 5 °C after 30 minutes warm up	
Resolution	The maximum resolution is 1 / Gate(s) for 1Hz, 0.1Hz for 10M Hz ~	
Input Impedance	1MΩ//1pF	
Sensitivity	35mVrms ~ 3Vrms (5Hz ~ 150MHz)	
DUAL CHANNEL FUNCTION		
Phase	-180° ~ 180°, Synchronize phase	-180° ~ 180°, Synchronize phase CH1->CH2
Tracking	CH2=CH1	Frequency(Ratio or Difference)/Amplitude & DC Offset
Coupling	Frequency(Ratio or Difference)/Amplitude & DC Offset	
DSCtrl	✓	✓

Rear Panel

SPECIFICATIONS		
	CH1	CH2
EXTERNAL TRIGGER INPUT		
Type	For FSK, Burst, Sweep	
Input Level	TTL Compatibility	
Slope	Rising or Falling(Selectable)	
Pulse Width	>100ns	
Input Impedance	10kΩ, DC coupled	
EXTERNAL MODULATION INPUT		
Type	For AM, FM, PM, FSK	
Voltage Range	±5V full scale	
Input Impedance	10kΩ	
Frequency	DC ~ 20kHz	
TRIGGER OUTPUT		
Type	For Burst, Sweep, etc.	
Level	TTL Compatible into 50Ω	
Pulse Width	>600ns	
Maximum Rate	1MHz	
Fan-out	4HTTL Load	
Impedance	50Ω Typical	
SAVE/RECALL		
10 Groups of Setting Memories		
INTERFACE		
USB(Host & Device)		
DISPLAY		
3.5" TFT LCD		
POWER SOURCE		
AC100~240V , 50~60Hz		
POWER CONSUMPTION		
25W (Max.)		
OPERATING ENVIRONMENT		
Temperature to satisfy the specification: 18~28°C, Operating temperature: 0~40°C, Relative Humidity: <80%, 0~40°C, ≤70%, 35~40°C Installation category: CAT II		
OPERATING ALTITUDE		
2000 meters		
STORAGE TEMPERATURE		
-10~70°C, Humidity: ≤70%		
DIMENSIONS & WEIGHT		
260(W)×100(H)×230(D) mm , Approx. 2.1 kg		

* The specifications apply when the function generator is powered on for at least 30 minutes under +18°C~28°C.

ORDERING INFORMATION

AFG-2225 25MHz True Dual Channel Arbitrary Function Generator

ACCESSORIES:

User Manual CD x 1, Quick Start Manual x 1, GTL-101 Test Lead x 2, Power Cord x 1

OPTIONAL ACCESSORIES

GTL-110	BNC Cable, BNC(F/M)-BNC(F/M), 1200mm
GTL-246	USB Cable, USB 2.0 Type A - Type B, 4P

FREE DOWNLOAD

PC Software Arbitrary Waveform Editing Software

25MHz/12MHz/5MHz Arbitrary Function Generator

AFG-2105/2112/2125

AFG-2005/2012/2025

The AFG-2100/2000 Series Arbitrary Function Generator is a DDS (Direct Digital Synthesized) based signal generator designed to accommodate the educational and basic industrial requirements for an accurate and affordable signal source covering the output of Sine, Square (Pulse), Ramp (Triangle), Noise and Arbitrary waveforms. The 200MSa/s sampling rate, 10 bit vertical resolution and 4k point memory of the AFG-2100/2000 Series provide users with a flexible environment for creating the specific waveform output as needed. The 0.1Hz resolution of Sine, Square and Triangle waveforms and the 1% ~ 99% adjustable duty cycle of Square (Pulse) waveforms are the remarkable features to greatly extend its application range in various fields. The AFG-2100/2000 Series includes 6 models in three frequency bands of 5MHz, 12MHz and 25MHz. Besides the basic features of the whole AFG-2100/2000 Series, AFG-2100 carries additional features of AM/FM/PM Modulation, Sweep, and Frequency Counter. The friendly human interface of AFG-2100/2000 Series allows users to set waveform parameters, including waveform type, frequency, amplitude, DC offset, modulation type, and duty cycle, through keypad entry and/or the knob selection, and display the set parameters on the 3.5" LCD screen. The AFG-2100/2000 Series is equipped with a USB Device interface for remote control and waveform editing through a PC. A waveform editing software is provided to facilitate the waveform creation on the PC. After the waveform editing is done, the user is able to download the waveform data from PC to the AFG-2100/2000 Series for a signal output.

FEATURES

- 0.1Hz ~ 5/12/25 MHz with in 0.1Hz Resolution
- Sine, Square, Ramp, Noise and Arbitrary Waveform
- 200MSa/s Sampling Rate, 10 bit Vertical Resolution and 4k point Memory for Arbitrary Waveform
- 1% ~ 99% Adjustable Duty Cycle for Square Waveform
- Waveform Parameter Setting Through Numeric Keypad Entry & Knob Selection
- Amplitude, DC Offset and Offset Key Setting Information Shown on the 3.5" LCD Screen Simultaneously
- AM/FM/PM Modulation, Sweep, and Frequency Counter Functions (AFG-2100 only)
- USB Device Interface for Remote Control and Waveform Editing
- PC Arbitrary Waveform Editing Software

Models	AFG-2005	AFG-2112	AFG-2125	AFG-3005	AFG-3012	AFG-3025
WAVEFORM						
	Sine, Square, Ramp, Noise, Arbitrary Waveform					
ARBITRARY FUNCTION						
Sample Rate	200MSa/s					
Repetition Rate	100MHz					
Waveform Length	4k point					
Amplitude Resolution	10 bit					
FREQUENCY CHARACTERISTICS						
Range	Sine/Square	0.1Hz~5MHz	0.1Hz~12MHz	0.1Hz~25MHz	0.1Hz~5MHz	0.1Hz~12MHz	0.1Hz~25MHz
	Ramp	0.1Hz ~ 1MHz					
Resolution		0.1Hz					
Accuracy	Stability	±20ppm					
	Aging	±1ppm/ per 1 year					
	Tolerance	±1Bit+Stb					
OUTPUT CHARACTERISTICS						
Amplitude						
Range		≤ 20MHz : 1mVpp~10Vpp (50Ω); 2mVpp~20Vpp (open circuit) ≤ 25MHz : 1mVpp~10pp (50Ω); 2mVpp~10pp (open circuit)				
Accuracy		±2% of setting ± 1mVpp (at 1kHz with 50Ω without DC offset)				
Resolution		1mVpp (50Ω)				
Flatness		≤10V@1.6MHz, 10MHz; ≤5V@3.6MHz (14Hz); ≤4V@4.6MHz, 12MHz; ≤2V@10MHz, 20MHz; ≤2V@14MHz, 25MHz (Sine wave relative to 1 kHz into 50Ω)				
Unit		Vpp, Vrms, dBm				
Offset						
Range		±2Vpk (ac+dc) into 50Ω; ±10Vpk (ac+dc) open circuit; ±2.5Vpk (ac+dc) into 50Ω for 20MHz~25MHz; ±5Vpk (ac+dc) open circuit for 20MHz~25MHz				
Accuracy		3% of setting ±20mV, 0.3% of amplitude				
Waveform Output Impedance		50Ω typical (Fixed); >50MΩ (output disabled)				
Protection		Short-circuit protected; Overload relay auto-matically disables main output				
SYNC Output						
Level		TTL compatible into >1kΩ				
Impedance		50Ω nominal				
Rise or fall Time		22ns				
SINE WAVE CHARACTERISTICS						
Harmonic Distortion		<-30 dBc DC ~ 20kHz, Ampl > 0.1Vpp; <-30 dBc 20kHz ~ 1MHz, Ampl > 0.1Vpp <-20 dBc 1MHz ~ 25MHz, Ampl > 0.1Vpp; <-30 dBc 5MHz ~ 25MHz, Ampl > 0.1Vpp				
SQUARE WAVE CHARACTERISTICS						
Rise/Fall Time		22ns or more (at output 1m to 10Vpp)				
Overshoot		< 5%				
Asymmetry		1% of period (1 to)				
Variable Duty Cycle		1%~99% (~20kHz), 20.0%~80.0% (~5MHz), 40.0%~60.0% (~10MHz), 50%@12MHz (1% Resolution for full Frequency Range)				
RAMP CHARACTERISTICS						
Linearity		<0.1% of peak output				
Variable Symmetry		0%~100%(0.1% Resolution)				
AM MODULATION						
Carrier Waveforms		Sine, Square, Triangle		-		
Modulating Waveforms		Sine, Square, Triangle				
Modulating Frequency		2mHz~20 kHz (int); DC~20kHz (Ext)				
Depth		0%~120.0%				
Source		Internal/External				
FM MODULATION						
Carrier Waveforms		Sine, Square, Triangle		-		
Modulating Waveforms		Sine, Square, Triangle				
Modulating Frequency		2mHz~20 kHz (int); DC~20kHz (Ext)				
Deviation		DC to Nyq Frequency				
Source		Internal/External				

25MHz/12MHz/5MHz Arbitrary Function Generator

AFG-2000 Series Rear Panel

AFG-2100 Series Rear Panel

SPECIFICATIONS

Models	AFG-2005	AFG-2112	AFG-2125	AFG-3081	AFG-3012	AFG-3025
SWEEP						
Waveforms	Sine, Square, Triangle					
Type	Linear or Logarithmic					
Start/Stop Frequency	0.1Hz to Max Frequency				-	
Sweep Time	1ms~500s					
Source	Internal/External					
FSK						
Carrier Waveforms	Sine, Square, Triangle					
Modulating Waveforms	50% duty cycle square				-	
Modulation Rate	2mHz~100kHz (2 Hz, DC~100kHz duty)					
Frequency Range	0.1Hz~Max Frequency					
Source	Internal/External					
FREQUENCY COUNTER						
Range	1Hz~120MHz					
Accuracy	Time Base accuracy ± 1count					
Time base	±20ppm (0°C~50°C) after 30minutes warm-up				-	
Resolution	1Hz/10Hz for 1 Hz, 0.1Hz for 1.000Hz					
Input Impedance	1MΩ/pF					
Sensitivity	35mVrms~30Vrms (1Hz~100MHz)					
STORE/RECALL						
10 Groups of Setting Memories						
INTERFACE						
USB (Host)						
Display						
LCD						
POWER SOURCE						
AC100~240V, 50~60Hz						
POWER CONSUMPTION						
21 VA						
OPERATING ENVIRONMENT						
Temperature to satisfy the specification: 18~28°C, Operating temperature: 0~40°C Relative Humidity: <80%, 0~35°C, <70%, 35~40°C, Installation category: CAT. II						
OPERATING ALTITUDE						
2000 meters						
STORAGE TEMPERATURE						
-10~70°C, Humidity: <90%						
DIMENSIONS & WEIGHT						
260(W)×107(H)×293(D) mm, Approx. 2.5 kg						

ORDERING INFORMATION

AFG-2005	5MHz Arbitrary Function Generator
AFG-2106	6MHz Arbitrary Function Generator
AFG-2012	12MHz Arbitrary Function Generator
AFG-2112	12MHz Arbitrary Function Generator
AFG-2025	25MHz Arbitrary Function Generator
AFG-2125	25MHz Arbitrary Function Generator

ACCESSORIES

CD (user manual + software) × 1, Quick Start Guide × 1, Power cord × 1
AFG-2100 Series : GTL-101 Test Lead × 1, Instruction Manual × 1, Power cord × 1
AFG-3000 Series : GTL-101 Test Lead × 1, Instruction Manual × 1, Power cord × 1

OPTIONAL ACCESSORIES

GTL-248	USB Cable, USB 2.0 Type-A - Type-B, 4P
GTL-118	BNC Cable, BNC(M)/BNC(M), 1000mm

FREE DOWNLOAD

PC Software	Arbitrary Waveform Editing Software
Driver	USB driver

SELECTION GUIDE

MODEL	AFG-2005	AFG-2006	AFG-2012	AFG-2112	AFG-2025	AFG-2125
FREQUENCY RANGE	5MHz	5MHz	12MHz	12MHz	25MHz	25MHz
ARBITRARY WAVEFORM	✓	✓	✓	✓	✓	✓
DUTY	✓	✓	✓	✓	✓	✓
TTL	✓	✓	✓	✓	✓	✓
DC OFFSET	✓	✓	✓	✓	✓	✓
USB INTERFACE	✓	✓	✓	✓	✓	✓
LIN/LOG SWEEP		✓		✓		✓
AM/FM/PSK MODULATION		✓		✓		✓
EXT COUNTER		✓		✓		✓

DIRECT DIGITAL SYNTHESIZED (DDS) FUNCTION GENERATOR OVERVIEW

DDS type Function Generator has become the most interest in signal generator. This technique brings the advantages of simplicity, stable frequency and low distortion. The basic principle of how DDS works is as follows.

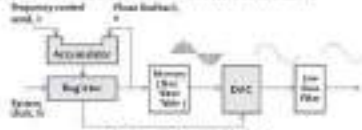


Figure 1 Block Diagram of DDS

The block diagram of DDS is illustrated in Figure 1 above. A digitized sine wave data is stored in a memory. The data is picked and sent out to a DAC, where step-shape sine wave is formed. A pure sine wave is then generated by a low pass filter.

The sine wave data is picked by accumulating the frequency control word, K. The whole sequence is as follows. At the very beginning, K is loaded into the accumulator. In a minute, an address θ in the memory selects the θ_0 data. Meanwhile the address θ is fed back as part of the phase feedback to be added with K. Repeat the above steps, the $2\theta_0$, $3\theta_0$, ... and eventually a wave data is sent to construct a complete sine wave. The time base is the system clock f_c. Compared with the conventional function generator introduced in the later section, there is no toggle between positive and negative current sources, therefore no spike noise occurs on the peak of the generated sine wave. Besides, the frequency stability follows the time base f_c. As a result, the frequency stability is much better than that of a conventional function generator.

The extended product of DDS function generators is the arbitrary waveform generator. In the DDS unit, a sine wave data is stored in the memory. If the waveform data is loaded into the memory as demanded, an arbitrary waveform generator is constructed accordingly.

DDS FUNCTION GENERATOR

MODEL	SFG-1003	SFG-1013
Technology	DDS	DDS
Analog Channel	1	1
Frequency Range	0.1Hz ~ 3MHz	0.1Hz ~ 3MHz
Frequency Resolution	0.1Hz	0.1Hz
Sample Rate	-	-
Repetition Rate	-	-
Vertical Resolution	-	-
Memory Length	-	-
Amplitude Range (@50Ω)	10Vp-p	10Vp-p
DC Offset (@50Ω)	±10V (0.1~20V)	±10V (0.1~20V)
Attenuator	40dB	40dB
Amplitude Unit	-	Vpp
Impedance Switch	50Ω	50Ω
Square Rise/Fall Time	33ns	33ns
Square Duty Cycle	25% ~ 75%	25% ~ 75%
Sine	V	V
Square	V	V
Triangle/Ramp	V	V
Pulse	-	-
Noise	-	-
Burst	-	-
CMOS Output	-	-
TTL Output(Sync Output)	-	-
Sweep	-	-
AM Modulation	-	-
FM	-	-
PM	-	-
FSK	-	-
PWM	-	-
SUM	-	-
VCF Function	-	-
VCP Function	-	-
Counter Function	-	-
Ext. Trigger Input	-	-
Ext. Modulation Input	-	-
Trigger Output	-	-
Modulation Output	-	-
Marker Output	-	-
GPIB	-	-
USB Host	-	-
USB Device	-	-
RS-232C	-	-
Display	8 digits LED	4 digits LED
Voltage Display	-	V
SD Card	-	-
Internal Storage Memory	-	-
LabView Driver	-	-
Power Source	AC 115/230V(50Hz/60Hz) ±10%	AC 115/230V(50Hz/60Hz) ±10%
Power Consumption	-	-
Page	C28	C29

3 MHz DDS Function Generator

For educational institutions, the SFG-1003/1013 series direct digital synthesis (DDS) signal generator is the most affordable option for accurate waveform generation. It supports outputs of up to 3MHz and includes a voltage display. Using DDS technology embedded in an FPGA chip, the SFG-1003/1013 series generates waveforms with high precision and high stability for customers who need accurate signals.

SFG-1003/1013 (3MHz)

CE

FEATURES

- DDS Technology and FPGA Design
- Frequency Range : 0.1Hz ~ 3MHz
- High Frequency Accuracy : 30ppm
- High Frequency Stability : 30ppm
- Max. Frequency Resolution : 100 mHz
- Low Distortion Sine Wave : -55dBc, 0.1Hz~200 kHz
- Voltage Display (Only SFG-1013)

SELECTION GUIDE

	SFG-1003	SFG-1013
Frequency	3 MHz	3 MHz
Offset	✓	✓
TTL Output	✓	✓
-40dB Attenuation	✓	✓
Voltage display	—	✓

SPECIFICATIONS

MAIN	
Output Waveform	Sine, Square, Triangle, TTL
Frequency Range(For Sine, Square)	0.1Hz ~ 3MHz
Frequency Range(For Triangle)	0.1Hz ~ 1MHz
Frequency Resolution	0.1Hz maximum
Frequency Stability	120ppm
Frequency Accuracy	120ppm
Aging	15ppm/year
Amplitude Range	1mVp-p ~ 10Vp-p (into 50Ω load)
Amplitude Accuracy	±20% at maximum position (only SFG-1013)
Impedance	50Ω (±10%)
Attenuator	-40dB(±1dB)
DC Offset	-5V ~ +5V (into 50Ω load)
Duty Control Range	20% ~ 80% (only 1MHz (for square wave only)
Display	6-digit LED display
Output Control	ON/OFF selector
SINE WAVE	
Harmonics Distortion	Maximum (amplitude attenuation to 1/10 of any panel settings, TTL OFF) ≥ -35dBc, 0.1Hz ~ 200kHz ≥ -40dBc, 0.2MHz ~ 2MHz ≥ -20dBc, 2MHz ~ 3MHz
Flatness (at maximum amplitude relative to 1kHz)	≤ 0.5dB, 0.1Hz ~ 1MHz ≤ 1.0dB, 1MHz ~ 2MHz ≤ 1.5dB, 2MHz ~ 3MHz
TRIANGLE WAVE	
Linear	0.1Hz ~ 100kHz : 2% ; 100kHz ~ 1MHz : 5%
SQUARE WAVE	
Symmetry	1% of period (1Hz, 0.1Hz ~ 100kHz)
Rise or Fall Time	≤ 100ns at maximum output (into 50Ω load)
TTL OUTPUT	
Level	≥ 2Vp-p
Fan Out	10 TTL load
Rise or Fall Time	≤ 25ns
GENERAL	
Operation Environment	Indoor use, altitude < 2000m Ambient Temperature : 5°C ~ 40°C Relative Humidity : < 80% at 5°C ~ 40°C Up to 70% at 35°C ~ 40°C Installation category II Pollution Degree 2
POWER SOURCE	
	AC 100V/110V/220V/240V ±10%, 50/60Hz
STORAGE CONDITION	
Temperature	14°F ~ 70°F
Humidity	90% (Maximum)
DIMENSION & WEIGHT	
251(W) x 111(H) x 291.5(D) mm, Approx. 2.1kg	

ORDERING INFORMATION

SFG-1003 3MHz DDS Function Generator
SFG-1013 3MHz DDS Function Generator with Voltage Display

ACCESSORIES
User manual x 1, Power cord x 1, Test lead (GTL-101) x 1

OPTIONAL ACCESSORIES

GTL-110 BNC Cable, BNC(P)/M) BNC(P/M), 1.8m/m

SPECIFIC APPLICATION SIGNAL SOURCE OVERVIEW

GAG-810 provide a convenient solution for low frequency (< 1MHz) signal generation, specifically for audio bandwidth. Intuitive and simple panel interface provides quick frequency and amplitude adjustment, with dial/key shortcuts to different ranges. Square wave generation covers digital application in addition to the traditional analog using sine wave. Distortion is kept at minimum level, especially at the audible frequency range : 0.02% or less distortion factor for 300Hz~20kHz. The external synchronization signal input helps collaborate with other measurement devices.

The GW Instek USG-Series RF signal generator is a pocket sized and USB interface compatible RF signal generator. It covers the frequency range from 35MHz ~ 4400MHz. The USG-Series provides continuous wave (CW) signal outputs without any signal modulation function.

The built in electronic attenuator of the USG-Series allows an adjustable power range between -30dBm to 0dBm. The USG-Series has several operational modes including fixed frequency, frequency sweep, frequency hopping, and power sweep.

AUDIO GENERATOR

MODEL	GAG-810
Application	Audio Signal
Analog Channel	1
Frequency Range	10Hz ~ 1MHz
Output Range	5Vrms
Impedance	600Ω
Power Source	AC100/110/220/230V±10%
Page	C31

RF SIGNAL GENERATOR

MODEL	USG-LF44
Application	RF signal generator
Analog Channel	1
Frequency Range	34.5MHz ~ 4400MHz
Output Range	-50dBm ~ 0dBm
Impedance	50Ω
Modulation	Sine Wave
Display	-
Interface	USB
Power Source	DC 5V
Power Consumption	-
Page	C32-33

GAC-810 provides a convenient solution for low frequency (< 1MHz) signal generation, specifically for audio bandwidth. Intuitive and simple panel interface provides quick frequency and amplitude adjustment, with dial/key shortcuts to different ranges. Square wave generation covers digital application, in addition to the traditional analog using sine wave. Distortion is kept at minimum level, especially at the audible frequency range 0.02% or less distortion factor for 100Hz–20kHz. The external synchronization signal input helps collaborate with other measurement devices.

GAC-810 (1MHz)

CE

FEATURES

- Frequency from 10Hz – 1MHz
- 0.005% Low Sine wave Distortion
- 6 Steps Output Attenuator
- EXT SYNC Function

SINE WAVE CHARACTERISTIC	
Frequency Range	10Hz – 1MHz, 5 Ranges
Frequency Indicator	Dial Scale
Frequency Accuracy	±5% ± 1Hz (at ×1k, ×100)
Output Voltage	5 Vrms (600Ω load)
Frequency Response	10Hz – 1MHz: 0.5dB(at 600Ω load)
	Reference Frequency (1kHz)
Distortion Factor	100Hz – 20kHz: ≦0.02%
	10Hz – 1MHz: ≦0.05%
	(×10 range for 10Hz, ×1k range for 1MHz)
	50Hz – 20kHz: ≦0.3%
	30Hz – 50kHz: ≦0.5%
	10Hz – 1MHz: ≦1.3%
SQUARE WAVE	
Output Voltage	≧10Vpp (no load)
Overshoot	≦2% (at 1kHz, max output)
Rise & Fall Time	< 100ns
Duty Ratio	50±2.5%
EXT SYNCHRONIZATION	
Synchronizing Range	±10 Vrms
Max. Allowable Input	15V (DC + AC peak)
Input Impedance	10kΩ
OUTPUT	
Output Impedance	600Ω
Output Attenuator	0, -10, -20, -30, -40, -50dB
	6 ranges (accuracy: ±1dB at 600Ω load)
POWER SOURCE	
AC 100/110/220/240V ±10%, 50/60Hz	
DIMENSIONS & WEIGHT	
110(W) x 214(H) x 240(D) mm, Approx. 3kg	

ORDERING INFORMATION

GAC-810 1MHz Audio Generator with 0.005% Low Sine Wave Distortion

ACCESSORIES

User Manual x 1, Power cord x 1, Test lead BTL-101 x 1

RF Signal Generator

USG-LF44

The USG-LF44 RF signal generator is a pictorialized and USB interface controllable RF signal generator. It covers the frequency range from 35MHz ~ 4400MHz. The USG-LF44 provides continuous wave (CW) signal outputs without any signal modulation function.

The built in electronic attenuator of the USG-LF44 allows an adjustable power range between -30dBm to 6dBm. The USG-LF44 has several operational modes, including fixed frequency, frequency sweep, frequency hopping, and power sweep.

A USG CONSOLE provides dedicated PC application programs, which were developed under JAVA software structure. This USG PC application program supports operating systems such as Windows 2000/XP/Vista/7/8, Linux & Mac OS X through the USB interface.

Users can download USG APP to smart phone or tablet with Android 4.0 or above. To operate USG, use USB OTG connecting cable to connect tablet (or smart phone) and USG. The Android APP application software for the USG signal generator is available on Google Play Store.

The USG signal generator can be designated as the tracking generator for GSP-730 spectrum analyzer to conduct measurement functions of scalar network analysis. A USG CD-ROM provides PC application programs for the GSP-730 Primary RF software. Users can, using a Windows OS computer, control USG and GSP-730 via the Primary RF software.

FEATURES

- Frequency Range : 34.5MHz ~ 4400MHz
- Output Power Range : -30dBm ~ 0dBm
- Continuous Wave Signal Without any Modulation
- Support Fixed Frequency, Frequency Sweep, Frequency Hopping & Power Sweep Mode
- -107dBc/Hz Phase Noise@100kHz Offset
- Frequency Resolution : 10kHz
- PC USB Interface Powered and Controlled
- External PC Software Support Different Operating System

SPECIFICATIONS
FREQUENCY RANGE
34.5 MHz ~ 4.4 GHz
OUTPUT POWER
-30 dBm ~ 0 dBm, in 1 dB steps
INTERNAL REFERENCE FREQUENCY
25 MHz, aging of 1 ppm at first year
FREQUENCY ACCURACY (0 dBm Output Level)
± 100 Hz at 100MHz
FREQUENCY RESOLUTION
10 kHz
OUTPUT ISOLATION
> 70 dBc, Output Control On/Off
MODE CONTROL
Fixed Frequency / Single Sweep / CW Sweep / Hopping / Power Sweep
STEP DWELL
0.1 ms to 1 ms steps
FREQUENCY OFFSET
50 kHz ~ 30 MHz (10 kHz steps)
OUTPUT FLATNESS (0 dBm Output Level)
1 dBm ~ 3.5 dBm, typical
PHASE NOISE
Carrier Frequency
1 ~ 1.5 GHz
at 10kHz Offset Frequency
< -97 dBc/Hz, typical (-100 dBc/Hz)
at 100kHz Offset Frequency
< -107 dBc/Hz, typical (-110 dBc/Hz)
2ND HARMONICS (0 dB Attenuation)
< -15 dBc, typical
34.5 MHz ~ 2.0 GHz
< -30 dBc, typical
2.0 GHz ~ 3.0 GHz
< -25 dBc, typical
3.0 GHz ~ 4.4 GHz
3rd HARMONICS (0 dB Attenuation)
< -5 dBc, typical
34.5 MHz ~ 2 GHz
< -20 dBc, typical
2.0 GHz ~ 3.0 GHz
< -40 dBc, typical
3.0 GHz ~ 4.4 GHz
SPURIOUS RELATED TO RESOLUTION SETTINGS
< -30 dBc, typical, Resolution = 1MHz
< -45 dBc, typical, Resolution = 10kHz
SPURIOUS RELATED TO THE FUNDAMENTAL OUTPUT
< -40 dBc, typical

ORDERING INFORMATION

USG-LF44	RF Signal Generator

ADP-003

SMA(F) type (female) to SMA (female) Adapter
For USG Series

GTL-103

SMA(M) to SMA(M) RF cable (300mm)
For USG Series

SPECIFICATIONS
SUPPORTED OS
Windows (Linux/Mac/Android)
INTERFACE
USB 2.0
USB CONNECTOR TYPE
Mini-B
SUPPLY VOLTAGE
5V nominal
CURRENT CONSUMPTION
200 mA
RF CONNECTOR TYPE
N type male
IMPEDANCE
50Ω nominal
OUTPUT VSWR
< 1.5 : 1 , Output Level @ -30 dBm
MAXIMUM PERMISSIBLE DC VOLTAGE
±50V
MAXIMUM REVERSE POWER
+30dBm (1W)
ELECTROMAGNETIC COMPATIBILITY
EN 55011 class A, EN 61326 "Industrial environment", EN 61326-2-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-1
DIMENSIONS & WEIGHT
200(W) x 70(H) x 130(D) mm, Approx. 1Kg

USG-LF44 : 35MHz ~ 4400MHz RF Signal Generator

ACCESSORIES
USB cable, CD-ROM with USG software, GSP-730 PrimeRF software and User manual
GTL-253 : USB Cable, USB 2.0, A-mini 5 Type, 1400mm

OPTIONAL ACCESSORIES

ADP-003 : SMA(F) type (female) to SMA (female) Adapter
GTL-103 : SMA(M) to SMA(M) RF cable (300mm)

Test Result of Simultaneous Power Sweep and Frequency Sweep

Easy to Use Graphical Interface with Numeric Setting

USG Android APP

Test Result of Low Pass Filter with PrimeRF Software

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
ADP-003	Adaptor, 50Ω, N(J/F) - SMA(J/F)	UGC-Series
CRA-432	Rack Adapter Kit	AFG-3000 Series
CTL-101	Test Lead, BNC(F/M) to Alligator Test Lead, 1150mm	AFG-Series, SFG-Series, GFC-Series
CTL-110	BNC Cable, BNC(F/M)-BNC(F/M), 1000mm	AFG-Series, SFG-Series, GFC-Series
CTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000mm	AFG-3021/3051, GFG-3015
CTL-246	USB Cable, USB 2.0, A-B Type, 1200mm	MFG-3000 Series, AFC-Series
CTL-248	GPIB Cable, Double Shielded, 2000mm	AFG-3000 Series
CTL-250	GPIB Cable, Double Shielded, 600mm	AFG-3000 Series
CTL-253	USB Cable, USB 2.0, A-mini B Type, 1480mm	UGC-Series
CTL-308	BT Cable, RG316 Assembly, 500mm, SMA(F/M)	UGC-Series

ADP-003

CTL-101

CTL-110

CTL-232

CTL-246

CTL-248

CTL-250

CTL-253

CRA-432 Rack Mount Kit

DC POWER SUPPLIES

Stemming from the design and manufacture demands of electronic industries, GW Instek offers diverse power supply product lines to meet user's demand for a variety of applications. Based on different needs, the product lines can be divided into several categories including DC Power Supply, AC Power Source, DC Electronic Load and Source Measure Unit.

For DC Power Supply, the products can be briefly categorized by the following types, Technic, Programmable or Non-programmable, Single or Multiple Outputs, High Precision or Affordable Price, Dual Range and Wide Combinations of Voltage and Current, which can be selected to meet the application requirements.

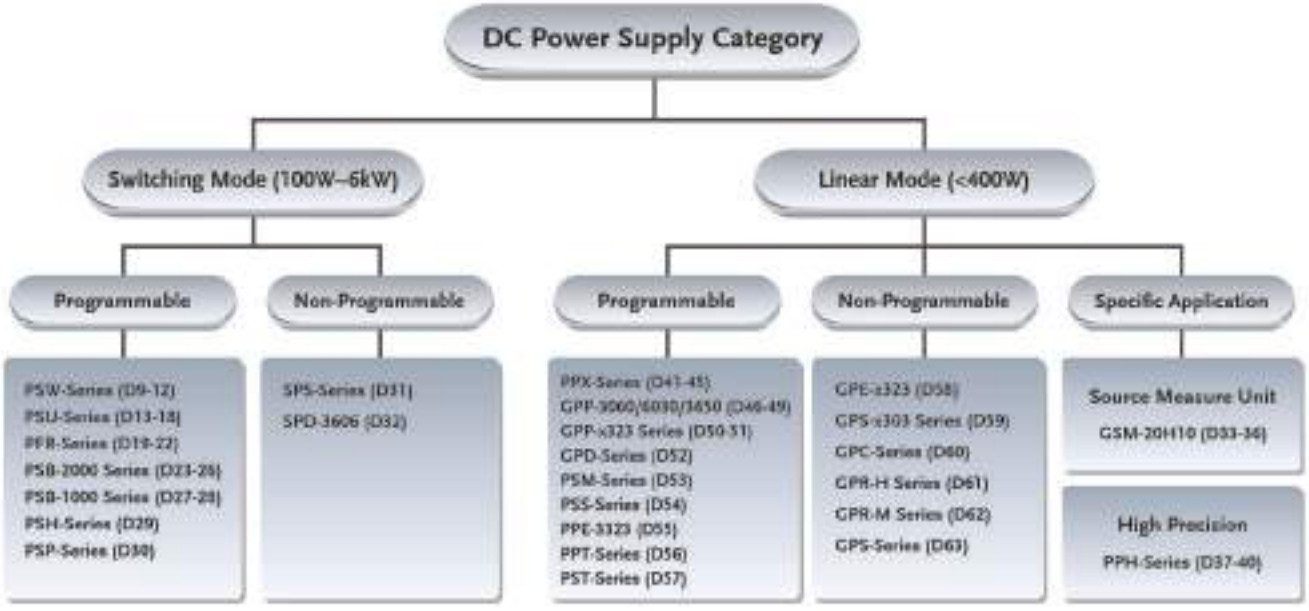
Precision source meter is the latest product offering a four-quadrant power supply, which can accurately utilize voltage or current and measure voltage and/or current at the same time.

GW Instek offers more than 100 power supply products, Which are suitable for the requirements of Electronic Assembly Testing, Education, Component Testing, Wireless Product Testing, Burn-in, Battery-Power Product Testing Automotive, Aerospace industries and so on.

PRODUCTS

- **Programmable & Single Channel DC Power Supply**
- **Non-Programmable & Single Channel DC Power Supply**
- **Programmable & Multiple Channel DC Power Supply**
- **Non-Programmable & Multiple Channel DC Power Supply**
- **Source Measure Unit**

GENERAL SELECTION GUIDE OF POWER SUPPLY BY APPLICATION



Series	Education	R&D/ Research Lab	Production Testing	ATE for Production	Burn-IN	Page
PSW-Series		V	V	V	V	D9-12
PSU-Series		V	V	V	V	D13-18
PFR-Series		V		V		D19-22
PSB-2000 Series		V	V	V	V	D23-26
PSB-1000 Series		V	V	V	V	D27-28
PSH-Series		V	V	V	V	D29
PSP-Series	V	V		V		D30
SPS-Series			V	V	V	D31
SPD-3606	V	V	V		V	D32
GSM-20H10	V	V	V	V		D33-36
PPH-Series		V	V		V	D37-40
PPX-Series		V	V		V	D41-45
GPP-3060/6030/3650		V	V	V	V	D46-49
GPP-x323 Series	V	V	V		V	D50-51
GPD-Series	V	V	V			D52
PSM-Series		V	V		V	D53
PSS-Series		V	V	V		D54
PPE-3323	V	V	V	V		D55
PPT-Series	V	V	V	V		D56
PST-Series	V	V	V	V		D57
GPE-x323	V	V	V			D58
GPS-x303 Series	V	V	V			D59
GPC-Series	V	V	V			D60
GPR-H Series		V	V		V	D61
GPR-M Series		V	V		V	D62
GPS-Series	V	V	V			D63

GENERAL SELECTION GUIDE OF DC POWER SUPPLY BY TECHNIC

Technic	Channel	Programmability	Display	Model Series	Page
Switching	1	Programable	LED	PSW-Series	D9-12
	1		LED	PSU-Series	D13-18
	1		LED	PFR-Series	D19-22
	1		LED	PSB-2400L/PSB-2800L/PSB-2400H/PSB-2800H/PSB-2800LS	D23-26
	1		LCD	PSB-1000 Series	D27-28
	1		LCD	PSH-Series	D29
	1		LCD	PSP-Series	D30
	1	Non-Programable	LED	SPS-Series	D31
	2	Programable	LED	PSB-2400L2	D23-26
	3	Non-Programable	LED	SPD-3606	D32
Linear	1	Programable	LCD	PPH-1503	D37-40
	1		LCD	GSM-20H10	D33-36
	1		LED	GPP-1326	D50-51
	1		LCD	PPX-Series	D41-45
	1		VFD	PSM-Series	D53
	1		LCD	PSS-Series	D54
	1	Non-Programable	LED	GPR-H Series	D61
	1		LED	GPR-M Series	D62
	1		LED	GPS-1830D/GPS-1850D/GPS-3030D/GPS-3030DD	D63
	1		LED	GPE-1326	D58
	2	Programable	LCD	PPH-1503D/PPH-1506D/PPH-1510D	D37-40
	3		LCD	GPP-3060/GPP-6030	D46-49
	2		LCD	GPP-2323	D50-51
	3			GPP-3323	
	4			GPP-4323	
	2		LED	GPD-2303S	D52
	3			GPD-3303S	
	4			GPD-4303S	
	3		LED	PPE-3323	D58
	3		LED	PPT-Series	D56
	3		LED	PST-3201	D57
	3		LED	PST-3202	
	2	Non-Programable	LED	GPE-2323	D58
	3			GPE-3323	
	4			GPE-4323	
	2		LED	GPS-2303	D59
	3			GPS-3303	
	4			GPS-4303	
	3		LED	GPC-Series	D60

GENERAL SELECTION GUIDE OF DC POWER SUPPLY BY CHANNEL

Channel	Programmability	Technic	Display	Model Series	Page
Single Channel	Programable	Switching	LED	PSW-Series	D9-12
			LED	PSU-Series	D13-18
			LED	PFR-Series	D19-22
			LED	PSB-2400L/PSB-2800L/PSB-2400H/PSB-2800H/PSB-2800LS	D23-26
			LCD	PSB-1000 Series	D27-28
			LCD	PSH-Series	D29
			LCD	PSP-Series	D30
		Linear	LCD	PPH-1503	D37-40
			LCD	GSM-20H10	D33-36
			LED	GPP-1326	D41-51
			LCD	PPX-Series	D41-45
			VFD	PSM-Series	D53
			LCD	PSS-Series	D54
	Non-Programable	Switching	LED	SPS-Series	D31
		Linear	LED	GPE-1326	D58
			LED	GPR-H Series	D61
			LED	GPR-M Series	D62
			LED	GPS-1830D/GPS-1850D/GPS-3030D/GPS-3030DD	D63
Multiple Channel	Programable	Switching	LED	PSB-2400L2	D23-26
		Linear	LCD	PPH-1503D/PPH-1506D/PPH-1510D	D37-40
			LCD	GPP-3060/GPP-6030	D46-49
			LED	GPP-2323/GPP-3323/GPP-4323	D50-51
			LED	GPD-Series	D52
			LED	PPE-3323	D55
			LED	PPT-Series	D56
			LED	PST-3201	D57
			LED	PST-3202	D57
	Non-Programable	Switching	LED	SPD-3606	D32
		Linear	LED	GPE-2323/GPE-3323/GPE-4323	D58
			LED	GPS-x303 Series	D59
			LED	GPC-Series	D60

PROGRAMMABLE & SINGLE CHANNEL DC POWER SUPPLY

Voltage(V)	Current(A)	Total Power(W)	Model Name	Display	Technic	Interface	Page
6	200	1200	PSU 6-200	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	D13-18
8	20	200	PSM-2010	VFD	Linear	RS-232, (Opt)GPIB	D53
9	5	45	PPH-1503	LCD	Linear	USBCDC, LAN, GPIB	D37-40
10	5	50	PPX-1005	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D41-45
12.5	120	1500	PSU 12.5-120	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	D13-18
15	3	45	PPH-1503	LCD	Linear	USBCDC, LAN, GPIB	D37-40
15	7	120	PSM-3004	VFD	Linear	RS-232, (Opt)GPIB	D53
20	1	20	GSM-20H10	LCD	Linear	RS-232, USBTMC, LAN, GPIB	D33-36
20	2	40	PPX-2002	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D41-45
20	5	100	PPX-2005	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D41-45
20	5	100	PSS-2005	LCD	Linear	RS-232, (Opt)GPIB	D54
20	10	200	PSP-2010	LCD	Switching	RS-232	D30
20	10	200	PSM-2010	VFD	Linear	RS-232, (Opt)GPIB	D53
20	18	360	PSH-2018A	LCD	Switching	RS-232, (Opt)GPIB	D29
20	76	1520	PSU 20-76	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	D13-18
30	4	120	PSM-3004	VFD	Linear	RS-232, (Opt)GPIB	D53
30	6	200	PSM-6003	VFD	Linear	RS-232, (Opt)GPIB	D53
30	36	360	PSW 30-36	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB	D9-12
30	72	720	PSW 30-72	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB	D9-12
30	108	1080	PSW 30-108	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB	D9-12
32	3	96	PSS-3203	LCD	Linear	RS-232, (Opt)GPIB	D54
32	6	192	GPP-1326	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	D50-51
36	1	36	PPX-3601	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D41-45
36	3	108	PPX-3603	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D41-45
36	10	360	PSH-3610A	LCD	Switching	RS-232, (Opt)GPIB	D29
36	20	720	PSH-3620A	LCD	Switching	RS-232, (Opt)GPIB	D29
36	30	1080	PSH-3630A	LCD	Switching	RS-232, (Opt)GPIB	D29
40	5	200	PSP-405	LCD	Switching	RS-232	D30
40	38	1520	PSU 40-38	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	D13-18
40	40	400	PSB-1400L	LCD	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D27-28
40	80	800	PSB-1800L	LCD	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D27-28
50	10	100	PFR-100L	LED	Switching	RS-232, RS-485, USB, (Opt)LAN, GPIB	D19-22
60	3.3	200	PSM-6003	VFD	Linear	RS-232, (Opt)GPIB	D53
60	3.5	200	PSP-603	LCD	Switching	RS-232	D30
60	25	1500	PSU 60-25	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	D13-18
80	13.5	360	PSW 80-13.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
80	27	720	PSW 80-27	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
80	40	400	PSB-2400L	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D23-26
80	40.5	1080	PSW 80-40.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
80	80	800	PSB-2800L	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D23-26
80	80	800	PSB-2800LS	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D23-26
100	1	100	PPX-10H01	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D41-45
100	15	1500	PSU 100-15	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	D13-18
150	10	1500	PSU 150-10	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	D13-18

DC POWER SUPPLIES

Voltage(V)	Current(A)	Total Power(W)	Model Name	Display	Technic	Interface	Page
160	7.2	360	PSW 160-7.2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
160	10	400	PSB-1400M	LCD	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D27-28
160	14.4	720	PSW 160-14.4	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
160	20	800	PSB-1800M	LCD	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D27-28
160	21.6	1080	PSW 160-21.6	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
200	0.1	20	GSM-20H10	LCD	Linear	RS-232, USBTMC, LAN, GPIB	D35-36
250	4.5	360	PSW 250-4.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
250	9	720	PSW 250-9	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
250	13.5	1080	PSW 250-13.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
300	5	1500	PSU 300-5	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	D13-18
400	3.8	1520	PSU 400-3.8	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	D13-18
600	2.6	1560	PSU 600-2.6	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	D13-18
800	1.44	360	PSW 800-1.44	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
800	2.88	720	PSW 800-2.88	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
800	3	400	PSB-2400H	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D23-26
800	4.32	1080	PSW 800-4.32	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D9-12
800	6	800	PSB-2800H	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D23-26

PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

Voltage(V)		Current(A)	Power per. CH	Total Power(W)	Model Name	Channel	Display	Technic	Interface	Page
CH1	15	3	45	63	PPH-1503D	2	LCD	Linear	USBTMC, LAN, GPIB	D37-40
	9	5	45							
CH2	12	1.5	18							
CH1	15	3	45	81	PPH-1506D	2	LCD	Linear	USBTMC, LAN, GPIB	D37-40
	9	5	45							
CH2	12	3	36							
CH1	15	3	45	81	PPH-1510D	2	LCD	Linear	USBTMC, LAN, GPIB	D37-40
	9	5	45							
	4.5	10	45							
CH2	12	3	36							
CH1	18	3	54	138	PPT-1830	3	LED	Linear	GPIB	D56
CH2	18	3	54							
CH3	6	5	30							
CH1	30	6	180	385	GPP-3060	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	D46-49
CH2	30	6	180							
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	30	3	90	180	GPD-2303S	2	LED	Linear	USBCDC	D52
CH2	30	3	90							
CH1	30	3	90	195	GPD-3303S	3	LED	Linear	USBCDC	D52
CH2	30	3	90							
CH3	2.5/3.3/5.0	3	15							
CH1	30	3	90	195	GPD-4303S	4	LED	Linear	USBCDC	D52
CH2	30	3	90							
CH3	5	3	15							
CH4	5	1	5							
CH1	30	3	90	195	GPD-3303D	3	LED	Linear	USBCDC	D52
CH2	30	3	90							
CH3	2.5/3.3/5.0	3	15							
CH1	32	3	96	192	GPP-2323	2	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	D50-51
CH2	32	3	96							
CH1	32	3	96	217	GPP-3323	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	D50-51
CH2	32	3	96							
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	32	3	96	212	GPP-4323	4	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	D50-51
CH2	32	3	96							
CH3	5	1	5							
CH4	15	1	15							
CH1	32	3	96	207	PPE-3323	3	LED	Linear	RS-232	D55
CH2	-32	3	96							
CH3	3.3 / 5	3	15							
CH1	36	1.5	54	126	PPT-3615	3	LED	Linear	GPIB	D56
CH2	36	1.5	54							
CH3	6	3	18							
CH1	32	2	64	158	PST-3202	3	LCD	Linear	RS-232,(Opt)GPIB	D57
CH2	32	2	64							
CH3	6	5	30							
CH1	32	1	32	96	PST-3201	3	LCD	Linear	RS-232,(Opt)GPIB	D57
CH2	32	1	32							
CH3	32	1	32							
CH1	60	3	180	385	GPP-6030	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	D46-49
CH2	60	3	180							
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	80	40	400	800	PSB-2400L2	2	LED	Switching	RS-232, USB, Analog Control, (Opt)GPIB	D23-26
CH2	80	40	400							

NON-PROGRAMMABLE & SINGLE CHANNEL DC POWER SUPPLY

Voltage(V)	Current(A)	Total Power(W)	Model Name	Display	Option	Remark	Page
8	30	240	GPR-8030HD	LED	Linear	Rear Panel Output	061
12	30	360	SPS-1230	LED	Switching	Rear Panel Output	061
18	3	54	GPR-1830D	LED	Linear	Rear Panel Output	060
18	5	90	GPR-1850D	LED	Linear		060
18	10	180	GPR-1810HD	LED	Linear	Rear Panel Output	062
18	20	360	SPS-1820	LED	Switching	Rear Panel Output	061
18	20	360	GPR-1820HD	LED	Linear	Rear Panel Output	061
24	15	360	SPS-2415	LED	Switching		061
30	3	90	GPR-3030D	LED	Linear	Rear Panel Output	060
30	5	90	GPR-3050DD	LED	Linear		060
30	6	180	GPR-3060D	LED	Linear	Rear Panel Output	062
32	5	155	GPR-1326	LED	Linear	Rear Panel Output	058
35	10	350	GPR-3510HD	LED	Linear	Rear Panel Output	061
36	10	360	SPS-3610	LED	Switching	Rear Panel Output	061
60	3	180	GPR-6030D	LED	Linear	Rear Panel Output	062
60	6	360	SPS-606	LED	Switching	Rear Panel Output	061
60	6	360	GPR-6060D	LED	Linear	Rear Panel Output	061
75	5	375	GPR-7550D	LED	Linear	Rear Panel Output	061
110	3	330	GPR-11H10D	LED	Linear	Rear Panel Output	061
300	1	300	GPR-30H10D	LED	Linear	Rear Panel Output	061

NON-PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

Voltage(V)	Current(A)	Power per CH	Total Power(W)	Model Name	Channel	Display	Option	Page
CH1	30	6	180	375	SPD-3606	3	LED	Switching	032
CH2	30	6	180						
CH3	5	1	15						
CH1	30	3	96	192	GPE-3323	2	LED	Linear	056
CH2	30	3	96						
CH1	30	3	96	217	GPE-3323	3	LED	Linear	056
CH2	30	3	96						
CH3	1.4/2.5/3.3/5.0	1	25						
CH1	30	3	96	272	GPE-4323	4	LED	Linear	056
CH2	30	3	96						
CH3	5	1	5						
CH4	15	1	15						
CH1	30	3	90	180	GPS-2303	2	LED	Linear	059
CH2	30	3	90						
CH1	30	3	90	195	GPS-3303	3	LED	Linear	059
CH2	30	3	90						
CH3	5	3	15						
CH1	30	3	90	280	GPS-4303	4	LED	Linear	059
CH2	30	3	90						
CH3	2.3 ~ 5.3	1	5.3						
CH4	5 ~ 15	1	15						
CH1	30	6	180	375	GPC-3060D	3	LED	Linear	060
CH2	30	6	180						
CH3	5	3	15						
CH1	60	3	180	375	GPC-6030D	3	LED	Linear	060
CH2	60	3	180						
CH3	5	3	15						

Programmable Switching D.C. Power Supply (Multi-Range D.C. Power Supply)

PSW-Series

CE | GPIB | USB | LabVIEW Driver | Analog Control | LAN

FEATURES

- Voltage Rating : 30V/40V/80V/160V/250V/800V, Output Power Rating : 360W~1080W
- Multi-range Voltage & Current Combinations in One Power Supply
- C.V/C.C Priority ; Particularly Suitable for the Battery and LED Industry
- Adjustable Slew Rate
- Series Operation(2 units in Series)for(30V/40V /80V/160V), Parallel Operation(3 units in Parallel) for (30V/40V/80V/160V/250V/800V)
- High Efficiency and High Power Density
- 1/2, 1/3, 1/6 Rack Mount Size Design (EIA/JIS Standard) for 360W, 720W, 1080W
- Standard Interface : LAN, USB, Analog Control Interface
- Optional Interface : GPIB-USB Adaptor, RS232-USB Cable
- LabVIEW Driver

PSW 80-40.5 (0~80V, 0~40.5A, 1080W)

PSW 80-27 (0~80V, 0~27A, 720W)

PSW 80-13.5 (0~80V, 0~13.5A, 360W)

The PSW-Series is a single-output multi-range programmable switching DC Power Supply covering a power range up to 1080W. This series of products include eighteen models with the combination of 30V, 40V, 80V, 160V, 250V and 800V rated voltages and 360W, 720W and 1080W maximum output powers. The multi-range feature allows the flexible and efficient configuration of voltage and current within the rated power range. As the PSW-Series can be connected in series for maximum 2 units or in parallel for maximum 3 units, the capability of connecting multiple PSW-Series units for higher voltage or higher current output provides a broad coverage of applications. With the flexibility of multi-range power utilization and series/parallel connection, the PSW-Series significantly reduces the users' cost for various power supply products to accommodate the projects with different power requirements.

The C.V/C.C priority selection of the PSW-Series is a very useful feature for DUT protection. The conventional power supply normally operates under C.V mode when the power output is turned on. This could bring a high inrush current to the capacitive load or current-intensive load at the power output-on stage. Taking the I-V curve verification of LED as an example, it becomes a very challenging task to perform this measurement using a conventional power supply. With LED connected to a power supply under C.V mode as the initial setting, when the power output is turned on and the voltage rises to the LED forward voltage, the current will suddenly peak up and exceed the preset value of current limit. Upon detecting this high current, the power supply starts the transition from C.V mode to C.C mode. Though the current becomes stable after the C.C mode being activated, the current spike occurred at the C.V and C.C crossover point may possibly damage the DUT. At the power output-on stage, the PSW-Series is able to operate under C.C priority to limit the current spike occurred at the threshold voltage and therefore protects DUT from the inrush current damage.

The adjustable slew rate of the PSW-Series allows users to set for either output voltage or output current, a specific rise time from low to high level transition, and a specific fall time from high to low level transition. This facilitates the characteristic verification of a DUT during voltage or current level changes with controllable slew rates. Most manufacturing tests of lighting device or large capacitor during power output-on are associated with the occurrence of high surge current, which can greatly reduce the life time of the DUT. To prevent inrush current from damaging current-intensive devices, a smooth and slow voltage transition during power On-Off can significantly reduce the spike current and protect the device from high current damage.

The OVP and OCP are provided with the PSW-Series. Both OVP and OCP levels can be selected, with default level set at 110%, of the rated voltage/current of the power supply. When any of the protection levels is tripped, the power output will be switched off to protect the DUT. The PSW-Series provides USB Host/Device and LAN interfaces as standard, GPIB-USB adapter and RS232-USB cable as optional. The LabView driver and the Data Logging PC software are supported on all the available interfaces. An analog control/monitoring connector is also available on the rear panel for external control of power On/Off and external monitoring of power output Voltage and Current.

PARALLEL OPERATION (3 UNITS)

MODEL	SINGLE UNIT	2 UNITS	3 UNITS
PSW 30-36	30V/36A	30V/72A	30V/108A
PSW 30-72	30V/72A	30V/144A	30V/216A
PSW 30-108	30V/108A	30V/216A	30V/324A
PSW 40-27	40V/27A	40V/54A	40V/81A
PSW 40-54	40V/54A	40V/108A	40V/162A
PSW 40-81	40V/81A	40V/162A	40V/243A
PSW 80-13.5	80V/13.5A	80V/27A	80V/40.5A
PSW 80-27	80V/27A	80V/54A	80V/81A
PSW 80-40.5	80V/40.5A	80V/81A	80V/121.5A
PSW 160-7.2	160V/7.2A	160V/14.4A	160V/21.6A
PSW 160-14.4	160V/14.4A	160V/28.8A	160V/43.2A
PSW 160-21.6	160V/21.6A	160V/43.2A	160V/64.8A
PSW 250-4.5	250V/4.5A	250V/9A	250V/13.5A
PSW 250-9	250V/9A	250V/18A	250V/27A
PSW 250-13.5	250V/13.5A	250V/27A	250V/40.5A
PSW 800-1.44	800V/1.44A	800V/2.88A	800V/4.32A
PSW 800-2.88	800V/2.88A	800V/5.76A	800V/8.64A
PSW 800-4.32	800V/4.32A	800V/8.64A	800V/12.96A

SERIES OPERATION (2 UNITS)

MODEL	SINGLE UNIT	2 UNITS
PSW 30-36	30V/36A	60V/36A
PSW 30-72	30V/72A	60V/72A
PSW 30-108	30V/108A	60V/108A
PSW 40-27	40V/27A	80V/27A
PSW 40-54	40V/54A	80V/54A
PSW 40-81	40V/81A	80V/81A
PSW 80-13.5	80V/13.5A	160V/13.5A
PSW 80-27	80V/27A	160V/27A
PSW 80-40.5	80V/40.5A	160V/40.5A
PSW 160-7.2	160V/7.2A	320V/7.2A
PSW 160-14.4	160V/14.4A	320V/14.4A
PSW 160-21.6	160V/21.6A	320V/21.6A
PSW 250-4.5	N/A	N/A
PSW 250-9	N/A	N/A
PSW 250-13.5	N/A	N/A
PSW 800-1.44	N/A	N/A
PSW 800-2.88	N/A	N/A
PSW 800-4.32	N/A	N/A

SPECIFICATIONS

	PSW 30-36	PSW 30-72	PSW 30-108	PSW 40-27	PSW 40-54	PSW 40-81	PSW 80-13.5	PSW 160-27	PSW 80-40.5
OUTPUT RATING									
Voltage	0 ~ 30V	0 ~ 30V	0 ~ 30V	0 ~ 40V	0 ~ 40V	0 ~ 40V	0 ~ 80V	0 ~ 80V	0 ~ 80V
Current	0 ~ 36A	0 ~ 72A	0 ~ 108A	0 ~ 27A	0 ~ 54A	0 ~ 81A	0 ~ 13.5A	0 ~ 27A	0 ~ 40.5A
Power	540W	1080W	1620W	360W	720W	1080W	1080W	2160W	1620W
REGULATION(CV)									
Load	20mV	20mV	20mV	20mV	20mV	20mV	40mV	40mV	40mV
Line	10mV	10mV	10mV	20mV	20mV	20mV	40mV	40mV	40mV
REGULATION(CC)									
Load	90mA	270mA	270mA	50mA	50mA	80mA	110.5mA	220mA	40.5mA
Line	90mA	270mA	270mA	50mA	50mA	80mA	110.5mA	220mA	40.5mA
RIPPLE & NOISE (Period: 5mS~20MHz) (Typical: Bandwidth=1MHz)									
CV p-p	60mV	80mV	100mV	60mV	80mV	100mV	60mV	80mV	100mV
CV rms	2mV	10mV	10mV	2mV	10mV	14mV	2mV	10mV	14mV
CC rms	25mA	144mA	216mA	54mA	108mA	162mA	27mA	54mA	81mA
PROGRAMMING ACCURACY									
Voltage	0.1% x 30mV	0.1% x 30mV	0.1% x 30mV	0.1%x15mV	0.1%x30mV	0.1%x30mV	0.1% x 80mV	0.1% x 80mV	0.1% x 80mV
Current	0.1% x 36mA	0.1% x 90mA	0.1% x 135mA	0.1%x28mA	0.1%x80mA	0.1%x88mA	0.1% x 90mA	0.1% x 36mA	0.1% x 40mA
MEASUREMENT ACCURACY									
Voltage	0.1% x 30mV	0.1% x 30mV	0.1% x 30mV	0.1%x15mV	0.1%x30mV	0.1%x30mV	0.1% x 80mV	0.1% x 80mV	0.1% x 80mV
Current	0.1% x 36mA	0.1% x90mA	0.1% x 135mA	0.1%x28mA	0.1%x80mA	0.1%x88mA	0.1% x 90mA	0.1% x 36mA	0.1% x40mA
RESPONSE TIME									
Rise Time	30ms	30ms	30ms	50ms	50ms	50ms	30ms	30ms	50ms
fall Time(Full Load)	30ms	30ms	30ms	50ms	50ms	50ms	50ms	50ms	50ms
fall Time(No Load)	500ms	500ms	500ms	500ms	500ms	500ms	500ms	500ms	500ms
Load Transient Recover Time (Load change from 10~90%)	1ms	1ms	1ms	1ms	1ms	1ms	1ms	1ms	1ms
PROGRAMMING RESOLUTION (By PC Remote Control Mode)									
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	2mV	2mV	2mV
Current	1mA	2mA	3mA	1mA	2mA	3mA	1mA	2mA	3mA
MEASUREMENT RESOLUTION (By PC Remote Control Mode)									
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	2mV	2mV	2mV
Current	1mA	2mA	3mA	1mA	2mA	3mA	1mA	2mA	3mA
SERIES AND PARALLEL CAPABILITY									
Parallel Operation	Up to 3 units including the master unit								
Series Operation	Up to 2 units including the master unit								
PROTECTION FUNCTION									
OVP	5~33V	5~33V	5~33V	4~44V	4~44V	4~44V	8~88V	8~88V	8~88V
OCP	5.5~38.6A	5~75.2A	5~115.6A	2.7~29.7A	5~58.4A	5~88.1A	1.35~14.85A	2.7~29.7A	4.05~44.55A
OHP	Activated by executed internal temperature								
FRONT PANEL DISPLAY ACCURACY, 4 digits									
Voltage	0.1%x30mV	0.1%x30mV	0.1%x30mV	0.1%x28mV	0.1%x30mV	0.1%x30mV	0.1%x80mV	0.1%x80mV	0.1%x80mV
Current	0.1%x40mA	0.1%x70mA	0.1%x100mA	0.1%x30mA	0.1%x60mA	0.1%x88mA	0.1%x90mA	0.1%x40mA	0.1%x50mA
ENVIRONMENT CONDITION									
Operation Temp	0℃ ~ 50℃								
Storage Temp	-20℃ ~ 70℃								
Operating Humidity	20% ~ 85% RH, No condensation								
Storage Humidity	90% RH or Less, No condensation								
READ BACK TEMP COEFFICIENT									
Voltage	100ppm/℃ of rated output voltage : after a 30 minute warm-up								
Current	200ppm/℃ of rated output current : after a 30 minute warm-up								
DETAILS									
Analog Control	Yes								
Interface	USB(1.1/2.0)/RS-232(Option)/RS232+USB(Option)								
Fan	With thermal sensing control								
POWER SOURCE	85VAC~265VAC, 47~63Hz, single phase								
DIMENSIONS & WEIGHT	71.5(W)x124.5(H) x230.5(D) mm , Approx. 2kg	143.5(W)x124.5(H) x230.5(D) mm , Approx. 3.3kg	214.5(W)x124.5(H) x230.5(D) mm , Approx. 7.3kg	71.5(W)x124.5(H) x230.5(D) mm , Approx. 2kg	143.5(W)x124.5(H) x230.5(D) mm , Approx. 3.3kg	214.5(W)x124.5(H) x230.5(D) mm , Approx. 7.3kg	71.5(W)x124.5(H) x230.5(D) mm , Approx. 2kg	143.5(W)x124.5(H) x230.5(D) mm , Approx. 3.3kg	214.5(W)x124.5(H) x230.5(D) mm , Approx. 7.3kg

PSW-001 PSW-002 PSW-003 PSW-004 PSW-005 PSW-006 PSW-007

Programmable Switching D.C. Power Supply (Multi-Range D.C. Power Supply)

SPECIFICATIONS

	PSW 160.7.2	PSW 160.14.4	PSW 160.21.6	PSW 250.4.5	PSW 250.9	PSW 350.13.5	PSW 800.1.44	PSW 800.3.88	PSW 800.4.32
OUTPUT RATING									
Voltage	0 ~ 160V	0 ~ 160V	0 ~ 160V	0 ~ 250V	0 ~ 250V	0 ~ 350V	0 ~ 800V	0 ~ 800V	0 ~ 800V
Current	0 ~ 7.2A	0 ~ 14.4A	0 ~ 21.6A	0 ~ 4.5A	0 ~ 9A	0 ~ 13.5A	0 ~ 1.44A	0 ~ 3.84A	0 ~ 4.32A
Power	1440W	2304W	3456W	1125W	2250W	4725W	1440W	3072W	3456W
REGULATION (CV)									
Load	65mV	65mV	65mV	125mV	125mV	130mV	465mV	465mV	465mV
Line	65mV	65mV	65mV	125mV	125mV	130mV	465mV	465mV	465mV
REGULATION (CC)									
Load	12.2mA	19.4mA	26.6mA	9.1mA	13mA	18.5mA	6.56mA	7.68mA	9.12mA
Line	12.2mA	19.4mA	26.6mA	9.1mA	14mA	18.5mA	6.56mA	7.68mA	9.12mA
RIPPLE & NOISE (Noise Bandwidth: 20MHz; Ripple Bandwidth: 1MHz)									
CV p-p	600mV	800mV	1000mV	600mV	600mV	1200mV	1400mV	2000mV	3000mV
CV rms	12mV	70mV	80mV	150mV	150mV	250mV	50mV	80mV	80mV
CC rms	15mA	30mA	45mA	18mA	30mA	60mA	5mA	10mA	18mA
PROGRAMMING ACCURACY									
Voltage	0.1% +150mV	0.1% +300mV	0.1% +300mV	0.1%+200mV	0.1%+200mV	0.1%+200mV	0.1%+800mV	0.1%+800mV	0.1%+800mV
Current	0.1% + 5mA	0.1% +15mA	0.1% +20mA	0.1%+5mA	0.1%+10mA	0.1%+15mA	0.1%+3mA	0.1%+6mA	0.1%+8mA
MEASUREMENT ACCURACY									
Voltage	0.1% +150mV	0.1% +300mV	0.1% +300mV	0.1%+200mV	0.1%+200mV	0.1%+200mV	0.1%+800mV	0.1%+800mV	0.1%+800mV
Current	0.1% +5mA	0.1% +15mA	0.1% +20mA	0.1%+5mA	0.1%+10mA	0.1%+15mA	0.1%+3mA	0.1%+6mA	0.1%+8mA
RESPONSE TIME									
Rise Time	100ms	100ms	100ms	100ms	100ms	100ms	140ms	130ms	130ms
Fall Time(Full Load)	100ms	160ms	160ms	150ms	150ms	150ms	300ms	300ms	300ms
Fall Time(No Load)	1000ms	1900ms	1900ms	1200ms	1200ms	1200ms	2000ms	2000ms	2000ms
Load Settled Time(to 1%)	2ms	2ms	2ms	2ms	4ms	2ms	2ms	2ms	2ms
PROGRAMMING RESOLUTION (By PC Remote Control Mode)									
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV
Current	1mA	1mA	1mA	1mA	1mA	1mA	1mA	1mA	1mA
MEASUREMENT RESOLUTION (By PC Remote Control Mode)									
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV
Current	1mA	1mA	1mA	1mA	1mA	1mA	1mA	1mA	1mA
SERIES AND PARALLEL CAPABILITY									
Parallel Operation	Up to 5 units including thermostat unit			5	5	5	5	5	5
Series Operation	Up to 2 units including the master unit			N/A	N/A	N/A	N/A	N/A	N/A
PROTECTION FUNCTION									
OVP	16~176V	16~176V	16~176V	28~275V	28~275V	28~385V	28~880V	28~880V	28~880V
OCP	0.72~7.92A	1.44~15.84A	2.16~23.76A	0.45~4.95A	0.9~9.9A	1.35~14.85A	0.144~1.584A	0.384~3.168A	0.432~4.752
OHP	Activated by detected internal temperature.								
FRONT PANEL DISPLAY ACCURACY, 4 digits									
Voltage	0.1%± 100mV	0.1%±100mV	0.1%±100mV	0.1%±100mV	0.1%±100mV	0.1%±200mV	0.1%±400mV	0.1%±400mV	0.1%±400mV
Current	0.1%±5mA	0.1%±20mA	0.1%±20mA	0.1%±5mA	0.1%±10mA	0.1%±20mA	0.1%±2mA	0.1%±4mA	0.1%±6mA
ENVIRONMENT CONDITION									
Operation Temp	0℃ ~ 40℃								
Storage Temp	-20℃ ~ 70℃								
Operating Humidity	20% ~ 80% RH, No condensation								
Storage Humidity	90% RH or Less, No condensation								
READ BACK TEMPERATURE COEFFICIENT									
Voltage	300ppm/℃ of rated output voltage, after a 30 minute warm-up								
Current	500ppm/℃ of rated output current, after a 30 minute warm-up								
OTHER									
Analog Control	Yes								
Interface	USB,LAN/GPIB,USB(Option),RS232,USB(Option)								
Fan	With thermal sensing control								
POWER SOURCE	85 VAC~265VAC, 47~63Hz, single phase								
DIMENSIONS & WEIGHT	212(W)x124(H) x330(D) mm ; Approx. 3kg	212(W)x124(H) x330(D) mm ; Approx. 3.5kg	212(W)x124(H) x330(D) mm ; Approx. 3.8kg	212(W)x124(H) x330(D) mm ; Approx. 3kg	212(W)x124(H) x330(D) mm ; Approx. 3.5kg	212(W)x124(H) x330(D) mm ; Approx. 3.8kg	212(W)x124(H) x330(D) mm ; Approx. 3.5kg	212(W)x124(H) x330(D) mm ; Approx. 3.8kg	212(W)x124(H) x330(D) mm ; Approx. 3.8kg

PSW-808 PSW-809 PSW-810 PSW-811 PSW-813

PSW-Series

ORDERING INFORMATION

PSW 30-36	(0-30V/0-36A/360W) Multi-Range DC Power Supply
PSW 30-72	(0-30V/0-72A/720W) Multi-Range DC Power Supply
PSW 30-108	(0-30V/0-108A/1080W) Multi-Range DC Power Supply
PSW 40-27	**(0-40V/0-27A/360W) Multi-Range DC Power Supply**
PSW 40-54	**(0-40V/0-54A/720W) Multi-Range DC Power Supply**
PSW 40-81	**(0-40V/0-81A/1080W) Multi-Range DC Power Supply**
PSW 80-13.5	(0-80V/0-13.5A/360W) Multi-Range DC Power Supply
PSW 80-27	(0-80V/0-27A/720W) Multi-Range DC Power Supply
PSW 80-40.5	(0-80V/0-40.5A/1080W) Multi-Range DC Power Supply
PSW 160-7.2	(0-160V/0-7.2A/360W) Multi-Range DC Power Supply
PSW 160-14.4	(0-160V/0-14.4A/720W) Multi-Range DC Power Supply
PSW 160-21.6	(0-160V/0-21.6A/1080W) Multi-Range DC Power Supply
PSW 250-4.5	(0-250V/0-4.5A/360W) Multi-Range DC Power Supply
PSW 250-9	(0-250V/0-9A/720W) Multi-Range DC Power Supply
PSW 250-13.5	(0-250V/0-13.5A/1080W) Multi-Range DC Power Supply
PSW 500-1.44	(0-500V/0-1.44A/360W) Multi-Range DC Power Supply
PSW 500-2.88	(0-500V/0-2.88A/720W) Multi-Range DC Power Supply
PSW 500-4.32	(0-500V/0-4.32A/1080W) Multi-Range DC Power Supply

ACCESSORIES :
CD-ROM x 1(Programming Manual, User Manual), GTL-123 Test Lead x 1(for PSW 160/40V/80V/160V), Power Cords 1 (Region dependent), GTL-240 (USB Cable * 1, Type 1, PSW-804 Basic Accessories Kit x 1 (for PSW 30/40V/80V/160V, includes: M4 terminal screws and washers x 2, Air Filter x 1, Analog control protection dummy x 1, Analog control cockpeat x 1, M5 terminal bolts, nuts and washers x 2

PSW-008	Basic Accessories Kit for PSW 250/360V models
PSW-009	Output Terminal Cover for 80V/40V/80V/160V models
PSW-011	Output Terminal Cover for 250V/500V models
PSW-012	High Voltage Output Terminal for 250V/500V model

OPTIONAL ACCESSORIES

PSW-001 Accessory Kit	PSW-015 Logic Wire (Type II) (1)
PSW-002 Simple CAC Test	GTL-240 CAN Cable, Double Shielded, 2000mm
PSW-003 Contact Resistant Test	GTL-250 CAN Cable, Double Shielded, 600mm
PSW-005 Cable for 2 units of PSW Series in Series Mode Connection (for PSW 30V/40V/80V/160V)	GUI-001A USB to RS-232 Cable, 300mm(1ft)
	GUI-001B RS-232 to USB Adapter with #4-40 UNC Thumbs
PSW-006 Cable for 2 Units of PSW Series in Parallel Mode Connection	GUC-001 CAN to USB Adapter
PSW-007 Cable for 3 Units of PSW Series in Parallel Mode Connection	GRK-410 J Rack Mount Kit (J)
	GRK-410 E Rack Mount Kit (E)

GET-001 Extended Terminal with max. 30A (for PSW 30V/40V/80V/160V)
GET-002 Extended Terminal with max. 16A (for PSW 250V/500V)
GET-005 Extended European Terminal with max. 30A (for PSW 30V/40V/80V/160V)
GTL-130 Test lead - 3 x red, 3 x black (for PSW 250V/500V)

PSW-Series (LV) Rear Panel

PSW-Series (HV) Rear Panel

GRA-410 (J) Rack Mount Kit (EIA)
For PSW Series

GTL-130 Test lead, 1000mm, 16AWG, UL 3239
(for PSW 250V/500V)

GUI-001A USB to RS-232 Cable
(for PSW Series, 300mm)

GUC-001 CAN to USB Adapter (for CCS-050Series, PSW Series)

GET-001 Extended Terminal (for PSW 30V/40V/80V/160V)

GET-002 Extended Terminal (for PSW 250V/500V)

GET-005 Extended European Terminal (for PSW 30V/40V/80V/160V)

PSU-Series

CE | USB | GPIB | RS232 | RS485 | LAN | Analog Control | Analog Control

FEATURES

- Voltage Output : 6V,8V,12.5V,15V,(19V,30V,40V) 50V,60V,80V,(100V,150V,300V)+80V,(60V
- Power Output : 1200W ~ 1560W
- C.V./C.C Priority Mode
- Adjustable Voltage/Current Rise and Fall Time
- Series/Parallel Connection : Max. 2 units (Models Under 300W),4 units of The Same Model
- High Efficiency and High Power Density
- 1U Height and 19"Rack Mount Size
- Three sets of Preset Function
- Bleeder Control Function
- Internal Resistance Function
- Panel Lock Function
- Protection : OVP, OCP, OHP, UVL, AC fail, FAN Fail
- Standard : USB, LAN, RS 232, RS 485, Analog Control
- Option : GPIB, Isolated Analog Interface (Voltage Control/Current Control)

1U Handle & Bracket

GW Instek PSU Series, a DC power supply with high power density design, in 1U in height and compact like with 19" Rack Mount Case. The series is suitable for test system installation or system integration by flexibly selecting models for the integration into the existing test system. The PSU-Series, featuring superior voltage and current control functions, comprises fifteen models with output voltage/current ranging from 6V/208A to 300V/2.6A. The Series is suitable for different test conditions and DUTs, including electronic components testing, micro resistors, relays, shunt resistors, 12V/24V/48V battery simulation, and automotive electronic device testing.

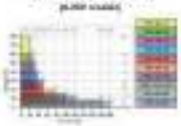
The PSU-Series is ideal for the primary input of DC/DC converter and servomotor production application. PSU is often integrated into component test systems such as aging test equipment for capacitors; 600V DC bias applications; aging test equipment for diodes; semiconductor production equipment; automotive electronics; and ECU for V8 engine or V12 engine, etc.

Utilizing same model units of the PSU-Series to conduct series and parallel connections can increase total output power, total current or total voltage. The wide voltage and current output ranges of the PSU-Series can fully satisfy various voltage and current measurement requirements. The PSU-Series is a single power output DC programmable power supply, which outputs 1200W to 1560W. The PSU-Series provides maximum 2 units in series connection (models under 300V) to achieve maximum 600V or 4 units in parallel connection to obtain maximum 880A and the maximum output power of 6.24 kilowatts.

The PSU-Series allows settings for CC priority or CV priority. Under CC or CV mode, users can adjust slew rate for output voltage or current based upon test requirements. There are two kinds of slew rate settings: high speed priority and slew rate priority. High speed priority sets slew rate at the maximum speed to result CC or CV mode. Slew rate priority allows users to set slew rate for CC or CV mode in order to control rise or fall slew rate. Slew rate priority mode is ideal for motor tests by adjusting the rise time of output voltage to protect DUT from being damaged by inrush current occurred at turn-on.

Comparing with other 1U power supplies available in the market, PSU supports a most complete array of interfaces, including USB, LAN, RS 232, RS 485, analog control interface, GPIB (option), isolated analog interface (voltage control), and isolated analog interface (current control). Via the multi-drop mode, PSU will not need any switch/hub and GPIB cable for remote control and slave unit augmentation when using LAN, USB or GPIB. This feature can help users save costs on augmentation equipment for connecting Users-wide using LAN or USB.

The PSU-Series provides users with flexible settings of High/Low Level or Trigger input/Trigger output signals with pulse width of 1 ~ 48ms. Trigger input controls PSU to output or upload preset voltage, current and memory parameters. While outputting or uploading preset voltage, current and memory parameters PSU can produce corresponding Trigger output signals.



PSU-6-208	6	208	1200W
PSU-8-156	8	156	1200W
PSU-12.5-96	12.5	96	1200W
PSU-15-80	15	80	1200W
PSU-19-80	19	80	1520W
PSU-30-52	30	52	1560W
PSU-40-39	40	39	1560W
PSU-50-31	50	31	1550W
PSU-60-26	60	26	1560W
PSU-80-20	80	20	1600W
PSU-100-15	100	15	1500W
PSU-150-10	150	10	1500W
PSU-300-5	300	5	1500W
PSU-80+80-20	80+80	20	1600W
PSU-300+80-5	300+80	5	1500W

Notes:
*1: Minimum voltage is guaranteed to maximum 0.5% of the rated output voltage.
*2: Minimum current is guaranteed to maximum 0.4% of the rated output current.
*3: 6-80, 12.5V or 15, 30 Max. constant load.
*4: From No load to Full load, constant input voltage. Measured at the sensing point in forward Sense.
*5: Measure with JEITA RC-9131B (1-3) probe.
*6: Measurement frequency bandwidth is 10Hz to 20kHz.
*7: Measurement frequency bandwidth is 1Hz to 1MHz.
*8: From 10% to 90% of rated output voltage, with rated resistive load.
*9: From 90% to 10% of rated output voltage, with rated resistive load.
*10: Time for output voltage to recover within 0.5% of its rated output for a load change from 10 to 90% of its rated output current. Voltage set point from 10% to 100% of rated output.
*11: For load voltage change, equal to the unit voltage rating, constant input voltage.
*12: For 6V-20V model the ripple is measured at 20 ~ rated output voltage and full output current. For other models, the ripples measured at 10~100% output component full output current.
*13: At rated output power.
*14: If install the front panel filter kit, the temperature is guaranteed to 40°C.

SPECIFICATIONS

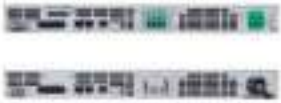
MODEL	PSU 6-20R	PSU 8-15R	PSU 12.5-12R	PSU 15-10R	PSU 20-7R	PSU 30-5R	PSU 40-3R	PSU 50-3R
OUTPUT RATINGS								
Rated Output Voltage (*1)	6V	8V	12.5V	15V	20V	30V	40V	50V
Rated Output Current (*1)	20A	15A	12A	10A	7A	5A	3A	3A
Rated Output Power	120W	120W	150W	150W	140W	150W	120W	150W
RIPPLE AND NOISE(*2)								
PARD(10 Hz ~ 20MHz) p-p (*3)	60mV	60mV	90mV	90mV	90mV	90mV	90mV	90mV
PARD(10Hz ~ 1MHz) r.m.s. (*3)	8mV	8mV	8mV	8mV	8mV	8mV	8mV	8mV
DCare(0Hz ~ 1MHz) r.m.s.(*3)	100mA	100mA	100mA	200mA	120mA	125mA	95mA	85mA
LOAD REGULATION								
Voltage(*4)	2.4mV	2.4mV	3.15mV	3.9mV	4mV	5mV	6mV	9mV
Current(*5)	40mA	41mA	49mA	58mA	26.2mA	11mA	12.8mA	11mA
LINE REGULATION								
Voltage(*3)	2.4mV	2.4mV	3.12mV	3.9mV	4mV	5mV	6mV	9mV
Current(*3)	20mA	20mA	16mA	15mA	8.4mA	7mA	3.8mA	3mA
ANALOG PROGRAMMING AND MONITORING								
External Voltage Control Output Voltage	Accuracy and linearity : ±0.5% of rated output voltage							
External Voltage Control Output Current	Accuracy and linearity : ±1% of rated output current							
External Resistor Control Output Voltage	Accuracy and linearity : ±1% of rated output voltage							
External Resistor Control Output Current	Accuracy and linearity : ±1.5% of rated output current							
Output Voltage Monitor	Accuracy : ±1%							
Output Current Monitor	Accuracy : ±1%							
Shutdown Control	Turn the output off with a LOW (0V to 0.5V) or short circuit.							
Output On/Off Control	Available logic selections: Turn the output on using a LOW (0V to 0.5V) or short circuit. Turn the output off using a HIGH (4.7V to 10V) or open circuit. Turn the output on using a HIGH (4.7V to 10V) or open circuit. Turn the output off using a LOW (0V to 0.5V) or short circuit.							
Alarm Clear Control	Clear alarms with a LOW (0V to 0.5V) or short circuit.							
CV/CC/Load (OVP/OCP/OLP) Detection	Photocoupler open collector output. Maximum voltage 30V, maximum sink current 8mA.							
Trigger Out	Maximum low level output = 0.8V, minimum high level output = 2V. Maximum source current = 8mA.							
Trigger In	Maximum low level input voltage = 0.8V, minimum high level input voltage = 2V, maximum sink current = 8mA.							
FRONT PANEL								
Display, 4 digits, Voltage Accuracy @ 25°C	±(0.5% of rated output voltage + 1 count)							
Current Accuracy @ 25°C	±(0.5% of rated output current + 1 count)							
Indicators	CAL(LH), CC, CV, OT, VLA, VSR, OPP, OCP, OLP, RMT, LAN, M1, M2, M3, M4, PWR, Output ON, RUN, LED 6, RUN, ERR							
Buttons	LH/RC(ADDRESS), PRESET(M1, CAL), Knob(SHIFT), Navi(M2), Set(M3), Shift, Output							
Knobs	Voltage, Current							
USB Port	Type B USB connector							
TRANSIENT RESPONSE TIME (*10)								
Transient Response Time	1.5ms	1.5ms	1ms	1ms	1ms	1ms	1ms	1ms
OUTPUT RESPONSE TIME								
Rise Time(*11) Rated load	80ms	80ms	80ms	80ms	80ms	80ms	80ms	80ms
No load	80ms	80ms	80ms	80ms	80ms	80ms	80ms	80ms
Fall Time(*6) Rated load	15ms	20ms	20ms	30ms	30ms	30ms	30ms	30ms
No load	1200ms	1600ms	1600ms	1600ms	1600ms	1600ms	1600ms	1200ms
PROGRAMMING AND MEASUREMENTS (RS-232/485, USB, LAN, GPIB)								
Output Voltage Programming Accuracy @ 25°C	24mV	24mV	0.12mV	1.2mV	10mV	12mV	20mV	20mV
Output Current Programming Accuracy @ 25°C	20mA	20mA	10mA	10mA	10mA	10mA	10mA	20mA
Output Voltage Programming Resolution	0.2mV	0.2mV	0.4mV	0.4mV	0.1mV	1mV	1.2mV	1.7mV
Output Current Programming Resolution	6mA	6mA	4mA	3.5mA	1.2mA	1.1mA	1.2mA	1mA
Output Voltage Measurement Accuracy @ 25°C	24mV	24mV	12.1mV	13mV	20mV	30mV	40mV	50mV
Output Current Measurement Accuracy @ 25°C	400mA	300mA	240mA	200mA	150mA	100mA	75mA	60mA
Output Voltage Measurement Resolution	0.2mV	0.21mV	0.4mV	0.4mV	0.1mV	1mV	1.2mV	1.7mV
Output Current Measurement Resolution	6mA	6mA	4mA	3.5mA	1.2mA	1.1mA	1.2mA	1mA
TEMPERATURE COEFFICIENCE								
Voltage & Current	100ppm/°C after a 30 minute warm-up							
REMOTE SENSE COMPENSATION VOLTAGE(*10) (MAX)								
Voltage	1V	1V	1V	1V	1V	1.5V	2V	2V
PROTECTION FUNCTION								
Over Voltage Protection(OVP) Setting Range	0.6~6.6V	0.8~8.8V	1.25~13.75V	1.5~16.5V	2~22V	3~33V	4~44V	5~55V
Setting Accuracy	±60mV	±80mV	±125mV	±150mV	±200mV	±300mV	±400mV	±500mV
Over Current Protection(OCP) Setting Range	1~22A	1~16A	1~13A	1~11A	0.35~8A	0~5A	0.8~4.15A	1~3A
Setting Accuracy	±300mA	±300mA	±240mA	±200mA	±120mA	±100mA	±80mA	±60mA
Under Voltage Limit(UVL) Setting Range	0~6.3V	0~8.4V	0~11.75V	0~15.75V	0~21V	0~31.5V	0~42V	0~52.5V
Over Temperature Protection(OTP) Operation	Turn the output off							
Overheating Sensing Area(OHS) Operation	Turn the output off							
Low AC Input Protection (AC FAIL) Operation	Turn the output off							
Shutdown (SD) Operation	Turn the output off							
Power Limit (PWR)(Fold back) Operation	Over power limit							
When Fixed	Approx. 110% of rated output power							
INTERFACE CAPABILITIES								
USB	Type-B, Mini, Type-B, Slave, Speed: 1.1 (1.0, USB Class: CDC/Communications Device Class)							
LAN	MAC Address, Link, IP Address, Lease Obtained, Gateway IP Address, Subnet Mask IP Address, Listener Mask							
RS-232 / RS-485	Complies with the EIA/TIA-232-F and RS-485 Specifications.							
GPIB (Factory Option)	IEEE 488.1-1987, ISO 7498-1 compliant interface							
ISOLATED ANALOG CONTROL INTERFACE (FACTORY OPTION)								
Voltage Control	Using 0.0V to 5.0V signals for programming and readback operation							
Current Control	Using 4-20mA current signals for programming and readback operation							
ENVIRONMENTAL CONDITIONS								
Operating Temperature	0 °C ~ 50 °C (*14)							
Storage Temperature	-20 °C ~ 85 °C							
Operating Humidity	20% ~ 85% RH, no condensation							
Storage Humidity	10% RH ~ 90% RH, no condensation							
Altitude	Maximum 3000m							
INPUT CHARACTERISTICS								
Nominal Input Rating	100Vac to 240Vac, 50Hz to 60Hz, single phase							
Input Voltage Range	85Vac ~ 265Vac							
Input Frequency Range	47Hz ~ 63Hz							
Maximum Input Current 100Vac/200Vac(a)	2A/1A							
Inrush Current	Less than 18A							
Maximum Input Power	200W/VA							
Power Factor 100Vac/200Vac	0.99/0.95							
Holdup Time	20ms or greater							
Efficiency (*13) 100Vac/200Vac(b)	76%/79%	76%/81%	82%/86%	82%/86%	81%/86%	81%/86%	84%/87%	84%/87%
DIMENSIONS & WEIGHT								
	165(W) x 40(H) x 125(D) mm / 6.5(W) x 1.57(H) x 4.92(D) inch, Approx. 0.4kg							

Programmable Switching D.C. Power Supply

SPECIFICATIONS

MODEL	PSU 60-25	PSU 80-19	PSU 100-15	PSU 150-10	PSU 300-5	PSU 480-3.8	PSU 600-2.6
OUTPUT RATINGS							
Rated Output Voltage (*1)	60V	80V	100V	150V	300V	480V	600V
Rated Output Current (*2)	25A	19A	15A	10A	5A	3.8A	2.6A
Rated Output Power	1500W	1520W	1500W	1500W	1500W	1824W	1560W
RIPPLE AND NOISE(*3)							
CV(p-p) (0 ~ 20MHz) p-p (*4)	480mV	480mV	960mV	960mV	1920mV	3840mV	3840mV
CV(rms)(5Hz ~ 1MHz) rms. (*5)	80mV	80mV	80mV	80mV	80mV	80mV	80mV
CC(rms)(5Hz ~ 1MHz) rms.(*6)	70mA	57mA	45mA	31mA	28mA	17mA	12mA
LOAD REGULATION							
Voltage(*7)	80mV	100mV	120mV	170mV	320mV	480mV	640mV
Current(*8)	100mA	80mA	60mA	50mA	40mA	23.8mA	16.2mA
LINE REGULATION							
Voltage(*9)	80mV	100mV	120mV	170mV	320mV	480mV	640mV
Current(*10)	100mA	80mA	60mA	50mA	40mA	23.8mA	16.2mA
ANALOG PROGRAMMING AND MONITORING							
External Voltage Control/ Output Voltage	Accuracy and linearity: ±0.5% of rated output voltage						
External Voltage Control/ Output Current	Accuracy and Linearity: ±1% of rated output current						
External Resistor Control/ Output Voltage	Accuracy and linearity: ±1% of rated output voltage						
External Resistor Control/ Output Current	Accuracy and linearity: ±1.5% of rated output current						
Front Voltage Monitor	Accuracy: ±1.5%						
Output Current Monitor	Accuracy: ±1%						
Shutdown Control	Turns the output off with a LOW (0V to 0.5V) or short circuit						
Output On/ Off Control	Available logic selection:						
	Turn the output on using a LOW (0V to 0.5V) or short-circuit, turn the output off using a HIGH (4.5V to 5V) or open-circuit						
	Turn the output on using a HIGH (4.5V to 5V) or open-circuit, turn the output off using a LOW (0V to 0.5V) or short-circuit						
Alarm Clear Control	Clear alarms with a LOW (0V to 0.5V) or short-circuit						
CV/CC/Alarm/PWR On/Shut Off Indication	Photocoupler open collector output, Maximum voltage 30V, maximum sink current 8mA						
Trigger Out	Maximum low level output = 0.5V, maximum high level output = 5V, Maximum source current = 8mA						
Trigger In	Maximum low level input voltage = 0.8V, minimum high level input voltage = 3V, Maximum sink current = 8mA						
FRONT PANEL							
Display, 4 digits, Voltage Accuracy ± 1%+ 2 Digits Current Accuracy ±2%+ 2 Digits	120mV 15mA	160mV 20mA	200mV 40mA	400mV 40mA	800mV 80mA	840mV 11.4mA	1680mV 7.8mA
Indications	CV(GREEN LED) / CC(YELLOW), VSR, ISR, OVP, OCP, OTP, UVP, ACF, ADJ, M/S, REM, Output ON/ REM LED(YELLOW), ALM, FAN						
Buttons	Control panel security, ENTER/ESC, Out, Down(Right), Up(Left), Setup(M/S), Output						
Knobs	Voltage, Current						
USB Port	Type-B, USB connector						
TRANSIENT RESPONSE TIME (*11)							
Transient Response Time	1ms	1ms	1ms	1ms	1ms	1ms	1ms
OUTPUT RESPONSE TIME							
Rise Time(*12) Rated load	30ms	150ms	150ms	150ms	160ms	200ms	250ms
No load	30ms	150ms	150ms	150ms	160ms	200ms	250ms
Fall Time(*13) Rated load	80ms	150ms	150ms	150ms	150ms	200ms	250ms
No load	1.6sec	1.2sec	1.0sec	0.8sec	0.6sec	0.6sec	0.6sec
PROGRAMMING AND MEASUREMENTS (RESOLUTION, LOCAL, LAN, GPIB)							
Output Voltage Programming Accuracy ±0.5%+	30mV	40mV	60mV	90mV	180mV	300mV	360mV
Output Current Programming Accuracy ±0.5%+	25mA	19mA	15mA	10mA	5mA	3.8mA	2.6mA
Output Voltage Programming Resolution	2mV	2.7mV	3.4mV	5.2mV	10.2mV	15.6mV	20.4mV
Output Current Programming Resolution	0.8mA	0.6mA	0.5mA	0.3mA	0.15mA	0.11mA	0.09mA
Output Voltage Measurement Accuracy ±0.5%+	60mV	80mV	100mV	150mV	300mV	480mV	600mV
Output Current Measurement Accuracy ±0.5%+	30mA	19mA	15mA	10mA	5mA	3.8mA	2.6mA
Output Voltage Measurement Resolution	2mV	2.7mV	3.4mV	5.2mV	10.2mV	15.6mV	20.4mV
Output Current Measurement Resolution	0.8mA	0.6mA	0.5mA	0.3mA	0.15mA	0.11mA	0.09mA
TEMPERATURE COEFFICIENCY							
Voltage & Current	100ppm/°C +(5m x 30 minute warming)						
REMOTE SENSE COMPENSATION VOLTAGE(TWO WIRE)							
Voltage	3V	3V	3V	3V	3V	3V	3V
PROTECTION FUNCTION							
Over Voltage Protection(OVP) Setting Range	3~66V	3~88V	3~110V	3~165V	3~330V	3~440V	3~660V
Setting Accuracy	660mV	880mV	1100mV	1650mV	3300mV	4800mV	6600mV
Over Current Protection(OCP) Setting Range	2.5~27.5A	1.9~20.9A	1.5~16.5A	1~11A	0.5~5.5A	0.38~4.18A	0.26~2.86A
Setting Accuracy	500mA	380mA	300mA	200mA	100mA	76mA	52mA
Under Voltage Limit(UVL) Setting Range	0~63V	0~84V	0~105V	0~157.5V	0~315V	0~440V	0~630V
Over Temperature Protection(OHP) Operation	Turn the output off						
Internal Long Duration Timer(ILDT) Operation	Turn the output off						
Side AC Input Protection (AC-FAIL) Operation	Turn the output off						
Shutdown (SD) Operation	Turn the output off						
Power Limit (POWER LIMIT) Operation	Over power limit						
Value (Fixed)	Approx. 105% of rated output power						
INTERFACE CAPABILITIES							
USB	Input: Host, Type: B-mb, Speed: 1.1/2.0, USB-Class: CDC(Communications Device Class)						
LAN	MAC Address, DHCP, IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask						
RS-232 / RS-485	Complies with the EIA/TIA-232-F / EIA485 Specifications						
GPIB Protocol (Option)	SCPI - 1999, IEEE 488.2 compliant interface						
ISOLATED ANALOG CONTROL INTERFACE (FACTORY OPTION)							
Voltage, Current	Using 0-5V or 0-10V signal for programming and measurement						
Current Control	Using 4-20mA current signals for programming and measurement						
ENVIRONMENTAL CONDITIONS							
Operating Temperature	0°C ~ 40°C (*14)						
Storage Temperature	-10°C ~ +70°C						
Operating Humidity	20% ~ 85% RH, No condensation						
Storage Humidity	90% RH or less, No condensation						
Altitude	Derate at 1000m						
INPUT CHARACTERISTICS							
Nominal Input Rating	100Vac to 240Vac, 50Hz to 60Hz, single phase						
Input Voltage Range	85Vac ~ 265Vac						
Input Frequency Range	47Hz ~ 63Hz						
Maximum Input Current 100Vac(200Vac)	21(11)						
Inrush Current	Less than 50A						
Maximum Input Power	2600VA						
Power Factor 100Vac(200Vac)	0.99(0.98)						
Holdover Time	20mS or greater						
Efficiency (*15) 100Vac(200Vac)	84.0%	84.5%	84.5%	84.5%	84.0%	84.0%	84.0%
DIMENSIONS, WEIGHT	423(W) x 44.4(H) x 441.2(D) mm, Approx. 8.7kg						

Rear Panel



PSU-Series

ORDERING INFORMATION

PSU 6-200	1200W	Programmable Switching DC Power Supply	**PSU 60-35**	1500W	Programmable Switching DC Power Supply
PSU 8-100	1440W	Programmable Switching DC Power Supply	**PSU 80-19**	1520W	Programmable Switching DC Power Supply
PSU 12.5-120	1500W	Programmable Switching DC Power Supply	**PSU 100-15**	1500W	Programmable Switching DC Power Supply
PSU 15-100	1500W	Programmable Switching DC Power Supply	**PSU 150-10**	1500W	Programmable Switching DC Power Supply
PSU 20-76	1520W	Programmable Switching DC Power Supply	**PSU 300-5**	1500W	Programmable Switching DC Power Supply
PSU 30-50	1500W	Programmable Switching DC Power Supply	**PSU 400-3.8**	1520W	Programmable Switching DC Power Supply
PSU 40-38	1520W	Programmable Switching DC Power Supply	**PSU 600-2.6**	1560W	Programmable Switching DC Power Supply
PSU 60-30	1500W	Programmable Switching DC Power Supply			

ACCESSORIES :

CD-ROM x 1 (User Manual, Programming Manual), Output terminal cover x 1, Analog connector plug for x 1, Output terminal (Block set (PSU-200 model)

Input terminal cover x 1, 3 x Handle (for PSU-30, Bracket (PSU-80), 2U Bracket (PSU-CT (Both)), Power Cord (3M) provided for certain regions only

OPTIONAL ACCESSORIES

PSU-A1A	Bus bar for 2 units in parallel connection
PSU-A1C	Cable for 2 units in parallel connection
PSU-A2A	Bus bar for 3 units in parallel connection
PSU-A2C	Cable for 3 units in parallel connection
PSU-A3A	Bus bar for 4 units in parallel connection
PSU-A3C	Cable for 4 units in parallel connection
PSU-231	RS232 Cable with DB9 connector kit
PSU-485	RS485 Cable with DB9 connector kit
PSU-001	Front panel filler (6 blanks installed)
PSU-STK	Joins a vertical stack of 2 PSU units together. (Cut-sized handles incl. panning plates x2)
PSU-03A	Joins a vertical stack of 3 PSU units together. (Cut-sized handles incl. panning plates x2)
PSU-04A	Joins a vertical stack of 4 PSU units together. (Cut-sized handles incl. panning plates x2)
PSU-ADJ	Isolated current source, common cathode/cathode (option)
PSU-ISO-V	Isolated voltage remote control (with factory option)

FREE DOWNLOAD

Driver : LabVIEW Driver

GTL-240	USB Cable, USB 2.0A-B Type Cable, 4P
GTL-232	GPIB Cable, 2000mm
GTL-232	RS232 Cable with DB9 connector to RJ45
GTL-485	RS485 Cable with DB9 connector to RJ45
GTL-257	Serial Master Cable Terminator (5 EA)
GTL-203	RS485 Slave cable
GRM-001	Shelf Mount Bracket for PSU option
PSU-GPIB	GPIB interface card (factory option)
GPM-001	1ch CAN power card for PSU option
GPM-002	4CH power card for PSU option
GPM-003	PDI power card for PSU option

A SERIES/PARALLEL OPERATION AND HIGH POWER DENSITY

F ADJUSTABLE SLEW RATE

VOLTAGE SLEW RATE	CURRENT SLEW RATE
0.001V~0.08V/msec (PSU 6-20)	0.001A~2.00A / msec (PSU 6-20)
0.001V~0.08V/msec (PSU 8-180)	0.001A~1.80A / msec (PSU 8-180)
0.001V~0.125V/msec (PSU 12.5-120)	0.001A~1.20A / msec (PSU 12.5-120)
0.001V~0.15V/msec (PSU 15-100)	0.001A~1.00A / msec (PSU 15-100)
0.001V~0.30V/msec (PSU 30-70)	0.001A~0.70A / msec (PSU 30-70)
0.001V~0.30V/msec (PSU 30-50)	0.001A~0.50A / msec (PSU 30-50)
0.001V~0.40V/msec (PSU 40-30)	0.001A~0.30A / msec (PSU 40-30)
0.001V~0.10V/msec (PSU 50-30)	0.001A~0.30A / msec (PSU 50-30)
0.001V~0.60V/msec (PSU 60-15)	0.001A~0.25A / msec (PSU 60-25)
0.001V~0.80V/msec (PSU 80-10)	0.001A~0.10A / msec (PSU 80-10)
0.001V~1.00V/msec (PSU 100-10)	0.001A~0.10A / msec (PSU 100-10)
0.001V~1.50V/msec (PSU 150-10)	0.001A~0.10A / msec (PSU 150-10)
0.001V~1.50V/msec (PSU 300-5)	0.001A~0.025A / msec (PSU 300-5)
0.001V~2.00V/msec (PSU 400-3.8)	0.001A~0.008A / msec (PSU 400-3.8)
0.001V~2.40V/msec (PSU 600-2.6)	0.001A~0.006A / msec (PSU 600-2.6)

Adjustable Voltage Slew Rate

The PSU series can adjust slew rate for current and voltage. Via setting the rise and fall time of voltage and current, users can verify DUT's characteristics during voltage and current variation. Additionally, slew rate adjustment can mitigate voltage drift to effectively prevent DUT from being damaged by inrush current. This function is ideal for tests such as capacitive load and motor.

G OVP (OCP AND UVL)

MODELS	OCP	OVP	UVL
PSU 6-200	5 ~ 220A	0.6 ~ 6.6V	0 ~ 6.3V
PSU 8-180	5 ~ 198A	0.8 ~ 8.8V	0 ~ 8.4V
PSU 12.5-120	5 ~ 132A	1.25 ~ 13.75V	0 ~ 13.12V
PSU 15-100	5 ~ 110A	1.5 ~ 16.5V	0 ~ 15.75V
PSU 20-70	5 ~ 83.6A	2 ~ 22V	0 ~ 21V
PSU 30-50	5 ~ 55A	3 ~ 33V	0 ~ 31.5V
PSU 40-30	5.6 ~ 41.8A	4 ~ 44V	0 ~ 42V
PSU 50-30	5 ~ 33A	5 ~ 55V	0 ~ 52.5V
PSU 60-25	2.5 ~ 27.5A	6 ~ 66V	0 ~ 63V
PSU 80-19	1.9 ~ 20.9A	8 ~ 88V	0 ~ 84V
PSU 100-15	1.5 ~ 16.5A	10 ~ 110V	0 ~ 105V
PSU 150-10	1 ~ 11A	15 ~ 165V	0 ~ 157.5V
PSU 300-5	0.5 ~ 5.5A	30 ~ 330V	0 ~ 315V
PSU 400-3.8	0.38 ~ 4.18A	40 ~ 440V	0 ~ 420V
PSU 600-2.6	0.26 ~ 2.86A	60 ~ 660V	0 ~ 630V

Once the voltage or current output exceeds the preset level of OVP or OCP, PSU will shut down output to protect DUT.UVL is for users to set the minimum output voltage from the output terminal.

H TRIGGER CONTROL (TRIGGER INPUT/TRIGGER OUTPUT)

PSU series provides users with complete trigger input and trigger output functions so as to flexibly control PSU series. Each function is elaborated as follows.

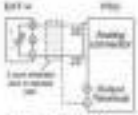
Trigger Input function :

1. Allow users to set the effective pulse width from 0.4ms for trigger input. (0 : the LOW or HIGH signal of DC level for trigger input)
2. Receive trigger input to control PSU series output or to output preset voltage and current.
3. Receive trigger input to upload preset memory parameters.

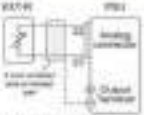
Trigger Output function :

1. Allow users to set the effective pulse width from 0.4ms for trigger output. (0 : the LOW or HIGH signal of DC level for trigger output)
2. Set LOW or HIGH for output DC level.
3. PSU produces trigger output signal when setting output or changing preset value or uploading preset memory parameters.

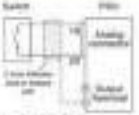
I EXTERNAL ANALOG CONTROL FUNCTION



- Pin23 → EXT-V (+)
- Pin22 → EXT-V (-)
- Wire shield → negative (-) output terminal



- Pin23 → EXT-R
- Pin22 → EXT-R
- Wire shield → negative (-) output terminal



- Pin19 → Switch
- Pin20 → Switch
- Wire shield → negative (-) output terminal

External Voltage Controls Voltage Range **External Resistance Controls Voltage Range** **External On-off to Control Output, on or off**

The rear panel of the PSU series has an analog control terminal. The external analog control interface allows external voltage or resistance to control voltage and current output, and allows power supply to output or to be turned on and off. The diagram on the upper shows typical connection methods for external control applications. For more detailed connection information please refer to user manual.

Fanless Multi-Range D.C. Power Supply

PFR-100L

PFR-100M

The PFR-100 series, a small and high-performance programmable D.C. power supply, adopts natural convection design to dissipation heat. The fanless structure allows users to focus on their experiments and tests in a quiet environment. Fanless power supply will not suck in dust and foreign objects, therefore, PFR-100 series has a longer life cycle compared with that of power supplies with fan.

The PFR-100 series is a power supply with a five-fold rated power that allows users to self-define voltage and current under rated power conditions so as to satisfy them with wider voltage and current operational ranges. PFR-100 series, with rated 300W, provides two models: PFR-100L - maximum output voltage of 50V (at 3A) or maximum output current of 10A (at 18V); PFR-100M - maximum output voltage of 250V (at 0.6A) or maximum output current of 2A (at 50V).

The PFR-100 series provides front and rear panel output terminals. The front panel output terminal helps users shorten test lead replacement time while conducting adjustment on front panel's function keys. The rear panel output terminal facilitates an easy wiring operation for cabinet-mount assembly. 3U height, 70mm width and 2.5KG in weight have greatly elevated PFR-100 series portability. Furthermore, the multi-drop mode allows users to control up to 31 PFR-100 series without using switch/Hub that help users save the equipment cost.

The LAN interface for PFR-100 is Ethernet port. PFR-100 also has a built-in web server and intuitive user-interface. Users, via general browsers including Internet Explorer, Mozilla Firefox or Android cellular phones, can monitor PFR-100's test and measurement anywhere. Users not only can remotely monitor PFR-100 via internet, but also remotely observe and adjust their operating PFR-100s in the lab from your home. The outputs of PFR-100 series can be monitored including OVP, OCP, UVL; and the system information can be checked such as unit's serial number, firmware edition and internet setting. Users can remotely adjust PFR-100 settings, including output voltage/current, the slew rate for voltage/current, bleeder circuit control, OCP, delayed time for output voltage and booster settings.

The PFR-100 series provides special functionalities to meet test requirements for different load's characteristics. The CC priority mode can be applied for DUTs with diode characteristics to prevent DUT from being damaged by inrush current. A slow rise time for voltage can also protect DUT from inrush current, especially for those as capacitive load. When power is off or load is disconnected, the activation of bleeder circuit control will allow the bleeder resistor to consume filter capacitor's electricity. Without the bleed resistor, power supply's filter capacitor may still have electricity that is a potential hazard. For automatic testing application systems, the bleeder resistor allows PFR-100 series to rapidly discharge to prepare itself for the next operation.

FEATURES

- Constant Power Output for Twofold Multi-Range(V&I) Operation
- Natural Convection Cooling Design (Fanless Structure)
- Preset Memory Function
- Output ON/OFF Delay Function
- CV, CC Priority Mode
- Adjustable Slew Rate for Voltage and Current
- Bleeder Circuit Control
- Protection : OVP, OCP, AC FAIL and OTP
- Support Front Panel and Rear Panel Output
- Interface: USB,LAN,RS-232,485 and 2 GPIB(opt.)
- Web Server Monitoring and Control
- External Analog Control and Monitor Function
- Remote Sensing Function

Model	PFR-100L	PFR-100M
Output Channel	1	1
Output Voltage	0~ 50V	0~ 250V
Output Current	0~ 10A	0~ 2A
Rated Power	100W	100W

SPECIFICATIONS

Model		PFR-100L	PFR-100M
OUTPUT RATING			
Rated Output Voltage		50V	250V
Rated Output Current		10A	2A
Rated Output Power		100W	100W
REGULATION (CV)			
Load Regulation (*1)		1mV	2.5mV
Line Regulation (*1)		3mV	5mV
REGULATION (CC)			
Load Regulation (*1)		10mA	5.2mA
Line Regulation (*1)		6mA	1.25mA
RIPPLE & NOISE (*2)			
Vpp (*4)		50mV	150mV
Rms (*5)		4mV	11mV
p-n (*3)		10mA	2mA
PROGRAMMING ACCURACY			
Voltage	0.1% of setting +	40mV	200mV
Current	0.2% of setting +	20mA	2mA
MEASUREMENT ACCURACY			
Voltage	0.1% of reading +	40mV	200mV
Current	0.2% of reading +	20mA	2mA
RESPONSE TIME			
Rise Time (*6)	Rated load	30ms	140ms
Fall Time (*7)	Rated load	100ms	600ms
	No load	500ms	1000ms
Transient Response Time (*8)		1.5ms	2ms
PROGRAMMING RESOLUTION			
Voltage		2mV	10mV
Current		1mA	0.1 mA
MEASUREMENT RESOLUTION			
Voltage		2mV	10mV
Current		1mA	0.1 mA
PROTECTION FUNCTION			
Over Voltage Protection (OVP)	Setting range	1~55V	1~275V
Over Current Protection (OCP)	Setting range	1~11A	0.2~2.2A
Under Voltage Limit (UVL)	Setting range	0~52.5V	0~262.5V
Over Temperature Protection (OTP)	Operation	Turn the output off	Turn the output off
Low AC Input Protection (AC Fail)	Operation	Turn the output off	Turn the output off
Power Limit (Power Limit)	Operation	Turn the output off	Turn the output off

PFR-Series

Rear Panel

SPECIFICATIONS			
Model		PFR-100L	PFR-100M
FRONT PANEL DISPLAY ACCURACY, 4 DIGITS			
Voltage Current	0.1% of reading + 0.2% of reading +	40 mV 10 mA	200 mV 1 mA
ENVIRONMENT CONDITION			
Operating Temperature Storage Temperature Operating Humidity Storage Humidity		0 °C to 40 °C -10 °C to 70 °C 20% to 80% RH, No condensation 20% to 90% RH, No condensation	
RESIDENCE TEMP. COEFFICIENT (after A 30 Minute Warm -up)			
Voltage Current		150ppm/°C 300ppm/°C	
OTHER			
Analog Control Interface AC Input		Yes USB, LAN, RS-232(Standard), GPIB(Opt.) 85~265VAC, 47~63Hz, single phase	
DIMENSIONS & WEIGHT			
		78.0(W)x124(H)x360(D)mm, Approx. 2.2kg	

Note: *1: At 85 ~ 132Vac or 170 ~ 265Vac, constant load.
*2: From the load or full load, constant input voltage. Measured at the sensing point in Remote Sense.
*3: Measured with JEITA RC-9131D (1 °C probe.
*4: Measurement frequency bandwidth is 10Hz to 20MHz.
*5: Measurement frequency bandwidth is 5Hz to 1MHz.
*6: From 10%~90% of rated output voltage, with rated resistive load.
*7: From 90%~10% of rated output voltage, with rated resistive load.
*8: Time for output voltage to recover within 0.1% + 10mV of its rated output for a load change from 50 to 100% of the rated output current.
*9: For load voltage change, equal to the rate voltage rating, constant input voltage.

ORDERING INFORMATION

PFR-100L Fanless 80x80 Range D.C. Power Supply
PFR-100M Fanless 80x80 Range D.C. Power Supply (European terminals provided only)

ACCESSORIES:
CD (User Manual, Programming manual) x 1, Power cord, GTL-104 test lead, Accessory Packages
GTL-104A test lead (for PFR-100L only), GTL-105A test lead (for PFR-100M only)
GTL-104A test lead (for PFR-100L European Type test terminal)

OPTIONAL ACCESSORIES

GTL-232	GPIB Cable, 2000mm	**GTL-259**	RS-232 Cable with DB9 connector to RJ45
PSU-232	RS-232 Cable with DB9 Connector Kit	**GTL-260**	RS-485 Cable with DB9 connector to RJ45
PSU-485	RS-485 Cable with DB9 Connector Kit	**GTL-261**	Serial Master Cable - Terminator, 0.5m
GTL-246	USB Cable, 2.0 (1.1) Type A-Type B, 1.8m	**GTL-262**	RS-485 Slave cable
GRA-431-J-400/800	Rack mount Kit (J-Size) for AC 190V/220V		
GRA-431-E-180/280	Rack mount Kit (E) for with AC 100V/200V		
PFR-GPIB	Optional GPIB Interface for PFR (Factory installed)		

GTL-259 GTL-260 GTL-261 GTL-262

GRA-431-J/E Rack Mount Kit(JIS/EIA)

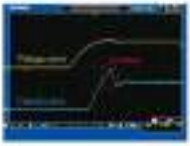
PSU-232 RS-232 Cable with DB9 Connector Kit

PSU-485 RS-485 Cable with DB9 Connector Kit

GTL-258 GPIB Cable, 2000mm

GTL-134 Test Lead

A C.V/C.C PRIORITY MODE



Under the conventional C.V mode, inrush current and surge voltage appeared at forward voltage (VF) of LED

Under C.C priority mode, inrush and surge voltage are effectively restrained.

Under the application conditions of diode load, conventional power supplies under the C.V priority mode will produce inrush current and surge voltage at turn-on. The PFR-100 series has C.V and C.C priority modes. The C.C priority mode can prevent inrush current and surge voltage from occurring at turn-on to protect DUT.

B ADJUSTABLE SLEW RATE

Adjustable Voltage Slew Rate

Voltage Slew Rate:
0.1V~100.0V/μs (PFR-100L)
0.1V~100.0V/μs (PFR-100M)

Adjustable Current Slew Rate

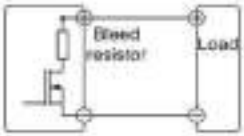
Current Slew Rate:
0.01A~20.00A/μs (PFR-100L)
0.001A~4.000A/μs (PFR-100M)

The PFR-100 series can adjust slew rate for current and voltage. Via setting the rise and fall time of voltage and current, users can verify DUT's characteristics during voltage and current variation. Additionally, slew rate adjustment can mitigate voltage shifts to effectively prevent DUT from being damaged by inrush current. This function is ideal for tests such as capacitive load and motor.

C WEB SERVER REMOTE CONTROL FUNCTION

Users, via general browsers including Internet Explorer, Mozilla Firefox or Android cellular phones, can monitor PFR-100's test and measurement anywhere. Users not only can remotely monitor PFR-100 via internet, but also remotely observe and adjust your operating PFR-100 in the lab from your home. The outputs of PFR-100 can be monitored including OVP, OCP, UVL and system information can be checked such as unit's serial number, firmware edition and internet setting. Users can remotely adjust PFR-100 settings, including output voltage/current, the slew rate for voltage/current, Bleed circuit control, OCP, delayed time for output voltage and Buzzer settings.

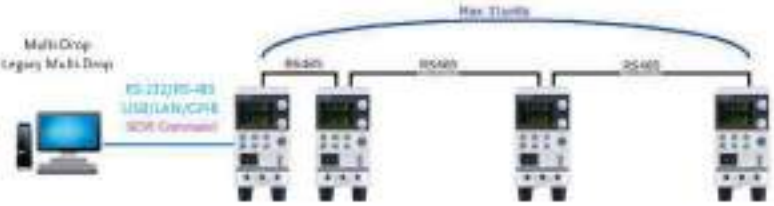
D BLEEDER CIRCUIT CONTROL



PFR-100 Series Bleeder Circuit

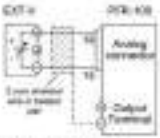
The PFR-100 series power supply has a bleeder circuit control which is in parallel with the output terminal. When power is off or load is disconnected, the bleed resistor will consume electricity from the filter capacitor. Without a bleed resistor, the filter capacitor of power could still be charged with electricity that poses a potential danger. In addition, for ATE system, bleed resistor allows the PFR-100 series to bleed current rapidly so as to prepare itself for the next operation.

E REMOTE PROGRAM CONTROL (UP TO 31 UNITS CONNECTION)



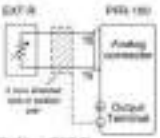
Provide USB, GPIB, LAN, RS-232 and RS-485 for PC to remote control Master PFR-100. RJ-45 connector on the rear panel can connect up to 31 units. LAN or USB remote control and augmenting slave units by using the multi-drop mode will no longer need any switch/hub that can help customers save equipment costs.

F EXTERNAL ANALOG CONTROL FUNCTION



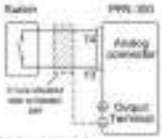
Pin16 → EXT-V (+)
Pin15 → EXT-V (-)
Wire shield → negative (-) output terminal

External Voltage Controls Voltage Range



Pin16 → EXT-R
Pin15 → EXT-R
Wire shield → negative (-) output terminal

External Resistance Controls Voltage Range



Pin16 → Switch
Pin15 → Switch
Wire shield → negative (-) output terminal

External ON-OFF To Control Output, ON or OFF

The rear panel of the PFR-100 series has an analog control terminal. The external analog control interface allows external voltage or resistance to control voltage and current output, and allows power supply to output or to be turned on and off.

This diagram above shows typical connection methods for external control applications. For more detailed connection information please refer to user manual.

G OUTPUT ON/OFF DELAY

An Example of Output On/Off Delay Control Among Multiple Outputs of the PFR-100 units

The Output On/Off delay feature enables the setting of a specific time delay for output on after the power supply output is turned on, and a specific time delay for output off after the power supply output is turned off. When multiple PFR-100 units are used, the On/Off delay time of each unit can be set respectively referring to fix time points. This multiple output control can be done through the analog control terminal at rear panel or through the PC programming with standard commands.

Programmable Switching D.C. Power Supply (Multi-range D.C. Power Supply)

PSB-2400L2

PSB-2400L/PSB-2400H/ PSB-2800L/PSB-2800H

PSB-2800LS

Note: PSB-2400H/PSB-2800H are not CE approved.

The PSB-2000 Series is a high power density, programmable and multi-range output DC power supply. There are six models in the series including one power booster unit. The PSB-2000 Series has the output voltage of 0-80V and 0-800V, and the output power ranges of 0-400W and 0-800W. The multi-range output functional ity facilitates flexible collocations of higher voltage and larger current under the rated power range. Both series and parallel connections can be applied to the PSB-2000 Series to fulfill the requirements of higher

The PSB-2000 Series provides three sets of preset function keys to memorize regularly used settings of voltage, current and power that users can recall rapidly. The sequence function, via RS232C, USB interface or optional GPIB interface, can connect with the computer to produce output power defined by sequence of a series of set voltage and current steps that are defined by the computer. This function is often used to establish a standard test procedure for the verification of the influence on OUTs done by the swiftly changing operating

The PSB-2000 Series protects over voltage and over current. The power supply output function will be shut down to protect OUTs while the protection mechanism is triggered to function. When conducting battery charging operation, the Hi-Z mode of the PSB-2000 Series will prevent reverse current from damaging power supply.

The PSB-2000 Series provides analog control interfaces on the rear panel to control PSB-2000 Series output via the external voltage or to externally monitor voltage and current output status of power supply. The PSB-2000 Series panel can be rotated 90 degree angle suitable for vertical or horizontal position to accommodate the ideal space utilization.

FEATURES

- Output Voltage Rating : 80V,800V, Output Power Rating : 400W ~ 800W
- Constant Power Output for Multi-Range (V & I) Operation
- Series and Parallel Operation (2 Units in Series or 4 Units in Parallel Maximum)
- 90 Degree Angle Rotatable Control Panel
- Sequence Function Edited by PC will be Controlled Through Power Supply Optional Interfaces
- Standard Interface : RS-232C/USB/Analog Control Interface
- Optional Interface : GPIB
- Preset Function (3 Points)
- LabVIEW Driver

SERIES OPERATION

MODEL NUMBER	SINGLE UNIT	TWO UNITS
PSB-2401	80V/40A	160V/40A
PSB-2801	80V/10A	160V/80A
PSB-2801LS (Booster Unit for PSB-2800L Only)	N/A	N/A
PSB-2401L2	N/A	N/A
PSB-2401H	N/A	N/A
PSB-2801H	N/A	N/A

PARALLEL OPERATION

MODEL NUMBER	SINGLE UNIT	TWO UNITS	THREE UNITS	FOUR UNITS
PSB-2401L	80V/40A	80V/80A	80V/120A	80V/160A
PSB-2801L	80V/80A	80V/160A	80V/240A	80V/320A
PSB-2801LS	N/A	80V/160A (PSB-2801L x 1 + PSB-2801LS x 1)	80V/240A (PSB-2801L x 1 + PSB-2801LS x 2)	N/A
PSB-2401L2	N/A	N/A	N/A	N/A
PSB-2401H	160V/5A	160V/5A	N/A	N/A
PSB-2801H	160V/10A	160V/10A	N/A	N/A

SPECIFICATIONS

	PSB-2400L	PSB-2800L	PSB-2400L2	PSB-2400H	PSB-2800H	PSB-2800L2
OUTPUT RATING						
Voltage	0 ~ 80V	0 ~ 80V	0 ~ 80V x 2CH	0 ~ 300V	0 ~ 300V	80V
Current	0 ~ 40A	0 ~ 80A	0 ~ 40A x 2CH	0 ~ 8A	0 ~ 16A	80A
Power	2400W	2800W	2400W	2400W	4800W	2800W
REGULATION (CV)						
Load	0.01 % + 2mV of rated voltage			0.01% + 50mV of rated voltage		N/A
Line	0.01 % + 2mV of rated voltage			0.01% + 20mV of rated voltage		
REGULATION (CC)						
Load	0.02% + 3mA of rated current			0.01% + 15mA of rated current		N/A
Line	0.01 % + 3mA of rated current			0.01% + 15mA of rated current		
RIPPLE & NOISE (Note: Bandwidth 20MHz ; Ripple Bandwidth: 1MHz)						
CV p-p	150mV	150mV	150mV	200mV [at fy output voltage measures more than 1 % of the rated voltage]	300mV [at fy output voltage measures more than 1% of the rated voltage]	N/A
CV rms	6mV	6mV	6mV	20mV [when current measures at 0A] 35mV [when current measures at 2A]	25mV [when current measures at 0A] 40mV [when current measures at 2A]	
CC rms	30mA	60mA	30mA	15mA	25mA	
PROGRAMMING ACCURACY						
Voltage	0.1 % setting±(32)gain			0.1% setting±(32)gain		N/A
Current	0.2%setting±(32)gain			0.2% setting±(32)gain		
Power	~ 0W			± 10W [at fy output voltage measures more than 1% of rated voltage]		
READ BACK ACCURACY						
Voltage	0.2% reading±2digits			0.2% readings2digits		N/A
Current	0.2% reading±2digits			0.3% readings2digits		
Power	0.5% reading±3digits			0.5% reading (Iout > 48mA		
RESPONSE TIME						
Rise Time(Full load)(Normal)	40ms			300ms		N/A
Fall Time(Full load)	100ms			300ms		
Fall Time(No load)	500ms			1800ms		
Load Transfer Recove Time (Load change from 10..100%)	1ms			2ms		
PROGRAMMING RESOLUTION						
Voltage	10mV			100mV		N/A
Current	10mA			10mA		
Power	10W			10W		
MEASUREMENT RESOLUTION						
Voltage	10mV			100mV		N/A
Current	10mA			10mA		
Power	10W			10W		
SERIES AND PARALLEL CAPABILITY						
Channel Number	1	1	2	1	1	for PSB-2800L Only
Series Operation	Up to 2 Units	Up to 2 Units	N/A	N/A	N/A	
Parallel Operation	Up to 4 Units	Up to 4 Units	N/A	Up to 2 Units	Up to 2 Units	
Redundancy for PSB-2800L	N/A	Up to 5 Units	N/A	N/A	N/A	
PROTECTION FUNCTION						
OVP (Fixed)	Output off when 110% of rated voltage			Output off when output voltage exceeds 110% of rated voltage		N/A
OVP (Variable)	Output off when operating Setting range 0V~84V with front panel			Presettable in range from 10V ~ 840V are front panel		
OCP (Fixed)	Output off when 110% of rated current			Output off when output voltage exceed 110% of rated current		
OCP (Variable)	Output off when operating Setting range 0A~42A(84A for model number)			Presettable in range from 0.1A ~ 6.20A on front panel		
OHP	Output off above hour limit setting temperature			Output off at the internal heat sink temperature over setting value		
ENVIRONMENT CONDITION						
Operation Temp	0°C ~ 40°C					N/A
Storage Temp	-20°C ~ 70°C					
Operating Humidity	30% ~ 85% RH (no dew condensation)					
Storage Humidity	10% ~ 90% RH (no dew condensation)					
OTHER						
Inrush Current	35A Max	70A Max	70A Max	35A Max	70A Max	70A Max
Power Consumption/Factor	2.6kVA/0.99	3.120VA/0.99	3.120VA/0.99	3.60VA/0.99	11.08VA/0.99	11.08VA/0.99
Cooling Method	Forced air cooling with fan inside					
Power Source	100VAC ~ 240VAC (50/60Hz) Single phase					
Interface (Standard)	RS-232/CAN					
Interface (Optional)	GPIB					
Analog Control	Yes					
DIMENSIONS & WEIGHT						
	3.5 (H) x 12 (W) x 19.0 (D) inch					
	Approx.9kg	Approx.9kg	Approx.7kg	Approx.11kg	Approx.16kg	Approx.7kg

PSB-2400L2

PSB-2400L/PSB-2400H/
PSB-2800L/PSB-2800H

PSB-2800LS

Rear Panel

PSB-003 Parallel Connection Kit for Horizontal Installation

PSB-004 Parallel Connection Kit for Vertical Installation

ORDERING INFORMATION

PSB-2400L2	0-80V/0-30A (600W) Multi-Range DC Power Supply
PSB-2400L	0-80V/0-30A (600W) Multi-Range DC Power Supply
PSB-2400L2	0-80V x 2/0-30A x 2 (600W) Multi-Range DC Power Supply
PSB-2400H	0-800V/0-3A (600W) Multi-Range DC Power Supply
PSB-2800H	0-800V/0-3A (800W) Multi-Range DC Power Supply
PSB-2800LS	60W Slave (Booster) Unit For Current Extension Only

ACCESSORIES

User Manual (CD) x 1, AC Power Cord x 1, External Control Connector (26pin), Screw for output terminal cover (for rear panel), Protection covers for output terminals on rear panel, Protection caps for output terminals on the front panel, GPIB Cable, USB Cable (For Model Number : PSB-2400L, PSB-2800L, PSB-2400L2, PSB-2400H, PSB-2800H) Local Bus (For Model Number : PSB-2400L, PSB-2800L, PSB-2400L2, PSB-2400H, PSB-2800H)

OPTIONAL ACCESSORIES

PSB-001	GPIB Card	GTL-248	USB Cable
PSB-003	Parallel Connection Kit for Horizontal Installation (Kit Includes: GTSS-007 Joint Kit, Horizontal bus bar x 2 , PSB-003 x 1)	GTL-248	GPIB Cable
PSB-004	Parallel Connection Kit for Vertical Installation (Kit Includes: GTSS-007 Joint Kit, Vertical bus bar x 2, PSB-004 x 1)	GRJ-1101	Modular Cable
PSB-005	Parallel Connection Signal Cable	GRM-430	Rack Mount Kit
PSB-006	Series Connection Signal Cable		
PSB-007	Joint Kit - Includes 4 Joining Plates, (M3x8 screws x 4, M4x8 screws x 2		
PSB-008	RS232C Cable (PSB-2000 Only)		

FREE DOWNLOAD

Driver Labview Driver

PSB-001 GPIB Control Board

GRJ-1101 Modular Cable

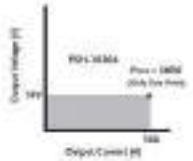
PSB-008 RS-232C Cable (PSB-2000 Only)

PSB-005 Parallel Connection Signal Cable

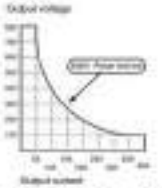
PSB-006 Series Connection Signal Cable

PSB-007 Joint Kit

A. MULTI-RANGE OUTPUT OPERATION



The operation area of a Conventional Power Supply



The operation area of a Multi-Range Power Supply for PSB-2000 Series

Compared with the maximum power output of the conventional power supply that is calculated by the maximum output voltage multiplied by the maximum output current, the PSB-2000 series, defying the formula, has a unique characteristic of multi-range output (voltage and current). This distinguishing feature, under the same maximum power output range, can output a higher voltage with a smaller current and vice versa. For instance, for a conventional power supply with a maximum power output of 1600W, the maximum voltage and current outputs are likely to be 10V and 160A respectively. Comparatively, PSB-2400L, with the maximum power output of 4000W, provides voltage and current output ranges of 0~80V and 0~40A. The maximum current of 5A will be provided when the voltage reaches 80V and the maximum voltage of 10V for the maximum current of 40A. PSB-2400L, breaking the limitation of Pmax=Vmax x Imax, broadens voltage and current application ranges. The following diagrams illustrate the voltage and current comparison between the multi-range output power supply and the conventional power supply.

B. PRODUCTS IN THE SERIES

There are six models in the PSB-2000 Series. Model type, output voltage, output current and output power are as follows:

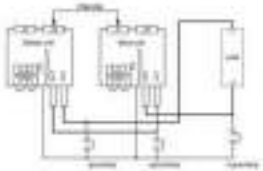
MODEL	PSB-2400	PSB-2400L	PSB-2400LS	PSB-2400H	PSB-2400H	PSB-2400LET
Channel Number	1	1	2	1	1	NA
Voltage Rating**	0 ~ 80V	0 ~ 80V	0 ~ 80V x 2CH	0 ~ 800V	0 ~ 800V	80V
Current Rating***	0 ~ 40A	0 ~ 80A	0 ~ 40A x 2CH	0 ~ 5A	0 ~ 5A	80A
Output Power (Max.)	4000W	8000W	8000W	4000W	8000W	8000W

* PSB-2400LS, a booster unit acting as slave to extend current, can not operate alone. It must operate with PSB-2800L master.

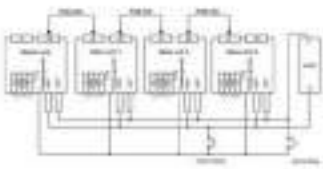
** The maximum current under the highest output voltage is power/voltage. For instance, when PSB-2400L outputs 80V the maximum current is 4000W/80V = 5A .

*** Same as above. When PSB2400L outputs 40A the highest voltage is 4000W/40A = 100V.

C. SERIES AND PARALLEL CONNECTIONS



Series Connection



Parallel Connection

Hence, the PSB-2000 Series, with its multi-range output function and the power extension capability of series and parallel connections, is the high power density and high performance-to-cost ratio DC power supply, which provides a wider range of power applications for any limited equipment space. The PSB-2000 Series is an ideal selection for testing DC power supply module, automobile lithium and lithium iron battery and electronic parts.

Programmable Multi-Range D.C. Power Supply

PSB-1000 Series

PSB-1000 is a series of Multi-Range DC Power Supply, whose maximum voltage output of 320V can be realized by placing 2 sets of 160V units in series connection. By connecting 4 sets of PSB-1000L units in parallel, the maximum current output of 120A can be achieved.

The PSB-1000 series is a bench-top power supply featuring user friendly interface, which can clearly display setting conditions and measurement results via LCD display and menu-typed functionality selection without referring to the user manual. All settings can be done by functionality keys, numerical keys, and speed dial keys. The 30A output capability from the front output terminal of the PSB-1000 series can better meet the requirements of laboratories and scientific R&D departments.

The PSB-1000 series features user-friendly menu-typed functionality interface and its built-in functionality can better meet industry's application requirements. Both front panel and rear panel output terminals of the PSB-1000 series facilitate researchers to access power output conveniently. The display panel adopts menu-typed functionality selection to help users quickly familiarize with settings and operation that is extremely suitable for on-site engineers and R&D engineers who deal with complicated functional setting requirements. Power On Configuration allows users to select previously set SEQ to carry out automatic execution as soon as power is turned on. For production lines demanding sequential power supply output application requirements, tremendous time can be saved by this function, which exempts users from resetting sequential power supply when power is turned on every single time.

Voltage Trigger allows users to set pulse signals for leading edge threshold and trailing edge threshold. VOUT TRIG can be applied to Automatic test system by providing output time for sending voltage via BNC adapter. The Output Delay function that lets users to respectively set active time for power output on and power output off for multiple sets of PSB-1000 so as to realize sequential power output applications.

The PSB-1000 series is equipped with multi-range power output capability providing flexible rated power output to meet customers' flexible application requirements.

FEATURES

- LCD Display and User Friendly Menu-Typed Functional Interface
- Voltage Rating : 40V/160V, Output Power Rating : 400W/800W
- Constant Power Output for Multi-Range(V & I) Operation
- The I/V Control Function(Adjustable Slew Rate) are Suitable for Diode Characteristic Load & Surge Reducing
- Sequence Function for Sequential D.C Waveform Output
- C.V/C.C Priority
- Auto Run for Output or Sequence Function
- Master-Slave Operation : 2 Units in Series/ 4 Units in Parallel
- Synchronized Operation(Voltage Trigger, Trigger In/Trigger Out Signal)
- Standard Interface : USB Host, LAN
- Option : GPIB
- Internal Setup Control(Knob/Front Panel/ Rear Panel)Function
- LabVIEW Driver

PSB-106 Basic accessory kit :

SPECIFICATIONS

Model Name	PSB-1400L	PSB-1400M	PSB-1800L	PSB-1800M
OUTPUT RATING				
Output Voltage(V)	0~40	0~160	0~40	0~160
Output Current(A)	0~40	0~10	0~80	0~20
Output Power(W)	400W	400W	800W	800W
REGULATION (CV)				
Load Regulation (mV)	25	85	25	85
Line Regulation (mV)	25	85	25	85
REGULATION (CC)				
Load Regulation (mA)	45	15	85	25
Line Regulation (mA)	45	15	85	25
RIPPLE & NOISE (Noise Bandwidth 20MHz ; Ripple Bandwidth = 1MHz)				
CV p-p	90	90	80	80
CV rms	7	12	11	15
CC rms	90	28	160	48
PROGRAMMING ACCURACY				
Voltage (mV) 0.1% +	30	38	38	38
Current (mA) 0.1% +	20	18	48	28
MEASUREMENT ACCURACY				
Voltage (mV) 0.1% +	30	38	38	38
Current (mA) 0.1% +	20	18	48	28
RESPONSE TIME				
Rise Time (ms)	50	180	28	180
Fall Time(Full load) (ms)	50	150	28	150
Fall Time(No load) (ms)	500	1200	500	1200
Load Transient Response Time(ms) (Load change from 0% to 100%)	1	1	1	1
PROGRAMMING RESOLUTION (By PC Remote Control Mode)				
Voltage (mV)	1	1	1	3
Current (mA)	1	1	2	1
MEASUREMENT RESOLUTION (By PC Remote Control Mode)				
Voltage (mV)	1	1	1	3
Current (mA)	1	1	2	1
SERIES AND PARALLEL CAPABILITY				
Parallel Operation	Up to 4 units (including the master unit)			
Series Operation	Up to 2 units (including the master unit)			
PROTECTION FUNCTION				
OVP (V)	4~44	9~176	4~44	9~176
OCP (A)	4~44	1~11	8~88	2~22
OHP	Turn the output off	Turn the output off	Turn the output off	Turn the output off

PSB-1000 Series

Rear Panel

Model Name	PSB-1400L	PSB-1400M	PSB-1800L	PSB-1800M
FRONT PANEL DISPLAY ACCURACY (4 Digits)				
Voltage (mV) 0.1% +	20	100	20	100
Current (mA) 0.1% +	20	10	40	10
ENVIRONMENT CONDITION				
Operation Temp	0 °C ~ 40 °C			
Storage Temp	-25 °C ~ 70 °C			
Operating Humidity	20% ~ 85% RH, No condensation			
Storage Humidity	90% RH or less, No condensation			
OTHER				
Analog Control	Yes			
Interface	USB/LAN/GPIB(Optional)			
Power Source	100Vac ~ 240Vac, 50Hz/ ~ 60Hz, single phase			
Dimension	214(W)x124(H)x358(D) mm			
Weight				
	Approx. 5.2kg	Approx. 5.2kg	Approx. 6.8kg	Approx. 6.8kg

ORDERING INFORMATION

PSB-1400L	40V/40A/400W Programmable Multi-Range D.C. Power Supply
PSB-1400M	100V/10A/400W Programmable Multi-Range D.C. Power Supply
PSB-1800L	40V/80A/800W Programmable Multi-Range D.C. Power Supply
PSB-1800M	100V/20A/800W Programmable Multi-Range D.C. Power Supply

ACCESSORIES

CD-ROM (User Manual, Programming Manual) x 1, Power cord for UL/CSA or VDE (Region dependent), Output terminal cover, Type-A to USB cable, PSB-108 Rack mountkit (x1 -
M4 terminal screws and washers x 2, M8 Terminal bolts, Nuts and washers x 2, Analog control protection dummy x 1, Analog control lock level x 2, Short bar x 1

OPTIONAL ACCESSORIES

PSP-001	Analog remote control connector kit
PSP-002	Sense DC test
PSP-003	Contact removal tool
PSB-101	Cable for 2 units of PSB-1000 in parallel connection
PSB-102	Cable for 3 units of PSB-1000 in parallel connection
PSB-103	Cable for 4 units of PSB-1000 in parallel connection
PSB-104	Cable for 2 units of PSB-1000 in series connection
PSB-105	GPIB card
PSB-106	Rack mount kit M4 Terminal screws and washers x 2, M8 Terminal bolts, Nuts and washers x 2, Analog control protection dummy x 1, Analog control lock level x 2, Short bar x 1
CAL-001	Rack mount kit (L)
CAL-002	Rack mount kit (EIA)
CTL-101	Foot holder to rack's front

FREE DOWNLOAD

Driver	Labview Driver

PSB-101 Cable for 2 units of PSB-1000 in parallel connection

PSB-102 Cable for 3 units of PSB-1000 in parallel connection

PSB-103 Cable for 4 units of PSB-1000 in parallel connection

PSB-104 Cable for 2 units of PSB-1000 in series connection

PSB-105 GPIB card

Programmable Switching D.C. Power Supply

PSH-Series

RS-232 | GPIB | Rear Panel Output | PC Software | 19" Rack Mount

FEATURES

- Wide Input Voltage Range and High Power Factor (P.F)
- High Efficiency and High Power Density
- Constant Voltage and Constant Current Operation
- Over Voltage , Over Current and Over Temperature Protection
- Self Test and Software Calibration
- Output ON/OFF Control
- Low Ripple and Noise
- LCD Display
- Built-in Buzzer Alarm
- Standard Interface : RS-232C
- Optional Interface : GPIB (IEEE-488.2)
- LabVIEW Driver

The PSH-Series is a single output from 360W to 1080W, programmable switching DC power supply. OVP, OCP and OTP protect the power supply and loads from unexpected conditions. Remote sensing adds an extra level of precision by compensating cable losses between loads. The bright LCD with simultaneous parameter outputs allows effortless operation. Software and software calibration features also reduce maintenance overhead. SCPI commands and LabVIEW driver access through the RS-232C or the optional GPIB interface allow remote control and ATE software development capability. Modular architecture, dedicated rear-panel output, and the 19 inch 4U rack mounting option ensure that the PSH-Series is optimized for large systems.

SPECIFICATIONS	PSH-3618A	PSH-3618A	PSH-3618A	PSH-3618A
OUTPUT				
Voltage	20V	18V	30V	18V
Current	18A	18A	20A	36A
REGULATION (C.V.)				
Load	≤ 0.1%+1mV	≤ 0.1%+1mV	≤ 0.1%+1mV	≤ 0.1%+1mV
Line	≤ 0.01%+1mV	≤ 0.01%+1mV	≤ 0.01%+1mV	≤ 0.01%+1mV
REGULATION (C.C.)				
Load	≤ 0.1%+1mA	≤ 0.2%+1mA	≤ 0.2%+10mA	≤ 0.2%+15mA
Line	≤ 0.2%+1mA	≤ 0.2%+1mA	≤ 0.2%+10mA	≤ 0.2%+15mA
RIPPLE & NOISE				
Voltage (pk-pk)	≤ 150mVp-p	≤ 150mVp-p	≤ 150mVp-p	≤ 150mVp-p
Voltage (rms)	≤ 30mVrms (20Hz-20MHz)	≤ 30mVrms (20Hz-20MHz)	≤ 30mVrms (20Hz-20MHz)	≤ 30mVrms (20Hz-20MHz)
Current (rms)	≤ 0.1%	≤ 0.1%	≤ 0.2% + 30mA	≤ 0.2% +40mA
RESOLUTION				
Voltage	10mV	10mV	10mV	10mV
Current	10mA	10mA	10mA	10mA
PROGRAM ACCURACY				
Voltage	≤ 0.05% (Zero)	≤ 0.05% (Zero)	≤ 0.05% (Zero)	≤ 0.05% (Zero)
Current	≤ 0.2% +30mA	≤ 0.2% +30mA	≤ 0.2% +30mA	≤ 0.2% +30mA
READBACK RESOLUTION (Meter)				
Voltage	Same as Resolution	Same as Resolution	Same as Resolution	As Resolution
Current	Same as Resolution	Same as Resolution	Same as Resolution	As Resolution
READBACK ACCURACY (MEAS)				
Voltage	Same as Program Accuracy	Same as Program Accuracy	Same as Program Accuracy	As Program Accuracy
Current	Same as Program Accuracy	Same as Program Accuracy	Same as Program Accuracy	As Program Accuracy
PROGRAM TEMP. COEFFICIENT				
Voltage (21 °C)	≤ 100ppm/ °C	≤ 100ppm/ °C	≤ 100ppm/ °C	≤ 100ppm/ °C
RESPONSE (Rise/Fall) TIME				
Voltage Up (0%...90%)	≤ 100mS (3%FS rating load)	≤ 100mS (3%FS rating load)	≤ 100mS (3%FS rating load)	≤ 100mS (3%FS rating load)
Voltage Down (100%...10%)	≤ 100mS (3%FS rating load)	≤ 100mS (3% FS rating load)	≤ 100mS (≥ 10% rating load)	≤ 100mS (≥10% rating load)
RECOVERY TIME (10% Step Load Change From 25%...75%)				
CV Mode	≤ 2mS	≤ 2mS	≤ 2mS	≤ 2mS
PROTECTION				
OVP/OCP/OTP	V	V	V	V
Rush Current	V	V	V	V
OUTPUT ON/OFF CONTROL				
	V	V	V	V
INTERFACE				
Standard : RS-232C, Optional : GPIB				
POWER SOURCE				
AC90~ 254V, 50/60Hz				
DIMENSIONS & WEIGHT				
	148.(W)x132.(H)x414.(D) mm, Approx. 3.0kg	308.(W)x142.(H)x393.(D) mm, Approx. 5.3kg	308.(W)x132.(H)x393.(D) mm, Approx. 5.2kg	308.(W)x132.(H)x393.(D) mm, Approx. 5.3kg

ORDERING INFORMATION

PSH-3618A	360W Programmable Switching D.C. Power Supply
PSH-3618A	360W Programmable Switching D.C. Power Supply
PSH-3628A	720W Programmable Switching D.C. Power Supply
PSH-3638A	1080W Programmable Switching D.C. Power Supply

ACCESSORIES :
User manual x 1 , Power cord x 1

OPTION

Opt.-01 : GPIB Interface (factory installed)

OPTIONAL ACCESSORIES

GRA-403	Rack Mount Kit
GTI-232	RS-232C Cable, 9 pin Female to 9 pin, null Modem for Computer
GTL-123	Test Lead, 1.2mm to Alligator Test Lead, Max. Current 40A, 1200mm
GTL-248	GPIB Cable, Double Shielded, 2000mm

FREE DOWNLOAD

PC Software	PC Software including Data Log , Remote Control Software
Driver	Labview Driver

Note : When opt.01 GPIB interface is ordered, the standard interface RS-232C will be deleted.

Rear Panel

Programmable Switching D.C. Power Supply

The PSP Series is a single output, 300W programmable switching DC power supply. OVL, OCL, OTP, and OPP protect the PSP Series and its loads from unexpected conditions. The PSP Series has a large LCD panel with output and parameter values and a key lock feature to prevent changing the settings. The PSP Series is suitable for general bench top applications in laboratories and educational institutions.

PSP-603/405/2010

CE RS-232 PC Software

FEATURES

- LCD Display
- Output ON/OFF Control
- 3 Step Fan Speed Control
- Voltage/Current/Power Setting
- Key Lock to Avoid Error Operation
- Normal , +% & -% Output Operation Key
- Standard Interface : RS-232C
- Optional European Type Jack Terminal

European Type Jack Terminal

Rear Panel

SPECIFICATIONS			
OUTPUT			
Model	**PSP-603**	**PSP-405**	**PSP-2010**
Voltage	0 ~ 60V	0 ~ 40V	0 ~ 20V
Current	0 ~ 3.5A	0 ~ 5A	0 ~ 10A
VOLTAGE REGULATION			
Load	10mV	10mV	10mV
Line	0.05%	0.05%	0.05%
CURRENT REGULATION			
Load	3mA	3mA	3mA
Line	0.05%	0.05%	0.05%
RIPPLE			
Voltage (p-p/rms)	50mV	50mV	50mV
Current (p-p/rms)	10mA	10mA	10mA
RESOLUTION			
Voltage	10mV	10mV	10mV
Current	10mA	10mA	10mA
PROGRAM ACCURACY			
Voltage	± 0.05%rdg.+ 4digits	± 0.05%rdg.+ 3digits	± 0.05%rdg.+ 3digits
Current	± 0.1%rdg. + 5digits	± 0.1%rdg. + 5digits	± 0.1%rdg. + 5digits
READBACK (METER) RESOLUTION			
Voltage	Same as Resolution	Same as Resolution	Same as Resolution
Current	Same as Resolution	Same as Resolution	Same as Resolution
READBACK (METER) ACCURACY			
Voltage	Same as Program Accuracy	Same as Program Accuracy	Same as Program Accuracy
Current	Same as Program Accuracy	Same as Program Accuracy	Same as Program Accuracy
PROTECTION			
OVL/OCL/OPL/OTP	V	V	V
OUTPUT ON/OFF CONTROL	V	V	V
DISPLAY			
LCD			
INTERFACE (STANDARD)			
RS-232C			
POWER SOURCE			
AC 115V/230V(T10A), 50/60Hz			
DIMENSIONS & WEIGHT			
212(W) x 100(H) x 305(D)mm , Approx. 4kg			

ORDERING INFORMATION

PSP-603 300W Programmable Switching DC Power Supply
PSP-405 300W Programmable Switching DC Power Supply
PSP-2010 300W Programmable Switching DC Power Supply

ACCESSORIES :
User manual x 1, Power cord x 1, Test lead CTL-18W x 1 , European test lead CTL-20W x 1

OPTIONAL ACCESSORIES

CTL-232A RS-232C Cable
GRA-415 Rack Mount Kit (19", 3U Size)

FREE DOWNLOAD

PC Software RS-232C Remote Control Software

Switching D.C. Power Supply

The SPS Series is a single-output, 160W, switching DC power supply. OVP protects the SPS Series and their loads from unexpected conditions. High regulation is maintained at 0.01%. Remote sensing adds an extra level of precision by compensating cable losses between loads. Turning the output On/Off from external device is available through Remote control terminals. The SPS Series is an ideal solution for power efficient bench top or portable applications requiring high regulation.

SPS-1230/1820/2415/3610/606

CE

FEATURES

- Dual Measurement Display
- 0.01 % High Regulation
- Constant Voltage and Constant Current Operation
- High Efficiency
- High Power Density
- Over Voltage Protection
- Remote Output ON/OFF Control

SPECIFICATIONS

OUTPUT					
	SPS-1230	SPS-1820	SPS-2415	SPS-3610	SPS-606
Voltage	0 ~ 12V	0 ~ 18V	0 ~ 24V	0 ~ 36V	0 ~ 60V
Current	0 ~ 30A	0 ~ 20A	0 ~ 15A	0 ~ 10A	0 ~ 6A
CONSTANT VOLTAGE OPERATION					
Regulation	Line regulation ≤ 5mV Load regulation ≤ 5mV				
Ripple & Noise	≤ 1mVrms, 100mVp-p 20Hz ~ 20MHz				
Recovery Time	≤ 500μS (50% Load change, Minimum load 0.5A)				
Temp. Coefficient	≤ 100ppm / °C				
Output Range	0 to rating voltage continuously adjustable				
CONSTANT CURRENT OPERATION					
Regulation	Line regulation ≤ 5mA Load regulation ≤ 5mA				
Ripple Current	≤ 3mArms (SPS-606) ≤ 5mArms (SPS-3610) ≤ 5mArms (SPS-2415) ≤ 5mArms (SPS-1820) ≤ 5mArms (SPS-1230)				
Output Range	0 to rating current continuously adjustable (HI/LO range switchable)				
METER					
Type	3 1/2 digits 0.8" LED display				
Accuracy	±(0.5% of rdg + 3digits)				
INSULATION					
Chassis and Terminal	20MΩ or above (DC 1000)				
Chassis and AC Cord	10MΩ or above (DC 1000)				
POWER SOURCE					
AC 115V/230VAC 15 %, 50/60Hz					
DIMENSIONS & WEIGHT					
128(W) x 151(H) x 340(D) mm, Approx. 1.2kg					

Rear Panel

ORDERING INFORMATION

SPS-1230 160W Switching D.C. Power Supply
SPS-1820 160W Switching D.C. Power Supply
SPS-2415 160W Switching D.C. Power Supply
SPS-3610 160W Switching D.C. Power Supply
SPS-606 160W Switching D.C. Power Supply

ACCESSORIES:
User manual x 1, Power cord x 1, Test lead CTL-203A x 1

Multiple Output Dual Range D.C. Power Supply

SPD-3606

FEATURES

- Three Independent, Isolated Output
- CH1/CH2 : Dual Output Range of 30V/6A or 60V/3A
- CH3 Adjustable Output : 0.1~5V/3A
- High Efficiency Power Conversion (Up to 25% Than Traditional Power Supply)
- Remote Output On/Off Control
- OVP to Protect the DUT
- OTP to Protect SPD-3606 for Reducing the Repair Rate
- Automatically Switches AC 115/230V Source
- Full Safety Design: Reverse Polarity, CH3 Overload Protection, Safe Output Setting
- C.C./C.V. Mode
- Compact Size, Light Weight
- Low Fan Acoustic Noise with Fan Speed Control Circuit
- Voltage/Current Protection Knob(Option)
- Optional European Jack Type Terminal

European Type Jack Terminal

Rear Panel

GPS-001

Voltage/Current protection Knob

The SPD-3606 DC power supply provides 370W output capacity. Three isolated outputs with dual range for CH1 & CH2, highly efficient power conversion, low noise, high reliability, thorough protection, excellent value and a compact size. SPD-3606 creates a new bench mark for satisfying mainstream power supply demands. CH1 & CH2 offer dual range output either at 30V/6A or 60V/3A per channel to accommodate a wide range of applications. SPD-3606 supports series and parallel tracking, allowing the CH1 and CH2 to be internally connected in series or parallel providing flexible output (30V/12A, 60V/6A, or 120V/3A). High power density and high power conversion efficiency lets SPD-3606 consume less energy making for a greener power supply. In addition, the high power density makes SPD-3606 weigh less than half and occupy much less space compared to linear power supplies. To avoid damage caused by improper operation, it also has OVP and OTP. The dual range AC input accepts both 115V and 230V inputs. When the instrument is on, devices can be connected and voltage/current levels can be adjusted safely from the front panel by turning off the output using the Output on/off key. The optional voltage/current protection knobs can be used to prevent accidentally changing the output levels. These knobs are useful for automated testing at fixed output levels, such as in assembly lines or product inspections.

SPECIFICATIONS	
OUTPUT RATINGS	
CH1/CH2 Independent	0 ~ 30V / 0 ~ 6A ; 0 ~ 60V / 0 ~ 3A
CH1/CH2 Series	0 ~ 60V / 0 ~ 6A ; 0 ~ 120V / 0 ~ 3A
CH1/CH2 Parallel	0 ~ 30V / 0 ~ 12A ; 0 ~ 60V / 0 ~ 6A
CH3	0.1 ~ 5V / 3A
VOLTAGE REGULATION	
Line	≤ 0.01% + 3mV
Load	≤ 0.01% + 6mV (rating current ≤ 6A) ≤ 0.01% + 8mV (rating current ≤ 12A)
Ripple & Noise	≤ 1mVrms (5Hz ~ 1MHz) ; ≤ 50mVpp (20Hz ~ 20MHz)
Recovery Time	≤ 100μs (50% load change, minimum load 0.5A)
CURRENT REGULATION	
Line	≤ 0.2% + 5mA
Load	≤ 0.2% + 5mA
Ripple & Noise	≤ 3mArms
TRACKING OPERATION	
Tracking Error	≤ 0.5% + 10mV of master
Series Regulation	≤ 300mV
Ripple & Noise	≤ 10mVrms (5Hz ~ 1MHz) ; ≤ 100mVpp (20Hz ~ 20MHz)
OUTPUT ON/OFF RESPONSE TIME	
Voltage Up (10% ~ 90%)	≤ 100ms (≤ 0.05% rating load)
Voltage Down (90% ~ 10%)	≤ 100ms (≤ 10% rating load)
OVP	
Accuracy	± (0.5% of reading + 0.5V)
METER	
Type	3 Yellow 0.3" LED display
Accuracy	± (0.3% of reading + 2 digits)
Resolution	10mV/10mA
INSULATION	
Chassis & Terminal	100MΩ or above (DC 500V)
Chassis & AC cable	100MΩ or above (DC 500V)
TEMPERATURE COEFFICIENT	
Voltage	≤ 100ppm/°C + 5mV
Current	≤ 150ppm/°C + 5mA
REMOTE CONTROL	
Output On/Off	
FAN NOISE	
≤ 50dB	
OPERATION ENVIRONMENT	
Ambient temperature 0 ~ 40 °C ; Relative Humidity ≤ 80%	
STORAGE ENVIRONMENT	
Ambient temperature -10 ~ 70 °C ; Relative Humidity ≤ 70%	
POWER SOURCE	
AC 115V/230V ±10%, 50/60Hz	
DIMENSIONS & WEIGHT	
251 (W) x 145.04 x 265 (D) mm ; Approx. 6kg	

ORDERING INFORMATION

SPD-3606 Multiple Output Dual Range D.C. Power Supply

ACCESSORIES :
User manual x 1, Power cord x 1, Test lead GTL-104A x 2, GTL-105A x 1
European Test Lead GTL-201A x 1, GTL-202A x 1, GTL-204A x 2

OPTIONAL ACCESSORIES

GPS-001 Voltage/Current protection Knob

GSM-20H10

NEW

CE | RS-232 | USB Host | USB Device | LAN | Digit I/O | GPIB

FEATURES

- Maximum Output ±210V/±1.05A/22W
- Built-in 4 Sequence Output Modes (Stair, Log, SRC-MEM, Custom), up to 2500 Points
- OVP /OTP Protection Function
- 0.012% Basic Measure Accuracy with 6½-digit Resolution
- Variable Sampling Speed
- SDM (Source Delay Measure) Cycle
- 2-, 4-, and 6-wire Remote V-source and Measure Sensing
- Variable Display Digits
- Built-in Limit Function
- Built-in 5 Calculation Functions
- 4.3" TFT LCD, Digital Number Keyboard
- Built-in RTC Clock
- Interface: RS-232, USBTMC, LAN, GPIB (Opt.)

GW Instek GSM-20H10 is a Source Measure Unit that provides highly stable DC power and instrument-grade 6½-digit multimeter measurements. While operating, it can be used as a voltage source, current source, voltmeter, ammeter, and ohmmeter, which is uniquely ideal for the evaluation of component characteristics and the test applications of production, including nanomaterials and components, semiconductor architecture, organic materials, high-efficiency illumination, passive components and material characteristics analysis, etc.

GSM-20H10 provides four-quadrant operation of ±210V/±1.05A/22W. The first and third quadrants operate as power supplies to supply power to the load. The second and fourth quadrants function as loads to consume power internally. Voltage value, current value and resistance value can be measured while operating the power supply or load function with an accuracy of 0.012% and a resolution of 1μV/10pA/10μΩ.

With respect to sampling rate, GSM-20H10 supports a sampling rate of up to 50k points/second, which can accurately analyze the characteristics of the DUT. With the large 4.3-inch screen, all measurement settings, parameters and results can be completely displayed on the screen. The SDM (Source Delay Measure) function is provided to delay sampling when the signal changes so as to prevent the unstable signal from being captured and cause misjudgment. There are four built-in sequence output modes (Stair, Log, SRC-MEM, Custom), which can support up to 2500 points of sequence variation output.

Pertaining to protection, GSM-20H10 provides OVP/OTP modes. The design of OVP allows users to self-define the range of OVP. OTP can effectively prevent errors caused by temperature drift during the test process. For interfaces, this product supports standard SCPI commands and provides RS-232, USBTMC, LAN, GPIB (optional) interfaces to meet users' different interface needs.

GSM-20H10

Rear Panel

SM-01/SM-02 Digital I/O Adapter

ORDERING INFORMATION

GSM-20H10 with GPIB	Source Measure Unit
GSM-20H10	Source Measure Unit

ACCESSORIES

CD User manual x 1, Quick Start manual x 1, Test Lead GTL-207A x 1, Alligator Clip x 2

OPTIONAL ACCESSORIES

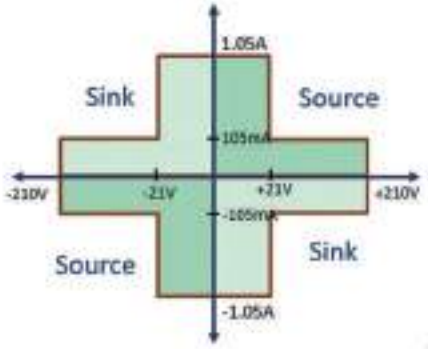
SM-01	Digital I/O Adapter, Convert DB15 to DB9 + 8-pin micro-DIN
SM-02	Digital I/O Adapter, Convert DB15 to DB37 + 8-pin micro-DIN
GTL-246	USB Cable (USB 2.0 A-B Type, approx., 1200mm)
GTL-248	GPIB Cable, 2000mm

NOTE 1. Speed – Normal (1 NPLC). For 0.1 PLC, add 0.005% of range to offset specifications, except 200mV, 1A ranges, add 0.05%. For 0.01 PLC, add 0.05% of range to offset specifications, except 200mV, 1A ranges, add 0.5%.
2. Required to reach 0.1% of final value after Command is processed. Resistive load, 10μA to 100mA range.
3. Overshoot into a fully resistive 100kΩ load. 10Hz to 1MHz BW, adjacent ranges. 100mV typical, except 20V/200V.
4. Maximum time required for the output to begin to change following the receipt of:SOURce:VOLTage|CURRent <nrf> Command.
5. Reading rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading forms.
6. Purely resistive load. 1μA and 10μA ranges =50ms.
7. 1000 point sweep was characterized with the source on a fixed range.
8. Pass/Fail test performed using one high limit and one low math limit.
9. Includes time to re-program source to a new level before making measurement.
10. Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.
11. Command processing time of :SOURce:VOLTage|CURRent:TRIGgered<nrf> Command not included.

SPECIFICATIONS

MAXIMUM RANGE	Voltage	±21V							
	Current	±1.05A							
	Power	22W							
	Voltage Resolution	1μV							
	Current Resolution	10pA							
SOURCE	DC Voltage	Output Voltage	±21V / ±1.05A, ±210V / ±105 mA						
		Current Limit	Min. 0.1% of range						
		Programming Resolution & Accuracy *1	Range	±200.000mV	±2.00000V	±20.0000V	±200.000V		
			Resolution	1μV	10μV	100μV	1mV		
			Accuracy	±(0.02%+600μV)	±(0.02%+600μV)	±(0.02%+2.4mV)	±(0.02%+24mV)		
		Load Regulation	0.01% of range+100μV						
		Line Regulation	0.01% of range						
		Overshoot	<0.1% typical (full scale step, resistive load, 50mA range)						
		Recovery Time (1800% Load Change)	<25μs (within 0.1% plus load regulation errors, 1A and 100mA compliance)						
		Ripple and Noise	4mVrms (20Hz ~ 10MHz) / 18mVpp(20Hz~ 10MHz)						
		Temperature Coefficient	±(0.1 × accuracy specification)/°C (0°~18°C & 28°~50°C)						
	DC Current	Output Current	±1.05A / ±21V, ±105 mA / ±210V						
		Voltage Limit	Min. 0.1% of range						
		Programmed Source Resolution & Accuracy *1	Range	±1.00000μA	±10.0000μA	±100.000μA	±1.00000mA	±10.0000mA	±100.000mA	±1.00000A
			Resolution	10pA	100pA	1nA	10nA	100nA	1μA	10μA
			Accuracy	±(0.035%+600pA)	±(0.02%+2nA)	±(0.021%+20nA)	±(0.024%+280nA)	±(0.045%+2μA)	±(0.066%+20μA)	±(0.12%+480μA)
		Load Regulation	0.01% of range+1400μA						
		Line Regulation	0.01% of range						
		Overshoot	<0.1% typical (1mA step, RL = 1kΩ, 28V range)						
		Temperature Coefficient	±(0.1 × accuracy specification)/°C (0°~18°C & 28°~50°C)						
	General	Output Settling Time *1	100μs typical time						
		Output Rise Time (μ300Ω)	300μs, 20V range, 1.8mA compliance ; 150μs, 20V range, 100mA compliance						
		DC Floating Voltage	Output can be floated up to ±250VDC						
		Remote Sense	Up to 1V drop per load lead						
		Compliance Accuracy	Add 0.3% of range and ±0.02% of reading to base specification						
		Range Change Overshoot *1	Adjacent range changes between 200mV, 2V and 20V ranges, 180mV typical						
		Minimum Compliance Value	0.1% of range						
		Command Processing Time *4	Autorange On/10ms, Autorange Off/1ms						
MEASUREMENT	Voltage	Input Resistance	>10 GΩ						
		Measurement Resolution & Accuracy	Range	±200.000mV	±2.00000V	±20.0000V	±200.000V		
			Resolution	1μV	10μV	100μV	1mV		
			Accuracy	±(0.012%+300μV)	±(0.012%+300μV)	±(0.015%+1.5mV)	±(0.015%+10mV)		
		Temperature Coefficient	±(0.1 × accuracy specification)/°C (0°~18°C & 28°~50°C)						
	Current	Voltage Burden (4-wire mode)	< 1mV						
		Programmed Source Resolution & Accuracy *1	Range	±1.00000μA	±10.0000μA	±100.000μA	±1.00000mA	±10.0000mA	±100.000mA	±1.00000A
			Resolution	10pA	100pA	1nA	10nA	100nA	1μA	10μA
			Accuracy	±(0.029%+30pA)	±(0.021%+90pA)	±(0.033%+6nA)	±(0.007%+8nA)	±(0.035%+60nA)	±(0.035%+6μA)	±(0.22%+570μA)
		Temperature Coefficient	±(0.1 × accuracy specification) / °C (0°~18°C & 28°~50°C)						
	Resistance	Range		<2.00000Ω	2.00000Ω	20.0000Ω	200.000Ω	2.00000kΩ	20.0000kΩ
			Resolution	—	10μΩ	100μΩ	1mΩ	10mΩ	100mΩ
			Test current	—	—	10mA	10mA	1mA	100μA
			Accuracy	Source IACC+Meas.VACC	Source IACC+Meas.VACC	±(0.1%+0.003Ω), Normal	±(0.06%+0.03Ω), Normal	±(0.07%+0.3Ω), Normal	±(0.065%+3Ω), Normal
						±(0.07%+0.001Ω), Enhanced	±(0.02%+0.01 Ω), Enhanced	±(0.05%+0.1Ω), Enhanced	±(0.04%+1Ω), Enhanced
				200.000kΩ	2.00000MΩ	20.0000MΩ	200.000MΩ	>200.000M Ω	
			Resolution	1Ω	10Ω	100Ω	1kΩ	—	
			Test current	10μA	1μA	0.5μA	100nA	—	
			Accuracy	±(0.07%+300Ω), Normal	±(0.11%+300Ω), Normal	±(0.11%+1kΩ), Normal	±(0.065%+10kΩ), Normal	Source IACC+Meas.VACC	
				±(0.05%+100Ω), Enhanced	±(0.05%+100Ω), Enhanced	±(0.05%+300Ω), Enhanced	±(0.35%+3kΩ), Enhanced		
		Temperature Coefficient	±(0.15 × accuracy specification)/°C (0°~18°C & 28°~50°C)						
		Source I mode, Manual OHMS	Total uncertainty = I source accuracy + V measure accuracy (4-wire remote sense)						
		Source V mode, Manual OHMS	Total uncertainty = V source accuracy + I measure accuracy (4-wire remote sense)						
		4-wire OHMS Mode	Available using active sense guard and guard sense. Max. Guard Output Current: 50mA (except 1A range). Accuracy is load dependent						
		Guard Output Impedance	<0.1Ω in ohms mode						
SYSTEM SPEED *5	Maximum Range Change Rate		75/second						
	Maximum Measure Auto Range Time		40ms (Fixed source) *6						
	Sequence Reading Rates *7 (rdg./second) for 60Hz (50Hz)	Speed	NPLC / Trig Origin	Measure		Source-Measure *9		Source-Measure Pass/Fail test *8, *9		Measure Memory *9	
				TO MEMORY	TO GPIB	TO MEMORY	TO GPIB	TO MEMORY	TO GPIB	TO MEMORY	TO GPIB
		Fast	0.01 / internal	3081 (3090)	1198 (1318)	1551 (1575)	1008 (900)	900 (908)	809 (840)	165 (165)	164 (165)
		488.2	0.01 / external	1239 (1280)	1079 (1058)	1018 (980)	916 (831)	830 (838)	756 (780)	163 (168)	162 (160)
		Medium	0.1 / internal	519 (455)	509 (493)	478 (470)	470 (410)	389 (343)	388 (345)	133 (126)	132 (126)
		488.2	0.1 / external	458 (388)	438 (380)	489 (368)	409 (361)	374 (333)	339 (333)	131 (125)	131 (123)
		Normal	1 / internal	59 (49)	59 (49)	58 (48)	58 (48)	56 (47)	56 (47)	44 (38)	44 (38)
		488.2	1 / external	57 (48)	57 (48)	57 (48)	57 (47)	56 (47)	56 (47)	44 (38)	44 (38)
	Single Reading Operation Rates (rdg./second) for 60Hz (50Hz)	Speed	NPLC / Trig Origin	Measure		Source-Measure *9		Source-Measure Pass/Fail test *8, *9	
				TO GPIB		TO GPIB		TO GPIB	
		Fast(488.2)	0.01 / internal	256 (254)		79 (80)		79 (80)	
		Medium(488.2)	0.1 / internal	147 (146)		72 (78)		69 (78)	
		Normal(488.2)	1 / internal	49 (42)		34 (33)		33 (34)	
	Component Interface Handler Time for 60Hz (50Hz) *8, *10	Speed	NPLC / Trig Origin	Measure		Source-Pass/Fail test		Source-Measure Pass/Fail test *8, *9	
				TO GPIB		TO GPIB		TO GPIB	
		Fast	0.01 / internal	1.84 ms (1.88 ms)		8.4 ms (8.5 ms)		6.82 ms (6.3 ms)	
		Medium	0.1 / internal	2.55 ms (2.9 ms)		8.5 ms (8.5 ms)		6.27 ms (7.1 ms)	
		Normal	1 / internal	17.51 ms (18.9 ms)		8.3 ms (8.5 ms)		17.31 ms (25.0 ms)	
SYSTEM GENERAL	Load Impedance		Stable into 20,000μF typical						
	Differential Mode Voltage		250VPk						
	Common Mode Voltage		250VDC						
	Common Mode Isolation		>1MΩ, <1000pF						
	Over Range		101% of range, source and measure						
	Max. Voltage Drop		5V						
	Max. Sense lead Resistance		1kΩ						
	Sense Input Impedance		>10GΩ						
	Guard Offset Voltage		<15μV, typical						
	Source Output Modes		Fixed DC level, Memory List (mixed functions), Step (linear and log)						
	Source Memory List		100 points max.						
	Memory Buffer		5,008 readings @ 5 digits (two 2,500 point buffers). Includes selected measured value(s) and time stamp. Lithium battery backup (3 yr + battery life)						
	Programmability		IEEE-488.2 (SCPI), RS-232 ; 3 user-definable power-up states plus factory default and *RST.						
	Digital I/O Connector		Active low input, Start of test, end of test, 3 category bits. ; +5V@ 500mA supply. ; 1 trigger input, 4 TTL/Relay Drive outputs (35V@500mA, diode)						
	Remote Interface		USB/GPIB/LAN/RS-232						
	Insulation		Chassis and terminal : 20MΩ or above (DC 500V) ; Chassis and AC cord : 10MΩ or above (DC 500V)						
	Operation Environment		Indoor use, Altitude: < 2000m Ambient temperature: 0 ~ 40°C Relative humidity: < 80% Installation category: II, Pollution degree: 2						
	Storage Environment		Temperature: -20°C ~ 70°C, Humidity: < 80%						
	Input Power		100-240VAC, 50-60Hz						
	Power Consumption		80W						
	Dimensions & Weight		214 (W) x 88 (H) x 356.5 (D) mm, Approx. 4.8kg						

A. MAXIMUM OUTPUT: ±210V/±1.05A/22W

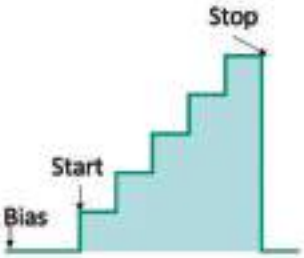


The power source output of the GSM-20H10 has two ranges.

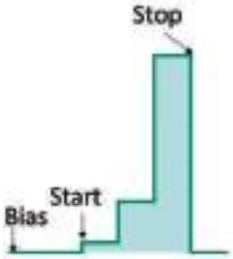
The voltage range is ±21 volts, and the current is ±1.05A.
The voltage range is ±210 volts, and the current range is ±105mA.
The power capacity is 22W.

Provide a full range of four-quadrant measurement without duty cycle limit.

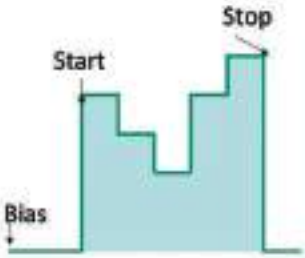
B. BUILT-IN 4 SEQUENCE OUTPUT MODES, UP TO 2500 POINTS



LINEAR STAIRCASE SWEEP



LOG STAIRCASE SWEEP



CUSTOM MODE

GSM-20H10 Source Measure Unit provides four sequence output modes: linear staircase, log staircase, SRC-MEM (source memory) and Custom (self-defined).

With these output modes, users can quickly generate output as needed. The total number of sequence points is 2,500.

C. OVP/OTP PROTECTION FUNCTION

In terms of protection, GSM-20H10 provides OVP/OTP protection modes; in the design of OVP, users can define the range of OVP, and the protection of OTP can effectively prevent errors caused by temperature drift during the test process.

D. 0.012% BASIC MEASURE ACCURACY WITH 6½DIGIT RESOLUTION

GSM-20H10 provides a measurement accuracy of up to 0.012%, and provides a meter display function of up to 6½ digits, allowing users to have more accurate results when measuring small signals...

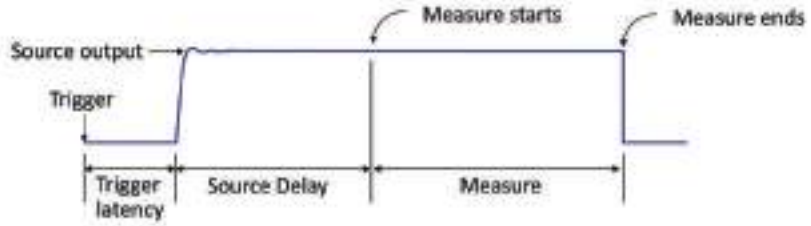
E. VARIABLE SAMPLING SPEED

The sampling rate of GSM-20H10 is variable. Therefore, users can choose the sampling rate from 0.01 PLC to 10 PLC according to their needs.

SAMPLING MODE	FAST	MEDIUM	NORMAL	HIGH	OTHER
Speed, NPLC	0.01	0.1	1	10	User defined
Digit	3½	4½	5½	6½	Selectable

Where NPLC represents the number of power line cycles, for example, AC power frequency is 50Hz, 1 PLC means 20ms, 2 PLC means 40ms, and so on.

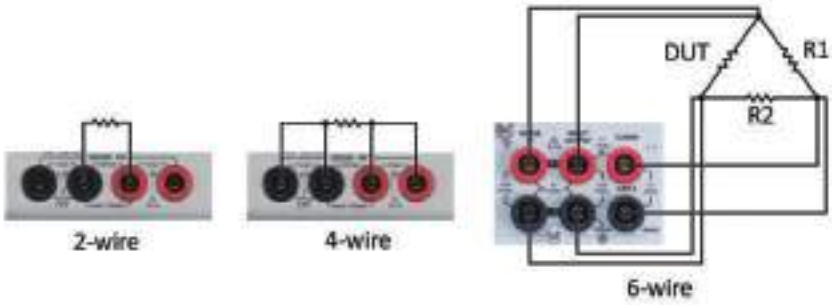
F. SDM (SOURCE DELAY MEASURE) CYCLE



The initial state of the source output may be unstable. If the meter starts measuring after the source is output, users can set the source delay to start the meter measurement after passing the unstable period so as to obtain stable measurement results.

GSM-20H10 Source Measure Unit delay range is 0 to 9999.999 seconds.

G. 2-, 4-, AND 6-WIRE REMOTE V-SOURCE AND MEASURE SENSING



Other than 2-wire, GSM-20H10 also provides 4-wire and 6-wire resistance measurements.

4-wire measurement eliminates the effect of lead resistance, realizing accurate measurement of small resistances below 100ohm at high currents.

6-wire combining 4-wire connection and the protection of ohm characteristics eliminate the effects of internal parallel resistance, realizing the resistance measurement of a tiny wire.

H. VARIABLE DISPLAY DIGITS

The display bits of GSM-20H10 are variable. Therefore, users can choose the number of display bits among 3.5, 4.5, 5.5, and 6.5 bits according to their needs.

I. BUILT-IN LIMIT FUNCTION

GSM-20H10 has three built-in Pass/Fail limit line tests with a total of 11 sets.

J. BUILT-IN 5 CALCULATION FUNCTIONS

- Power = V×I
- CompOhms = $\frac{(V2-V1)}{(I2-I1)}$
- Vcoeff(%) = $\left[\frac{\Delta R}{(R2+SP)}\right]$ × 100%
- VarAlpha , $\alpha = \frac{\log(I2+/I1)}{\log(V2+/V1)}$
- Dev = $\left[\frac{(A-T)}{T}\right]$ × 100%

GSM-20H10 provides five built-in calculation functions: Power, Offset Compensation Ohms, Voltage Coefficient, Varistor Alpha, and Percent Deviation.

Programmable High Precision D.C. Power Supply

PPH-1503

PPH-1503D/1506D/1510D

FEATURES

- 3.5" TFT LCD Display
- High Measurement Resolution: 1mV/0.1μA for 1mA range
- Transient Recovery Time: 040μS within 100mV; <80μs within 20mV
- Current Sink Function
- Pulse Current Measurement (Pulse width min.: 33μs)
- Long Integration Current Measurement
- Built-in DVM Measurement Function
- Sequence Function (Sequence power output)
- Built-in Battery Simulation Function (CH1 of PPH-1506D)
- OVP, OCP, OTP & Temperature Display for Heat Sink
- Support USB (Device & Host)/GPIB/LAN
- Five Groups of Save/Recall Setting
- External Relay Control

PPH-1503 Rear Panel

PPH-1503D/1506D/1510D Rear Panel

PPH Series high precision measurement capability achieves the maximum resolution of 1mV/1, 1μA and the smallest pulse current width of 33μs that satisfy customers' measurement application requirements of high resolution and pulse current. Fast load current variation will result in voltage lag for general power supplies that will have an impact on DUT's internal circuit operation. PPH Series is equipped with the excellent transient recovery time, which can, in less than 40μs, recover the output voltage to within 100mV of the previous voltage output when the current level changes from 10% to 100% of the full scale. Furthermore, conventional power supplies do not have sufficient response speed to promptly respond to set voltage value once the set voltage is changed. PPH-1506D has a max rise of 8.2ms and a fall time of 10ms, which are 100 times faster than that of conventional power supplies. Therefore, PPH-1506D can provide DUT with a stable output voltage even when DUT is operating under large transient current output. The internal high-speed sampling circuit design of PPH-1506D, with the sample rate of 1MS, can conduct pulse current measurement without using a current probe and oscilloscope. The current read back accuracy is 0.2%+1μA (equals to 11μA) at 3mA range, and the read back resolution is 1, 1μA that allow DUT to be measured with a high accuracy level. Unlike battery, general power supplies, which do not have the characteristics of fast transient recovery time, can not maintain a stable power supply for cellular phone, wireless device, and wearable device which produce large transient pulse current load for hundreds of μs to dozens of ms when in use. PPH-1506D, different from general power supplies, has the characteristics of fast 40μs recovery time. While simulating battery to output pulse current, PPH-1506D can quickly compensate the voltage drop caused by pulse current. PPH-1506D's CH1 has the built-in battery simulation function, which can define output impedance settings so as to accurately simulate battery's impedance characteristics during battery discharge. Fast transient recovery time and built-in battery simulation function together facilitate PPH-1506D to accurately simulate battery's real behavior pattern so as to conduct protection tests.

PPH-1506D is not only suitable for simulating battery charger and supplying power to DUT, but also ideal for simulating an electronic load to conduct discharge tests with its built-in current capability. PPH-1506D's current function allows PPH-1506D to simulate a voltage source with the sink current capability. The maximum sink current of PPH-1506D's CH1 is 0.5A and for CH2 is 3A. Long integration current measurement can be utilized to conduct average current measurements for periodical pulse current in a long period of time that is applied to a battery-powered consumption for a period of time. One of the applications is to measure the average power consumption of a cellular phone in use so as to conduct the internal RF module parameter analysis. The maximum pulse current measurement range of CH1 is 3A and for CH2 is 3A. The built-in sequence function of CH1 provides users with 1000 steps to edit sequential outputs, including voltage, current and execution time. The built-in DVM function of CH1 has a voltage range from 0 to +20VDC that saves users the cost of purchasing an additional voltage meter.

PPH-1506D provides OTP function and shows heat sink temperature on the upper right corner of the display screen. Other than this, features such as five sets of system setting values for the Save/Recall function, 10 sets of Power On Setup Settings, Key Lock function to prevent unauthorized inputs, temperature-controlled fan to reduce noise, backlight to save screen information, and external relay control device together augment PPH-1506D's usability. PPH Series supports test measurements of Profile1, Profile2 and Profile3 from USB Power Delivery(PD) constructed by USB-IF association.

SELECTION GUIDE

Model	PPH-1503	PPH-1503D	PPH-1506D	PPH-1510D
Channel	1	3	3	3
Dual Range Output (Channel 1)	0~15V/0~3A or 0~30V/0~1.5A	0~15V/0~3A or 0~30V/0~1.5A	0~15V/0~3A or 0~30V/0~1.5A	0~15V/0~3A or 0~30V/0~1.5A Rear Terminal: 0~15V/0~6.0V)
Channel 2	NA	0~12V/0~1.5A	0~12V/0~3.0A	0~12V/0~3.0A
Display	3.5 inch TFT LCD	3.5 inch TFT LCD	3.5 inch TFT LCD	3.5 inch TFT LCD
Current Measurement Range	1A/1mA	3A/10mA/1mA(CH1)	3A/100mA/1mA(CH1)	10A/100mA/1mA(CH1)
CV&CC	✓	✓	✓	✓
Built-in DVM Measurement Function	✓	✓ (CH1)	✓ (CH1)	✓ (CH1)
Pulse Current Measurement	✓	✓	✓	✓
Long Integration Current Measurement	✓	✓	✓	✓
Battery Simulation	NA	✓ (CH1)	✓ (CH1)	✓ (CH1)
Automated Sequential Output	✓	✓ (CH1)	✓ (CH1)	✓ (CH1)
High Measurement Resolution	✓ (1mV/0.1 μA)	✓ (1mV/0.1 μA)	✓ (1mV/0.1 μA)	✓ (1mV/0.1 μA)
Sink Current Capability	✓ (Max : 3A)	✓ (Max : 3.3A)	✓ (Max : 3.3A)	✓ (Max : 3.3A)
Selectable Output from Front or Rear Panel	✓	✓	✓	✓
Relay Output Control	✓	✓	✓	✓
Memory	5 Sets	5 Sets	5 Sets	5 Sets
Simple Mode	40K	44K	44K	44K
Lock Function	✓	✓	✓	✓
Protection Function	OVP/OCP/OAP	OVP/OCP/OAP	OVP/OTP/OCP/OAP	OVP/OTP/OCP/OAP
Rear Wire Output Over Current Protection	NA	✓	✓	✓
Temperature Display for Heat Sink	NA	✓	✓	✓
Standard Interface (LXI)	✓	✓	✓	✓
LAN, USB, Analog Control USB	✓ (DDC)	✓ (TMC)	✓ (TMC)	✓ (TMC)
Interface LAN	✓	✓	✓	✓

ORDERING INFORMATION

PPH-1503 (0~15V/0~3A or 0~30V/0~1.5A)High Precision DC Power Supply

PPH-1503D (CH1:0~15V/0~3A or 0~30V/0~1.5A; CH2:0~12V/0~1.5A)High Precision Dual Channel Output DC Power Supply

PPH-1506D (CH1:0~15V/0~3A or 0~30V/0~1.5A;CH2:0~12V/0~3A)High Precision Dual Channel Output DC Power Supply

PPH-1510D (CH1:0~15V/0~6A or 0~30V/0~3A;CH2:0~12V/0~3A)High Precision Dual Channel Output DC Power Supply

ACCESSORIES:

CD (User manual x1, Quick start manual x1), Power cord (Region dependent), Test lead (DTL-002B x1), DTL-003A x1, DTL-004A x1

OPTIONAL ACCESSORIES:

GTL-246 USB Cable (USB 3.0, A-B Type)

SPECIFICATIONS

Model	PPH-1303	PPH-1585D		PPH-1506D		PPH-1510D	
OUTPUT RATING							
Number of Output Channel	1	2		2		2	
Channel No.	CH 1	CH 1	CH 2	CH 1	CH 2	CH 1	CH 2
Mode	60W	40W	30W	60W	30W	60W	30W
Voltage	0 ~ 60 V or 0 ~ 30 V	0 ~ 15 V or 0 ~ 80 V	0 ~ 15 V	0 ~ 15 V or 0 ~ 60 V	0 ~ 15 V	0 ~ 15 V or 0 ~ 60 V	0 ~ 15 V
Current	0 ~ 3 A or 0 ~ 1 A	0 ~ 2 A or 0 ~ 0.5 A	0 ~ 2 A	0 ~ 3 A or 0 ~ 1 A	0 ~ 2 A	0 ~ 5 A or 0 ~ 2 A (Over 5 V/10 A, use 2 CH)	0 ~ 2 A
Output Voltage Rising Time	0.15ms (40V ~ 90%)	0.45ms (30V ~ 90%)		0.28ms (30V ~ 90%)		0.28ms (30V ~ 90%)	
Output Voltage Falling Time	0.45ms (90% ~ 10%)	0.45ms (90% ~ 10%)		0.28ms (90% ~ 10%)		0.28ms (90% ~ 10%)	
LOAD (V)							
Voltage	0.01% + 2mV	0.01% + 2mV		0.01% + 2mV		0.01% + 2mV	
Cur/mV	0.2 / 0.1 mA	—		—		—	
REGULATION (CC)							
Load	0.01% + 4mV	0.01% + 4mV		0.01% + 4mV		0.01% + 4mV	
Line	0.5mA	0.5mA		0.5mA		0.5mA	
RIPPLE & NOISE (20Hz~20MHz)							
CV p-p	6mV	1.5V, Setting≥20mV: 30mVrms		1.5V, Setting≥20mV: 30mVrms		1.5V, Setting≥20mV: 30mVrms 1.5V, 1 Setting≥20mV, 80mVrms	
CV rms	1mV	2mV/20.1 Setting		2mV/20.1 Setting		2mV/20.1 Setting	
CC rms	—	—		—		—	
PROGRAMMING ACCURACY							
Voltage	0.03% + 10mV	0.03% + 10mV		0.03% + 10mV		0.03% + 10mV	
Current(0.1A or above rated)	0.1% + 5mA	0.1% + 5mA, Apply 1 sec		0.1% + 5mA, Apply 1 sec		0.1% + 5mA, Apply 1 sec	
Current (Mid-range)	—	0.1% + 2.5mA	—	0.1% + 2.5mA	—	0.1% + 2.5mA	—
Current (Low-range)		0.1% + 1mA		0.1% + 1mA		0.1% + 1mA	
READBACK ACCURACY							
Voltage	0.03% + 5mV	0.03% + 5mV	0.03% + 5mV	0.03% + 5mV	0.03% + 5mV	0.03% + 5mV	0.03% + 5mV
Current(0.1A or above rated)	0.1% + 4mA(CC/CV)	0.1% + 4mA(CC)	0.2% + 4mA	0.1% + 4mA(CC)	0.2% + 4mA	0.1% + 4mA(CC)	0.2% + 4mA
Current (Mid-range)	—	0.1% + 1mA	—	0.1% + 1mA	—	0.1% + 1mA	—
Current (Low-range)	0.1% + 1mA	0.1% + 1mA	0.2% + 1mA	0.1% + 1mA	0.2% + 1mA	0.1% + 1mA	0.2% + 1mA
RESPONSE TIME							
Transient Recovery Time (Response to 100% Load Change)	<1ms (Load for 100mS) <10mS (Load for 20mS)	<1ms (Load for 100mS, 1ms) <1ms (Load for 100mS, 1ms) <1ms (Load for 20mS)		<1ms (Load for 100mS, 1ms) <1ms (Load for 100mS, 1ms) <1ms (Load for 20mS)		<1ms (Load for 100mS, 1ms) <1ms (Load for 100mS, 1ms) <1ms (Load for 20mS)	
PROGRAMMING RESOLUTION							
Voltage	1 mV	10mV	1 mV	10mV	1mV	10mV	1 mV
Current (1A range)	1.0mA	1.0mA(1A)	1.0mA	1.0mA(1A)	1.0mA	1.0mA(1A)	1.0mA
Current (10mA range)	—	0.1mA	—	0.1mA	—	0.1mA	—
Current (Low range)		1.0mA		1.0mA		1.0mA	
READBACK RESOLUTION							
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	1mV
Current (1A range)	0.1mA	0.1mA(CC)	0.1mA(CC)	0.1mA(CC)	0.1mA(CC)	0.1mA(CC)	0.1mA(CC)
Current (10mA range)	—	0.01mA	—	0.01mA	—	0.01mA	—
Current (Low range)	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA
PROTECTION FUNCTION							
OVP Accuracy	10mV	On ~ 24V: ±0.1V, 30mV		3V ~ 24V: ±0.1V, 30mV		3V ~ 24V: ±0.1V, 30mV	
OVP Resolution	10mV	10mV		10mV		10mV	
OVM							
OCP(Software Limit)(CC/CV)	0.05% + 6mA	<30mA: ±6mA ≥1mV 0 ~ 20V/30 -5V ~ 63V 20mV		<30mA: ±6mA ≥1mV 0 ~ 20V/30 -5V ~ 63V 20mV		<30mA: ±6mA ≥1mV 0 ~ 20V/30 -5V ~ 63V 20mV	
Readback Resolution	1mV						
Input Voltage Range	0 ~ 20V/30						
Maximum Input Voltage	63V						
Input Resistance at Equipment	1000KΩ						
PROGRAMMABLE OUTPUT RESISTANCE							
Range	0.001 Ω ~ 1.000 Ω	0.001 Ω ~ 1.000 Ω 0.5% + (0.1 Ω) 1 Ω		0.001 Ω ~ 1.000 Ω 0.5% + (0.1 Ω) 1 Ω		0.001 Ω ~ 1.000 Ω 0.5% + (0.1 Ω) 1 Ω	
Programming Accuracy							
Resolution							
PULSE CURRENT MEASUREMENT							
Trigger Level	1mA ~ 3A, 1mA/Step	1mA ~ 3A, 1mA/Step		1mA ~ 3A, 1mA/Step		1mA ~ 3A, 1mA/Step	
High Time/Low Time	1E-3s ~ 65.5s/1s	1E-3s ~ 65.5s/1s		1E-3s ~ 65.5s/1s		1E-3s ~ 65.5s/1s	
Average Time	1E-3s/1ms	1E-3s/1ms		1E-3s/1ms		1E-3s/1ms	
Trigger Delay	0 ~ 65.5s/1ms	0 ~ 65.5s/1ms		0 ~ 65.5s/1ms		0 ~ 65.5s/1ms	
Average Readings	1 ~ 255	1 ~ 255		1 ~ 255		1 ~ 255	
Low/High-value Ratio Trim	1% ~ 625	1% ~ 625		1% ~ 625		1% ~ 625	
Load Regulation	0.2mV/0.2mA/0.2mV/0.2mA + 0.2% of Programmed Value	0.2mV/0.2mA/0.2mV/0.2mA + 0.2% of Programmed Value		0.2mV/0.2mA/0.2mV/0.2mA + 0.2% of Programmed Value		0.2mV/0.2mA/0.2mV/0.2mA + 0.2% of Programmed Value	
Measurement Time	0.1ms/0.2ms/0.4ms/0.8ms/1.6ms/3.2ms/6.4ms/12.8ms/25.6ms/51.2ms/102.4ms/204.8ms/409.6ms/819.2ms/1.638s/3.276s/6.553s/13.107s	0.1ms/0.2ms/0.4ms/0.8ms/1.6ms/3.2ms/6.4ms/12.8ms/25.6ms/51.2ms/102.4ms/204.8ms/409.6ms/819.2ms/1.638s/3.276s/6.553s/13.107s		0.1ms/0.2ms/0.4ms/0.8ms/1.6ms/3.2ms/6.4ms/12.8ms/25.6ms/51.2ms/102.4ms/204.8ms/409.6ms/819.2ms/1.638s/3.276s/6.553s/13.107s		0.1ms/0.2ms/0.4ms/0.8ms/1.6ms/3.2ms/6.4ms/12.8ms/25.6ms/51.2ms/102.4ms/204.8ms/409.6ms/819.2ms/1.638s/3.276s/6.553s/13.107s	
Long Duration Trigger Mode	Timing, Falling, Manual	Timing, Falling, Manual		Timing, Falling, Manual		Timing, Falling, Manual	
I/O PORTS							
Output Terminal	Front/Rear Panel	Front/Rear Panel	Rear Panel	Front/Rear Panel	Rear Panel	Front/Rear Panel	Rear Panel
SENSE Input	Front/Rear Panel	—	Front Panel	—	Front Panel	—	Front Panel
GENERAL							
Relay Control Connector	1 Pin for 5V I/O output, 100mA	1 Pin for 5V I/O output, 100mA		1 Pin for 5V I/O output, 100mA		1 Pin for 5V I/O output, 100mA	
Operation Temperature	0 ~ 40°C	0 ~ 40°C		0 ~ 40°C		0 ~ 40°C	
Operation Humidity	< 80%	< 80%		< 80%		< 80%	
Storage Temperature	-10°C ~ 70°C	-10°C ~ 70°C		-10°C ~ 70°C		-10°C ~ 70°C	
Storage Humidity	< 80%	< 80%		< 80%		< 80%	
PC INTERFACE INTERFACE							
Standard	GPIB, USB, LAN	GPIB, USB, LAN		GPIB, USB, LAN		GPIB, USB, LAN	
CURRENT SINK CAPACITY							
Sink Current Rating	3A (Total ≤ 10 A) (2A (1 CH Max)) (2V, 0.2 CH)	5A (1 CH) 3 A, 4 A (2 CH) 2 A (2V, 0.2 CH) (1 CH) 3 A (2V, 0.2 CH) (1 CH) 2 A (2V, 0.2 CH)	2A (1 CH) 2 A, 1 A (2 CH) 1 A (2V, 0.2 CH) (1 CH) 2 A (2V, 0.2 CH)	5A (1 CH) 3 A, 4 A (2 CH) 2 A (2V, 0.2 CH) (1 CH) 3 A (2V, 0.2 CH) (1 CH) 2 A (2V, 0.2 CH)	2A (1 CH) 2 A, 1 A (2 CH) 1 A (2V, 0.2 CH) (1 CH) 2 A (2V, 0.2 CH)	5A (1 CH) 3 A, 4 A (2 CH) 2 A (2V, 0.2 CH) (1 CH) 3 A (2V, 0.2 CH) (1 CH) 2 A (2V, 0.2 CH)	2A (1 CH) 2 A, 1 A (2 CH) 1 A (2V, 0.2 CH) (1 CH) 2 A (2V, 0.2 CH)
ACCESSORY							
Secondary Fuse	1 Set	1 Set		1 Set		1 Set	
POWER							
Input Power Power Consumption	90 ~ 264VAC, 50/60Hz 60W	90 ~ 264VAC, 50/60Hz 60W		90 ~ 264VAC, 50/60Hz 60W		90 ~ 264VAC, 50/60Hz 60W	
DIMENSIONS & WEIGHT	213(W)×88(H)×345(D)mm, Approx. 3.2kg	213(W)×88(H)×345(D)mm, Approx. 3.2kg		213(W)×88(H)×345(D)mm, Approx. 3.2kg		213(W)×88(H)×345(D)mm, Approx. 3.2kg	

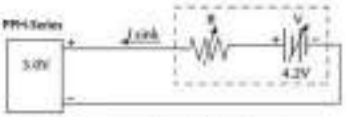
A FAST RESPONSE TO LOAD AND VOLTAGE CHANGES

PPH Series

Conventional Power Supply

When DUT such as cellular phone switches to idling, receiving or transmitting mode, the current drawn from power supply changes over twofold. The sudden current change will cause the supplied voltage to drop as well. The conventional power supply is considered a dull device since it will take several milliseconds for the dropped voltage to return to the original level. PPH Series is designed to simulate battery response where a significant voltage drop occurs. Recovery time of 40μs or less is guaranteed when the maximum voltage drop is within 500mV.

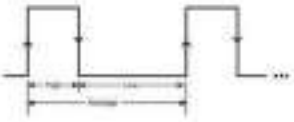
B SINK CURRENT FUNCTION



PPH Series and an Electrical Potential Circuit

When connecting with an electric potential circuit and the output voltage of the tested electric potential circuit is greater than that of PPH Series by approximately 0.2V to 2.5V, PPH Series will automatically convert its power supply role to the sink current role acting as a load of voltage source. At this time, the voltage setting of PPH Series can be regarded as the CV setting of an electronic load. A single PPH Series can be used to charge battery and to simulate battery's load to consume power without extra instruments. PPH Series is ideal for tests on battery and portable charger.

C PULSE CURRENT MEASUREMENTS



Pulse Current Measurement

PPH Series DC power supply can perform current measurements for pulsing loads. To avoid false pulse detection, users can use a trigger level of up to 5A. All pulses, noise or other transients that are less than set trigger level will be ignored. The manual integration time range setting is 33 us to 833,333 us. Pulse current measurement can measure transient current consumption to provide the information for the allocation of power supply system for products' preliminary design, i.e. power supply circuits, battery selections for clients' product analyses. Portable communications products, i.e. RF modules and designs based upon blue tooth system can better use pulse current measurement function.

D LONG INTEGRATION CURRENT MEASUREMENT

Long Integration Current Measurement

Long integration current measurement is to measure the average current of periodical pulse current in a long period of time. The measured pulse current must be a complete periodical waveform or multiple complete periodical waveforms. The total measurement time is up to 60 seconds. Measurements can be taken from pulse's positive edge trigger or negative edge trigger. Users can also take measurements from the beginning of power output. Long integration current measurement is to analyze power consumption for a period of time. For instance, users can measure the average power consumption of a cellular phone in use to analyze its internal RF module parameters.

E BUILT-IN DIGITAL VOLTMETER

DVM Input for PPH Series

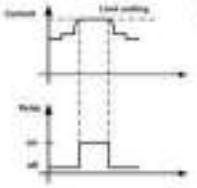
The built-in Digital Volt-Meter (DVM) of PPH Series has a dedicated input terminal located on the front panel. With the DC voltage measurement range from 0 to +120VDC, PPH Series not only provides power supply for DUT but also measures the voltage on DUT. The read back accuracy reaches ±(0.05%+3mV) and read back resolution is 1mV. Users are able to save the cost of purchasing an extra voltage meter. Furthermore, DVM measurements can be remotely controlled by SCPI commands via a PC.

F MEASUREMENTS FOR POWER CONSUMPTION ANALYSIS

Voltage and Current Waveforms of the Receiving Signals of a Cellular Phone

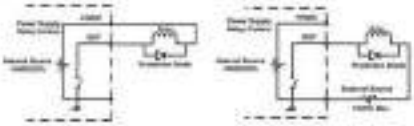
One particular requirement of power consumption for portable wireless communications devices is Pulse Current. Portable devices such as cellular phones must transmit and receive (detect) signal periodically by drawing pulse current instead of constant current from battery to ensure devices sound connection in networks. To analyze the transient power consumption of a DUT, the peak of short pulse current and average current measurements over a long period of time are crucial. PPH Series provides pulse current and long integration functions, the former can measure the peak value of a pulse, the latter can measure the average value of pulses. PPH Series provides DUT with pulse current measurement and analyzes the transient power consumption to qualify the device for specified power consumption requirements.

G EXTERNAL RELAY CONTROL



Limit Relay　　Trip Relay

Relay Can be Driven by Using Internal +5V or External Power Source :



+5VDC Relay Output

Using the +5VDC relay output to drive an external relay. Ensure the current does not exceed 100mA.

External Power Source

Using an external power source to drive the external relay. The voltage of the source can not exceed 72V and the current can not exceed 120mA.

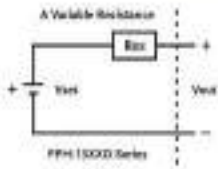
PPH Series provides Limit relay and Trip relay modes and is equipped with corresponding output ports, in which output signals control external relay. Under Limit relay mode and the current limit is reached, PPH Series will switch from Constant Voltage to Constant Current automatically. Under "Trip relay" mode and the current limit is reached, PPH Series will turn output off. Furthermore, External Relay control can be used if users simultaneously use other devices for test system. When "Limit Relay" mode is selected and the current limit is reached, External Relay control signal will go high and will return back to the low level when the current level goes back below the constant current setting. When "Trip Relay" mode is selected and the current limit is reached, the relay control signal will go high and the output is disabled. When the output goes back on and the current is less than the current setting, the relay control signal will back to the low level. Users can use relay control signal to control other devices for test system.

H SEQUENCE FUNCTION

Functional Setting Page for Sequence Function

For the practical usage, PPH-1500 can be programmed to output a sequential voltage variation according to the requirements. There are 1000 steps for users to edit output voltage, current and execution time. Programmable execution time range is from 0.001 second to 9999 seconds and the resolution is 0.001 second. Programmable recurring frequency is from 1 to 9999 or it can be set to infinite execution (set recurring frequency to 0).

I BATTERY SIMULATION FUNCTION



Battery Equivalent Model

PPH-1500's battery simulation function is equivalent to a variable resistance circuit internally connected in series to simulate battery's output impedance. The function can also be regarded as a power supply with a variable internal resistor. The variable internal resistance range is from 0.000Ω to 1.000Ω and the resolution is 1mΩ. PPH-1500 can be utilized as a battery or an ideal voltage source. Users to be connected with variable resistance Rbat in series. The following diagram shows battery simulation to produce output voltage Vout.

Programmable High-precision D.C. Power Supply

PPX-Series

CE | RS-232 | RS-485 | USB | LAN | Analog | GPIB

FEATURES

- CV, CC Priority Start Function
- Four Levels of Current Measurement Resolution (min. 0.1pA)/Two Levels of Voltage Measurement Resolution (min. 0.1mV)
- Power Output ON/OFF Delay Function
- Adjustable Voltage and Current Slew Rate
- Bleeder Circuit Control
- Delayed Over-current Protection(OCP Delay)
- Sequential Power Output Function
- Remote Sensing Function & Data Logger
- 10 Sets of Memory Function
- Over Voltage Protection, Under Voltage Limit, Over Current Protection, Over Temperature Protection, AC Alarm Function
- Supports K-Type Thermocouple Temperature Measurement
- Interfaces: USB, LAN, RS-232, RS-485, Analog Control, Opt: GPIB

The PPX Series programmable high-precision DC power supplies include six models: PPX-1005 (30V/5A/150W), PPX-2003 (20V/20A/400W), PPX-3005 (30V/5A/150W), PPX-3610 (36V/10A/360W), PPX-3605 (36V/5A/180W), and PPX-10405 (100V/5A/400W). This series has the output low noise (0.35mVrms) and fast transient response characteristics (<50μs) of conventional linear power supplies. It also provides constant voltage and constant current priority output modes, and the series can also set the voltage and current rising/falling slew rates separately, and the delay time for the output to be turned on and off.

The PPX Series has four current levels and two voltage levels to provide users with high-precision measurements, and via the Data Logger function, the measurement records can be stored in the USB for long-term measurement and recording of IoT devices, portable devices, wearable devices, and sensor components.

In order to extend the use time of portable devices and wearable devices, manufacturers are not only committed to improving the operating efficiency of the circuit, but also reducing standby power consumption as much as possible. In order to satisfy users' low-power measurement applications, GW Instek has launched the PPX Series with current measurement resolutions (0.1pA, 1pA, 10pA, 0.1mA) and voltage measurement resolutions (0.1mV, 1mV) to provide power for portable devices and wearable devices. When the device enters the sleep mode or the standby mode, the PPX series can still measure the subtle current changes of the DUT.

The PPX Series provides the Test Sequence function, which allows users to arbitrarily define output waveforms. The voltage rising or falling time and the voltage maintenance time of each step can be set. For the operation, users can directly edit parameters on the front panel of the PPX Series, or the CSV file can be edited via computer and imported into the PPX Series, and the PPX Series can be remotely edited. In addition, the OCP Delay function of the PPX Series allows users to flexibly adjust the time to enable the over-current protection according to the characteristics of the DUT to protect the DUT and at the same time to test the current change of the DUT within a certain period of time.

Other than voltage, current, and power measurement, the PPX Series also supports temperature measurement. While collocating with a K Type Thermocouple, the temperature range can be measured from -200°C ~ +1372°C. Supported standard communication interfaces include USB, LAN, RS-232, RS-485 and optional GPIB interface.

PPX-Series

GTL-205A | GTL-219 | GTL-246 | GTL-247 | GTL-252

SPECIFICATIONS

Model	PPX-1005	PPX-2002	PPX-2005	PPX-3601	PPX-3603	PPX-1041-01
DC Output Mode						
Output Voltage	0~60V	0~60V	0~60V	0~60V	0~60V	0~60V
Output Current	0~5A	0~2A	0~5A	0~1A	0~3A	0~10A
Output Power	150W	120W	300W	60W	180W	600W
CONSTANT VOLTAGE OPERATION						
Line Regulation	≤0.01% of setting+1mV	≤0.01% of setting+1mV	≤0.01% of setting+1mV	≤0.01% of setting+1mV	≤0.01% of setting+1mV	≤0.01% of setting+1mV
Load Regulation	≤0.01% of setting+2mV	≤0.01% of setting+2mV	≤0.01% of setting+2mV	≤0.01% of setting+2mV	≤0.01% of setting+2mV	≤0.01% of setting+2mV
Transient Response*	<50μs	<50μs	<50μs	<50μs	<50μs	<100μs
Ripple Noise(Vrms)*/(Vp-p)*	0.5mVrms/3mVp-p	0.5mVrms/3mVp-p	0.5mVrms/3mVp-p	0.5mVrms/3mVp-p	0.5mVrms/3mVp-p	1.5mVrms/15mVp-p
Rise Time* Rated load	20ms	30ms	30ms	50ms	50ms	100ms
Rise Time* No load	20ms	30ms	30ms	50ms	50ms	100ms
Fall Time* Rated load	90ms	30ms	30ms	30ms	30ms	80ms
Fall Time* No load	1500ms	1500ms	1500ms	1500ms	1500ms	3000ms
Setting Range (100%)	0V ~ 61.5V	0V ~ 61.5V	0V ~ 61.5V	0V ~ 61.5V	0V ~ 61.5V	0V ~ 61.5V
Setting Resolution	1mV	1mV	1mV	1mV	1mV	10mV
Setting Accuracy (25°C±5°C)	≤0.05% of setting+5mV	≤0.05% of setting+5mV	≤0.05% of setting+5mV	≤0.05% of setting+5mV	≤0.05% of setting+5mV	≤0.05% of setting+50mV
Remote Sensing Compensation Voltage(single)	1V	1V	1V	1V	1V	1V
Temperature Coefficient (TYP.)	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C
CONSTANT CURRENT OPERATION						
Line Regulation	≤0.02% of setting+250μA	≤0.02% of setting+250μA	≤0.02% of setting+250μA	≤0.02% of setting+250μA	≤0.02% of setting+250μA	≤0.02% of setting+250μA
Load Regulation	≤0.05% of setting+500μA	≤0.05% of setting+1.5mA	≤0.05% of setting+500μA	≤0.05% of setting+500μA	≤0.05% of setting+1.5mA	≤0.05% of setting+1.5mA
Ripple Noise(Arms)*	6mA	3mA	6mA	10mA	6mA	15mA
Setting Range (100%)	0A ~ 5.15A	0A ~ 2.1A	0A ~ 5.15A	0A ~ 1.05A	0A ~ 3.15A	0A ~ 10.5A
Setting Resolution	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA
Setting Accuracy (25°C±5°C)	≤0.05% of setting+3mA	≤0.05% of setting+3mA	≤0.05% of setting+3mA	≤0.05% of setting+3mA	≤0.05% of setting+3mA	≤0.05% of setting+3mA
Temperature Coefficient (TYP.)	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C
MEASUREMENT AND DISPLAY						
Voltage Range H	61.500V	61.500V	61.500V	61.500V	61.500V	100.00V
L	1.4500V	1.4500V	1.4500V	1.4500V	1.4500V	10.000V
Current Range H	5.1500A	2.1000A	5.1500A	1.0500A	3.1500A	10.500A
M	500.00mA	200.00mA	500.00mA	100.00mA	300.00mA	1.0000A
L	50.000mA	20.000mA	50.000mA	10.000mA	30.000mA	100.00mA
LL	5.0000mA	2.0000mA	5.0000mA	1.0000mA	3.0000mA	10.000mA
Measurement Voltage(H)	1mV	1mV	1mV	1mV	1mV	10mV
Resolution Voltage(L)	0.1mV	0.1mV	0.1mV	0.1mV	0.1mV	1mV
Current(H)	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA
Current(M)	0.01mA	0.01mA	0.01mA	0.01mA	0.01mA	0.01mA
Current(L)	0.001mA	0.001mA	0.001mA	0.001mA	0.001mA	0.001mA
Current(LL)	0.0001mA	0.0001mA	0.0001mA	0.0001mA	0.0001mA	0.0001mA
Measurement Voltage(H,L)	≤0.03% of rdg+2mV	≤0.03% of rdg+4mV	≤0.03% of rdg+4mV	≤0.03% of rdg+4mV	≤0.03% of rdg+4mV	≤0.03% of rdg+10mV
Accuracy Temperature Coefficient (TC)	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C
Current(H,M)	≤0.05% of rdg+2.5mA	≤0.05% of rdg+1.5mA	≤0.05% of rdg+2.5mA	≤0.05% of rdg+0.5mA	≤0.05% of rdg+1.5mA	≤0.05% of rdg+1.5mA
Current(L,LL)	≤0.1% of rdg+30μA	≤0.1% of rdg+30μA	≤0.1% of rdg+30μA	≤0.1% of rdg+30μA	≤0.1% of rdg+30μA	≤0.1% of rdg+30μA
Temperature Coefficient (TC)	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C
THERMOMETER MEASURED						
Temperature Range	-20°C ~ 110°C					
(K Type Thermocouple) Resolution	0.01°C					
Accuracy	±0.5% (-5°C)					
PROTECTION						
Over Voltage Operation	Turn the output off, display OVP and light a LED					
Protection(OVP) Setting Range	0.5V ~ 70.0V	1.0V ~ 22.0V	1.0V ~ 66.0V	1.0V ~ 66.0V	1.0V ~ 66.0V	1.0V ~ 110.0V
Setting Accuracy	(0% at 0.00V of the output voltage setting) ±1% of rated					
Over Current Operation	Turn the output off, display OCP and light a LED					
Protection(OCP) Setting Range	0.05A ~ 5.5A	0.1A ~ 2.2A	0.05A ~ 5.5A	0.05A ~ 1.1A	0.15A ~ 3.3A	0.05A ~ 11A
Setting Accuracy	(0% at 0.00A of the output current setting) ±1% of setting					
Over Temperature Protection(OTP) Operation	Turn the output off, display OTP and light a LED					
OTHER						
Interface Capabilities LAN	RJ45 Version, DNS IP Address, Web Password, Subnet IP Address, Instrument IP Address, Default Mask					
USB	Plug & Play, Type B, Baud Speed: 115.2 kB, USB-CDC					
RS-232/RS-485	Compliance with standard RS-232/RS-485 specifications, conforming to connectors					
Nominal Input Voltage	100Vac / 115Vac / 200Vac / 230Vac / 240Vac, 50Hz / 60Hz, single phase					
Input Frequency Range	47Hz ~ 63Hz					
Max. Inrush Current	20Amax 40Ams	20Amax 10ms	30Amax 60ms	20Amax 10ms	40Amax 80ms	30Amax 60ms
Max. Power Consumption						
Operating Temperature	0°C ~ 40°C					
Storage Temperature	-40°C ~ 70°C					
Operating Humidity	20% ~ 80% RH, no condensation					
Storage Humidity	10% ~ 90% RH, no condensation					
Dimensions & Weight	107(W) × 124(H) × 272(D) mm (not including protrusions), Approx. 1.1kg					

NOTE: *1. Time for output voltage to recover within ± 50 mV of its rated output for a load change from 90% to 100% of its rated output current.
*2. Measurement frequency bandwidth 0.3 Hz to 10 MHz.
*3. Measurement frequency bandwidth 20 Hz to 20 MHz.
*4. From 10% ~ 90% of rated output voltage, with rated resistive load.
*5. From 90% ~ 10% of rated output voltage, with rated resistive load.
*6. Temperature coefficient after a 30 minute warm-up.
*7. Before connecting the power plug to an AC line outlet, make sure the voltage selector switches of the bottom panel in the correct position. It might be damages the instrument by connecting to the wrong AC line voltage.

Rear Panel

GRA-441-J/E Rack Mount Kit(JIS/EIA)

ORDERING INFORMATION

PPX-1005	10V/5A/50W Programmable High-precision DC Power Supply
PPX-2002	20V/2A/40W Programmable High-precision DC Power Supply
PPX-2005	20V/5A/100W Programmable High-precision DC Power Supply
PPX-3601	36V/1A/36W Programmable High-precision DC Power Supply
PPX-3603	36V/3A/108W Programmable High-precision DC Power Supply
PPX-10H05	100V/5A/500W Programmable High-precision DC Power Supply

ACCESSORIES

CD (User Manual), Power Cord, Test Lead(CTL-18A for PPX-1005/PPX-2002/PPX-3601, 1m, 18A/CTL-10A4 for PPX-2005/PPX-3603, 1 m, 5A/CTL-28A4 for PPX-3603/PPX-2005/PPX-3605+European Type jack Terminal+1m/28A/CTL-20A4 for PPX-2002/PPX-3601/PPX-1H401+European Type jack Terminal+1m/5A/CTL-30A4, Ground lead for European Type jack Terminal)

OPTIONAL ACCESSORIES

GTL-048	USB Cable (USB 2.0 Type A-Type B Cable,6ft)
GTL-085A	Temperature probe adapter(thermal coupling, K-Type, about 1800mm)
GTL-103	GPIB Cable, 2000mm
GTL-232	RS-232 Cable with DB9 connector to RS9
GTL-485	RS-485 Cable with DB9 connector to RS9
GTL-261	Serial Master Cable+Terminator, 0.5M
GTL-262	RS-485 Slave cable
GRA-441-J	Rack for PPX Series(JIS)
GRA-441-E	Rack for PPX Series(EIA)
PPX-IC	GPIB Interface(Factory installed)

A DISPLAY MODE

Voltage and Current

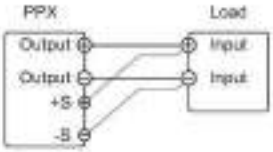
Voltage, Current and Wattage

Voltage, Current and Sequence Test

Voltage, Current and Temperature Measurement

The PPX Series has four display modes, namely 1) voltage and current 2) voltage, current and wattage 3) voltage, current and Sequence Test 4)voltage, current and temperature measurement, which are convenient for users to switch to different display modes according to test requirements.

B REMOTE SENSING



REMOTE SENSING CONNECTION DIAGRAM

The Remote-Sensing function can be used to compensate for the voltage drop caused by the resistance on the test connection lead from the power output to the load. PPX-1005/2002/2005/3601/3603 compensates for voltages up to 1 volt, and PPX-10H01 compensates for voltages up to 3 volts. When testing, choose a test connection lead with a voltage drop less than the compensation voltage of the PPX series as much as possible.

C TEMPERATURE MEASUREMENT

Blue: Temperature Control on with no GTL-205A Connected

Green: Output Safe is Activated and Output is on with GTL-205A Connected

White: Temperature Control on with GTL-205A Connected

Red: The Alarm of Short Circuit Occurs From Temperature Measurement

The PPX Series can measure DUT temperature while outputting power. Before measuring the temperature, please use the optional accessory GTL-205A (temperature probe adapter with K-type thermocouple) to connect the DUT and TC input terminals on the front panel of the PPX Series respectively. During the measurement process, users can set the monitoring temperature for the DUT. Once the measurement temperature reaches the monitoring temperature value, the PPX Series will stop the output. The PPX Series can measure the temperature range of -200.0℃~1372.0℃ [-328.0°F~2501.6 °F]. Users can choose the display unit as ℃ or °F according to the requirement.

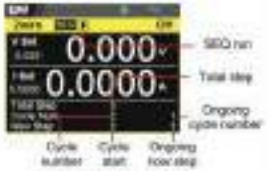
D DATA LOGGER

Data Logger Function

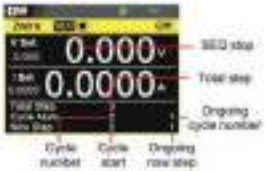
Save Data Log Into USB Disk

The PPX Series can record the measured voltage, current and temperature data to a USB flash drive or can be remotely controlled to read the data. Data sampling interval is 0.1~999.9 seconds.

E SEQUENCE TEST



SEQ Run in Cycle Mode



SEQ Stop in Cycle Mode

The Sequence Test function allows users to plan the PPX Series to execute a sequential power output. The PPX Series will automatically execute the planned power output to the DUT to realize automated measurement. The PPX Series can store

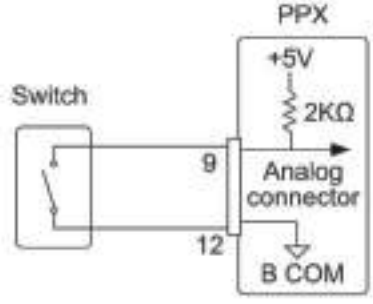
F. V/I SLEW RATE

Model	R_V Slew Rate/ F_V Slew Rate Setting Range
PPX-1005	0.0001V/ms ~ 0.1V/ms
PPX-2002	0.0001V/ms ~ 0.2V/ms
PPX-2005	0.0001V/ms ~ 0.2V/ms
PPX-3601	0.0001V/ms ~ 0.36V/ms
PPX-3603	0.0001V/ms ~ 0.36V/ms
PPX-10H01	0.001V/ms ~ 0.5V/ms

Voltage Rising/Falling Slew Rate

The PPX-Series can adjust the slew rate of current and voltage. Via setting the rising and falling time of voltage and current, users can verify the performance of the DUT during the voltage/current changes. In addition, the adjustment of the slew rate slows down the voltage transfer, which can effectively avoid the damage of the inrush current to the DUT, therefore, the series is especially suitable for the testing of capacitive loads and motors.

G. ANALOG REMOTE CONTROL



External Control of Output

The PPX-Series supports the analog control function, including external voltage to control voltage output/current output, external resistance to control voltage output/current output, external control of power output, trigger input/trigger output, and voltage/current monitoring.

H. MULTIPLE UNIT CONNECTION

Multiple Unit Connection

The PPX series can connect up to 31 units. The PC is connected to the first unit of PPX through GTL-260, and the remaining PPX units are connected in a daisy-chained method via GTL-262. When using PPX-Series Multiple Unit Connection for remote program control and slave expansion, there is no need to use other remote control equipment (E.g. switch/Hub), which can help users save equipment purchase costs.

Triple-channel Programmable DC Power Supply

GPP-3060/6030/3650

NEW

CE | RS-232 | GPIB | USB | LAN | Ext I/O

FEATURES

- 4.3"TFT LCD Display
- Setting Resolution: 1mV/0.1mA; Read Back Resolution: 0.1mV/0.1mA
- Low Ripple Noise: ≦1mVrms/≦2mArms
- Transient Response Time: ≦100μs
- Load Function (CC, CV, CR mode)
- Tracking Series and Parallel Function without Additional External Wiring
- Utilizing Hardware to Realize Over Voltage Protection/Over Current Protection/Over Temperature Protection
- Delay Function/Output Monitoring Function/ Output Recorder Function
- Supports Setting Value, Measurement Value and Output Waveform Display
- Sequential Output Function and Built-in 8 Template Waveforms
- The Output Recoeder Function Records the Output Voltage & Current Parameters with a Minimum Recording Interval of 1 Second
- Provides 10 Sets of Memory for Each Sequence/Delay/Recorder/Panel Setting Condition
- GPP-3060/6030 Supports a USB (Type A) Output Terminal
- Intelligent Temperature Control Fan Effectively Reduces Noise
- Standard: RS-232, USB, Ext I/O Optional (manufacturer installed only): LAN, LAN+GPIB

GPP-3060 and GPP-6030 triple-channel programmable DC power supplies are extension models of the GPP-X323 series. The maximum output power of these three models is 385W. GPP-3650 supports CH1/CH2: 0 ~ 36V / 0 ~5A output; CH3 supports 1.8V, 2.5V, 3.3V, 5.0V / 5A. GPP-3060 supports CH1/CH2: 0 ~ 30V / 0 ~ 6A output; GPP-6030 supports CH1/CH2: 0 ~ 60V / 0 ~ 3A output; CH3 of both models supports 1.8V, 2.5V, 3.3V, 5.0V/5A.

GPP-3650, GPP-3060 and GPP-6030 inherit the high program resolution (1mV/0.1mA) and read back resolution (0.1mV/0.1mA) of the GPP series with low-ripple noise characteristics ≦1mVrms/≦ 2mArms and ≦100μs output transient recovery ability. An independent output on-off switch is provided for each channel.

For series and parallel applications of CH1 and CH2, the tracking function can automatically switch to series or parallel output without additional external wiring. Multiple display modes including single channel or multi-channel setting value, measurement value and waveform display to collocate with the built-in output monitoring function allow users to set the monitoring conditions according to their needs so as to generate an alarm or stop the output during the measurement process in order to stop the measurement and protect the customer's DUT. The output recorder function can record the voltage/current of the output process in the internal memory, and save the result as a (*.REC) or (*.CSV) file, and then save it to a USB flash drive. The unique load function of the GPP series can arbitrarily set CH1/CH2 as power supply or load function. For example, one channel is set as power output, and the other channel is set as load function to consume the power of the DUT to satisfy simple battery charging and discharging or load characteristic test by a single power supply. The sequence output function allows users to edit the power output waveforms by themselves, and also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveforms such as serial power output or dynamic load simulation test. Channel 3 (CH3) incorporates 3A USB (Type A) output terminal, which can be used for USB charging test.

Pertaining to measurement protections, OVP/OCP/OPP/OTP protection functions are provided. The protection mechanism of OVP/OCP/OTP is implemented by hardware circuits, which has a faster response time to protect equipment or DUT while comparing with competitors who use software for protection. The OVP and OCP functions allow users to set the protection action point according to the conditions of the DUT. OPP only provides protection during the operation of the load function.

In addition, GPP-3650 , GPP-3060 and GPP-6030 incorporate terminal output on the rear panel, and include a voltage remote sensing terminal. Users can choose front panel or rear panel terminal output, which is convenient for stand-alone or rack operation. Output value setting and Sequence/ The Delay/Recorder functions provide 10 sets of internal memory, which can be uploaded/stored by a USB flash drive.

GPP-3650

GRA-449-J Rack Mount Kit (JIS)

GRA-449-E Rack Mount Kit (EIA)

Rear Panel

European Type Jack Terminal

Triple-channel Programmable DC Power Supply

SPECIFICATIONS

		GPP-3060			GPP-6030			GPP-3650		
Output Mode										
Number of Channel		CH1	CH2	CH3	CH1	CH2	CH3	CH1	CH2	CH3
Voltage		0 ~ 30.000V	0 ~ 30.000V	1.8V(2.5V)/3.3V/5.0V,±5%	0 ~ 60.000V	0 ~ 60.000V	1.8V(2.5V)/3.3V/5.0V,±5%	0 ~ 36.000V	0 ~ 36.000V	1.8V(2.5V)/3.3V/5.0V,±5%
Current		0 ~ 6.0000A	0 ~ 6.0000A	5A (USB Port 3A)	0 ~ 3.0000A	0 ~ 3.0000A	5A (USB Port 3A)	0 ~ 5.0000A	0 ~ 5.0000A	5A (USB Port 3A)
Tracking Series Voltage / Current		0 ~ 60.000V / 0 ~ 6.0000A	-	-	0 ~ 120.000V / 0 ~ 3.0000A	-	-	0 ~ 72.000V / 0 ~ 5.0000A	-	-
Tracking Parallel Voltage / Current		0 ~ 30.000V / 0 ~ 12.0000A	-	-	0 ~ 60.000V / 0 ~ 6.0000A	-	-	0 ~ 36.000V / 0 ~ 10.0000A	-	-
Warning		The CH3 output current from the 2 terminals should Not exceed 5A								
Constant Voltage Operation										
Line Regulation		≤ 0.01% + 3mV		≤ 1mV	≤ 0.01% + 3mV		≤ 3mV	≤ 0.01% + 3mV		≤ 3mV
Load regulation		≤ 0.01% + 5mV (rating current ≤ 10A)		≤ 1mV	≤ 0.01% + 5mV (rating current ≤ 10A)		≤ 5mV	≤ 0.01% + 5mV (rating current ≤ 10A)		≤ 5mV
Ripple & noise (5Hz-1MHz)		≤1mVrms		≤ 2mVrms	≤1mVrms		≤ 2mVrms	≤1mVrms		≤ 2mVrms
Transient recovery time		≤100μs								
		(50% load change, minimum load 0.1A)								
Temperature coefficient		≤ 300ppm/°C								
Constant Current Operation										
Line Regulation		≤ 0.01% + 3mA								
Load regulation		≤ 0.01% + 3mA								
Ripple & noise		≤ 3mArms								
Resolution										
Programming	Voltage	1mV	-		2mV	-		2mV	-	
	Current	0.2mA			0.1mA			0.1mA		
Readback	Voltage	0.1mV			0.1mV			0.1mV		
	Current	0.1mA			0.1mA			0.1mA		
Tracking Operation(CH1/CH2)										
Tracking error		≤ 0.1% +10mV of Master	-		≤ 0.2% +20mV of Master	-		≤ 0.1% +10mV of Master	-	
		(No Load, with load add load regulation +20mV)			(No Load, with load add load regulation +20mV)			(No Load, with load add load regulation +20mV)		
Parallel regulation	Line	≤ 0.01% + 3mV			≤ 0.01% + 3mV			≤ 0.01% + 3mV		
	Load	≤ 0.01% + 5mV (rating current ≤ 10A)			≤ 0.01% + 5mV (rating current ≤ 10A)			≤ 0.01% + 5mV (rating current ≤ 10A)		
		≤ 0.02% + 5mV (rating current > 10A)			≤ 0.02% + 5mV (rating current > 10A)			≤ 0.02% + 5mV (rating current > 10A)		
Series regulation	Line	≤ 0.01% + 3mV			≤ 0.01% + 5mV			≤ 0.01% + 5mV		
	Load	≤ 280mV			≤ 200mV			≤ 200mV		
Ripple & noise		≤2mVrms(5Hz-1MHz)			≤3mVrms(5Hz-1MHz)			≤2mVrms(5Hz-1MHz)		
Note		Tracking is not supported in LOAD mode								
Meter										
Full Scale	Voltage	12.000V	1.8V/2.5V/3.3V/5.0V		62.000V	1.8V/2.5V/3.3V/5.0V		38.000V	1.8V/2.5V/3.3V/5.0V	
	Current	6.2000A			3.2000A			5.2000A		
Programming Resolution	Voltage	5 digits			5 digits			5 digits		
	Current	5 digits			5 digits			5 digits		
Readback Resolution	Voltage	6 digits	-		6 digits	-		6 digits	-	
	Current	5 digits			5 digits			5 digits		
Setting accuracy	Voltage	± (0.03% of reading + 10mV)			± (0.03% of reading + 18mV)			± (0.03% of reading + 18mV)		
	Current	± (0.3% of reading + 10mA)			± (0.3% of reading + 18mA)			± (0.3% of reading + 10mA)		
Readback accuracy	Voltage	± (0.03% of reading + 10mV)			± (0.03% of reading + 18mV)			± (0.03% of reading + 18mV)		
	Current	± (0.3% of reading + 10mA)			± (0.3% of reading + 18mA)			± (0.3% of reading + 10mA)		
DC Load Mode										
Display	Voltage	1 ~ 61.80V			1 ~ 62.00V			1 ~ 38.500V		
	Current	0 ~ 6.300A			0 ~ 3.200A			0 ~ 5.200A		
	Power	0 ~ 50.00W			0 ~ 50.00W			0 ~ 50.00W		
CV Mode	CH1/CH2	1.500V ~ 32.00V			1.500V ~ 62.00V			1.500V ~ 36.50V		
	Setting Accuracy	≤±(0.1% + 30mV)			≤±(0.1% + 30mV)			≤±(0.1% + 30mV)		
	Readback Accuracy	≤±(0.1% + 30mV)			≤±(0.1% + 30mV)			≤±(0.1% + 30mV)		
	Resolution	10mV			10mV			10mV		
CC Mode	CH1/CH2	0 ~ 6.300A			0 ~ 3.200A			0 ~ 5.200A		
	Setting Accuracy	≤±(0.3% + 10mA)			≤±(0.3% + 10mA)			≤±(0.3% + 10mA)		
	Readback Accuracy	≤±(0.3% + 10mA)			≤±(0.3% + 10mA)			≤±(0.3% + 10mA)		
	Resolution	1mA			1mA			1mA		
CR Mode	CH1/CH2	30 ~ 1kΩ			10 ~ 1kΩ			10 ~ 1kΩ		
	Setting Accuracy	≤±(3% + 1Ω)			≤±(3% + 1Ω)			≤±(3% + 1Ω)		
		(voltage>8.1V, and current>0.1A)			(voltage>8.1V, and current>0.1A)			(voltage>0.1V, and current>0.1A)		
	Readback Accuracy	≤±(3% + 1Ω)			≤±(3% + 1Ω)			≤±(3% + 1Ω)		
		(voltage>8.1V, and current>0.1A)			(voltage>8.1V, and current>0.1A)			(voltage>0.1V, and current>0.1A)		
	Resolution	1Ω			1Ω			1Ω		
Protection										
OVP	Power Mode	OFF,ON(3.3V-33.0V)	Fixed 3.3V		OFF,ON(3.3V-63.0V)	Fixed 3.3V		OFF,ON(3.3V-38.8V)	Fixed 3.3V	
	Load Mode	OFF,ON(1.5V-33.0V)	-		OFF,ON(1.5V-63.0V)	-		OFF,ON(1.5V-38.8V)	-	
	Setting Accuracy	±100mV								
	Resolution	100mV								
OCP	Power Mode	OFF,ON(0.05A-6.50A)	3.1A(USB port)		OFF,ON(0.05A-3.50A)	3.1A(USB port)		OFF,ON(0.05A-3.50A)	3.1A(USB port)	
	Load Mode	OFF,ON(0.05A-6.50A)	-		OFF,ON(0.05A-3.50A)	-		OFF,ON(0.05A-3.50A)	-	
	Setting Accuracy	±20mA								
	Resolution	10mA								
Insulation resistance	Between chassis and terminal	30MΩ or above (DC 500V)								
	Between chassis and DC power cord	30MΩ or above (DC 500V)								
General										
Operation Environment		Indoor use, Altitude: ≤ 2000m								
		Ambient temperature: 0 ~ 40°C								
		Relative humidity: ≤ 80%								
		Installation category: II / Pollution degree: 2								
Storage Environment		TEMPERATURE: -10°C ~ 70°C								
		HUMIDITY: ≤70%								
Power Input		AC 100V/120V/220V/230V±10%, 50/60Hz								
Power Consumption		900VA, 600W								
Accessories		CD (User manual x1, Quick Start manual x1, Power Cord x1								
		Test lead: GTL-104A x 3								
		(Europe) Test lead: GTL-204A x 3, GTL-201A x1								
Dimensions		213 (W) x 145 (H) x 362 (D) mm								
Weight		Approx. 10kg								

ORDERING INFORMATION

GPP-3060 385W Triple-channel Programmable DC Power Supply

GPP-3650 385W Triple-channel Programmable DC Power Supply

GPP-6030 385W Triple-channel Programmable DC Power Supply

ACCESSORIES :

CD (User manual), Quick start manual, Power cord, test lead: GTL-104A x 3, European test leads: GTL-204A x 3, GTL-201A x 1

OPTIONAL ACCESSORIES

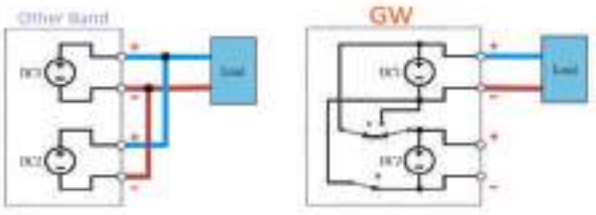
GTL-246 USB Cable **GRA-449-E** Rack Mount Kit (EIA) **GRA-449-J** Rack Mount Kit (JIS)

INTERFACE

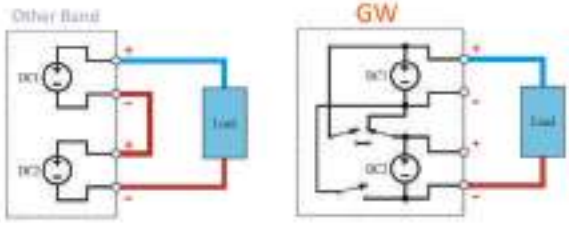
Standard: RS-232, USB, Ext I/O, Optional(manufacturer installed only): LAN, GPIB+LAN

NOTE: Contact local sales if you have issues with Interface purchase.

A. TRACKING SERIES AND PARALLEL FUNCTION



Output in Parallel Connections

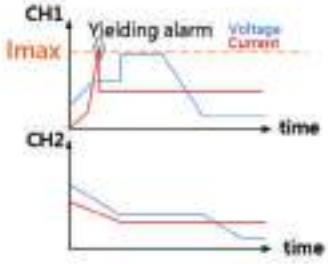


Output in Series Connections

For series and parallel applications of CH1 and CH2, the tracking function of the GPP-Series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output.

The tracking function design of other brands requires additional external wiring connections for the output in series or parallel. However, excessively long, thin or inconsistent external wiring may cause inaccurate voltage or current output.

B. OUTPUT MONITORING FUNCTION



Output Monitoring

Monitoring Function Setting

The output monitoring function allows users to set the monitoring conditions according to the requirements, including the voltage, current, and power greater than or less than the setting and the logical relationship of AND, OR. It also allows users to sound alarms or stop the output during the measurement process, stop the measurement, and protect the customer's DUT. Both Channel could be monitored simultaneously as well.

* Channel 3 does not support the output monitoring function.

C. SEQUENCE OUTPUT FUNCTION

Output Waveform of the GPP-6030/3060

The GPP-Series provides a sequential output function on Channel 1 and Channel 2. This function not only allows users to edit the power output waveform, but also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveform, i.e. a serial power output or a simulation test of a dynamic load. The maximum settable points for sequence function are 2048, and interval range of each point can be set from 1 to 300 seconds. In order to simplify the setting of waveform editing, the GPP-Series has 8 built-in Templet waveforms in sequence output function for users to directly apply for output, including Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, and Exp Fall waveforms.

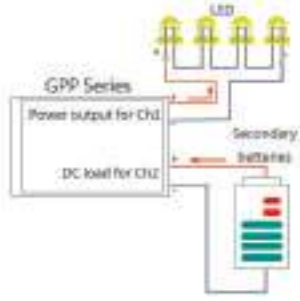
The editing data of the sequence output can be stored in the internal 10 sets of the memory, or to be saved by USB flash drive (Save/Recall) and saved as *.SEQ or *.CSV file; The stored *.CSV can be exported into Excel for editing and analysis. The final edited file can be imported to (Save/Recall) of the power supply using a USB flash drive.

D. HARDWARE PROTECTION FUNCTION(OVP/OCP/OTP)

OVP Trigger

The protection mechanism of OVP/OCP/OTP is implemented by hardware circuit, which has the advantage of faster response time than competitors who use software to achieve protection. When it is detected that the voltage of the DUT exceeds the setting value of the OVP, the output of the power supply can be stopped in a short time to achieve the purpose of protecting the DUT.

E. LOAD FUNCTION



GPP-Series Application

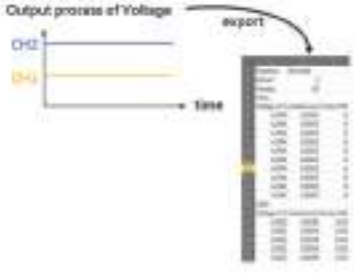
The CH1/CH2 of the GPP series is designed with the load function. A single power supply can meet the basic battery charging and discharging test requirements. It can provide power output in channel 1 and channel 2. The rated constant voltage load (CV), rated constant current load (CC) and maximum 1kΩ constant resistance load (CR) function are built-in to allow users to conduct discharging test without using an electronic load. In application, users can also set either that one channel of the single GPP series as the power output, one channel as the load function to consume the power of the DUT, or that both channels as load functions to consume the power of different loads simultaneously.

F. OUTPUT DELAY FUNCTION

GPP-Series Delayed Waveform

Output delay function allows users to edit the timing waveform of the power output on/off when the front panel voltage and current settings are unchanged. In order to simplify the setting of waveform editing, the GPP-Series has three built-in timing modes in the delay output function, including Fixtime, Increase, Decline for users to apply directly. The editing data of the output delay can be stored in the internal 10 sets of memory, or to be saved by USB flash drive (Save/Recall) and saved as *.DLY or *.CSV file. The stored *.CSV can be exported into Excel for editing and analysis. The final edited file can be exported to (Save/Recall) of the power supply using a USB flash drive.

G. OUTPUT RECORDER FUNCTION



Schematic Diagram for Recorder Function

Recorder Function Setting

Save as*.REC

The output recorder function records the voltage & current parameters of the output process. The recording interval of each point can be set according to user's requirements, and the shortest interval is 1 second and the longest is 300 seconds. The results can be stored in *.REC or *.CSV format to the power supply or directly saved in the USB flash drive. The stored *.CSV can be exported into Excel to conduct the future analysis. (*.REC can be saved to 2048 records, *.CSV can be saved to 614400 records)

* Channel 3 does not support the output recorder function

Multi-output Programmable D.C. Power Supply

GPP-Series

CE | RS-232 | GPIB | USB | LAN | Ext I/O

FEATURES

- 4.3" TFT LCD Display
- Supports Setting Value, Measurement Value and Output Waveform Display
- Load Function (CC, CV, CR Mode)
- Setting Resolution: 1mV/0.1mA ; Read Back Resolution: 0.1mV/0.1mA
- Low Ripple Noise: ≦350μVrms/≦2mArms
- Transient Response Time: ≦50μs
- Tracking Series and Parallel Function without Additional External Wiring
- Utilizing Hardware to Realize Over Voltage Protection/Over Current Protection/Over Temperature Protection
- Delay Function/Output Monitoring Function/ Output Recorder Function
- Intelligent Temperature Control Fan Effectively Reduces Noise
- Sequential Output Function and Built-in 8 Template Waveforms
- The Output Recorder Function Records The Output Voltage & Current Parameters with A Minimum Recording Interval of 1 Second
- Provides 10 Sets of Memory for Each Sequence /Delay/Recorder/Panel Setting Condition
- GPP-3323 Supports A USB(Type A) Output Terminal
- Standard: RS-232, USB, Ext I/O; Optional (Manufacturer Installed Only) : LAN, GPIB+LAN
- Compatible with Commands of GPD-X303S Series

With the maximum output power of 217W, the GPP-Series, the multi-channel programmable DC power supply, includes four models: GPP-1326 (0~32V/0~6A) for single-channel output and GPP-2323 for dual-channel output (CH1:0~32V/0~3A, CH2:0~32V/0~3A), GPP-3323 for three-channel output (CH1: 0~32V/0~3A, CH2:0~32V/0~3A, CH3: 1.8V, 2.5V, 3.3V, 5.0V/5A) and GPP-4323 for four-channel output (CH1:0~32V/0~3A, CH2:0~32V/0~3A, CH3:0~5V/0 ~1A, CH4: 0~15V/0~1A). This series not only provides high program resolution (1mV/0.1mA) and read back resolution (0.1mV/0.1mA), but also features optimal low-ripple noise characteristics ≦350μVrms/≦ 2mArms and output transient recovery capability≦50μs. Independent output on-off switch is provided for each channel.

For series and parallel applications of CH1 and CH2, the tracking function of the GPP-Series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output. The tracking function design of other brands requires additional external wiring connections for the output in series or parallel. However, excessively long, thin or inconsistent external wiring may cause inaccurate voltage or current output.

The GPP-Series offers a variety of display modes, including single or multi-channel setting values, measurement values, and waveform displays. The Monitor function of the GPP-Series allows users to set monitoring conditions according to requirements, sound alarms or stop output during the measurement process, and stop measurement and protect the customer's DUT. The GPP-Series provides output recorder function, which records the voltage/current of the output process to the internal memory, and the result can be stored as a (*.REC) or (*.CSV) file, which can then be transferred to the USB flash drive. The stored *.CSV can be exported to the Excel to conduct the future analysis.

The CH1/CH2 of the GPP-Series are designed with the load function. A single power supply can set one channel as the power output, and one channel for the load function to consume the power of the DUT so as to meet the basic charging and discharging test requirements for battery. Channel 1 and channel 2 not only provide 32V/3A power output, but also feature built-in maximum 32V constant voltage load (CV), maximum 3.2A constant current load (CC) and maximum 1kΩ constant resistance load (CR) function.

The GPP-Series provides the sequential output function on Channel 1 and Channel 2. This function not only allows users to edit the power output waveform, but also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveform, i.e. a serial power output or a simulation test of a dynamic load. In order to simplify the setting of waveform editing, the GPP-Series has 8 built-in Templet waveforms in the sequence output function for users to directly apply for output, including Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, Exp Fall waveforms.

The sound protection functions include OVP/OCP/OPP/OTP, in which the protection mechanism for OVP/OCP/OTP is implemented by hardware circuit that has the advantage of faster response time compared with competitors who adopt software to achieve protections. The OVP/OCP functions allow users to set the protection action point (except CH3 of GPP-3323) according to the conditions of the DUT. The OPP is only activated during the operation of the load function. The Delay Function sets the length of time during channel 1 or channel 2 power output on or during power output off.

In addition, the Trigger In/Trigger Out functions synchronize external devices. The GPP-3323 channel 3 adds a 3A USB (Type A) output terminal for USB charging test. The intelligent temperature-controlled fan can adjust the speed according to the temperature of the power transistor so as to reduce unnecessary noise. The output value setting and the Sequence/Delay/Recorder functions provide 10 sets of internal memory for use, and can be loaded/stored using a USB flash drive. In addition to the standard RS-232 and USB remote interfaces, the GPP-Series also has an optional LAN or LAN+GPIB interface to facilitate different requirements. The commands of the GPP-Series conform to SCPI requirements and are compatible with the commands of the GPD-X303S Series.

European Type Jack Terminal

Rear Panel (LAN+GPIB)

Rear Panel (LAN)

Rear Panel

OUTPUT FUNCTION LIST

Model Number	GPP-4323 / GPP-3323 / GPP-2323 / GPP-1326			
Number of Outputs	CH1	CH2	CH3	CH4
Sequence Output Function	✓	✓		
Load Functions (CC, CV, CR mode)	✓	✓		
Output Delay Function	✓	✓		
Output Monitoring Function(10 sets)	✓	✓	✓ (GPP-4323 supported)	✓
Output Recorder Function	✓	✓	✓ (GPP-4323 supported)	✓
Panel Save/Recall	✓	✓	✓	✓

Multi-output Programmable D.C. Power Supply

SPECIFICATIONS

		GPP-1326	GPP-2323		GPP-3323			GPP-4323			
OUTPUT MODE											
Number of Channel		CH1	CH1	CH2	CH1	CH2	CH3	CH1	CH2	CH3	CH4
Voltage		0 ~ 32.000V	0 ~ 32.000V	0 ~ 32.000V	0 ~ 32.080V	0 ~ 32.080V	1.8V/2.5V/3.3V/5.0V, ±5%	0 ~ 32.080V	0 ~ 32.080V	0 ~ 5.000V	0 ~ 15.080V
Current		0 ~ 6.000A	0 ~ 3.000A	0 ~ 3.000A	0 ~ 3.000A	0 ~ 3.000A	5A (USB Port 3A)	0 ~ 3.000A	0 ~ 3.000A	0 ~ 1.000A	0 ~ 1.000A
Tracking Series Voltage/Current		-	0 ~ 64.000V / 0 ~ 3.000A		0 ~ 64.000V / 0 ~ 3.000A		-	0 ~ 64.000V / 0 ~ 3.000A		-	-
Tracking Parallel Voltage/Current		-	0 ~ 32.000V / 0 ~ 6.000A		0 ~ 32.000V / 0 ~ 6.000A		-	0 ~ 32.000V / 0 ~ 6.000A		-	-
Warning : The CH3 of GPP-3323 output current from the 2 terminals should Not exceed 5A.											
CONSTANT VOLTAGE OPERATION											
Line Regulation		≤ 0.01% + 3mV	≤ 0.01% + 3mV		≤ 0.01% + 3mV		≤ 5mV	≤ 0.01% + 3mV			
Load Regulation		≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)		≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)		≤ 5mV	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)			
Ripple & Noise (5Hz-1MHz)		≤0.5mVrms	≤0.35mVrms		≤0.35mVrms		≤2mVrms	≤0.35mVrms		≤5mVrms	
Transient Recovery Time		≤100μs	≤50μs		≤50μs		≤100μs	≤50μs			
					(50% load change ; minimum load 0.5A)						
Temperature Coefficient		≤ 300ppm/°C									
CONSTANT CURRENT OPERATION											
Line Regulation		≤ 0.3% + 3mA									
Load Regulation		≤ 0.2% + 3mA									
Ripple & Noise		≤6mArms	≤ 2mArms		≤ 2mArms			≤ 2mArms			
Resolution											
Programming	Voltage/Current	1mV / 0.1mA	1mV / 0.1mA		1mV / 0.1mA		-	1mV / 0.1mA			
Readback	Voltage/Current	1mV / 0.1mA	0.1mV / 0.1mA		0.1mV / 0.1mA		-	0.1mV / 0.1mA			
TRACKING OPERATION(CH1/CH2)											
Tracking Error		-	≤±(0.1%+18mV of Master)(0~32V) (No Load, with load add load regulation≤108mV)		≤±(0.1%+18mV of Master)(0~32V) (No Load, with load add load regulation≤180mV)		-	≤±(0.1%+10mV of Master(0~32V)) (No Load, with load add load regulation≤180mV)		-	
Parallel Regulation	Line		≤ 0.01% + 3mV		≤ 0.01% + 3mV			≤ 0.01% + 3mV			
	Load		≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)		≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)			≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)			
Series Regulation	Line		≤ 0.01% + 3mV		≤ 0.01% + 3mV			≤ 0.01% + 3mV			
	Load		≤ 100mV		≤ 100mV			≤ 100mV			
Ripple & Noise			≤1mArms(5Hz-1MHz)		≤1mArms(5Hz-1MHz)			≤1mArms(5Hz-1MHz)			
Note : GPP-1326 does not have Tracking Function and Tracking is not supported in LOAD mode.											
METER											
Full Scale	Voltage/Current	33.000V / 6.200A	33.000V / 3.200A		33.000V / 3.200A		5A(12.5V/3.5V/5.0V	33.000V / 3.200A			
Programming Resolution	Voltage/Current	5 digits / 5 digits	5 digits / 5 digits		5 digits / 5 digits			5 digits / 5 digits			
Readback Resolution	Voltage/Current	6 digits / 5 digits	6 digits / 5 digits		6 digits / 5 digits			5 digits / 6 digits			
Setting Accuracy	Voltage	± (0.03% of reading + 18mV)	± (0.03% of reading + 18mV)		± (0.03% of reading + 18mV)		-	± (0.03% of reading + 18mV)			
	Current	± (0.3% of reading + 18mA)	± (0.3% of reading + 18mA)		± (0.3% of reading + 18mA)			± (0.3% of reading + 18mA)			
Readback Accuracy	Voltage	± (0.03% of reading + 18mV)	± (0.03% of reading + 18mV)		± (0.03% of reading + 18mV)			± (0.03% of reading + 18mV)			
	Current	± (0.3% of reading + 18mA)	± (0.3% of reading + 18mA)		± (0.3% of reading + 18mA)			± (0.3% of reading + 18mA)			
DC LOAD MODE											
Display	Voltage	1 ~ 35.00V	1 ~ 33.08V		1 ~ 33.08V		-	1 ~ 33.08V			
	Current	0 ~ 6.200A	0 ~ 3.200A		0 ~ 3.200A			0 ~ 3.200A			
	Power	0 ~ 180.80W	0 ~ 50.80W		0 ~ 50.08W			0 ~ 58.08W			
CV Mode	CH1/CH2	1.500V ~ 33.80V	1.500V ~ 33.80V		1.500V ~ 33.80V			1.180V ~ 33.88V			
	Setting/Readback Accuracy	±(0.1% + 18mV)	±(0.1% + 18mV)		±(0.1% + 18mV)			±(0.1% + 18mV)			
	Resolution	18mV	18mV		18mV			18mV			
CC Mode	CH1/CH2	0 ~ 3.200A	0 ~ 3.200A		0 ~ 3.200A			0 ~ 3.200A			
	Setting/Readback Accuracy	±(0.1% + 18mA)	±(0.3% + 18mA)		±(0.3% + 18mA)			±(0.3% + 18mA)			
	Resolution	1mA	1mA		1mA			1mA			
CR Mode	CH1/CH2	10 ~ 1kΩ	10 ~ 1kΩ		10 ~ 1kΩ			10 ~ 1kΩ			
	Setting/Readback Accuracy	±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)	±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)		±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)			±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)			
	Resolution	1Ω	1Ω		1Ω			1Ω			
PROTECTION											
OVP	Power Mode	OFF,ON(0.5V ~ 35.0V)	OFF,ON(0.5V ~ 35.0V)		OFF,ON(0.5V ~ 35.0V)		Fixed 5.3V	OFF,ON(0.5V ~ 35.0V)		OFF,ON (0.5V~5.0V)	OFF,ON (0.5V~16.5V)
	Load Mode	OFF,ON(1.5V ~ 35.0V)	OFF,ON(1.5V ~ 35.0V)		OFF,ON(1.5V ~ 35.0V)		-	OFF,ON(1.5V ~ 35.0V)		-	
	Setting Accuracy	±180mV									
	Resolution	160mV									
OCP	Power Mode	OFF,ON(0.05A ~ 7.08A)	OFF,ON(0.05A ~ 3.30A)		OFF,ON(0.05A ~ 3.30A)		3.1A(USB port)	OFF,ON(0.05A ~ 3.30A)		OFF,ON(0.05A ~ 1.20A)	
	Load Mode	OFF,ON(0.05A ~ 7.08A)	OFF,ON(0.05A ~ 3.30A)		OFF,ON(0.05A ~ 3.30A)		-	OFF,ON(0.05A ~ 3.30A)		-	
	Setting Accuracy	±20mA									
	Resolution	10mA									
Insulation Resistance		Between chassis and terminal : 20MΩ or above (DC 500V) Between chassis and DC power cord : 40MΩ or above (DC 500V)									
GENERAL											
Operation Environment		Indoor use, Altitude: ≤ 2000m ; Ambient temperature: 0 ~ 40°C ; Relative humidity: ≤ 80% ; Installation category: II ; Pollution degree: 2									
Storage Environment		TEMPERATURE: -10°C ~ 70°C ; HUMIDITY: ≤ 70%									
Power Input		AC 100V/120V/220V/230V±10%, 50/60Hz									
Power Consumption		180W	360W		450W			520W			
Dimensions & Weight		213 (W) x 145 (H) x 512 (D) mm ; Approx. 7.5kg									

ORDERING INFORMATION

GPP-1326 (32V/6A) Single-Output Programmable DC Power Supply
GPP-2323 (32V/3A*2) Dual-Output Programmable DC Power Supply
GPP-3323 (32V/3A*2; 1.8V or 2.5V or 3.3V or 5V/5A*1) Three-Output Programmable DC Power Supply
GPP-4323 (32V/3A*2; 5V/1A; 15V/1A) Four-Output Programmable DC Power Supply

ACCESSORIES :
User Manual x 1 , Power cord x 1
GPP-1326 Test Lead GTL-104A x 1, GTL-105A x 1 **GPP-2323** Test Lead GTL-104A x 2 **GPP-3323** Test Lead GTL-104A x 3 **GPP-4323** Test Lead GTL-104A x 2, GTL-105A x 2

European Test Leads :
GPP-1326 GTL-203A x 1, GTL-204A x 1, GTL-201A x 1 **GPP-2323** GTL-204A x 2, GTL-201A x 1
GPP-3323 GTL-204A x 3, GTL-201A x 1 **GPP-4323** GTL-203A x 2, GTL-204A x 2, GTL-201A x 1

OPTIONAL ACCESSORIES

GTL-246 USB Cable **GRA-449-J** Rack Mount Kit (JIS) **GRA-449-E** Rack Mount Kit (EIA)

OPTIONS (Manufacturer Installed Only)

LAN Interface: GPIB+LAN Interface

Multiple Output Programmable Linear D.C. Power Supply

GPD-23035/3303S/ 4303S/3303D

CE USB PC Software LabVIEW Driver

FEATURES

- 2, 3 and 4 Independent Isolated Output
- 4 LED Display Sets : 3 Digits After Decimal Point (GPD-3303S/3303S/4303S)
- Minimum Resolution : GPD-3303S/3303S/4303S (1mV/1mA) GPD-3303D (10mV/10mA)
- Digital Panel Control (Rotary Encoder Switch, Rubber Key With Indicator)
- User Friendly Operation, Coarse / Fine Volume Control
- 4 Sets Save / Recall
- Key-Lock
- Output ON/OFF
- Tracking Series and Parallel Mode
- Smart Cooling Fan Achieving Low Noise
- Compact Design
- PC Software & USB Driver
- USB Standard Interface
- Optional European Jack Type Terminal

Rear Panel

European Type Jack Terminal

The GPD Series is a cutting edge, economical, high resolution programmable power supply. Which is equipped with 2, 3 and 4 independent output channels and support a maximum output from 180Watt to 195Watt. The power supplies include four sets of memory for voltage and current setting, a USB remote interface, high resolution (GPD-2303S / GPD-3303S / GPD-4303S) and intelligent fan control to reduce noise. The durable features, along with the free output monitoring software make the GPD-Series suitable for any lab as well as the LED industry.

SPECIFICATIONS

	GPD-2303S	GPD-3303S		GPD-4303S			GPD-3303D		
OUTPUT									
Channel	CH1	CH2	CH3	CH1	CH2	CH3	CH1	CH2	CH3	CH4	CH1	CH2	CH3
Voltage	0~30V	0~30V	5V	0~30V	0~30V	5V/12V/2.5V	0~30V	0~30V	5V/12V/2.5V	0~5V	0~30V	0~30V	5V/12V/2.5V
Current	0~3A	0~3A	3A	0~3A	0~3A	3A	0~3A	0~3A	0~3A	0~3A	0~3A	0~3A	3A
CONSTANT VOLTAGE OPERATION									
Regulation	Line regulation: ≤ 0.01%+3mV Load regulation: ≤ 0.01%+3mV(rating current ≤ 3A); ≤ 0.01%+6mV(rating current >3A)								
Ripple & Noise	≤ 1mVrms (20Hz~20MHz)								
Recovery Time	≤ 100us (0.01% load change, Minimum load 0.5A)								
Temp.Coefficient	0.02ppm / °C								
CONSTANT CURRENT OPERATION									
Regulation	Line regulation: ≤ 0.2%+3mA; Load regulation: ≤ 0.2%+3mA								
Ripple Current	≤ 3mArms								
TRACKING OPERATION									
Regulation of PARA.	Line regulation: ≤ 0.01%+3mV Load regulation: ≤ 0.01%+3mV (rating current ≤ 3A); ≤ 0.02%+6mV (rating current >3A)								
Regulation of SERI.	Line regulation: ≤ 0.01%+3mV Load regulation: ≤ 100mV								
Tracking Error	≤ 0.1%+20mV (30 ~ 80% rated load, with load added to an regulation ≤ 10ms)								
METER									
Display	Voltage: 3 digits 0.4" LED Display (full scale:32V) Current: 4 digits 0.4" LED Display (full scale:3.33A)						Voltage:3 digits 0.4"LED Display Current:4 digits 0.4"LED Display		
Resolution	Voltage: 1mV Current: 1mA						Voltage:10mV Current:10mA		
Program Accuracy(25°C)	Voltage: ≤(0.03% of RDG.+10 digits) Current: ≤(0.3% of RDG.+10 digits)						Voltage:≤(0.5% of RDG.+2 digits) Current:≤(0.5% of RDG.+2 digits)		
Readback Accuracy(25°C)	Voltage: ≤(0.03% of RDG.+10 digits) Current: ≤(0.3% of RDG.+10 digits)						Voltage:≤(0.5% of RDG.+2 digits) Current:≤(0.5% of RDG.+2 digits)		
CH3 SPECIFICATIONS									
Output Voltage Output Current Regulation (25±1°C) Ripple & Noise	—	5.1V/5.3V/5V ±8% 3A Line regulation: ≤ 0.01%+3mV Load regulation: ≤ 0.01%+3mV ≤ 1mVrms (5Hz~1MHz)		5.1V/5.3V/5V ±8% 3A/5A Line regulation: ≤ 0.01%+3mV Load regulation: ≤ 0.01%+3mV ≤ 1mVrms (5Hz~1MHz)			5.1V/5.3V/5V ±8% 3A Line regulation: ≤ 0.01%+3mV Load regulation: ≤ 0.01%+3mV ≤ 1mVrms (5Hz~1MHz)		
KEY LOCK									
Yes									
MEMORY SAVE/RECALL									
4 sets									
POWER SOURCE									
AC180V~110V (100V/115V/230V ± 10%, 50/60Hz; Power consumption : 1980VA max.									
DIMENSION & WEIGHT									
210(W) x 130(H) x 285(D) mm ; Approx. 7kg									

ORDERING INFORMATION

GPD-2303S GPD-2303S 2-Channels, 180W Programmable Linear DC Power Supply
GPD-3303S GPD-3303S 3-Channels, 180W Programmable Linear DC Power Supply
GPD-4303S GPD-4303S 4-Channels, 180W Programmable Linear DC Power Supply
GPD-3303D GPD-3303D 3-Channels, 195W Programmable Linear DC Power Supply

ACCESSORIES
User Manual x 1, Power cord x 1
GPD-2303S Test Lead CTL-1008 x 2, European Test Lead CTL-2045x2, CTL-2053 x 1
GPD-3303S Test Lead CTL-1008 x 2 CTL-1053 x 1, European Test Lead CTL-2008 x 1, CTL-2045 x 1, CTL-2053 x 1
GPD-4303S Test Lead CTL-1008 x 2 CTL-1053 x 2, European Test Lead CTL-2008 x 2, CTL-2045 x 1, CTL-2053 x 1
GPD-3303D Test Lead CTL-1008 x 2 CTL-1053 x 1, European Test Lead CTL-2008 x 2, CTL-2045 x 1, CTL-2053 x 1

OPTIONAL ACCESSORIES
CTL-USB USB Cable

FREE DOWNLOAD
PC Software PC Software (Loading Data Log)
Driver Labview Driver

Programmable Dual-range Linear D.C. Power Supply

PSM-2010/3004/6003

FEATURES

- Single Output Dual Range Max. 200W
- High Resolution: 1mV/1mA
- Stable & Clear Power: 0.01% Load/Line Regulation, 3mVp-p Ripple
- 100 Sets Memory
- Auto Step Running With Timer Setting
- Safety Design: OVP, OCP & OTP; Output ON/OFF Control/OCP Provides Delay Setting to Prevent Trip of High Start-Up Current
- Self Test and Software Calibration
- Highly Visible Vacuum-Fluorescent Display
- Front and Rear Output Terminal
- Standard Interface: RS-232C, GPIB
- Optional European Jack Type Terminal

European Type Jack Terminal

Rear Panel

The PSM Series is a single output / dual range, 120W or 200W, programmable linear DC power supply. OVP, OCP, OTP, and output On/Off control protect the PSM Series and their loads from unexpected conditions. High resolution, high regulation, and low ripple are maintained at 1mV/1mA, 0.01%, and <150μVp-p, respectively. Operation and configuration is simplified with a digital interface and a clear LCD display. Standard features include: store/recall output memories, automatic stepping with timers for continuous testing and self testing and software calibration features to reduce maintenance overhead. SCPI programming, LabVIEW drivers, RS-232C and GPIB interfaces enable easy automated test system integration and remote control. The PSM Series is an ideal choice for high precision applications such as QA verification and product development.

SPECIFICATIONS

		PSM-2010	PSM-3004	PSM-6003
DC OUTPUT				
Low Range		0 ~ 8A/20A	0 ~ 15V/4A	0 ~ 30V/4A
High Range		0 ~ 35V/5.6A	0 ~ 30V/4A	0 ~ 60V/3.3A
CONSTANT VOLTAGE OPERATION				
Regulation (% of output + offset)		Load regulation ≤ 0.01% + 2mV ; Line regulation ≤ 0.01% + 2mV		
Ripple & Noise		< 150μArms/3mVp-p	< 100μArms/3mVp-p	<20V: <200μArms/3mVp-p <30V: <150μArms/3mVp-p
CONSTANT CURRENT OPERATION				
Regulation (% of output + offset)		Load regulation ≤ 0.01% + 250μA ; Line regulation ≤ 0.01% + 250μA		
Ripple & Noise		< 2mArms		
RESOLUTION				
Programming	Voltage	1mV	1mV	2mV
	Current	1mA	0.1mA	0.1mA
Readback	Voltage	0.1mV	0.1mV	1mV
	Current	1mA	0.1mA	0.1mA
Front Panel	Voltage	1mV		
	Current	1mA (<10A), 10mA (>10A)		
OVP/OCP	Voltage	10mV		
	Current	10mA		
ACCURACY				
Programming	Voltage	0.05% + 10mV		
	Current	0.2% + 10mA		
Readback	Voltage	0.05% + 2mV		
	Current	0.15% + 2mA		
OVP/OCP	Voltage	0.2% + 50mV		
	Current	0.4% + 50mA		
TRANSIENT RESPONSE				
		< 20μsec. (for output to recover within 15mV following a change in output current from full load to half load.)		
COMMAND PROCESSING TIME				
		100 ms		
VOLTAGE PROGRAMMING RESPONSE TIME (for resistive load, 10% ~ 90%)				
Voltage Up	Full Load	90 ms	30 ms	40 ms
	No Load	40 ms	20 ms	100 ms
Voltage Down	Full Load	30 ms	40 ms	30 ms
	No Load	400 ms	400 ms	400 ms
STABILITY (0.1% of output + offset)				
Voltage		0.02% + 1mV		
Current		0.1% + 1mA		
MEMORY				
Storing Recall		100 sets		
TEMPERATURE COEFFICIENT PER °C (% of Output + Offset)				
Voltage		0.01% + 2mV		
Current		0.02% + 3mA		
POWER SOURCE				
AC 198V~230V,230V±10% , 50Hz ~ 60Hz, 300W Max.				
INTERFACE				
Standard: RS-232C , GPIB				
DIMENSIONS & WEIGHT				
330(W) x 140(H) x 380(D) , Approx. 10kg				

ORDERING INFORMATION

PSM-2010 : 200W Single Output, Programmable Power Supply
PSM-6003 : 200W Single Output, Programmable Power Supply
PSM-3004 : 150W Single Output, Programmable Power Supply

ACCESSORIES :
User manual x 1, Power cord x 1, Test lead GTL-104A x 1, European test lead GTL-104A x 1, Current test GTL-203A x 1 (European terminal), Sense lead GTL-101 x 1 (European Terminal)

OPTION
Opt. 01 GRA-401 Rack Mount Kit

OPTIONAL ACCESSORIES
GTL-232 RS-232C Cable, 9 pin Female to 9 pin, Null Modem for PC Computer
GTL-248 GPIB Cable, Double Shielded, 2000mm
GRA-401 Rack Mount Kit

FREE DOWNLOAD
PC Software : PC Software including Data Log , Remote Control Software
Driver : Labview Driver , PSM VB Example , PSM VC++ Example

Programmable Linear D.C. Power Supply

PSS-2005/3203

FEATURES

- Digitized Programmable Interface
- High Resolution: 10mA, 1mA
- High Stability, Low Drift
- Over-Voltage, Over-Current, Over Temperature Protection
- Intelligent Fan Control (Change by Output Power)
- Built-in Buzzer Alarm
- LabVIEW Driver
- Standard Interface : RS-232C
- Optional Interface : GPIB (IEEE-488.2)
- Optional European Jack Type Terminal

The PSS Series is a single output, 90W or 300W, programmable Linear DC power supply. OVP, OCP, and OTP protect the PSS series and their loads from unexpected conditions. The LCD panel simultaneously displays output and other parameters and the regulated cooling fan ensures low noise for comfortable operation. RS232C and GPIB interfaces, SCPI command sets and LABVIEW drivers make remote control and ATE software development easier. (Note: only RS-232C or GPIB can be installed at one time). The compact PSS series is suitable for any high resolution bench top or rack mount application.

SPECIFICATIONS	PSS-2005	PSS-3203
OUTPUT		
Voltage	0 ~ 20V	0 ~ 32V
Current	0 ~ 5A	0 ~ 3A
OVP	0 ~ 22V	0 ~ 37V
LOAD REGULATION		
Voltage	≤ 3mV (≤ 5mA, rating current > 3.0A)	
Current	≤ 3mA (≤ 5mA, rating current > 3.0A)	
LINE REGULATION		
Voltage	≤ 3mV	
Current	≤ 3mA	
RESOLUTION		
Voltage	10mV	
Current	1mA (10mA, rating current > 3.0A)	
OVP	10mV	
PROGRAM ACCURACY (25 ± 5°C)		
Voltage	≤ 0.05%+20mV	
Current	≤ 0.1%+3mA (>10mA, rating current > 3.0A)	
OVP	≤ 0.05%+20mV	
RIPPLE & NOISE (20Hz ~ 20MHz)		
Voltage	80μVp-p, 1mVrms(typical)(p-p) ; Noise ≤ 2mVrms(20mVp-p	
Current	≤ 6mArms (≤ 5mArms, rating current > 3.0A)	
TEMPERATURE COEFFICIENT (0 ~ 40°C)		
Voltage	≤ 100ppm+1mV	
Current	≤ 100ppm+1mA	
READBACK RESOLUTION		
Voltage	10mV	
Current	1mA (2mA, rating current > 3.0A)	
READBACK ACCURACY(25 ± 5°C)		
Voltage	≤ 0.05%+10mV	
Current	≤ 0.1%+5mA (10mA rating current > 3.0A)	
READBACK TEMPERATURE COEFFICIENT		
Voltage	≤ 100ppm+1mV	
Current	≤ 100ppm+3mA (10mA rating current > 3.0A)	
RESPONSE TIME		
Voltage Up (10%~90%)	≤ 100mS	
Voltage Down (90%~10%)	≤ 100mS (@50% rating load)	
DRIFT		
Voltage	≤ 300ppm+1mV	
Current	≤ 300ppm+1mA	
INTERFACE		
Standard : RS-232C, Option : GPIB		
POWER SOURCE		
AC 100V/120V/220V ±10%, 220V ± 10%, 50/60Hz		
DIMENSIONS & WEIGHT		
108 (W) x 142 (H) x 318 (D) mm, Approx. 4.8kg		

ORDERING INFORMATION

PSS-2005 : 100W Single Output Programmable D.C. Power Supply
PSS-3203 : 96W Single Output Programmable D.C. Power Supply

ACCESSORIES :
User manual x 1, Power cord x 1, Test lead GTL-104A x 1 (PSS-2005) or GTL-105A x 1 (PSS-3203)
European Test Lead GTL-204A x 1 (PSS-2005) or GTL-205A x 1 (PSS-3203)

OPTION
Opt.01 : GPIB interface (Factory installed)

OPTIONAL ACCESSORIES

GTL-232	RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer
GRA-409	Rack Adapter Panel (19" 3U)
GTL-246	GPIB Cable, Double Shielded, 1000mm

FREE DOWNLOADS

PC Software	PC Software including Data Log, Remote Control Software
Driver	LabVIEW Driver

Note : When Opt.01 GPIB interface is ordered, the standard interface RS-232C will be deleted.

European Type Jack Terminal

Rear Panel

Multiple Output Programmable Linear D.C. Power Supply

PPE-3323

FEATURES

- Easy Operation with UP/DOWN Key
- High Resolution: 10mV, 1mA
- Over Voltage Protection, Over Current Protection (by Software)
- 10 Sets Memory
- Self Test and Software Calibration
- Auto Step Running With Timer Setting
- Triple Output
- Auto Tracking
- RS-232C Communication
- High Stability, Low Drift
- 4 Digit Display
- IEC Safety Regulation

The PPE Series is a 3 channel, programmable linear DC power supply with 200W output. The PPE Series features OVP and OCP and is compliant with all major safety standards(UL, CSA, and IEC) for safe, reliable operation. The digital interface and smart features simplify operation and configuration with output limit store/recall functions, tracking, serial operation, and auto stepping for continuous testing. The series has PC software and SCPI commands as standard for remote control and PC interfacing via RS-232C. The versatile PPE Series is ideal for high-level applications requiring high resolution, multiple outputs, and an extra level of safety.

SPECIFICATIONS	
OUTPUT	
Voltage	0 ~ CH1/2: ~ CH3: 0 ~ 6V / 0 ~ 30V
Current	0 ~ 3A / 0 ~ 1A, 3A: 0 ~ 3A
OVP	0 ~ CH1/2: ~ 33V
LOAD REGULATION	
Voltage	10mV
Current	10mA
LINE REGULATION	
Voltage	10mV
Current	10mA
RESOLUTION	
Voltage	10mV (30mV< setting voltage < 36V)
Current	10mA (30mA< setting current < 3.3A)
OVP	10mV (30mV< setting voltage < 36V)
PROGRAM ACCURACY (25±5℃)	
Voltage	0.05% + 20mV (< 30mV< setting voltage < 36 V)
Current	0.2% + 10mA
OVP	2% + 0.6V
RIPPLE & NOISE (20Hz ~ 20MHz)	
Voltage	Ripple: 1mVrms / 1mVp-p Noise: 1mVrms / 20mVp-p
Current	10mA rms (< 3mA rms (setting current < 3.3A)
TEMPERATURE COEFFICIENT (0 ~ 40℃)	
Voltage	100ppm + 1mV
Current	100ppm + 1mA
READBACK RESOLUTION/ACCURACY (USB/IPIB)	
Voltage	10mV (30mV< setting voltage < 36V)
Current	1mA (30mA< setting current < 3.3A)
Voltage	0.05% + 20mV (< 30mV< setting voltage < 36V)
Current	0.2% + 10mA
RESPONSE TIME	
VOLTAGE UP 10% ~ 90%	100mS
VOLTAGE DOWN 90% ~ 10%	100mS (< rating load)
READBACK TEMPERATURE COEFFICIENT	
Voltage	100ppm + 10mV (< 30mV< setting voltage < 36V)
Current	100ppm + 10mA
DRIFT	
Voltage	100ppm + 10mV
Current	100ppm + 10mA
TRACK CHARACTERISTICS	
Tracking Error	0.1% + 10mV
Series Regulation	10mV
PARALLEL OPERATION (OPP Series only)	
Program Accuracy (25±5℃)	Voltage: 0.05% + 20mV (< 30mV< setting voltage < 36V) Current: 0.2% + 10mA
Load Effect	OVP: 2% + 0.6V Voltage: 10mV< one output (< 5mV from output) Current: 10mA (< 10mA< setting current < 3.3A)
Source Effect	Voltage: 10mV< Current: < 5mA
MEMORY	
Store/Recall	10 sets
TIMER	
Setting Time	1 second ~ 99 minutes (Max. 99 minutes 59 sec)
Resolution	1 second
Function	For output switching loop (Auto Step running)
STANDARD INTERFACE	
RS-232C	
POWER SOURCE	
AC 198V(128V) 228V(148V) 110V, 60/50Hz	
DIMENSIONS & WEIGHT	
210(W) x 140(H) x 340(D) mm, Approx. 10kg	

ORDERING INFORMATION

PPE-3323 200W Triple Output Programmable D.C. Power Supply

Model	Independent	Series	Parallel	Display Type	Weight (kg)
PPE-3323	(0~30V/0~3A x2, 0~6V/0~5A)	60V/3A	30V/6A	LED	10

ACCESSORIES
User manual x 1, Power cord x 1, Test lead (2ft, 10A) x 3

OPTIONAL ACCESSORIES	
GRA-401	Rack Mount Kit

FREE DOWNLOAD	
PC Software	Remote Control Software

Rear Panel

Multiple Output Programmable Linear D.C. Power Supply

PPT-1830/PPT-3615

FEATURES

- Easy Operation with UP/DOWN Key
- High Resolution 10mV/ 1mA
- Over Voltage Protection, Over Current Protection (PPT Series by Hardware)
- 50 Sets Memory
- Self Test and Software Calibration
- Auto Step Running With Timer Setting
- FRONT/REAR Output and Sense Switch Selectable
- Triple Output
- Auto Series and Parallel Operation
- Auto Tracking
- IEEE-488.2 and SCPI Compatible Command set
- GPIB Standard Interface
- LabVIEW Driver
- High Stability, Low Drift
- 4 Digit Display
- IEC Safety Regulation

The PPT Series is a 3-channel, programmable linear DC power supply with 180W or 120W output. The PPT-Series features OVP and OCP and is compliant with all major safety standards (UL, CSA, and IEC) for safe, reliable operation. For extra precision, the PPT Series includes remote sensing that adds an extra level of precision by compensating cable losses between loads. The digital interface and smart features simplify operation and configuration with output limit, store/recall functions, automatic tracking, automatic series or parallel operation, and auto stepping for customized testing. The series has LabView drivers and SCPI commands as standard for remote control and PC monitoring via GPIB. The versatile PPT-Series is ideal for high-level applications requiring high resolution, multiple outputs, and an extra level of safety.

SPECIFICATIONS

MODEL	PPT-1830	PPT-3615
OUTPUT		
Voltage	0-18V/0-9V×2	0-36V/0-9V×2
Current	0-3A/0-3A×2	0-1.5A/0-3A×2
OVP	0-20V/0-10V×2	0-38.5V/0-11V×2
LOAD REGULATION		
Voltage Current	≤ 3mV (for output ≤ 18mV from output) ≤ 3mA (≤ 3mA rating current + 0.5A)	
LINE REGULATION		
Voltage Current	≤ 3mV ≤ 3mA	
RESOLUTION		
Voltage Current OVP	10mV (20mV rating voltage < 30V) 1mA (2mA rating current < 3.1A) 10mV (20mV rating voltage < 30V)	
PROGRAM ACCURACY (25°±5°C)		
Voltage Current OVP	0.03% + 20mV (≤ 30mV rating voltage < 35 V) 0.2% + 10mA 2% + 0.6V	
RIPPLE & NOISE (20Hz ~ 20MHz)		
Voltage Current	Regular Sentence / Sentence Regular Sentence / Sentence ≤ 3mA rms (≤ 3mA rms rating current + 3.1A)	
TEMPERATURE COEFFICIENT (0~40°C)		
Voltage Current	100ppm + 1mV 100ppm + 1mA	
FEEDBACK RESOLUTION/ACCURACY (25°±5°C)		
Voltage Fix mod Voltage Current	10mV (20mV rating voltage < 30V) 1mA (2mA rating current < 3.1A) 0.05% + 20mV (≤ 30mV rating voltage < 35V) 0.2% + 10mA	
RESPONSE TIME		
VOLTAGE UP 10% ~ 90%	≤ 100mS	
VOLTAGE DOWN 90% ~ 10%	≤ 100mS (≤ rating load)	
RESISTANCE TEMPERATURE COEFFICIENT		
Voltage Current	100ppm + 10mV (≤ 30mV rating voltage < 36V) 100ppm + 10mA	
DRIFT		
Voltage Current	≤ 0.05% + 3mV ≤ 0.1% + 6mA	
TRACK OPERATION		
Tracking Error Series Regulation	≤ 0.1% + 10mV Same	
PARALLEL OPERATION		
Program Accuracy (25°±5°C) Load Effect Source Effect	Voltage ≤ 0.05% + 20mV (≤ 30mV rating voltage < 36V) Current ≤ 0.2% + 20mA OVP ≤ 20V + 0.6V Voltage ≤ 10mV (for output ≤ 18mV from output) Current ≤ 3mA (≤ 3mA rating current + 3.1A) Voltage ≤ 5mV (Current = Fixed)	
MEMORY		
Store/Recall	50 sets	
TIMER		
Setting Time Resolution Function	1 second ~ 255 minutes (Max. 255 minutes x 99 sets) 1 second Set a digital working loop (Auto Stop running)	
STANDARD INTERFACE		
GPIB		
POWER SOURCE		
AC 100V/115V/230V/240V ±10%, 50/60Hz		
DIMENSIONS & WEIGHT		
350(W) x 145(H) x 340(D) mm; Approx. 10kg		

ORDERING INFORMATION

PPT-1830 120W Triple Output Programmable D.C. Power Supply
PPT-3615 120W Triple Output Programmable D.C. Power Supply

Model	Independent	Series	Parallel	Display Digit	Weight (kg)
PPT-1830	(0-18V/0-9V×2) (0-3A/0-3A×2)	36V/3A	18V/6A	4位	10
PPT-3615	(0-36V/0-9V×2) (0-1.5A/0-3A×2)	72V/1.5A	36V/3A	4位	10

ACCESSORIES
User Manual x 1, Power Cord x 1, Test lead GTL-104A x 3, GTL-104A x 1

OPTIONAL ACCESSORIES

GRA-401 Rack Mount Kit GPI-464A GPIB Interface Card x 1
GTL-248 GPIB Cable, Double Shielded, 2000mm

FREE DOWNLOAD

Driver LabView Driver

Multiple Output Programmable Linear D.C. Power Supply

PST-3201/3202

FEATURES

- Digitized Programmable Interface
- High Resolution 10mV, 1mA
- 192 x 128 LCD Display, Simultaneously Shows Settings and Measuring Result
- Over-Voltage, Over-Current, Over-Temperature Protection
- Intelligent Fan Control (Changes by Output Power)
- 100 Sets Memory
- Auto Step Running With Timer Setting
- Auto Series and Parallel Function
- LabVIEW Driver
- Standard Interface : RS-232C
- Optional Interface : GPIB (IEEE-488.2)
- Optional European Jack Type Terminal

European Type Jack Terminal

Rear Panel

SPECIFICATIONS	PST-3202	PST-3201
OUTPUT		
Voltage	0~32Vx2, 5~8Vx1	0~32Vx1
Current	0~3Ax2, 0~5Ax1	0~3Ax1
OVP	0~33Vx2, 6~9Vx1	0~33Vx1
LOAD REGULATION		
Voltage	≤ 3mV (≤ 3mV rating current >3.0A)	
Current	≤ 5mA (≤ 5mA rating current >3.0A)	
LINE REGULATION		
Voltage	≤ 3mV	
Current	≤ 5mA	
RESOLUTION		
Voltage	10mV	
Current	1mA (2mA, rating current >3.0A)	
OVP	10mV	
PROGRAM ACCURACY(25 °C)		
Voltage	≤ 0.05%x20mV	
Current	≤ 0.1%x5mA (+10mA, rating current>3.0A)	
OVP	≤ 0.05%x200mV	
RIPPLE & NOISE(20Hz~20MHz)		
Voltage	Ripple ≤ 1mVrms/3mVp-p , Noise ≤ 2mVrms/30mVp-p	
Current	≤ 3mArms (≤ 5mArms, rating current >3.0A)	
TEMPERATURE COEFFICIENT (0 ~ 40° C)		
Voltage	≤ 100ppm+1mV	
Current	≤ 100ppm+1mA	
READBACK RESOLUTION		
Voltage	10mV(<30mV, rating voltage <30V)	
Current	1mA(1mA, rating current <3.0A)	
READBACK ACCURACY(25 ± 5 °C)		
Voltage	≤ 0.05%+30mV(<30mV, rating voltage <30V)	
Current	≤ 0.1%+5mA(+10mA, rating current>3.0A)	
READBACK TEMPERATURE COEFFICIENT		
Voltage	≤ 100ppm+10mV(<30mV, rating voltage <30V)	
Current	≤ 150ppm+10mA(<30mA, rating current <3.0A)	
RESPONSE TIME		
Voltage Up (90%~99%)	≤ 100mS	
Voltage Down (99%~90%)	≤ 100mS (@ 10% rating load)	
DRIFT		
Voltage	≤ 100ppm+30mV(<30mV, rating voltage <30V)	
Current	≤ 150ppm+10mA	
TRACK OPERATION		
Tracking Error	≤ 0.1%x(8+1)	
Series(Load Effect)	≤ 20mV	
PARALLEL OPERATION		
Program Accuracy(25℃)	Voltage ≤ 0.05%x(20mV), Current ≤ 0.1%x(10mA), OVP ≤ 0.05%x(200mV)	
Load Effect	Voltage ≤ 2mV(≤ 5mV, rating current>3.0A), Current ≤ 4mA	
Source Effect	Voltage ≤ 5mV, Current ≤ 4mA	
MEMORY		
Store/Recall	100 Sets	
TIMER		
Setting Time	0 ~ 59 second, 00 Minutes 59 second (Max. 99 Minutes 59 second x 100)	
Resolution	01 second	
Function	Auto step running (for output working time)	
INTERFACE		
Standard : RS-232C ; Option : GPIB (IEEE-488.2)		
POWER SOURCE		
AC 90V~128V/180V~256V ± 10%, (50Hz~60Hz) 900W		
DIMENSIONS & WEIGHT		
238(W) x 140(H) x 385(D) mm , Approx. 10kg		

ORDERING INFORMATION

PST-3202 1500W Triple Output Programmable D.C. Power Supply
PST-3201 900W Triple Output Programmable D.C. Power Supply

Model	Independent	Series	Parallel	Display Type	Weight (kg)
PST-3201	(0~32V/0~3A)x1	64V/3A	32V/6A	LCD	10
PST-3202	(0~32V/0~3A)x2, (5~8V/0~5A)x1	64V/3A	32V/6A	LCD	10

ACCESSORIES :
User's Manual x 1 ; Power cord x 1 ; Test lead: GTL-104A x 2 (PST-3201 or GTL-105A x 1 (PST-3201)
European test lead: GTL-204A x 2 (PST-3202) or GTL-203A x 3 (PST-3201)

OPTION
GPIB-01 GPIB Interface (Factory installed)

OPTIONAL ACCESSORIES
GRA-401 Rack Mount Kit
GTL-248 GPIB Cable, Double Shielded, 2000mm
GTL-232 RS-232C Cable, 9-pin Female to 9-pin Male (Modem for Computer)

FREE DOWNLOAD
PC Software : PC Software including Data Log / Remote Control Software
Driver : LabView Driver

Multiple Output Linear D.C. Power Supply

GPE-X323 Series

CE Remote I/O

FEATURES

- 1/2/3/4 Independent Isolated Output
- 4.3 Inch LCD Display
- Setting & Read Back Resolution 100mV/10mA (*1)
- Output ON/OFF Switch
- Analog Control (Remote I/O) for Output ON/OFF
- Set View Function for Checking an Original V/I Setting During Output On
- Key Lock Function
- Tracking Series and Parallel Operation
- Optional European Jack Type Terminal

European Type Jack Terminal

Rear Panel

The GPE-X323 series is a cutting edge, economical linear DC Power supply. The GPE-X323 series features output power from 192 to 217 watts, three independent isolated output channels (for GPE-3323), high resolution, low noise, high reliability, and compact size. The GPE-X323 series has a built-in digital panel control design to replace conventional control method. This unique design allows the GPE-X323 series linear DC power supply to provide users with more efficient functionalities, including set view and key lock so as to expedite the operation process. The key lock function protects DUTs by preventing others from changing voltage and current parameters. Additionally, output key light facilitates users in clearly reading the operational status of power supply.

SPECIFICATIONS

	GPE-4323				GPE-3323			GPE-2323		GPE-1326
OUTPUT MODE										
Number of Channel	CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH1	CH2	CH1
Voltage	0~32V	0~32V	0~5V	0~15V	0~32V	0~32V	5V	0~32V	0~32V	0~32V
Current	0~3A	0~3A	0~1A	0~1A	0~3A	0~3A	5A	0~3A	0~3A	0~6A
Tracking Series Voltage	0~64V		-		0~64V		-	0~64V		-
Tracking Parallel Current	0~6A				0~6A			0~6A		
CONSTANT VOLTAGE OPERATION										
Line Regulation	≤0.01%+3mV									
Load Regulation	≤0.01%+3mV(rating current ≤3A) ≤0.02%+5mV(rating current >3A)									
Ripple & Noise	≤1mVrms(5Hz~1MHz)									
Recovery Time	≤100μs(50% Load Change, minimum load 0.5A)									
CONSTANT CURRENT OPERATION										
Line Regulation	≤0.2%+3mA									
Load Regulation	≤0.2%+3mA									
Ripple & Noise	≤3mArms									
TRACKING OPERATION (CH1,CH2)										
Tracking Error	≤0.1%+10mV of Master(0~32V) No Load , with Load add load regulation ≤100mV)									
Parallel Regulation	Line : ≤0.01%+3mV Load : ≤0.01%+3mV(rating current≤3A) ≤0.02%+5mV(rating current >3A)									
Series Regulation	Line : ≤0.01%+5mV; Load : ≤100mV									
Ripple & Noise	≤2mVrms , 5Hz ~ 1MHz									
CH3 OPERATION FOR (GPE-3323)										
Output Voltage	5.0V, ±5%									
Output Current	5A									
Line Regulation	≤3mV									
Load Regulation	≤5mV									
Ripple & Noise	1mVrms(5Hz~1MHz)									
METER										
Voltage Resolution	100mV (*1)									
Current Resolution	10mA (*1)									
Setting Accuracy	Voltage±(0.1% of reading +30mV); Current±(0.3% of reading +6mA)									
Readback Accuracy	Voltage±(0.1% of reading +30mV); Current±(0.3% of reading +6mA)									
INSULATION										
Chassis and Terminal	20MΩ or above (DC 500V)									
Chassis and AC Cord	30MΩ or above (DC 500V)									
ENVIRONMENT CONDITION										
Operation Temp	0~40℃									
Storage Temp	-10~70℃									
Operating Humidity	≤80% RH									
Storage Humidity	≤70% RH									
OTHER										
Power Source	AC100V/120V/220V±10%; 230V(+10%~-6%); 50/60Hz									
Dimensions & Weight	210(W)x 155(H) x 306(D) mm ; Approx. 7kg									

ORDERING INFORMATION

GPE-1326	Single Channel, 192W Linear DC Power Supply
GPE-2323	2 Channels, 192W Linear DC Power Supply
GPE-3323	3 Channels, 217W Linear DC Power Supply
GPE-4323	4 Channels, 212W Linear DC Power Supply

ACCESSORIES :
User Manual (CD) x 1 ; Power Cord x 1

GPE-1326	Test Lead GTL-104A x 1 ; GTL-105A x 1 ; or European GTL-204A x 1, GTL-203A x 1
GPE-2323	Test Lead GTL-104A x 2 ; or European GTL-204A x 2
GPE-3323	Test Lead GTL-104A x 3 ; or European GTL-204A x 3
GPE-4323	Test Lead GTL-104A x 2 ; GTL-105A x 2 or European GTL-204A x 2 , GTL-203A x 2

Note : (*1) For a higher resolution (10mV/1mA), please follow the setting procedure of the user manual on p35.
When using a higher resolution, the current or voltage adjustment may be limited by the loads sensitivity.

Multiple Output Linear D.C. Power Supply

GPS-2303/3303/4303

CE

FEATURES

- 2, 3 and 4 Independent Isolated Output
- Four "3 Digits" LED Displays
- 0.01% Load and Line Regulation
- Low Ripple and Noise
- Tracking Operation and Auto Series/Parallel Operation
- Output ON/OFF Switch
- Output Voltage and Current Setting When Output Disable (Except for GPS-2303)
- Fan Speed Control Circuit to Minimize Fan Noise
- Over Load and Reverse Polarity Protection
- Optional European Jack Type Terminal

European Type Jack Terminal

GPS-001

Voltage/Current protection Knob

Rear Panel

GPS-3303

The GPS Series linear power supplies have 2-4 independent output channels, 195W to 280W output, overload and reverse polarity protection as well as an output ON/OFF switch for safety. The tracking mode switches allow voltage/current to be output in parallel or series and the intelligent fan reduces noise. The GPS Series is an entry level general purpose power supply recognized for their affordability in education, laboratories and industry.

	GPS-4303				GPS-3303		GPS-2303	
OUTPUT MODE								
	CH1	CH2	CH3	CH4	CH1 / CH2	CH3	CH1	CH2
Voltage	0 ~ 30V		2.2 ~ 5.5V	0 ~ 15V	0 ~ 30V	5V Fixed	0 ~ 30V	
Current	0 ~ 3A		1A Max.	1A Max.	0 ~ 3A	3A Max.	0 ~ 3A	
Tracking Series Voltage	0 ~ 60V		----		0 ~ 60V	----	0 ~ 60V	
Tracking Parallel Current	0 ~ 6A				0 ~ 6A		0 ~ 6A	
CONSTANT VOLTAGE OPERATION (CH1, CH2)								
Line Regulation	≤ 0.01% + 3mV							
Load Regulation	≤ 0.01% + 1mV (rating current ≤ 3A) ≤ 0.02% + 3mV (rating current > 3A)							
Ripple & Noise	≤ 1mVrms (5Hz ~ 1MHz)							
Recovery Time	≤ 100μS (50% Load change, Minimum load 0.1A)							
CONSTANT CURRENT OPERATION (CH1, CH2)								
Line Regulation	≤ 0.2% + 3mA							
Load Regulation	≤ 0.2% + 3mA							
Ripple & Noise	≤ 3mArms							
TRACKING OPERATION (CH1, CH2)								
Tracking Error	≤ 0.1% + 1mV of CH1							
Series Regulation	≤ 0.01% + 1mV							
Load Regulation	≤ 30mV							
Ripple & Noise	≤ 2mVrms (5Hz ~ 1MHz)							
CH3 OPERATION (for GPS-3303/4303)								
CH3 Voltage	GPS-4303 : 2.2V ~ 5.0V ; GPS-3303 : 5V Fix							
Line Regulation	≤ 3mV							
Load Regulation	≤ 15mV							
Ripple & Noise	≤ 2mVrms (5Hz ~ 1MHz)							
Current Output	GPS-4303 : 1A, GPS-3303 : 0A							
CH4 OPERATION (for GPS-4303)								
CH4 VOLTAGE	6V ~ 15V							
Line Regulation	≤ 3mV							
Load Regulation	≤ 10mV							
Ripple & Noise	≤ 2mVrms (5Hz ~ 1MHz)							
Current Output	1A							
METER								
Digital	3 digits 0.5" LED display GPS-4303/3303 Dial ON Accuracy ± (0.5% of rdg + 1 digit) GPS-4303/3303 Dial OFF Accuracy ± (0.5% of rdg + 8 digits) GPS-2303 Accuracy ± (0.5% of rdg + 1 digit)							
INSULATION								
Chassis and Terminal	≥ DC 500V / 20MΩ							
Chassis and AC Cord	≥ DC 500V / 20MΩ							
POWER SOURCE								
AC 100V/110V/120V/220V/230V/240V, 50Hz~60Hz, 180W/Hz								
DIMENSIONS & WEIGHT								
213(W) x 143(H) x 340(D) mm, Approx. 7kg								

ORDERING INFORMATION

GPS-4303 4-channels, 280W Multiple Output Linear DC Power Supply
GPS-3303 3-channels, 195W Multiple Output Linear DC Power Supply
GPS-2303 2-channels, 180W Multiple Output Linear DC Power Supply

ACCESSORIES :
User manual x 1, Power cord x 1,
GPS-4303 : Test lead CTL-704A x 2, CTL-1006 x 2, European test lead CTL-208A x 2, CTL-204A x 2, CTL-201A x 1
GPS-3303 : Test lead CTL-704A x 2, CTL-1006 x 1, European test lead CTL-208A x 1, CTL-204A x 1, CTL-201A x 1
GPS-2303 : Test lead CTL-704A x 2, European test lead CTL-204A x 2, CTL-201A x 1

OPTIONAL ACCESSORIES
GPS-001 Voltage/Current Protection Knob

Triple Output Linear D.C. Power Supply

GPC-3060D/6030D

The GPC Series is a triple output, 175W, linear DC power supply. Channel 1 and 2 are fully adjustable (model dependent) and channel 3 is fixed at 5V/3A with ripple and noise at less than 1mVrms. Overload and reverse polarity protection keep GPC Series and its loads safe from unexpected conditions. GPC features continuous or dynamic internal load selection and series or parallel tracking for application flexibility. The GPC Series is an ideal solution for inexpensive bench-top applications requiring low noise and multiple outputs.

FEATURES

- Triple Output
- Auto Tracking
- Auto Series and Parallel Operation
- Constant Voltage and Constant Current Operation
- Low Ripple and Noise
- Internal Select for Continuous or Dynamic Load
- Overload and Reverse Polarity Protection
- 3 1/2 Digits 0.5" LED Display
- 5V, 3A Fixed Output

SPECIFICATIONS

OPERATION MODE	
Independent	Two independent outputs and 5V fixed output
Series	Output from 0 to rating volts and 0 to rating amperes Output from 0 to tracking volts at rating amperes each Output from 0 to double rating volts at rating amperes Output from 0 to double rating amperes at rating volts
Parallel	
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation: ≤ 0.01% + 3mV Load regulation: ≤ 0.01% + 3mV (rating current ≤ 5A) ≤ 0.01% + 3mV (rating current ≤ 10A) ≤ 0.02% + 3mV (rating current >10A)
Ripple & Noise	< 1mVrms (5Hz ~ 1MHz)
Recovery Time	≤ 100μS (50% Load change, Minimum load 0.5A)
CONSTANT CURRENT OPERATION	
Regulation	Line regulation: ≤ 0.2% + 3mA Load regulation: ≤ 0.2% + 5mA
Ripple Current	< 3mArms
5V FIXED OUTPUT	
Regulation	Line regulation: ≤ 5mV Load regulation: ≤ 50mV
Ripple & Noise	<2mVrms
Voltage Accuracy	5V ± 0.25V
Output Current	3A
TRACKING OPERATION	
Tracking Error	≤ 0.5% + 10mV of the master
Series Regulation	≤ 300mV
METER	
Digital	3½ digits 0.5" LED display Accuracy: ≤ (0.5% of rdg + 2 digits)
INSULATION	
Chassis and Terminal	100MΩ or above (DC 500V)
Chassis and AC Cord	100MΩ or above (DC 500V)
POWER SOURCE	
AC 100V/120V/220V/240V ± 10%, 50/60Hz	
DIMENSIONS	
212(W) × 140(H) × 420(D) mm	

ORDERING INFORMATION

Model	Independent	Series	Parallel	Weight: kg
GPC-6030D	175W 3-C Power Supply (0 ~ 60V/0 ~ 3A) x 2, (5V/3A fixed) x 1	120V 3A	60V 6A	13.5
GPC-3060D	175W 3-C Power Supply (0 ~ 30V/0 ~ 6A) x 2, (5V/3A fixed) x 1	60V 6A	30V 12A	13.5

ACCESSORIES:
User manual x 1, Power cord x 1
Test lead (TL-924) x 1 (1.5A) or (TL-994) x 1 (2.5A)

OPTIONAL ACCESSORIES

GRA-401 Rack Adapter kit

Linear D.C. Power Supply

The GPR-H Series consists of a single output linear DC power supplies with voltage outputs rating from 8V to 300V. The series includes overload and reversed polarity protection to protect devices under test from being damaged due to improper operation. The internal select for dynamic loads is often used for amplifier testing. It can support high pulse current derived from dynamic processes as well as support low noise and noise, which make it suitable for high-end bench top applications requiring precision. Its rear panel supports output wiring. These features combined into one assembly allow the GPR-H Series to predominate in applications requiring high voltage or high current.

GPR-H Series

CE

FEATURES

- 0.01% High Regulation
- Constant Voltage and Constant Current Operation
- Internal Select For Continuous or Dynamic Load
- Low Ripple and Noise
- Overload and Reverse Polarity Protection
- 3 1/2 Digit 0.3" LED Display
- Internal Select for Continuous or Dynamic Load (for GPR-3510HD/GPR-6060D/GPR-7550D)

CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation ≤ 0.01% + 3mV Load regulation ≤ 0.01% + 5mV (≤ 10A) ≤ 0.02% + 5mV (≤ 15A)
Ripple & Noise	≤ 1mVrms (1Hz ~ 1MHz)
Recovery Time	≤ 100μS (50% load change, minimum load 0.1A)
Output Range	Zero rating voltage continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation ≤ 0.2% + 3mA Load regulation ≤ 0.2% + 3mA
Ripple Current	≤ 3mArms (≤ 30A), ≤ 5mArms (≤ 50A) ≤ 30mArms (≤ 15A)
Output Range	Zero rating current continuously adjustable
METER	
Type	3 1/2 Digit 0.3" LED display
Accuracy	± (0.5% of rdg + 1 digits)
INSULATION	
Chassis and Terminal	100MΩ or above (DC1000V)
Chassis and AC Cord	100MΩ or above (DC1000V)
POWER SOURCE	
AC 100V/120V/220V/240V ± 10%, 50/60Hz	
DIMENSIONS	
214(W) x 132(H) x 408(D) mm	

Rear Panel

ORDERING INFORMATION				
Model		**Output Volts (V)**	**Output Amps (A)**	**Weight (kg)**
GPR-1830HD	240W D.C. Power Supply	0 ~ 30	0 ~ 8	10.5
GPR-1850HD	360W D.C. Power Supply	0 ~ 18	0 ~ 20	10.5
GPR-3510HD	350W D.C. Power Supply	0 ~ 35	0 ~ 10	10.0
GPR-6060D	360W D.C. Power Supply	0 ~ 60	0 ~ 6	10.0
GPR-7550D	375W D.C. Power Supply	0 ~ 75	0 ~ 5	10.5
GPR-11H30D	330W D.C. Power Supply	0 ~ 110	0 ~ 3	13.5
GPR-30H10D	300W D.C. Power Supply	0 ~ 300	0 ~ 1	13.0

ACCESSORIES :
User manual x 1, Power cord x 1
Test lead GTL-105A x 1 (1.5A) or GTL-246 x 1 (15A) or Not Available (> 30A)

OPTIONAL ACCESSORIES	
GTL-123	Test lead, U type to Alligator Test lead, Max. Current 40A, 1.2Meter

Note: CE Approved Only for GPR-1830HD, GPR-3510HD, GPR-7550D, GPR-11H30D
Rear Panel Output Only for GPR-1830HD, GPR-1850HD

Linear D.C. Power Supply

The GPR-M Series is a single output, 180W, linear DC power supply which featuring all the same functions as the GPR-H Series but for lower power demands. Like the GPR-H Series, the GPR-M Series is suitable for high-end precision bench top applications. Low load and line regulation for both constant voltage and constant current mode ensure reliable, predictable output. Overload and reverse polarity protection as well as internal selection for dynamic or constant load are standard.

GPR-M Series

CE

FEATURES

- 0.01% High Regulation
- Constant Voltage and Constant Current Operation
- Internal Select for Continuous or Dynamic Load
- Low Ripple and Noise
- Overload and Reverse Polarity protection
- 3 1/2 Digit 0.1" LED Display

SPECIFICATIONS	
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation ≤ 0.01% + 3mV Load regulation ≤ 0.01% + 3mV (≤ 10A) Load regulation ≤ 0.02% + 5mV (≤ 20A)
Ripple & Noise	≤ 1mVrms (1Hz ~ 1MHz)
Recovery Time	≤ 100μS (50% load change, minimum load 0.5A)
Output Range	0 to rating voltage continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation ≤ 0.2% + 3mA Load regulation ≤ 0.2% + 3mA
Ripple Current	≤ 3mArms
Output Range	0 to rating current continuously adjustable
METER	
Digital	3 1/2 Digits 0.1" LED display Accuracy: 0.5% of rdg. ± 1 digit
INSULATION	
Chassis and Terminal	20MΩ or above (DC 500V)
Chassis and AC Cord	20MΩ or above (DC 500V)
POWER SOURCE	
AC 90V/110V/120V/140V/190V/220V/240V	
DIMENSIONS	
214(W) x 152(H) x 348(D) mm	

ORDERING INFORMATION

Model		Output Volts (V)	Output Amps (A)	Weight (kg)
GPR-1810HD	180W D.C. Power Supply	0 ~ 18	0 ~ 10	11.5
GPR-3660D	180W D.C. Power Supply	0 ~ 36	0 ~ 6	11.5
GPR-6030D	180W D.C. Power Supply	0 ~ 60	0 ~ 3	11.5

ACCESSORIES:
User manual x 1 , Power cord x 1
Test lead CTL-10A x 1 (GPR-1810HD)
CTL-10Ax 1 (GPR-3660D/6030D)

OPTIONAL ACCESSORIES	
GRA-401	Rack Adapter Panel (19", 4U)

Linear D.C. Power Supply

The GPS Series is a single output, 5/9/18 to 60VDC linear DC power supply. The GPS Series has digital display meters with varying power outputs. The GPS Series features overload and reverse polarity protection as well as high regulation and low ripple/noise that are maintained at 0.01% and < 1mVrms, respectively. Continuous or dynamic internal load selection accommodates applications such as pulsed current. Remote control terminals offer programming and operation from an external device.

GPS-1830D/1850D/3030D

CE

GPS-3030DD

CE

FEATURES

- Light and Compact Design
- 0.01% High Regulation
- Constant Voltage and Constant Current Operation
- Remote Control for External Programmability
- Internal Select for Continuous or Dynamic Load
- Low Ripple and Noise
- Overload and Reverse Polarity Protection
- Series or Parallel Operation
- Optional European Type Jack Terminal for GPS-3030D/GPS-3030DD

European Type Jack Terminal

SPECIFICATIONS	
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation: ≤ 0.01% + 3mV Load regulation: ≤ 0.01% + 1mV (rating current ≤ 3A) ≤ 0.01% + 5mV (rating current >3A)
Ripple & Noise	≤ 0.5mVrms 5Hz ~ 1MHz (rating current ≤ 3A) ≤ 1mVrms 5Hz ~ 1MHz (rating current >3A)
Recovery Time	≤ 100μS (50% load change, minimum load 0.5A)
Temp. Coefficient	≤ 300 ppm /°C
Output Range	0 to rating, single control continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation: ≤ 0.2% + 3mA Load regulation: ≤ 0.2% + 3mA
Ripple Current	≤ 3mArms
Output Range	0 to rating current continuously adjustable (Hi/Lo range switchable)
METER	
Digital	3½ digits 0.1" LED display (GPS-1830D/1850D/3030D) 3½ digits 0.39" LED display (GPS-3030DD) Accuracy: ± (0.5% of rdg + 2 dgits)
INSULATION	
Chassis and Terminal	30MΩ or above (DC 500V)
Chassis and AC Cord	30MΩ or above (DC 500V)
POWER SOURCE	
AC 100V/110V/220V/240V (10%, 50/60Hz	
DIMENSIONS	
133(W) x 145(H) x 285(D) mm	

ORDERING INFORMATION

Model	Output Volts(V)	Output Amps(A)	Weight (kg)
GPS-1830D	5/9/18 D.C. Power Supply	0 ~ 18	4
GPS-1850D	9/18/30 D.C. Power Supply	0 ~ 18	5
GPS-3030D	9/18/30 D.C. Power Supply	0 ~ 30	5
GPS-3030DD	9/18/30 D.C. Power Supply	0 ~ 30	5

ACCESSORIES:
User manual x 1 (Power cord x 1)
Test lead GTL-103A x 1 (≤ 3A) or GTL-104A x 1 (≤ 10A)
European test lead GTL-205A x 1 (≤ 3A) or GTL-206A x 1 (≤ 10A)

NOTE

AC POWER SOURCES

GW Instek AC Power Sources currently can be divided into three categories: Programmable AC/DC Power Source, Programmable AC Power Source, AC Power Source.

AC Power Source ASR-3000/ASR-2000 Series not only plays the role as a precision AC/DC power source but also a powerful analyzer. It contains abundant features for the testing and characteristic analysis of power supplies, electronic devices, components and modules.

The APS-7000 Series is programmable linear AC Power Source, with the height of 2U and output frequency range is 45~1000Hz. The maximum rated output for APS-7050 is 500VA, 310Wrms, 4.2Arms and APS-7100 is 1060VA, 310Wrms, 8.4Arms. The APS-7000 Series comprises more measurement and test functions and provides user interface similar to that of AC Power Meter.

PRODUCTS

- **Programmable AC/DC Power Source**
- **Programmable AC Power Source**
- **AC Power Source**

AC POWER SOURCES

Programmable Switching AC/DC Power Source

GW Instek not only provides compact and lightweight Switching AC/DC power sources but also features AC, DC and AC+DC power outputs and the real time measurements of Vrms, Vpp, Vpeak, Irms, Ipeak, Ipeak, P, S, Q, PF, CF, 40 th order Voltage Harmonic and Current Harmonic. Four signal sources are collocated as Internal (INT), External (EXT), Internal + External (SUM), and External Synchronization (SYNC) to flexibly output power so as to meet customers' demands. The powerful sequence function is very suitable for producing arbitrary waveforms. 16 sets of arbitrary waveform storage space and 10 sets of panel setting memory space are provided for data storage and setting input.

Linear AC Power Source

GW Instek recommends linear AC power source for AC power with the requirements of high accuracy, high stability and low ripple/noise. Programmable AC Power Source APS-7000 is suitable for simulating AC power outputs and it has 9 measurement functions (Vrms, Irms, F, Ipk, W, VA, PF, Ipk hold, CF). 7 waveform modes, Sequence mode, Simulate mode, and Surge/Dip Control Mode etc. Purpose AC power source applications, non-programmable AC source APS-7000E Series, with high precision and THD of less than 0.5%, is the ideal selection.

2K~4KVA PROGRAMMABLE SWITCHING AC/DC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight (kg)	Page
ASR-2200	2KVA	1~999.9Hz	AC 150V Range 0.0V~200.0V AC 300V Range 0.0V~400.0V DC 150V Range -265V~+285V DC 300V Range -519V~+570V	AC 150V Range 30A AC 300V Range 10A DC 150V Range 30A DC 300V Range 10A	LCD	35	D67-72
ASR-3300	3KVA	1~999.9Hz	AC 150V Range 0.0V~200.0V AC 300V Range 0.0V~400.0V DC 150V Range -265V~+285V DC 300V Range -519V~+570V	AC 150V Range 30A AC 300V Range 15A DC 150V Range 30A DC 300V Range 15A	LCD	35	
ASR-4400	4KVA	1~999.9Hz	AC 150V Range 0.0V~200.0V AC 300V Range 0.0V~400.0V DC 150V Range -265V~+285V DC 300V Range -519V~+570V	AC 150V Range 40A AC 300V Range 20A DC 150V Range 40A DC 300V Range 20A	LCD	35	
ASR-34004H	4KVA	1~5000Hz	AC 150V Range 0.0V~200.0V AC 300V Range 0.0V~400.0V DC 150V Range -265V~+285V DC 300V Range -519V~+570V	AC 150V Range 40A AC 300V Range 20A DC 150V Range 40A DC 300V Range 20A	LCD	35	

PROGRAMMABLE SWITCHING AC/DC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight (kg)	Page
ASR-2010/ ASR-2010S	1000VA	1~999.9Hz	AC 150V Range 0.0V~176.8V AC 300V Range 0.0V~350.0V DC 150V Range -250.0V~+250.0V DC 300V Range -500.0V~+500.0V	AC 150V Range 5A AC 300V Range 2.5A DC 150V Range 5A DC 300V Range 2.5A	LCD	11.3 ASR-2010 Series 10.3 ASR-2010S Series	D73-76
ASR-2100/ ASR-2100S	1000VA	1~999.9Hz	AC 150V Range 0.0V~176.8V AC 300V Range 0.0V~350.0V DC 150V Range -250.0V~+250.0V DC 300V Range -500.0V~+500.0V	AC 150V Range 10A AC 300V Range 5A DC 150V Range 10A DC 300V Range 5A	LCD	11.3 ASR-2100 Series 10.3 ASR-2100S Series	

PROGRAMMABLE LINEAR AC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight (kg)	Page
APS-3050	500 VA	45~500Hz Option: 45~999.9Hz	0~150V, 0~155V Option: 0~300V	2.1A, 4.2A	LCD	24	D77-80
APS-7150	1000 VA	45~500Hz Option: 45~999.9Hz	0~150V, 0~155V Option: 0~300V	4.2A, 8.4A	LCD	38	
APS-7205	2000 VA	45~500Hz Option: 45~999.9Hz	0~150V, 0~155V Option: 0~300V	8.4A, 16.8A	LCD	90	
APS-7330	3000 VA	45~500Hz Option: 45~999.9Hz	0~150V, 0~155V Option: 0~300V	13.6A, 15.5A	LCD	128	

LINEAR AC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight (kg)	Page
APS-7050E	500 VA	45~500Hz	0~150V, 0~155V	2.1A, 4.2A	LCD	24	D81-83
APS-7150E	1K VA	45~500Hz	0~150V, 0~155V	4.2A, 8.4A	LCD	38	

ASR-3000 Series

FEATURES

- Output Rating: AC 0 ~ 400 Vrms, DC 0 ~ ±339 V
- Output Frequency: up to 999.9 Hz (5kHz for ASR-3400HF only)
- DC Output (100% of Rated Power)
- Measurement Items: Vrms, Vavg, Vpeak, Irms, Iphase, Iavg, Ipeak, P, S, Q, PF, CF
- Voltage and Current Harmonic Analysis (THDv, THDi)
- Remote Sensing Capability
- OCP, OPP, OTP, AC Fail Detection and Fan Fail Alarm
- Support Arbitrary Waveform Function
- Output Capacity: 2kVA/3kVA/4kVA
- Customized Phase Angle for Output On/Off
- Sequence and Simulation Function (up to 10 sets)
- Interface(std): USB, LAN, RS-232, GPIB
- Built-in External Control I/O and External Signal Input
- Built-in Output Relay Control
- Memory Function (up to 10 sets)
- Built-in Web Server

The ASR-3000 Series is an AC+DC power source, featuring high-speed DC voltage rising and falling time (≤ 100us). There are four models of the series: ASR-3200(2kVA), ASR-3300(3kVA) and ASR-3400(3400HF /4kVA). The series can provide rated power output during AC output and DC output. Ten ASR-3000 Series output modes are available, including 1) AC power output mode (AC-INT Mode), 2) DC power output mode (DC-INT Mode), 3) AC/DC power output mode (AC+DC-INT Mode), 4) External AC signal source mode (AC-EXT Mode), 5) External AC/DC signal source mode (AC+DC-EXT Mode), 6) External AC signal superimposition mode (AC-ADD Mode), 7) External AC/DC signal superimposition mode (AC+DC-ADD Mode), 8) External AC signal synchronization mode (AC-SYNC Mode), 9) External AC/DC signal synchronization mode (AC+DC-SYNC Mode)10) External DC voltage control of AC output mode(AC-VCA).

ASR-3000 Series is ideal for the development of On-board Chargers, Server Powers, LED modules, AC Motors, AC Fans, UPS and various electronic components, as well as for testing applications of automotive electrical equipment and home appliances.

The ASR-3000 Series provides users with waveform output capabilities including 1) Sequence mode generates waveform fallings, surges, sags, changes and other abnormal power line conditions; 2) Arbitrary waveform function allows users to store/upload user-defined waveforms; and 3) Simulate mode simulates power outage, voltage rise, voltage fall, and frequency variations. When the ASR-3000 Series power source outputs, it can also measure Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, Inlrf, P, S, Q, PF, CF, 1800-order Voltage Harmonic and Current Harmonic. In addition, the remote sensing function ensures accurate voltage output, and the Custom-ized Phase Angle for Output On/Off function can set the start and end angles of the voltage output according to the test requirements. The protection limits of V-Limit, Iavg-Limit and F-Limit can be set according to user requirements. Over voltage limit, OCP, OPP will protect the DUT during the output process. The Fan Fail Alarm function and the AC fail alarm function are also designed in the ASR-3000 Series.

The front panel of the ASR-3000 Series provides a universal socket or a European socket, which allows users to plug and use so as to save wiring time. Since the power socket specification has a maximum current of 15A, the rear panel of ASR-3000 Series is designed with a current circuit breaker. When the socket current is greater than 15A, it will automatically open the circuit to protect users. The ASR-3000 Series supports I/O interface and is standardly equipped with USB, LAN, External I/O, RS-232C and GPIB.

ASR-002 External three phase control unit

GRA-442-J Rack Mount Adaptor(JIS)

GRA-442-E Rack Mount Adaptor(EIA)

GTL-107 Output power wire

APS-008 Air inlet filter

GPW-005 Power cord

GPW-006 Power cord

GPW-007 Power cord

SPECIFICATIONS

			ASR-0330	ASR-0330	ASR-0450	ASR-0450-F
INPUT RATING (AC)						
OPERATING RANGE OF VOLTAGE			380 Vac to 480 Vac			
INPUT VOLTAGE RANGE			380 Vac to 480 Vac			
PHASE			Single phase, Two wire			
OPERATING RANGE OF FREQUENCY			47 Hz to 63 Hz			
INPUT FREQUENCY RANGE			47 Hz to 63 Hz			
MAX. POWER CONSUMPTION			3.3kVA at 415Vac	3.3kVA at 415Vac	4.5kVA at 415Vac	4.5kVA at 415Vac
POWER FACTOR		415Vac	0.98 (typ)			
MAX. INPUT CURRENT		415Vac	11.5 A	11.5 A	15.5 A	15.5 A
* Current value is measured when 380V, 400V or 480V input voltage is connected to the unit.						
DC VOLTAGE OUTPUT RATINGS (DC Side)						
VOLTAGE		**Setting Range***	0.0 V to 1000.0 V (0.0 V to 1000.0 V)			
		Setting Resolution:	0.1 V			
		Accuracy*	±(1.0% of set + 1.0 V)			
OUTPUT MODE			Single phase, Two wire			
MAXIMUM CURRENT*		**300 V**	30 A	30 A	45 A	45 A
		600 V	15 A	15 A	22.5 A	22.5 A
MAXIMUM PEAK CURRENT*		**300 V**	120 A	120 A	240 A	180 A
		600 V	60 A	60 A	120 A	90 A
LOAD POWER FACTOR			1 to 1 (leading or lagging)			
POWER CAPACITY			9kW (1)	9kW (1)	13.5kW (1)	13.5kW (1)
PROGRAM		**Setting Range**	AC mode: 0.0 V to 300.0 V (1) AC+DC mode: 0 V to 300.0 Vac			AC mode: 300 V to 1,000 Vac AC+DC mode: 1 Vac to 300 Vac and -1 V to -1.5A to 99.99 Vdc 0.1 Vac (VAC) to 0.01 Vdc 1 Vac (VAC) to 0.05 Vdc
		Setting Resolution:	0.01 V to 1.00 A(VAC<99.99 Vac) 0.1 Vdc, 0.001 A(VDC<99.9 Vdc)			
		Accuracy	0.05% of set (@ 0 ~ 5 V)			
		Stability	± 0.05%			
OUTPUT ON/OFF			0 to 3.0V variable (setting resolution 1 V)			
DC CHARGE			Without ± 20 V/ 0.5 V/ 0.1 V			
* At 1 kHz range.						
** Current output voltage from 0 volts to 100 % to 100% of output frequency at 47 Hz and 63 Hz, current limit 10 % of FS.						
*** Current output voltage of 0 V to 100 % to 0.5 V, 0.1 V, 0.01 V, 0.001 V, 0.0001 V, 0.00001 V, 0.000001 V, 0.0000001 V, 0.00000001 V, 0.000000001 V, 0.0000000001 V, 0.00000000001 V, 0.000000000001 V, 0.0000000000001 V, 0.00000000000001 V, 0.000000000000001 V, 0.0000000000000001 V, 0.00000000000000001 V, 0.000000000000000001 V, 0.0000000000000000001 V, 0.00000000000000000001 V, 0.000000000000000000001 V, 0.0000000000000000000001 V, 0.00000000000000000000001 V, 0.000000000000000000000001 V, 0.0000000000000000000000001 V, 0.00000000000000000000000001 V, 0.000000000000000000000000001 V, 0.0000000000000000000000000001 V, 0.00000000000000000000000000001 V, 0.000000000000000000000000000001 V, 0.0000000000000000000000000000001 V, 0.00000000000000000000000000000001 V, 0.000000000000000000000000000000001 V, 0.0000000000000000000000000000000001 V, 0.00000000000000000000000000000000001 V, 0.000000000000000000000000000000000001 V, 0.0000000000000000000000000000000000001 V, 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Rear Panel

ASR-3000 Series

SPECIFICATIONS

		ASR-3200	ASR-3300	ASR-3400	ASR-3400HF
OUTPUT CURRENT	Range	0 to 100% rating of the fundamental wave			
EFFECTIVE (RMS) [Note]	Full Scale	32 A / 16 A, 150V	48 A / 24 A, 150V	64 A / 32 A, 150V	
PHASE [°]	Resolution	0.01° (0.1 Hz)			
(at +25° and 60Hz/400Hz only)	Accuracy [*]	0 to 1kHz ±(0.1% of reading+0.1A/0.1 A) 1kHz to 10kHz ±(0.3% of reading+0.1A/0.1 A)	0 to 1kHz ±(0.1% of reading+0.2A/0.2 A) 1kHz to 10kHz ±(0.3% of reading+0.2A/0.2 A)	0 to 1kHz ±(0.1% of reading+0.3A/0.3 A) 1kHz to 10kHz ±(0.3% of reading+0.3A/0.3 A)	

[*] Percentage applies when 50Hz ≤ f ≤ 1kHz, value will be ±1% in DC mode.
[*] At the time of rated output voltage (150 V) at 50 Hz to 60 Hz and 0°C ≤ T ≤ 40°C. For loads that are substantially different from the rated load, add 0.1% to the accuracy.
[*] The output current is derated at 0°C ≤ T ≤ 10°C and 40°C ≤ T ≤ 50°C.
[*] The power factor is derated at 0°C ≤ T ≤ 10°C and 40°C ≤ T ≤ 50°C. The accuracy of the power factor is specified at 0.5 ≤ PF ≤ 1.0 and 0°C ≤ T ≤ 50°C.
[*] For an output voltage of 0 V, a phase current greater than the range of 0 to the rated current (0 A or more) flows and 0 V is output. The accuracy of the power factor is specified at 0.5 ≤ PF ≤ 1.0 and 0°C ≤ T ≤ 50°C.
[*] The peak and overload current are not displayed in the GP-IB mode.
[*] The power source in the fault state cannot be set.
[*] At the rated voltage (150 V) at 50 Hz to 60 Hz and 0°C ≤ T ≤ 40°C.

DISPLAY			
PANEL SETTING			LAN, GPIB, USB, Key lock
DISPLAY			16*2 LCD, 4.3" LCD
MEMORY FUNCTION			Save and load (settings, Basic settings: 10 (0-9 numeric keys)
ARBITRARY WAVE	Number of elements		16 (maximum)
	Waveform length		1000 points
INTERFACE	Standard	USB	Type A: Host, Type B: Slave, Speed: 1.1 (LS, FS) 2.0 (HS), USBTMC-USB488
		LAN	MAC address, IPv4, IP address, Port, Password, Gateway IP Address, Subnet Mask, Instrument IP Address, Subnet Mask
		GP-IB(option)	Complies with the SCPI-1997 specifications
		EXT Control	Control Signal Input Terminal (Option) I/O
		RS232	9600 bps, 8 bit, 1 stop bit, no parity, no flow control
INSULATION RESISTANCE			100 MΩ, 500 VDC or more
Between input and chassis, output and chassis, input and output			
WITHSTAND VOLTAGE			1500 Vac, 1 minute
Between input and chassis, output and chassis, input and output			
EMC			EN 61000-3-2:2014+A1:2019+A2:2024 Class A, EN 61000-3-3:2013+A1:2019+A2:2021 (Class A), EN 61000-3-11:2000 (Class A), EN 61000-3-12:2011
SAFETY			EN 61010-1
ENVIRONMENT	Operating Environment		Indoor use, Pollution Degree 2
	Operating Temperature Range		0 °C to 40 °C
	Storage Temperature Range		-10 °C to 70°C
	Operating Humidity Range		20 % to 80 % RH (no condensation)
	Storage Humidity Range		10 % RH or less (no condensation)
	Altitude		Up to 2000 m
DIMENSIONS & WEIGHT			430(W)x178(H)x550(D) mm (excluding protrusions), Approx. 23 kg

ORDERING INFORMATION

ASR-3200 2KVA Programmable AC/DC Power Source
ASR-3300 3KVA Programmable AC/DC Power Source
ASR-3400 4KVA Programmable AC/DC Power Source
ASR-3400HF 4KVA Programmable AC/DC Power Source

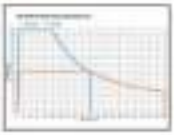
ACCESSORIES:
CD (User manual/Programming manual), Safety guide, Input Terminal Cover, Output terminal cover include remote sensing.
GRA-443-E Rack mount adapter(EIA), CTL-246 USB Cable

OPTIONAL ACCESSORIES

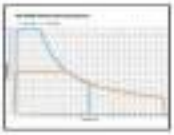
CPO-005 Power cord, 3m, 10A/C, UL/CSA type
CPO-006 Power cord, 3m, 10A/C, VDE type
CPO-007 Power cord, 3m, 10A/C, BS type
GRA-443-I Rack mount adapter(JIS)
GRA-443-E Rack mount adapter(EIA)
CTL-137 Output sense wire(load wire_10AWG/10ft, 600V/sense wire_16AWG/20ft, 600V)
CTL-232 RS232C Cable, approx. 3m
CTL-248 GPIB Cable, approx. 2m
ASR-002 External control cable connection unit for (72VA, 81W, 324W output
APS-008 Air inlet filter

* European output outlet(factory installed)

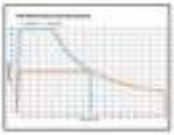
A. OPERATING AREA FOR ASR-3000 SERIES



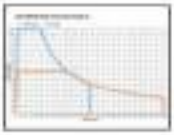
AC Output for ASR-3200



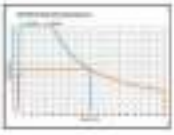
DC Output for ASR-3200



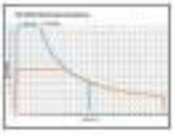
AC Output for ASR-3500



DC Output for ASR-3500



AC Output for ASR-3400



DC Output for ASR-3400

Model Name	Power Rating	Max. Output Current	Max. Output Voltage
ASR-3200	2k VA	28 / 18 A	600 Vrms / ±850 Vdc
ASR-3500	5k VA	56 / 35 A	600 Vrms / ±850 Vdc
ASR-3400	4k VA	45 / 28 A	600 Vrms / ±850 Vdc

The ASR-3000 series is an AC + DC power source that provides not only rated power output for AC output, but also rated power output for DC output.

B. MEASUREMENT ITEMS FOR ASR-3000 SERIES

RMS Meas Display

AVG Meas Display

Peak Meas Display

Voltage Harmonic

Current Harmonic

The ASR-3000 Series provides users with measurement capabilities including Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, Ipk-l, P, S, Q, PF, CF, 100th order Voltage Harmonic and Current Harmonic. During the power output, the measurement parameters including Vrms/Irms, Vavg/Iavg and Vmax/Vmin/Imax/Imin can be switched by users at any time to display the instantaneous calculation reading.

C. SEQUENCE MODE AND BUILT-IN ISO-16750-2 WAVEFORMS

SEQ6: Momentary Drop in Supply Voltage

SEQ7: Reset Behavior at Voltage Drop with 12V System

SEQ8: Starting Profile Waveform

SEQ9: Load Dump with Td_10ms, Td_40ms

The sequence mode provides editable 10 sets of SEQ0~SEQ9, each set has 0~999 steps, each step time setting range is 0.0001~999.9999 seconds. Users can combine multiple sets of steps to generate the required waveforms, including waveform falling, surges, sags and other abnormal power line conditions to meet the needs of the test applications.

In addition, ASR-3000 Series also built in common ISO-16750-2 test waveforms or the Sequence Mode preset waveforms including Momentary Drop in Supply Voltage built in at SEQ6, Reset Behavior at Voltage Drop with 12V system built in at SEQ7, Starting Profile Waveform built in at SEQ8 and Load Dump with Td_10ms, and Td_40ms built in at SEQ9.

5. SIMULATE MODE

Power Outage

Voltage Rise

Voltage Fall

Simulate Mode can quickly simulate different transient waveforms, such as power outage, voltage rise, voltage fall, etc., for engineers to evaluate the impact of transient phenomena on the DUT. Ex: Capacitance durability test.

6. FUNCTION WAVEFORM (ARBITRARY EDIT) MODE

TRI Waveform

STAIR Waveform

CLIP Waveform

SURGE Waveform

Fourier Series Synthesized Waveform

ASR-3000 Series provides more than 20,000 waveform combinations in seven categories, allowing users to quickly simulate different AC voltage waveforms. Adjust the desired waveform type directly through the panel (displayed synchronously on the screen), then the waveform is loaded into the ARB 1~16 waveform register through the access procedures, and return to the main menu output mode to perform ARB Waveform output.

7. PC SOFTWARE

Basic Controller

Sequence Mode

ARB Waveform Edit

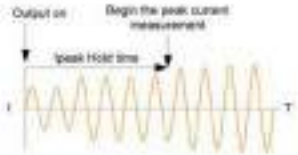
The Waveform is Observed with DSO

The ASR-3000 Series software includes basic settings, the Simulate Mode, the Sequence Mode, Data Log and the arbitrary waveform editing function. Users can directly set output voltage, frequency, start/stop phase on ASR-3000 Series through the software.
The Simulate Mode can quickly simulate different transient waveforms such as power outage, voltage rise, voltage fall... etc.

The Sequence Mode can edit the editing parameters read back from ASR-3000 Series, or directly edit the parameters and control ASR-3000 Series to output waveforms according to the set sequence.

The arbitrary waveform editing function not only combines various waveforms, including sine waves, square waves, triangle waves, and noise waveforms, but also allows users to draw arbitrary waveforms and output them.

T, IPK HOLD & IPK, HOLD FUNCTIONS

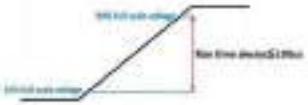


T, Ipk Measurement

T, Ipk Hold is used to set the delay time after the output (1ms ~ 60,000ms) to capture the Ipeak value and keep the maximum value. The update only functions when the measurement value is greater than the original value. The T, Ipk Hold delay time setting can be used to measure surge current at the power on process of the DUT.

Ipk Hold can be used to measure the transient surge current of the DUT at power on without using an oscilloscope and a current probe.

SLEW RATE MODE



Time Mode

Slope Mode

The ASR-3080 Series can set the Slew Rate Mode to determine the rise time of the voltage according to the test requirements of the DUT. Slew Rate Mode provides "Time" and "Slope" modes. When setting "Time" mode, ASR-3800 Series can increase output to 10-90% of the set voltage within 100μs; and when selecting "Slope" mode, ASR-3000 Series increases output voltage by a fixed rising slope of 1.5V/μs until reaching the set voltage value.

In addition, if users decide to self-define the rise time of the output voltage, users can flexibly set the rise time of the ASR-3000 Series voltage by editing the Sequence mode.

Compact Programmable A.C./D.C. Power Source

ASR-2050/2100 Series

ASR-2050R/2100R Series

FEATURES

- Output Rating: AC 0 ~ 330 Vrms, DC 0 ~ ±308 V
- Output Frequency: up to 999.9 Hz
- DC Output (100% of Rated Power)
- Output Capacity: 1800VA/3180VA
- Measurement Items: Vrms, Vavg, Vpeak, Irms, Iphase, Iavg, Ipeak, P, S, Q, PF, CF
- Voltage and Current Harmonic Analysis (THDv, THDi)
- Customized Phase Angle for Output On/Off
- Remote Sensing Capability
- OVP, OCP, OPP, OTP, AC Fail Detection and Fan Fail Alarm
- Interface: USB/LAN/RS-232(std.); GPIB(opt.)
- Built-in External Control I/O and External Signal Input
- Built-in Output Relay Control
- Memory Function (up to 10 sets)
- Sequence and Simulation Function (up to 10 sets)
- Support Arbitrary Waveform Function
- Built-in Web Server

GET-003 Universal Extended Terminal Box
(ASR-2050R only)

GET-004 Euro Extended Terminal Box
(ASR-2050R only)

The ASR-2000 series, an AC/DC power source aiming for system integration or desktop applications, provides both rated power output for AC output and rated power output for DC output. The ASR-2000 output modes are available including: 1) AC power output mode (AC-VHT Mode), 2) DC power output mode (DC-VHT Mode), 3) AC/DC power output mode (AC+DC-LHT Mode), 4) External AC signal source mode (AC-EXT Mode), 5) External AC/DC signal source mode (AC+DC-EXT Mode), 6) External AC signal superimposition mode (AC-ADD Mode), 7) External AC/DC signal superimposition mode (AC+DC-ADD Mode), 8) External AC signal synchronization mode (AC-SYNC Mode), 9) External AC/DC signal synchronization mode (AC+DC-SYNC Mode), 10) External DC voltage control of AC output mode(AC-VCN).

The ASR-2000 series provides users with waveform output capabilities to meet the test requirements of different electronic components development, automotive electrical devices and home appliance, including 1) Sequence mode provides waveform fallings, surges, sags, changes and other abnormal power line conditions; 2) Arbitrary waveform function allows users to store/upload user-defined waveforms; and 3) Simulate mode includes power outage, voltage rise, voltage fall, and frequency variations. When the ASR-2000 series power source outputs, it can also measure Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, Iphase, P, S, Q, PF, CF, VDHv, VDHi under Voltage Harmonic and Current Harmonic. In addition, the Remote sense function ensures accurate voltage output. The Customized Phase Angle for Output On/Off function can set the starting angle and ending angle of the voltage output according to the test requirements. It can...

The front panel of the ASR-2050/2100 provides a universal socket or a European socket, which allows users to plug and use so as to save wiring time. The ASR-2050/2100R is 4U height and 1/2 Rack width design, which is compatible with 19"...

SPECIFICATIONS

		ASR-2050/ASR-2050R	ASR-2100/ASR-2100R
INPUT (VAC/VDC)			
NOMINAL INPUT VOLTAGE		1 Φ2 Wire, 100 ~ 240 Vac	100 Vac to 240 Vac
INPUT VOLTAGE RANGE		90 Vac to 264 Vac	90 Vac to 264 Vac
PHASE		Single-phase, Two-wire	Single-phase, Two-wire
INPUT FREQUENCY RANGE		47 Hz to 63 Hz	47 Hz to 63 Hz
MAX. POWER CONSUMPTION		2050 VA or less	3200 VA or less
POWER FACTOR	100Vac	0.95 (typ.)	0.95 (typ.)
	200Vac	0.90 (typ.)	0.90 (typ.)
MAX. INPUT CURRENT	100Vac	20 A	32 A
	200Vac	10 A	16 A

*1. The inrush current will typically be twice of the rated current. Users should carefully select their fuses or circuit breakers.

AC MODE OUTPUT (0 ~ 300 V)(LINE MODE)				
VOLTAGE	Setting Range	0.0 V to 330.0 V / 0.0 V to 308.0 V		
	Setting Resolution	0.1 V		
	Accuracy*1	±(0.2 % of set + 0.4 V) / (1 V)		
OUTPUT PHASE		Single-phase, Two-wire		
MAXIMUM CURRENT*2	100 V	18 A	32 A	
	200 V	9 A	16 A	
MAXIMUM PEAK CURRENT*3	100 V	36 A	64 A	
	200 V	18 A	32 A	
POWER CAPACITY		1800 VA	3180 VA	
FREQUENCY	Setting Range	AC Mode: 45.00 Hz to 999.9 Hz, AC+DC Mode: 1.00 Hz to 999.9 Hz		
	Setting Resolution	0.01 Hz (1.00 Hz to 99.99 Hz), 0.1 Hz (100.0 Hz to 999.9 Hz)		
	Accuracy	For 45 Hz to 65 Hz: ±(0.01 % of set). For 1.00 Hz to 999.9 Hz: ±(0.05 % of set)		
	Stability*4	± 0.005%		
OUTPUT ON PHASE		0.0° to 359.9° variable (setting resolution: 0.1°)		
DC OFFSET*5		Typical: ± 28 mV (TYP.)		

*1. 45 Hz ~ 65 Hz range.
*2. For continuous output of 1 hour. For 2 hr ~ 3 hr, the unit needs to reduce the output current to 50% of the rated current. For output exceeding the allowable maximum time, the unit will automatically shut down the output.
*3. For 5 sec. For output exceeding the allowable maximum time, the unit will automatically shut down the output. Crest factor = 2.
*4. After stabilization for approximately one hour, the output current will remain constant.
*5. Typical value for the reference purpose only. Actual value will vary with the environment and the load. For a maximum accuracy, zero calibration is recommended.

OUTPUT RATING FOR DC MODE				
VOLTAGE	Setting Range	0.0 V to +0.0 V / -0.0 V to -0.0 V		
	Setting Resolution	0.1 V		
	Accuracy*1	±(0.5 % of set) + 0.8 V / (1.3 V)		
MAXIMUM CURRENT*2	100 V	9 A	16 A	
	200 V	4.5 A	8 A	
MAXIMUM PEAK CURRENT*3	100 V	18 A	32 A	
	200 V	9 A	16 A	
POWER CAPACITY		900 W	1600 W	

*1. 100 V, 200 V range.
*2. For continuous output of 1 hour. For 2 hr ~ 3 hr, the unit needs to reduce the output current to 50% of the rated current. For output exceeding the allowable maximum time, the unit will automatically shut down the output.
*3. For 5 sec. For output exceeding the allowable maximum time, the unit will automatically shut down the output.

OUTPUT VOLTAGE STABILITY	
LINE REGULATION*	±0.2% or less
LOAD REGULATION*	±0.1% (0 ~ 100% load change) (Measured at rated output terminal)
RIPPLE NOISE*	0.7 Vrms / 1.4 Vrms (TYP.)

*1. Power source is operated at 100 V, 120 V or 220 V, no load, rated output.
*2. Measurement bandwidth is 10 Hz to 1 MHz. Measurement is performed by twisting the output wire at 50 cm from the output terminal.

OUTPUT VOLTAGE WAVEFORM DISTORTION (AC OUTPUT RESISTIVE RESPONSE TIME, EFFICIENCY	
TOTAL HARMONIC DISTORTION(THD)*1	≤ 0.5% @45 ~ 65 Hz, ≤ 1.5% @ 65 ~ 500 Hz, ≤ 3.0% @ 500.1 Hz ~ 999.9 Hz
OUTPUT VOLTAGE RESPONSE TIME*	180 μs (TYP.)
EFFICIENCY*	76 % or more

*1. At an output voltage of 100 V or 200 V, 1 kHz or 10 kHz, output power factor = 1, and 5 th ~ 50 th order harmonic.
*2. Measured at 100 V / 200 V, 1 kHz or 10 kHz, output power factor = 1, and 5 th ~ 50 th order harmonic. Measured at rated current and rated voltage.

MEASURED VALUE DISPLAY				
VOLTAGE (RMS, AVG Value)	Resolution	0.1 V		
	Accuracy	For 45 Hz to 65 Hz and DC: ±(0.2 % of reading + 0.1 V)/(0.5 V) For 66 Hz to 999.9 Hz: ±(0.7 % of reading + 0.8 V)/ (1.3 V)		
Peak Value	Resolution	0.1 V		
	Accuracy	For 45 Hz to 65 Hz and DC: ±(2 % of reading + 1 V) / (3 V)		
CURRENT (RMS, AVG Value	Resolution	0.01 A	0.01 A	
	Accuracy	For 45 Hz to 65 Hz and DC: ±(0.2 % of reading + 0.02 A)/(0.1 A)	For 45 Hz and DC: ±(0.2 % of reading + 0.1 A)/(0.5 A)	
		For 66 Hz to 999.9 Hz: ±(0.7 % of reading + 0.04 A) / (0.2 A)	For 66 Hz to 999.9 Hz: ±(0.7 % of reading + 0.08 A) / (0.4 A)	

ASR-2000 Series

SPECIFICATIONS

			ASR-2050/ASR-2050R	ASR-2100/ASR-2100R
	Peak Value	Resolution RECORD[*]	0.01 A for 45 Hz to 65 Hz and DC: ±(2 % of reading+0.3 A/0.1 A)	0.01 A for 45 Hz to 65 Hz and DC: ±(2 % of reading+0.3 A/0.1 A)
POWER	Active (W)	Resolution Accuracy[*]	0.1 / 1 W ±(2 % of reading + 0.2 W)	0.1 / 1 W ±(2 % of reading + 1 W)
	Apparent (VA)	Resolution RECORD[*]	0.1 / 1 VA ±(2 % of reading + 0.2 VA)	0.1 / 1 VA ±(2 % of reading + 1 VA)
	Reactive (VAR)	Resolution RECORD[*]	0.1 / 1 VAR ±(2 % of reading + 0.2 VAR)	0.1 / 1 VAR ±(2 % of reading + 1 VAR)
LOAD POWER FACTOR		Range Resolution	0.000 to 1.000 0.001	0.000 to 1.000 0.001
LOAD CREST FACTOR		Range Resolution	1.00 to 10.00 0.01	1.00 to 10.00 0.01
HARMONIC VOLTAGE EFFECTIVE VALUE (RMS)		Range Full Scale	Up to 50th order of the fundamental wave 150 V / 300 V / 600 V	Up to 50th order of the fundamental wave 150 V / 300 V / 600 V
HARMONIC VOLTAGE PERCENT (%)		Resolution Accuracy[*]	0.1 % Up to 20th: ±(0.3% of reading + 0.3% FS) 21th to 50th: ±(0.7% of reading + 0.3% FS)	0.1 % Up to 20th: ±(0.3% of reading + 0.3% FS) 21th to 50th: ±(0.7% of reading + 0.3% FS)
HARMONIC CURRENT EFFECTIVE VALUE (RMS)		Range Full Scale	Up to 50th order of the fundamental wave 1 A / 3 A / 6 A / 12A	Up to 50th order of the fundamental wave 3 A / 6 A / 12A
HARMONIC CURRENT PERCENT (%)		Resolution Accuracy[*]	0.1 % Up to 20th: ±(0.3% of reading + 0.3% FS) 21th to 50th: ±(0.7% of reading + 0.3% FS)	0.1 % Up to 20th: ±(0.3% of reading + 0.3% FS) 21th to 50th: ±(0.7% of reading + 0.3% FS)

[*] 1) For testing loading current in RMS: 1) 10% to 100% of FS: mode and 20% to 100% of FS: mode.
[*] 2) For testing loading current in RMS: 1) 10% to 100% of FS: mode and 20% to 100% of FS: mode.
[*] 3) For testing loading current in RMS: 1) 10% to 100% of FS: mode and 20% to 100% of FS: mode.
[*] 4) For testing loading current in RMS: 1) 10% to 100% of FS: mode and 20% to 100% of FS: mode.
[*] 5) For testing loading current in RMS: 1) 10% to 100% of FS: mode and 20% to 100% of FS: mode.
[*] 6) For testing loading current in RMS: 1) 10% to 100% of FS: mode and 20% to 100% of FS: mode.
[*] 7) For testing loading current in RMS: 1) 10% to 100% of FS: mode and 20% to 100% of FS: mode.
[*] 8) For testing loading current in RMS: 1) 10% to 100% of FS: mode and 20% to 100% of FS: mode.

OTHERS

PHYSICAL SIZE			482(W) x 177(H) x 600(D) mm (19" Rack Mount)
DISPLAY			7" TFT-LCD, 65 K color
MEMORY FUNCTION			100 sets for Store and Recall settings
WAVEFORM MEMORY	Number of Waveforms		16 (user-defined)
	Waveform Length		4096 points
INTERFACE	Standard	USB	Type B: Host, Type B: Slave, Speed: 1.1/2.0, USB DMC
		LAN	MAC Address, DHCP, IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask Complies with the EIA-RS-232 specification
		RS-232C	
		EXT Control	External Signal Input, External Control, I/O
	Optional	GPIB	IEEE-488.1, IEEE-488.2 standard interface
INSULATION RESISTANCE			500 VDC, 30 MΩ or more
WITHSTAND VOLTAGE			1500 Vac, 1 minute
EMC			EN 61326-1 (Class A),EN 61000-3-2 (Class A),EN 61000-3-3 (Class A, Except T),EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-8/-4-11 (Class A,Criteria A),CISPR 11 (Class A, Group 1),EN 61000-6-1 Industrial use, Commitment Category I
Safety			IEC/EN 61010-1 (Class I, Pollution Degree 2, Measurement Category II)
Environment	Operating Environment		Indoor use, Overvoltage Category II
	Operating Temperature Range		0 °C to 40 °C
	Storage Temperature Range		-10 °C to 70 °C
	Operating Humidity Range		20 % RH to 80 % RH (no condensation)
	Storage Humidity Range		80 % RH or less (no condensation)
	Altitude		Up to 2000 m
DIMENSIONS & WEIGHT			ASR-2050 : 482 (W) x 133(H) x 480(D) mm (excluding protrusions), Approx. 11.5 kg ASR-2100R : 482 (W) x 177(H) x 600(D) mm (excluding protrusions), Approx. 19.5 kg

ORDERING INFORMATION

ASR-2050 5000VA Programmable AC/DC Power Source
ASR-2100 10000VA Programmable AC/DC Power Source
ASR-2050R 5000VA Programmable AC/DC Power Source for 3U 19" Rack Mount
ASR-2100R 10000VA Programmable AC/DC Power Source for 6U 19" Rack Mount

ACCESSORIES
CD-ROM(User Manual, Programming manual), Safety Guide, Power Cord, Blank Terminal Cover Set, Remote Sense Terminal Cover Set, GTL-120 Test Lead, GTL-246 USB Cable

OPTIONAL ACCESSORIES

ASR-GPIB-IK Optional GPIB interface for ASR-2000 (factory installed)
ASR-EUCR European Output Outlet only for ASR-2000 (Factory installed)
GRA-439-J Standard 19 Inch Rack Mount Kit
GRA-439-E Standard 19 Inch Rack Mount Kit
GTL-231 4P Test Lead, 1.5m
GTL-232 GPIB Cable, approx. 2m
CTL-251 GPIB Cable, approx. 2m, shielding
ASR-001 Air Inlet Filter
ASR-002 External three phase control unit
GTL-246 USB Cable

FREE DOWNLOAD

USB Driver

Note : GTL-120/GTL-246 are not CE approved.

ASR-2050/2100 Rear Panel

ASR-2050R/2100R Rear Panel

GRA-439-J/E Rack Mount Kit(JIS/EIA)

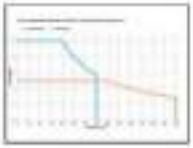
For : ASR-2000 Series

GTL-248 GPIB Cable, 2000mm

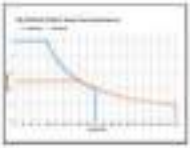
ASR-001 Air Inlet Filter

ASR-002 External three phase control unit

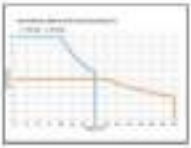
A. OPERATING AREA FOR ASR-2000 SERIES



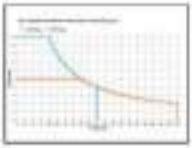
AC Output for
ASR-2050/ASR-2050R



DC Output for
ASR-2050/ASR-2050R



AC Output for
ASR-2100/ASR-2100R



DC Output for
ASR-2100/ASR-2100R

The ASR-2000 series is an AC+DC power source that provides rated power output not only at the AC output, but also at the DC output. The operation areas are shown in diagrams.

Model Name	Power Rating	Max. Output Current	Max. Output Voltage
ASR-2050	500 VA	5 / 2.5 A	150 Vrms / 380 Vdc
ASR-2100	1000 VA	10 / 5 A	300 Vrms / 380 Vdc
ASR-2050R	500 VA	5 / 2.5 A	150 Vrms / 380 Vdc
ASR-2100R	1000 VA	10 / 5 A	300 Vrms / 380 Vdc

B. MEASUREMENT ITEMS FOR ASR-2000 SERIES

RMS Meas Display

AVG Meas Display

Peak Meas Display

Voltage Harmonic

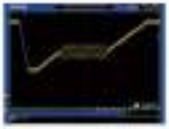
Current Harmonic

The ASR-2000 series provides users with measurement capabilities including Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, Ipkhf, P, S, Q, PF, CF, 40th order Voltage Harmonic and Current Harmonic. During the power output, the measurement parameters including Vrms/Irms, Vavg/Iavg and Vmax/Vmin/Imax/Imin can be switched by users at any time to display the instantaneous calculation reading.

C. SEQUENCE MODE AND APPLICATIONS

Momentary Drop in Supply Voltage

Reset Behavior at Voltage Drop



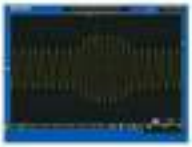
Starting Profile Waveform

Instantaneous Power Failure

There are 10 sets of Sequence mode and each set has 0~999 steps. The time setting range of each step is 0.0001 ~ 999.9999 seconds. Users can combine multiple sets of steps to generate the desired waveforms, including waveform fallings, surges, sags, changes and other abnormal power line conditions to meet the needs of the test application.

5. SIMULATE MODE

Power Outage

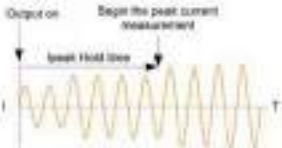


Voltage Rise

Voltage Fall

Simulate Mode can quickly simulate different transient waveforms, such as power outage, voltage rise, voltage fall, etc., for engineers to evaluate the impact of transient phenomena on the DUT. Ex: Capacitance durability test.

6. T. IPK HOLD & IPK HOLD FUNCTIONS



T. Ipk Measurement

T. Ipk Hold is used to set the delay time after the output. (1ms ~ 60,000ms) to capture the Ipeak value and keep the maximum value. The update only functions when the measurement value is greater than the original value. The T. Ipk Hold delay time setting can be used to measure surge current at the power on process of the DUT.

Ipk Hold can be used to measure the transient surge current of the DUT at power on without using an oscilloscope and a current probe.

7. SLEW RATE MODE

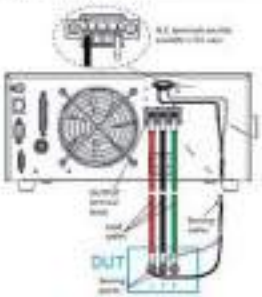
Time Mode

Slope Mode

The ASR-2000 series can set the Slew Rate Mode to determine the rise time of the voltage according to the test requirements of the DUT. Slew Rate Mode provides "Time" and "Slope" modes. When setting "Time" mode, ASR-2000 can increase output to 10~90% of the set voltage within 100μs and when selecting "Slope" mode, ASR-2000 increases output voltage by a fixed rising slope of 1.5V/μs until reaching the set voltage value.

In addition, if users decide to self-define the rise time of the output voltage, users can flexibly set the rise time of the ASR-2000 series voltage by editing the Sequence mode.

8. REMOTE SENSE FUNCTION



For high current output applications, the voltage drop caused by large current passing through the load cables will affect the measurement results. The ASR-2000 series provides the remote sense function that can sense the voltage drop of the DUT to the ASR-2000 series and the DUT will be compensated by the ASR-2000 series. The maximum voltage that the remote sense function can compensate is 5% of the output voltage.

500/1000/2000/3000 VA Programmable Linear AC Power Source

APS-7050

APS-7100

CE | cULus | USB Device | GPIB | LAN | RS-232

FEATURES

- 4.3-Inch TFT-LCD
- **Output Capacity:**APS-7050(series, 500VA/350W) & 1000VA) APS-7100(series, 1000VA/700W) & 2000VA), APS-7200(series, 2000VA/1400W) & 3000VA), APS-7300(series, 3000VA/2100W)
  Output Augmentation by Optional(series connection) (APS-7000 only)
- Low Ripple & Noise
- **Measurement and Test Functions Include:**VOLT, CURR, PWR, SVA, IPK, IPEH, FREQ, PF, CF
- Support a Small AC Current Measurement (mA ~35A, Min. Resolution 0.01mA)(APS-7000 only)
- Reverse Current Alarm Function
- **10 sets of Sequence Function to Edit Output Waveforms(10 sets of Simulate Mode to Rapidly Simulate Transient Power Supply(10 sets of Program Mode to Define Measurement Sequence(10 sets of Panel Memory Function**
- **Automatic Execution of Sequence, Simulate, Program mode and Output function when the Power is on**
- Standard Interface:USB Host/USB Device,LAN
- **Optional Interface:GPIB(APS-7000 only),RS-232/USB CDC(APS-7050 to 300, 1000 only),RS-232** (APS-7007 for APS-7050, APS-7300 only)

APS-001/APS-002 Interface Card

APS-003 (Output Voltage Capacity) APS-004 (Output Frequency Capacity)

APS-007 RS-232 Interface Card

For APS-7300 Series, APS-7500 Series

Chroma introduces APS-7000 series programmable AC power sources, which consists of 500VA of APS-7050, 1000VA of APS-7100, 2000VA of APS-7200 and 3000VA of APS-7300. APS-7000 series features power characteristics from a linear structure design including low noise, low THD, and highly stabilized power output that are ideal for the product development and verification of input power with low noise requirement as stereo, video and audio device applications, etc. The maximum rated voltage is 0~310Vrms, 25.2Arms, 108.8A peak current and the output frequency range is 45~500.0Hz. Users can conveniently augment the output voltage from 0Vrms to 600Vrms and output frequency from 45Hz to 999.9Hz by purchasing options without sending equipment back to OEM maker.

One of the popular alternative energy solutions in the market is to utilize inverter to convert DC to AC and the converted AC is then sent to power grid as products required electricity. For instance, DC produced by PV inverter is sent to power grid as equipment requires electricity. While simulating power grid as utility inverter connecting with power grid, general AC power sources cannot absorb power from feedback energy, hence, additional power consumption resistors are needed to prevent AC power source from being damaged. On the contrast, APS-7000 series has the characteristic of absorbing reverse current so that additional power consumption resistors are not required. The input terminal of APS-7000 series is designed to isolate from the simulated AC power grid output terminal, therefore, users do not need an additional isolation device to protect UUT. APS-7000 series is suitable for simulating power grid and evaluating inverter output characteristics tests, including asynchronized phase and frequency. Reverse current and power detected by APS-7000 series will be displayed in real readings to facilitate user's test observations. APS-7000 series utilizes Simulate mode and Sequence mode to provide a single step or consecutive power changes, and to simulate power grid's Voltage Abnormality Test and Frequency Abnormality Test.

APS-7000 series comprises true measurement and test functions (Vrms, Irms, F, Ipk, W, VA, PF, IpkFactor, CF), and provides user interface similar to that of AC Power Meter. APS-7000 series is ideal for the LCD industry and monitor model power consumption test. Under the ATE mode, APS-7000 series provides waveforms in seven categories including Sine waveform, Triangle waveform, Staircase waveform, Square wave, Clipped Sinewave, Crest Factor waveform, Surge waveform, and Pulse waveform and 3000 waveform combinations so as to meet the requirements of simulating abnormal input power waveform test of various industries. Ten Preset settings allow users to save ten sets of sets, Power On Output setting allows Sequence, Simulate, and Program to automatically execute output after the equipment power is on.

To meet the test criteria of line voltage fluctuation often seen in consumer electronics, APS-7000 series features the methods to cope with special purpose or abnormal voltage, frequency, and phase test one of the Simulate mode simulates power outage, voltage rise, and voltage fall, ten sets of the Sequence mode allow users to define parameters and produce some wave by editing steps; ten sets of the Program mode can edit AC waveform output and define the rising and fall level of measurement items for different DUTs; Ramp Control allows users to set the rotation speed for output voltage rise and fall; Surge/Dip Control simulates UUT's input power producing a Surge or Dip voltage overlapping with output voltage waveform at a specific time. For large current output applications, voltage drop occurs once the output cables should be extended. APS-7000/7500 also provide the remote sense function, which senses UUT's voltage and sends the information back to APS-7000/7500 for program's controlled voltage compensation. Therefore, APS-7000/7500 can avoid the voltage drop of the cable to affect output voltage.

Ethernet Port, on the rear panel, can be used for remote program control. Sync Output Socket provides external "SYNC" signal output. Signal Output Connector provides monitor of Program's execution results. APS-7000 series also provides users with Trigger In/Out and Output and Remote control Extension Port. 3 connector on the rear panel.

SPECIFICATIONS

Model		APS-7050	APS-7100	APS-7200	APS-7300
AC OUTPUT					
Power Rating		500VA	1000VA	2000VA	3000VA
Output Voltage		0 ~ 155Vrms 0 ~ 310Vrms	0 ~ 155Vrms 0 ~ 310Vrms	0 ~ 155Vrms 0 ~ 310Vrms	0 ~ 155Vrms 0 ~ 310Vrms
Output Frequency		45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz
Maximum Current(peak)	0~155Vrms	6.2A	8.4A	16.8A	25.2A
	0~310Vrms	2.1A	4.2A	8.4A	12.6A
Maximum Current(peak)	0~155Vrms	10.8A	21.6A	67.2A	108.8A
	0~310Vrms	3.4A	10.8A	33.6A	50.4A
OPT. APS-002(rms)	0~600Vrms	1.05A	2.1A	4.2A	6.3A
OPT. APS-002(peak)	0~600Vrms	4.2A	8.4A	16.8A	25.2A
Total Harmonic Distortion (THD)*2		80.2Hz at 0 ~ 300Hz (Sensitive Load)			
Crest Factor		≦3			
Line Regulation		0.1% (% of full scale)			
Load Regulation		0.2% (% of full scale)			
Response Time		<100μs			
Inrush Current		30% of Maximum Output RMS Current (Continue) 100% of Maximum Output RMS Current (50/60Hz 1 cycle)			
SETTING					
Voltage	Range	0 ~ 155Vrms, 0 ~ 310Vrms, Auto			
	Resolution	0.01V at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 310.0Vrms			
	Accuracy	±(0.2% of setting+2 counts)			
Frequency	Range	45 ~ 500Hz			
	Resolution	0.01Hz at 45.00 ~ 99.99Hz, 0.1Hz at 100.0 ~ 500.0Hz			
	Accuracy	±(0.02% of setting)			
Phase Shift	Range	0 ~ 359°			
	Resolution	1°			
	Accuracy	±1° (45 ~ 65Hz)			
MEASUREMENT*3					
Voltage(RMS)	Range	0.25 ~ 38.75 Vrms / 38.75 ~ 77.50Vrms / 77.5 ~ 155.00Vrms / 155 ~ 310.00Vrms		0.50 ~ 38.75 Vrms / 38.75 ~ 77.50Vrms / 77.5 ~ 155.00Vrms / 155 ~ 310.00Vrms	
	Resolution	0.01V at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 310.0Vrms		0.01V at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 310.0Vrms	
Frequency	Accuracy*4	±(0.2% of reading + 3 counts)		±(0.2% of reading + 2 counts)	
	Range	45 ~ 999.9 Hz		45 ~ 999.9 Hz	
	Resolution	0.01Hz at 45Hz ~ 99.99Hz 0.1Hz at 100Hz ~ 999.9Hz		0.01Hz at 45Hz ~ 99.99Hz 0.1Hz at 100Hz ~ 999.9Hz	
	Accuracy	±0.1%		±0.1%	
Current(RMS)	Range	2.00 ~ 38.00mA/38.0 ~ 152.0mA/ 0.300 ~ 3.200A/1.00 ~ 12.5A		0.269 ~ 1.384A/3.08 ~ 13.38A	
	Resolution	0.01mA, 0.1mA, 0.001A, 0.01A		0.001A,0.01A	
	Accuracy	±(0.6% of reading, 5 counts)/2.00~38.0mA; ±(0.2% of readings 5 counts)/38.0~152.0mA; ±(0.2% of readings 5 counts)/0.300~1.920A; ±(0.2% of reading+3 counts)/1.920~12.50A		±(0.6% of reading, 5 counts)/0.269~1.384A ±(0.2% of readings 1 count)/1.384~13.38A	

APS-7200

APS-7300

SPECIFICATIONS

Model		APS-7050	APS-7100	APS-7200	APS-7300
Current(Peak)	Range	0.0 ~ 70.0A		0.0 ~ 140.0A	
	Resolution	0.1A		0.1A	
	Accuracy	±(1% of reading + 1 count)		± 1% of reading + 1 count)	
Power(W)	Resolution	0.01W/0.1W/1W		0.1W/1W	
	Accuracy	±(0.6% of reading+5 counts) (0.20~90.00W) ±(0.6%of reading+5 counts) (90.1~999.9W) ±(0.6% of reading+3 counts) (1.000~4.000kW)		±(0.6% of reading+5counts) (0.2~999.9W) ±(0.6% of reading+3counts) (1.000~4.000kW)	
Apparent(VA)	Resolution	0.01VA, 0.1VA, 1VA		0.1VA, 1VA	
	Accuracy	± (1% of reading+1 count) (0.20~90.00VA, ± (1% of reading+1 count) (90.1~999.9VA, ± (1% of reading+3 counts) (1.000~4.000kVA		± (1% of reading+1 count) (0.2~999.9VA, ± (1% of reading+5 counts) (1.000~4.000kVA	
Power Factor	Resolution	0.001		0.001	
Accuracy		±(2% of reading + 3 counts)		±(2% of reading+3 counts)	
GENERAL					
Remote control signal		Run, Fail, Sense Process, Trigger in, Trigger out, OUT ON/OFF			
Sync output signal		Output Signal: 5V/0.4MHz Type			
Number of Preset		10 (0~9 numeric keys)			
Protection		OCP, OPP, UVP and Alarm			
Trigger Out		Maximum low level output : 0.8V / Minimum high level output : 2V, Maximum source current : 4mA			
Trigger In		Maximum low level input voltage : 0.8V / Minimum high level input voltage : 2.0V, Maximum sink current : 8mA			
EQUIVALENT SIMULATION FUNCTION					
Number of Memories		10 (0 ~ 9 numeric keys)			
Number of Steps		100 steps (for 1 sequence)			
Step Time Setting Range		0.01 ~ 999.99s			
Operation When Step Parameters		Constant, Step, Linear Sweep Output Range, Frequency, Waveform (sine wave only), On Phase, Off Phase, Sync Jump Count (0 ~ 255), Jump to, Branch 1, Branch 2, Trigger Output			
Sequence Control		Start, Stop, Hold, Continue, Branch 1, Branch 2			
AC INPUT					
Phase		Single Phase	Single Phase	Single Phase	Single Phase
Input Voltage		115/230Vac±10%	115/208Vac±10%	230Vac±10%	208Vac±10%
Input Frequency		50/60Hz	50/60Hz	50/60Hz	50/60Hz
Max. Current		10A/5A	20A/16A	20A	16A
Power Factor		0.99pf	0.99pf	0.99pf	0.99pf
Power Consumption		1.6KVA or less	3.6KVA or less	3.2KVA or less	13.5KVA or less
ENVIRONMENT CONDITIONS					
Operating Temperature Range		0 ~ +40°C			
Storage Temperature Range		-10 ~ +70°C			
Operating Humidity Range		30 ~ 85% RH (No Condensation)			
Storage Humidity Range		90% RH or less (No Condensation)			
INTERFACE					
Standard		USB Host, LAN		USB Host, USB CDC, LAN	
Optional		GPIB (APS-001) RS232 / USB CDC (APS-002)		GPIB (APS-001) RS232 (APS-002)	
DIMENSIONS & WEIGHT					
		440(W) x 88(H) x 405(D) mm Approx. 24kg	440(W) x 88.9(H) x 595(D) mm Approx. 30kg	440(W) x 133.2(H) x 510(D) mm Approx. 40kg	440(W) x 488.9(H) x 630(D) mm Approx. 128kg

ORDERING INFORMATION

APS-7050 3000W Programmable AC Power Source
APS-7100 6000W Programmable AC Power Source
APS-7200 12000W Programmable AC Power Source
APS-7300 30000W Programmable AC Power Source

ACCESSORIES
CD-ROM (User Manual, Programming Manual for APS-7000 s / Power Cord Region Dependent), GTL-115 Test Lead

OPTIONAL ASSESSORIES

APS-001 GPIB interface card
APS-002 RS-232/USB interface cards (APS-7050, APS-7100)
APS-003 RS-232 (no fax cord)(APS-7200, APS-7300)
APS-005 Output Voltage Capability(85~265Vac)
APS-006 Output Frequency Capability(45~999.9Hz)
CRA-420 APS-7050, APS-7100 rack mount kit
CRA-421 APS-7200, APS-7300 rack mount kit
CRA-426 Rack mount kit (APS-7200)
CRA-436 Rack mount kit (APS-7300)

Note : 1. APS-7050/APS-7100 are not CE approved.
2. The minimum time settings of sequence mode or analysis mode must be greater than 1 cycle of the waveform itself.

APS-7300 Rear Panel

APS-7200 Rear Panel

APS-7100 Rear Panel

APS-7050 Rear Panel

APS-7000 Series Europe Type Output Outlet

NOTE
The Specifications are not suit for ARM mode.
*1. Maximum output current at working voltage 180V rms, 360Vrms
*2. 45~65Hz, 50% or higher of the rated output voltage, the maximum current of Lower
*3. All of measurement accuracy is at 23±5°C
*4. In the case of 15~150V, 30~450V rms ranges, in load

Mains Terminal Cover Set

A CONTROL PANEL CHARACTERISTICS

Standard Mode　　Simple Mode

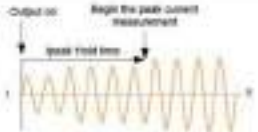
There are two control panel modes: Standard mode and Simple mode. Both modes are shown on the above. Standard mode controls settings and AC Power Meter measurement window display. Users apply function key (F1~F3) to select required measurement items. There are nine items for selection. Simple mode shows all measurement items on the display.

B REVERSE CURRENT DISPLAY

Standard Mode　　Simple Mode

When output terminal detects 180 degree phase difference between voltage and current (reverse current), the front panel of APS-7000 Series will remind users the power and power factor measurement results in red numerical display. TRA feature can be applied to show the power and power factor measurement while testing inverter for feedback power grid. As shown on the above:
APS-7000 Series runs with rated reverse current: 10% of the maximum effective current or maximum current output with a three minutes.

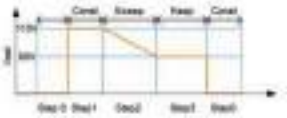
C T.PEAK, HOLD FUNCTION



Ipeak Measurement

T.Ipk Hold sets delay time (1ms~60 seconds) for measurement after the output of Ipeak value and the maximum value will be retrieved. Update will be proceeded only if measured value is greater than the original value. Ipk Hold is for measuring transient inrush current as soon as the equipment power is on that is usually done by oscilloscope and current probe. T. Ipk Hold delay time setting can be applied to measure inrush current of sequentially energized OUT.

D SEQUENCE MODE



Sequence Mode

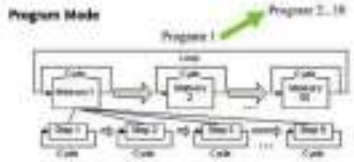
There are ten sets of Sequence mode and each set has 0~255 steps. The time setting range for each step is 0.01 ~ 999.99 seconds. Combining many sets of steps to edit required waveforms can satisfy users' requirement of highly complicated waveforms.

E SIMULATE MODE

Power Outage　　Voltage Rise　　Voltage Fall

This mode can rapidly produce different simulated input transient waveforms such as power outage, voltage rise and voltage fall etc. for engineers to evaluate the impact on DUT posed by the transient phenomena. For instance, capacitor endurance test.

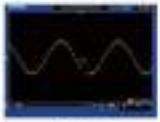
F PROGRAM MODE



This mode allows users to set voltage and timer specifications to produce PASS/FAIL result after the measurement is done. It can also show test results for each test procedure or only show the last result.

There are ten sets of Program mode and each set has 50 sets of memory. Each memory consists 8 steps. Each Program will operate according to memory sequence, self-defined loops or designated steps to stop.

G SURGE/DIP CONTROL



Surge

Dip

Overlapping a Surge(Dip) voltage on a normal voltage as the input power for DUT allows users to simulate Surge/Dip situation and evaluate DUT characteristics.

H FUNCTION WAVEFORM (ARB) MODE

Provide waveforms in seven categories and 20,000 waveform combinations so as to rapidly simulate distorted AC voltage waveforms.

Sine Waveform
Standard AC Waveform

Triangle Waveform
Power Harmonic Output Simulation
to Triangle Waveform

Staircase Waveform
Simulate Square Waveform And Staircase
Waveform For Commercial Use

Clipped Sinewave
Simulate Grid Power Supply Heavy
Load Waveform

Crest Factor Waveform
Simulate Rectified Filter Current
Waveform By Capacitor Input

Surge Waveform
Simulate Grid Power Supply's
Peak Over-voltage

Fourier Series Synthesized Waveform

Simulate real output power waveform. Distorted power waveform is produced due to output impedance and non-linear effect such as inductance, capacitance and parasitic capacitance effect. For example: motors

I RAMP CONTROL

Tup → 0.1 ~ 999.9ms
Tdn → 0.1 ~ 999.9ms

Vup → 0.01 ~ 99.99 Vrms
Vdn → 0.01 ~ 99.99 Vrms

Mode=Time, Tup=1msec,
VAC=100V, Freq=50Hz,
Ramp output=on.

Mode=Voltage, Vdn=2Vrms,
VAC=100V, Freq=50Hz,
Ramp output=off.

Ramp control allows users to set output voltage rise or fall speed which is based on time (Trms) or voltage (Vrms) unit.

500/1000 VA AC Power Source

APS-7050E

APS-7100E

The GW Instek launches the APS-7000E series the economy version of the APS-7000 programmable AC power source. With the height of 2U, the maximum rated output for APS-7050E is 500VA, 310Vrms, 4.2Arms and APS-7100E is 1000VA, 310Vrms, 8.4Arms. The output frequency range of the series is 45~500Hz. The series is ideal for the test and development of DC power supply devices, consumer electronics, automotive electronics and electronic components.

The APS-7000E series comprises six measurement and test functions (Vrms, Irms, P, Ips, W, PF), and provides user interface similar to that of AC Power Meter. The APS-7000E series, via switching many sets of current levels to increase serial current measurement resolution, is ideal for the LED industry and standby mode power consumption test. Ten sets of Preset allow users to store ten settings.

To meet the test criteria of line voltage fluctuation often seen in consumer electronics, the APS-7000E series not only provides a stable AC power source but also features the Test mode to satisfy special or abnormal voltage and frequency variation demands. Ten sets of the Test mode simulate power outage, voltage rise, and voltage fall. The APS-7000E series that simulates waveforms of city power grid's transient changes is suitable for verifying electronic products operated under abnormal power source.

The APS-7000E series is the economy version of the APS-7000 series. If communications interface and larger voltage/frequency are required, please refer to the APS-7000 series.

FEATURES

- 4.3" large LCD Display
- Output Capacity:
  APS-7050E (500VA, 310Vrms, 4.2(3.5)Arms)
  APS-7100E (1000VA, 310Vrms, 8.4(4.5)Arms)
- Measurement Function :
  Voltage, Current, Power, Frequency, Power Factor, Ipeak
- Reverse Current Alarm Function
- 10 Sets of The Test Mode Simulate Power Transient Output
- 10 Sets of Preset Allow Users to Store Ten Settings
- OCP/OPP/OTP Protection
- Variable Voltage, Frequency and Current Limiter
- Universal Power Inlet

SPECIFICATIONS

Model		APS-7050E	APS-7100E
Power Rating		500VA	1000VA
Output Voltage		0 ~ 155Vrms/0 ~ 310.0 Vrms	0 ~ 155Vrms/0 ~ 310.0 Vrms
Output Frequency		45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz
Maximum Current (rms)	0-150Vrms	3.5A	8.4A
	0-310Vrms	2.1A	4.2A
Maximum Current (peak)	0-155Vrms	6.3A	21.0A
	0-310Vrms	4.4A	16.8A
Total Harmonic Distortion (THD)		1.0% (in 45 ~ 500Hz (Resistive Load)	
Crest Factor		3:1	
Line Regulation		0.1% (of full scale)	
Load Regulation		0.1% (of full scale)	
Response Time		<100μs	
Reverse Current		10% of Maximum Output RMS Current (Continue), 100% of Maximum Output RMS Current (Within 5 seconds)	
SETTING			
Voltage	Range	0 ~ 155Vrms/0 ~ 310.0Vrms (Auto)	
	Resolution	0.01V, at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 310.0Vrms	
	Accuracy	±0.5% of setting (2 counts)	
Frequency	Range	45 ~ 500Hz	
	Resolution	0.01Hz (at 45.00 ~ 99.99Hz), 0.1Hz (at 100.0 ~ 500.0Hz)	
	Accuracy	±0.01% of setting	
MEASUREMENT			
Voltage(RMS)	Range	0.29~82.5Vrms/0.58.76~17.26 Vrms/17.51 ~ 155.0Vrms/155.1 ~ 310.0Vrms	
	Resolution	0.01V at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 310.0Vrms	
	Accuracy	±0.5% of reading (3 counts)	
Frequency	Range	45 ~ 500Hz	
	Resolution	0.01Hz (at 45.00~99.99Hz), 0.1Hz (at 100.0~500.0Hz)	
	Accuracy	±0.1Hz	
Current(RMS)	Range	0.00 ~ 700.0mA/80.0 ~ 350.0mA/0.300 ~ 3.500A/3.00 ~ 17.5A	
	Resolution	0.01mA, 0.1mA, 0.001A, 0.01A	
	Accuracy	±(0.5% of reading+5 counts); 2.80~350.0mA, ±(1% of reading+5 counts); 0.350~3.500A, ±(0.5% of reading+5 counts);3.500~17.5A	
Current(Peak)	Range	0.0 ~ 70.0A	
	Resolution	0.1A	
	Accuracy	±(5% of reading+5 counts)	
Power(W)	Resolution	0.01W, 0.1W, 1W	
	Accuracy	±(0.5% of reading+5 counts); 0.03~99.99W, ±(0.5% of reading+5 counts); 100.0~999.9W, ±(0.5% of reading+5 counts); 1000~9999W	
Power Factor	Resolution	0.01	
	Accuracy	±(1% of reading + 3 counts)	
GENERAL			
Number of Preset		10(6~9 Numeric keys)	
Protection		OCP, OPP, OTP and Alarm	

APS-7050E

APS-7050E Rear Panel

APS-7100E

APS-7100E Rear Panel

SPECIFICATIONS

Model	APS-7050E	APS-7100E
ENVIRONMENT CONDITIONS		
Operation Temperature	0 ~ +40℃	
Storage Temperature	-10 ~ +70℃	
Operating Temperature	20 ~ 80% RH (No Condensation)	
Storage Humidity	90% RH or below (Condensation)	
AC INPUT		
Input Power Source	1Φ AC 115/230Vac ±15%	
DIMENSION & WEIGHT		
	430(W) x 88(H) x 400(D) mm Approx. 10kg	430(W) x 88(H) x 480(D) mm Approx. 18kg

ORDERING INFORMATION

APS-7050E 500VA AC Power Source
APS-7100E 1000VA AC Power Source

Accessories:
CD ROM (User Manual) x 1, Power Cord (Region Dependent), Mains Terminal Cover Set, GTL-105 Test Lead

OPTIONAL ASSESSORIES

GRA-431 Rack Mount Kit (APS-7000E Series)

Mains Terminal Cover Set

APS-7000E Series Europe Type Output Outlet

ELECTRONIC LOADS

GW Instek provides DC electronic loads, AC/DC electronic loads, which allow users to flexibly test various batteries, energy storage systems, and power supply devices. DC electronic load can simulate load characteristics including static, dynamic, constant current, constant resistance, constant voltage, constant power and short circuit. AC/DC electronic load can simulate sine wave current load in the CC mode, non-sine wave current load in the linear CC mode, and AC rectified load in the rectifier mode.

Electronic loads can be simply divided into multi-channel electronic loads and single channel electronic loads according to application requirements. The multi-channel electronic load can test and measure multiple sets of low-power and different specifications of power output devices at the same time; and the single-channel electronic load can, based on the characteristics of a single load, choose high power, high voltage, high precision, high resolution or fast dynamic response to conduct test and measurement.

Electric vehicles, solar energy, energy storage systems, server power supplies, and power electronics, etc., can use the built-in dedicated test modes of GW Instek electronic loads to simplify user's operating procedures and shorten the test time. For example: using the CC+CV, CP+CV, CC+UVP, CP+UVP battery discharge modes to discharge electric vehicle battery can avoid over-discharge and protect the battery at the same time. The MPPT mode can quickly obtain the maximum power point of the solar panel.

PRODUCTS

- **Multi-channel Electronic Loads**
- **High Power DC Electronic Load**
- **DC Electronic Load**
- **AC & DC Electronic Load**

MULTI-CHANNEL DC ELECTRONIC LOAD MODULES

Model	Operation Voltage	Operation Current	Power	Channel	Weight/kg	Page
PEL-2020A(H)	0 ~ 80V	20A	100/150W	2	3.8	D99-102
PEL-2030A(H)	0 ~ 80V	5/40A	30/250W	2	3.8	
PEL-2040A(H)	0 ~ 80V	70A	350W	1	3.8	
PEL-2041A(H)	0 ~ 500V	10A	850W	1	3.8	

DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight/kg	Page
PEL-503-80-50	0 ~ 80V	50A	250W	1	5.3	D111-112
PEL-504-80-70	0 ~ 80V	70A	350W	1	5.3	
PEL-507-80-140	0 ~ 80V	140A	700W	1	10.3	
PEL-3021	0 ~ 150V	35A	175W	1	6	D87-92
PEL-3031E	0 ~ 150V	60A	300W	1	7.5	D93-98
PEL-3041	0 ~ 150V	70A	350W	1	7	D87-92
PEL-3111	0 ~ 150V	210A	1050W	1	17	
PEL-3211	0 ~ 150V	420A	2100W	1	33	
PEL-3212	0 ~ 150V	420A	2100W	1	67.5	
PEL-3322	0 ~ 150V	630A	3150W	1	75	
PEL-3323	0 ~ 150V	630A	3150W	1	83.5	
PEL-3424	0 ~ 150V	840A	4200W	1	110	
PEL-3535	0 ~ 150V	1050A	5250W	1	96.5	
PEL-3535	0 ~ 150V	1050A	5250W	1	127.5	
PEL-3744	0 ~ 150V	1470A	7350W	1	125	
PEL-3955	0 ~ 150V	1890A	9450W	1	149	
PEL-3032E	0 ~ 500V	15A	300W	1	7.5	D93-98
PEL-504-500-15	0 ~ 500V	15A	350W	1	5.3	D111-112
PEL-507-500-30	0 ~ 500V	30A	700W	1	10.3	
PEL-3021H	0 ~ 800V	8.75A	175W	1	6	D87-92
PEL-3041H	0 ~ 800V	17.5A	350W	1	7	
PEL-3111H	0 ~ 800V	52.5A	1050W	1	17	
PEL-3211H	0 ~ 800V	105A	2100W	1	33	
PEL-3212H	0 ~ 800V	105A	2100W	1	67.5	
PEL-3322H	0 ~ 800V	157.5A	3150W	1	75	
PEL-3323H	0 ~ 800V	157.5A	3150W	1	83.5	
PEL-3424H	0 ~ 800V	210A	4200W	1	110	
PEL-3535H	0 ~ 800V	262.5A	5250W	1	96.5	
PEL-3535H	0 ~ 800V	262.5A	5250W	1	127.5	
PEL-3744H	0 ~ 800V	367.5A	7350W	1	125	
PEL-3955H	0 ~ 800V	472.5A	9450W	1	149	

HIGH POWER DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
PEL-5006C-150-600	150V	600A	6kW	1	62	D103-113
PEL-5008C-150-800	150V	800A	8kW	1	77.5	
PEL-5010C-150-1000	150V	1000A	10kW	1	84.8	
PEL-5012C-150-1200	150V	1200A	12kW	1	92	
PEL-5015C-150-1500	150V	1500A	15kW	1	116.5	
PEL-5018C-150-1800	150V	1800A	18kW	1	124	
PEL-5020C-150-2000	150V	2000A	20kW	1	140.5	
PEL-5024C-150-2000	150V	2000A	24kW	1	155	
PEL-5006C-600-420	600V	420A	6kW	1	62	
PEL-5008C-600-560	600V	560A	8kW	1	77.5	
PEL-5010C-600-700	600V	700A	10kW	1	84.8	
PEL-5013C-600-840	600V	840A	13kW	1	92	
PEL-5015C-600-1050	600V	1050A	15kW	1	116.5	
PEL-5018C-600-1260	600V	1260A	18kW	1	124	
PEL-5020C-600-1400	600V	1400A	20kW	1	140.5	
PEL-5024C-600-1680	600V	1680A	24kW	1	155	
PEL-5006C-1200-240	1200V	240A	6kW	1	62	
PEL-5008C-1200-320	1200V	320A	8kW	1	77.5	
PEL-5010C-1200-400	1200V	400A	10kW	1	84.8	
PEL-5012C-1200-480	1200V	480A	12kW	1	92	
PEL-5015C-1200-600	1200V	600A	15kW	1	116.5	
PEL-5018C-1200-720	1200V	720A	18kW	1	124	
PEL-5020C-1200-800	1200V	800A	20kW	1	140.5	
PEL-5024C-1200-960	1200V	960A	24kW	1	155	
PEL-5004G-150-400	150V	400A	4kW	1	28	D119-122
PEL-5005G-150-500	150V	500A	5kW	1	28	
PEL-5006G-150-600	150V	600A	6kW	1	28	
PEL-5004G-600-280	600V	280A	4kW	1	29	
PEL-5005G-600-350	600V	350A	5kW	1	29	
PEL-5006G-600-420	600V	420A	6kW	1	29	
PEL-5004G-1200-160	1200V	160A	4kW	1	29	
PEL-5005G-1200-200	1200V	200A	5kW	1	29	
PEL-5006G-1200-240	1200V	240A	6kW	1	29	

AC/DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
AEL-5003-350-18.75	350V	18.75A	1875W	1	21.5	
AEL-5003-350-28	350V	28A	2800W	1	27.5	
AEL-5004-350-37.5	350V	37.5A	3750W	1	33.5	
AEL-5006-350-56	350V	56A	5600W	1	58	
AEL-5008-350-75	350V	75A	7500W	1	70	
AEL-5012-350-112.5	350V	112.5A	11250W	1	105	
AEL-5015-350-112.5	350V	112.5A	15000W	1	140	
AEL-5019-350-112.5	350V	112.5A	18750W	1	260	
AEL-5023-350-112.5	350V	112.5A	22500W	1	295	
AEL-5003-425-18.75	425V	18.75A	1875W	1	21.5	D113-118
AEL-5003-425-28	425V	28A	2800W	1	27.5	
AEL-5004-425-37.5	425V	37.5A	3750W	1	33.5	
AEL-5006-425-56	425V	56A	5600W	1	58	
AEL-5008-425-75	425V	75A	7500W	1	70	
AEL-5012-425-112.5	425V	112.5A	11250W	1	105	
AEL-5015-425-112.5	425V	112.5A	15000W	1	140	
AEL-5019-425-112.5	425V	112.5A	18750W	1	260	
AEL-5023-425-112.5	425V	112.5A	22500W	1	295	
AEL-5003-480-18.75	480V	18.75A	2800W	1	27.5	
AEL-5004-480-28	480V	28A	3750W	1	33.5	

PEL-3111/3111H

PEL-3041/3041H/3021/3021H

CE | KSC | EPRI | RS-232 | RS-485 | LAN

FEATURES

- Operating Voltage (DC) : 0~150V(PEL-3008/ 0-300V(PEL-3008H)
- Operating Mode : C.C/C.V/C.R/C.P/C.C+C.V/ C.R+C.V/C.P+C.V
- Parallel Connection of Inputs for Higher Capacity (Max : 9,450W)
- Support of High Slew Rate : Max 10A/μs (PEL-3008)/0.04A/μs (PEL-3008H)
- Run Program Function (Go/NoGo Test)
- Sequence Function for High Efficient Load Simulations
- Dynamic (Switching) Function : 0.01kHz~ 20kHz
- Soft Start Function : Off/On (1~300ms, Res. 1ms)
- Adjustable OCP/OPP/OPP/UVP Setting
- Short Circuit Function
- Timer Function : Elapsed Time of Load on
- Cut Off Time (Auto Load Off Timer) : 1s to 99Hr 59min 59s or Off
- External Channel Control/Monitoring Via Analog Control Connector
- Setup Memories : 100 sets
- 3.5 inch TFT LCD Display
- Multi Interface : USB, RS-232 (Std.)/ GPIB, LAN (Opt.)

Rear Panel

The PEL-3000 Series, a single-channel, programmable D.C. electronic load with 0.01 mA current resolution and 10kHz current Slew Rate, is very ideal for testing server power supply and SMPS(Switching Power Supply) for commercial and industrial equipment. For a heavy-duty device like cloud ecosystem running 24-hour nonstop operations, a stable and high-power power supply, ranging from 1000W to 1500W, is required to maintain the normal operation of server, Hub, and the equipment of data storage and internet communications. Owing to the increasing demand of data transmission and large-scale data storage of telecommunications systems, the infrastructure of Internet communications is in the pace of rapid expansion. This has greatly boosted the market demand of telecommunications equipment powered by power supply of 2000W and above. The flexible power combination of PEL-3000 Series meets the test requirements of present high-power power supply. The PEL-3000H Series programmable DC Electronic load, which not only inherited functions and features from the PEL-3008 Series but, providing three current ranges for all PEL-3000H Series and adding voltage monitor BNC terminals on the front panel. The PEL-3000H Series, a single-channel, programmable D.C. electronic load with 80W and 0.04A/μs current Slew Rate, is ideal for the test of the high-voltage devices such as the EV & HEV in-vehicle chargers, DC/DC converters or high-voltage batteries. With respect to battery testing applications such as rechargeable battery for electrical cards, battery module and automobile battery, PEL-3000(H) Series has three stand-alone models to offer including 170W, 150W, 1050W and 8modes. By connecting Booster 2100W units with master units, the maximum load capacity of the whole system can reach 9,450W. Hence, the PEL-3008(H) Series fulfills various power testing requirements in electric, medical or low-power or high-power power supply.

The PEL-3000(H) Series has seven operating modes and three operating functions. Among the seven operating modes, four of them are basic operating modes, including constant current, constant voltage, constant resistance, and constant power, and the other three are advanced operating modes including constant current + constant voltage, constant resistance + constant voltage, and constant power + constant voltage. Users must first select operating mode and then operating function based upon the test requirements. Basic, Dynamic and Sequence operating functions can be applied to different testing conditions, including a fixed load level, switching between two levels or switching among more than two levels. Sequence function is divided into Fast Sequence and Normal Sequence according to the test time of each step. Both Dynamic and Sequence are to assist users to simulate the genuine load change. For instance, PEL-3008(H) Series can simulate HEV current consumption to make sure that automobile battery can supply HEV with sufficient power need on the road. By so doing, manufacturers can elevate product quality and reliability.

The Soft Start function of the PEL-3000(H) Series can set current rise time for the inverter. PEL-3008(H) Series is aimed on or reduce the abnormal situation of the voltage drop of power supply under test. The adjustable Under Voltage Protection (UVP), CC/CRD/CCD voltage input monitoring function, current monitoring function and Timer function to control load activation time can be jointly applied to the characteristic tests of battery. Meeting to avoid the over discharge during bleed-off operation. Based upon the functionalities described above, the PEL-3000(H) Series can test a vast variety of power supply ranging from the fundamental static unit current to complex dynamic load simulations so as to enhance product quality and reliability.

The single unit D.C Electronic Load of PEL-3000(H) Series

The PEL-3000(H) Series is a high speed, single-channel and programmable D.C. electronic load and its power function ality, parallel combination and size are listed on the following chart:

MODEL	PEL-3021/3021H	PEL-3041/3041H	PEL-3111/3111H	PEL-3211/3211H
Power	170W	350W	1050W	2100W (Booster)
Function	Full function Single Unit	Full function Single Unit	Full function Single Unit	No control panel, can not be operated alone
Parallel Combination	Parallel with same model, 5 units the maximum	Parallel with same model, 5 units the maximum	Parallel with same model, 5 units the maximum Parallel with the mixed use of the PEL-3211(H)	Parallel with PEL-3111(H)
Size	Half Rack	Half Rack	Full Rack	Full Rack

Note:

1 : Full scale of H range

2 : Min. input terminal voltage of electronic load

3 : M range applies to the full scale of H range

4 : Trans time[S] = Input current[A] / Input voltage[V] = (Programmed[S])

5 : Converted value at the input current. At the input current, it is not applied for the condition of the parallel operation.

6 : sec = Vin/Rser

7 : At the sensing point during remote sensing under the operating range of the input voltage. It is also applied for the condition of the parallel operation.

8 : It is not applied for the condition of the parallel operation.

9 : Time to reach from 10 % to 90 % when the current is varied from 2 % to 100 % (20 % to 100 % in M range) of the rated current.

10. N = Number of units in parallel (same model)

11. N = Number of units in parallel (same model) or N = 1 ~ 2 x (Number of units in parallel (PEL-3211))

SPECIFICATIONS

Model			PEL-3021	PEL-3041	PEL-3111	PEL-3211
Voltage			0V~150V	0V~150V	0V~150V	0V~150V
Current			30A	60A	210A	420A
Power			1125W	2250W	7875W	15750W
Input Resistance			500 kΩ	500 kΩ	500 kΩ	500 kΩ
Min. Operating Voltage(CC Mode)			0.75V@1.5A 1.5V@30A	0.75V@3.0A 1.5V@60A	0.75V@10.5A 1.5V@210A	0.75V@21.0A 1.5V@420A
CONSTANT CURRENT MODE						
Operating Range	H, M, L		0.15A ~ 3A | 0.3A ~ 6A | 1.5A ~ 30A	0.3A ~ 6A | 0.6A ~ 12A | 3A ~ 60A	0.75A ~ 15A | 1.5A ~ 30A | 7.5A ~ 150A	1.5A ~ 30A | 3A ~ 60A | 15A ~ 300A
Accuracy of Setting	H, M		±(0.2 % of set + 0.1 % of Fs *) + Vin* / 500 kΩ			±(1.2% of set + 1.1% of Fs)
Accuracy of Setting	L		±(0.2 % of set + 0.1 % of Fs *) + Vin* / 500 kΩ			N/A
Accuracy of Setting(Parallel)			±(1.2% of set + 1.1% of Fs *)			±(1.2% of set + 1.1% of Fs)
Resolution	H, M, L		1mA | 0.1mA | 0.01mA	2mA | 0.2mA | 0.02mA	10mA | 1mA | 0.1mA	N/A
CR MODE						
Operating Range	Range	H	0.1Ω/30 ~ 450Ω (120.1mW ~ 2.7kW)	16.6mΩ/30 ~ 600mΩ (1.43W ~ 1.25kW)	150.2mΩ/30 ~ 2.1mΩ (1.43W ~ 13.5kW)	(80.0Ω/(3 ~ 4.8V) (0.072W ~ 0.108 W)*2)
		M	2.1Ω/600 ~ 4.2kΩ (428.5mW ~ 15kW)	4.66Ω/75 ~ 600Ω (3.4W ~ 2.5kW)	19.09Ω/75 ~ 243.2Ω (7.4W ~ 4.16kW)	298.8Ω/3.6 ~ 38.4kΩ (0.7156W ~ 0.8850W*2)
		L	0.15Ω/4.2kΩ ~ 6kΩ (4.286mW ~ 214kW)	8.66Ω/375 ~ 8kΩ (21.43W ~ 1.28kW)	1.40Ω/1.5k ~ 20.2kΩ (714.3mW ~ 41.66kW)	N/A
Accuracy of Setting	H, M		±(0.3 % of set* + 0.2 % of Fs *) + Vin* / 500kΩ			±(1.6% of set* + 1.1% of Fs *)
Accuracy of Setting	L		±(0.3 % of set* + 0.2 % of Fs *) + Vin* / 500kΩ			N/A
Parallel			±(1.2 % of set + 1.1 % of Fs *)			±(1.6% of set + 1.1% of Fs *)
Resolution	H, M, L		400mΩ | 40mΩ | 4mΩ	800mΩ | 80mΩ | 8mΩ	2.4mΩ | 240mΩ | 24mΩ	N/A
CONSTANT VOLTAGE MODE						
Operating Range	Range	H	1.5V~150V			1.5V~150V
		L	1.5V~15V			1.5V~15V
Accuracy of Setting	H, L		±(0.1 % of set + 0.1 % of Fs)			N/A
Resolution	H, L		10mV | 1mV			
CONSTANT POWER MODE						
Operating Range	Range	H	11.25W~1.75kW	22.5W~3.5kW	101.8W~12.6kW	210W~21.0kW
		M	1.75W~17.5W	3.5W~35W	12.6W~126W	21W~210W
		L	0.175W~1.75W	0.35W~3.5W	1.26W~12.6W	N/A
Accuracy of Setting	H, M, L		±(2.5 % of set * + 1.4 % of Fs *) + Vin* / 500kΩ			N/A
Resolution	H, M, L		10mW | 1mW | 0.1mW	15mW | 1mW | 0.1 mW	100mW | 10mW | 1mW	
PARALLEL Mode						
Capacity			0~90	0~180	0~630	PEL-3111 with 4 booster units : Max 0~630V PEL-3211 with 4 booster units : Max 0~630V
SLEW RATE						
Operation Mode			CC, CR	CC, CR	CC, CR	N/A
Setting Range (CC mode)	Range	H	2.5 x 10⁻³ mA/μs~2.5A/μs	5 x 10⁻³ mA/μs~5A/μs	10 x 10⁻³ mA/μs~1.5A/μs	N/A
		M	250 x 10⁻⁶ mA/μs~250mA/μs	500 x 10⁻⁶ mA/μs~500mA/μs	1.5 x 10⁻³ mA/μs~1.5A/μs	
		L	25 x 10⁻⁶ mA/μs~25mA/μs	50 x 10⁻⁶ mA/μs~50mA/μs	150 x 10⁻⁶ mA/μs~150mA/μs	
Setting Range (CR Mode)	Range	H	250 x 10⁻³ mA/μs~25mA/μs	500 x 10⁻³ mA/μs~50mA/μs	1.5 x 10⁻³ mA/μs~1.5A/μs	N/A
		M	25 x 10⁻⁶ mA/μs~25mA/μs	50 x 10⁻⁶ mA/μs~50mA/μs	150 x 10⁻⁶ mA/μs~150mA/μs	
		L	2.5 x 10⁻⁶ mA/μs~2.5mA/μs	5 x 10⁻⁶ mA/μs~5mA/μs	15 x 10⁻⁶ mA/μs~15mA/μs	
Accuracy of Setting	H, M, L		±(2.5 % of set* + 1μs)			N/A
Resolution (Setting Range)			1 x 10⁻³ mA 250 x 10⁻⁶ mA/μs~2.5A/μs 100 x 10⁻⁶ mA 25 x 10⁻⁶ mA/μs~250 x 10⁻³ mA/μs 10 x 10⁻⁶ μA 2.5 x 10⁻⁶ mA/μs~25 x 10⁻³ mA/μs 1 x 10⁻⁶ mA 250 x 10⁻⁹ mA/μs~2.5 x 10⁻³ mA/μs 100 x 10⁻⁹ mA 25 x 10⁻⁹ mA/μs~250 x 10⁻⁶ mA/μs 10 x 10⁻⁹ μA 2.5 x 10⁻⁹ mA/μs~25 x 10⁻⁶ mA/μs	2 x 10⁻³ mA 500 x 10⁻⁶ mA/μs~5A/μs 200 x 10⁻⁶ mA 50 x 10⁻⁶ mA/μs~500 x 10⁻³ mA/μs 20 x 10⁻⁶ mA 5 x 10⁻⁶ mA/μs~50 x 10⁻³ mA/μs 2 x 10⁻⁶ mA 500 x 10⁻⁹ mA/μs~5 x 10⁻³ mA/μs 200 x 10⁻⁹ mA 50 x 10⁻⁹ mA/μs~500 x 10⁻⁶ mA/μs 20 x 10⁻⁹ mA 5 x 10⁻⁹ mA/μs~50 x 10⁻⁶ mA/μs	6 x 10⁻³ mA 1.5 x 10⁻³ A/μs~15A/μs 600 x 10⁻⁶ mA 150 x 10⁻³ mA/μs~1.5 x 10⁻³ A/μs 60 x 10⁻⁶ mA 15 x 10⁻³ mA/μs~150 x 10⁻³ mA/μs 6 x 10⁻⁶ mA 1.5 x 10⁻³ mA/μs~15 x 10⁻³ mA/μs 600 x 10⁻⁹ mA 150 x 10⁻⁶ mA/μs~1.5 x 10⁻³ A/μs 60 x 10⁻⁹ mA 15 x 10⁻⁶ mA/μs~150 x 10⁻³ mA/μs	N/A
METER						
Voltmeter Ammeter Ammeter(Parallel Operation)	Accuracy Accuracy Accuracy		0.2 % of rdg. + 0.1 % of Fs 0.2 % of rdg. + 0.1 % of Fs 0.5 % of rdg. + 1 % of Fs			N/A
DYNAMIC MODE						
Operation Mode T1 & T2 Accuracy			CC, CR and CP (4.25ms~10ms/Res : 1μs ; 1ms~4s/Res : 1ms ±100μs or setting			
Slew Rate (CC Mode)	Range	H	2.5mA/μs~2.5A/μs	5mA/μs~5A/μs	15mA/μs~1.5A/μs	N/A
		M	250μA/μs~250mA/μs	500μA/μs~500mA/μs	1.5mA/μs~1.5A/μs	
		L	25μA/μs~25mA/μs	50μA/μs~50mA/μs	150μA/μs~150mA/μs	
Slew Rate (CR Mode)	Range	H	250μA/μs~25mA/μs	500μA/μs~50mA/μs	1.5mA/μs~1.5A/μs	N/A
		M	25μA/μs~25mA/μs	50μA/μs~50mA/μs	150μA/μs~150mA/μs	
		L	2.5μA/μs~2.5mA/μs	5μA/μs~5mA/μs	15μA/μs~15mA/μs	
Current Accuracy			0.1% F.S.	0.1% F.S.	0.1% F.S.	0.1% of set (1% of F.S.)
PROTECTION FUNCTION						
Function			Over voltage protection (OVP), Over current protection (OCP), Over power protection (OPP), Overheat protection (OHP), Undervoltage protection (UVP), Reverse connection protection (RCP)			
GENERAL						
Input Range			1Φ3W, 110VAC/208VAC~230VAC Single phase, 47Hz~63Hz			
Power(Max.)			1.8kW	3.6kW	14kVA	28kW
Interface			USB, RS232, Analog Control (Standard) ; GPIB/LAN (Optional)			
Dimension & Weight			213.5(W)x133.5(H)x480(D)mm Approx. 8kg	214.5(W)x124.5(H)x498.5(D)mm Approx. 9kg	430.5(W)x128.5(H)x480.5(D)mm Approx. 17kg	427.5(W)x128.5(H)x615.5(D)mm Approx. 23kg

Programmable D.C. Electronic Load

SPECIFICATIONS

Model	PEL-1212	PEL-1323	PEL-3424	PEL-3535	PEL-1322	PEL-3533	PEL-3746	PEL-3951
Voltage	0~150V	0V~150V	0V~150V	0V~350V	0V~150V	0V~150V	0V~150V	0V~350V
Current	0~120A	0~30A	0~240A	0~105A	0~60A	0~210A	0~315A	0~180A
Power	2400W	1200W	4800W	5250W	1200W	3150W	7350W	9450W
Input Resistance	25K Ω	166.7 KΩ	12.5 KΩ	100 KΩ	333 KΩ	166 KΩ	166 KΩ	200 KΩ
Min. Operating Voltage/Current	0.75V@0.12A 1.0V@120A	0.75V@0.03A 1.5V@30A	0.75V@0.48A 1.5V@240A	0.75V@0.021A 1.5V@105A	0.75V@0.12A 1.5V@60A	0.75V@0.21A 1.5V@210A	0.75V@0.315A 1.5V@315A	0.75V@0.018A 1.5V@189A
CONSTANT CURRENT MODE								
Operating Range	H,M,L	0~120A,0~12A,0~1.2A	0~30A,0~3A,0~0.3A	0~240A,0~24A,0~2.4A	0~105A,0~10.5A,0~1.05A	0~60A,0~6A,0~0.6A	0~210A,0~21A,0~2.1A	0~315A,0~31.5A,0~3.15A
Accuracy of Setting	H,M,L	≦0.2 % of set + 0.1 % of F.s. (~ 10~90% RH, 25℃)						
Resolution	H,M,L	10mA, 1mA, 0.1mA	1mA,0.1mA,0.01mA	10mA, 1mA, 0.1mA	10mA, 1mA, 0.1mA	10mA, 1mA, 0.1mA	10mA, 1mA, 0.1mA	10mA, 1mA, 0.1mA
CR MODE								
Operating Range	H	120.00/12.00/1.200Ω ~ 2.1710Ω	600.00/60.00/6.000Ω ~ 108.60Ω	300.00/30.00/3.000Ω ~ 54.310Ω	900.00/90.00/9.000Ω ~ 162.93Ω	600.00/60.00/6.000Ω ~ 108.60Ω	300.00/30.00/3.000Ω ~ 54.310Ω	1800.00/180.00/18.000Ω ~ 325.86Ω
	M	30.000Ω ~ 542.50mΩ	150.00Ω ~ 2.7150Ω	75.000Ω ~ 1.3575Ω	225.00Ω ~ 4.0725Ω	150.00Ω ~ 2.7150Ω	75.000Ω ~ 1.3575Ω	450.00Ω ~ 8.1450Ω
	L	7.5000Ω ~ 135.62mΩ	37.500Ω ~ 678.75mΩ	18.750Ω ~ 339.37mΩ	56.250Ω ~ 1.0181Ω	N/A	N/A	N/A
Accuracy of Setting	H,M,L	≦(0.5 % of set + 0.5 % of F.s.) + 1mS / [1/(2πLf)]						
Resolution	H,M,L	4 digits / 4 digits / 4 digits	4 digits / 4 digits / 4 digits	4 digits / 4 digits / 4 digits	4 digits / 4 digits / 4 digits	4 digits / 4 digits / 4 digits	4 digits / 4 digits / 4 digits	4 digits / 4 digits / 4 digits
CONSTANT VOLTAGE MODE								
Operating Range	H	1.5V~150V						
	L	1.5V~75V						
Accuracy of Setting	H,L	≦(0.1 % of set + 0.1 % of F.s.)						
Resolution	H,L	10mV/1mV						
CONSTANT POWER MODE								
Operating Range	H	1200W~1200W	3150W~3150W	4200W~4200W	5250W~5250W	3150W~3150W	5250W~5250W	7350W~7350W	9450W~9450W
	M	270W~270W	675W~675W	900W~900W	1125W~1125W	675W~675W	1125W~1125W	1575W~1575W	2025W~2025W
	L	67.5W~67W	168.8W~168W	225W~225W	281.3W~281W	N/A	N/A	N/A	N/A
Accuracy of Setting	H,M,L	≦(0.5 % of set + 0.5 % of F.s.) + 1mS / [1/(2πLf)]						
Resolution	H,M,L	100mW/10mW/1mW	100mW/10mW/1mW	100mW/10mW/1mW	100mW/10mW/1mW	100mW/10mW/1mW	100mW/10mW/1mW	100mW/10mW/1mW	100mW/10mW/1mW
PARALLEL Mode									
Capacity		–	–	–	–	–	–	–	–
SLEW RATE									
Operation Mode		CC, CR	CC, CR	CC, CR	CC, CR	CC, CR	CC, CR	CC, CR	CC, CR
Setting Range (CC mode)	H	2.5mA/μs~1.875A/μs	10mA/μs~7.500A/μs	10mA/μs~7.500A/μs	20mA/μs~7.500A/μs	10mA/μs~7.500A/μs	20mA/μs~7.500A/μs	30mA/μs~11.25A/μs	40mA/μs~15.00A/μs
	M	1.2mA/μs~1.84A/μs	4.8mA/μs~7.36A/μs	4.8mA/μs~7.36A/μs	9.6mA/μs~7.36A/μs	4.8mA/μs~7.36A/μs	9.6mA/μs~7.36A/μs	14.4mA/μs~11.04A/μs	19.2mA/μs~14.72A/μs
	L	310uA/μs~460mA/μs	1.2mA/μs~1.84A/μs	1.2mA/μs~1.84A/μs	2.4mA/μs~1.84A/μs	N/A	N/A	N/A	N/A
Setting Range (CR Mode)	H	2.5mA/μs~1.8A/μs	10mA/μs~7.2A/μs	10mA/μs~7.2A/μs	20mA/μs~7.2A/μs	10mA/μs~7.2A/μs	20mA/μs~7.2A/μs	30mA/μs~10.8A/μs	40mA/μs~14.4A/μs
	M	312uA/μs~108mA/μs	1.2mA/μs~432mA/μs	1.2mA/μs~432mA/μs	2.4mA/μs~432mA/μs	1.2mA/μs~432mA/μs	2.4mA/μs~432mA/μs	3.6mA/μs~1.08A/μs	4.8mA/μs~1.44A/μs
	L	78uA/μs~27mA/μs	300uA/μs~108mA/μs	300uA/μs~108mA/μs	600uA/μs~108mA/μs	N/A	N/A	N/A	N/A
Accuracy of Setting	H,M,L	≦(0.5 % of set + 1μs)							
Resolution (Setting Range)		10mA 1.875A/μs~187mA/μs 1.2mA 187mA/μs~1.84A/μs 120μA 18.7mA/μs~184mA/μs 12mA 1.84A/μs~187mA/μs 1.2mA 184mA/μs~18.4mA/μs 120uA 18.4mA/μs~1.84mA/μs 12mA 1.84A/μs~1.87A/μs	10mA 7.500A/μs~749mA/μs 1.2mA 749mA/μs~7.36A/μs 120μA 74.9mA/μs~736mA/μs 12mA 7.36A/μs~749mA/μs 1.2mA 736mA/μs~73.6mA/μs 120uA 73.6mA/μs~7.36mA/μs 12mA 7.36A/μs~7.49A/μs	20mA 7.500A/μs~749mA/μs 1.2mA 749mA/μs~7.36A/μs 120μA 74.9mA/μs~736mA/μs 12mA 7.36A/μs~749mA/μs 1.2mA 736mA/μs~73.6mA/μs 120uA 73.6mA/μs~7.36mA/μs 12mA 7.36A/μs~7.49A/μs	50mA 7.500A/μs~749mA/μs 1.2mA 749mA/μs~7.36A/μs 120μA 74.9mA/μs~736mA/μs 12mA 7.36A/μs~749mA/μs 1.2mA 736mA/μs~73.6mA/μs 120uA 73.6mA/μs~7.36mA/μs 12mA 7.36A/μs~7.49A/μs	30mA 11.25A/μs~1.124A/μs 1.8mA 1.124A/μs~11.04A/μs 180μA 112.4mA/μs~1.104A/μs 18mA 11.04A/μs~1.124A/μs 1.8mA 1.104A/μs~110.4mA/μs 180uA 110.4mA/μs~11.04mA/μs 18mA 11.04A/μs~11.24A/μs	50mA 11.25A/μs~1.124A/μs 1.8mA 1.124A/μs~11.04A/μs 180μA 112.4mA/μs~1.104A/μs 18mA 11.04A/μs~1.124A/μs 1.8mA 1.104A/μs~110.4mA/μs 180uA 110.4mA/μs~11.04mA/μs 18mA 11.04A/μs~11.24A/μs	70mA 11.25A/μs~1.124A/μs 1.8mA 1.124A/μs~11.04A/μs 180μA 112.4mA/μs~1.104A/μs 18mA 11.04A/μs~1.124A/μs 1.8mA 1.104A/μs~110.4mA/μs 180uA 110.4mA/μs~11.04mA/μs 18mA 11.04A/μs~11.24A/μs	90mA 11.25A/μs~1.124A/μs 1.8mA 1.124A/μs~11.04A/μs 180μA 112.4mA/μs~1.104A/μs 18mA 11.04A/μs~1.124A/μs 1.8mA 1.104A/μs~110.4mA/μs 180uA 110.4mA/μs~11.04mA/μs 18mA 11.04A/μs~11.24A/μs
METER									
Voltmeter	Accuracy	≦(0.1 % of rdg + 0.1 % of F.s)							
Ammeter	Accuracy	≦(0.2 % of rdg + 0.2 % of F.s)							
DYNAMIC MODE									
Operation Mode T1 & T2 Accuracy		T1 and T2 ≦(2%ms~2.5ms/0ms~1μs ; 1ms~65s/0ms~1ms 1μs/1ms & 1~10digits)							
Slew Rate (CC Mode)	H	10mA/μs~1.875A/μs	40mA/μs~7.500A/μs	40mA/μs~7.500A/μs	80mA/μs~7.500A/μs	40mA/μs~7.500A/μs	80mA/μs~7.500A/μs	120mA/μs~11.25A/μs	160mA/μs~15.00A/μs
	M	2.5mA/μs~1.84A/μs	10mA/μs~7.36A/μs	10mA/μs~7.36A/μs	20mA/μs~7.36A/μs	10mA/μs~7.36A/μs	20mA/μs~7.36A/μs	30mA/μs~11.04A/μs	40mA/μs~14.72A/μs
	L	310uA/μs~187mA/μs	1.2mA/μs~749mA/μs	1.2mA/μs~749mA/μs	2.4mA/μs~749mA/μs	N/A	N/A	N/A	N/A
Slew Rate (CR Mode)	H	1.25mA/μs~1.8A/μs	5mA/μs~7.2A/μs	5mA/μs~7.2A/μs	10mA/μs~7.2A/μs	5mA/μs~7.2A/μs	10mA/μs~7.2A/μs	15mA/μs~10.8A/μs	20mA/μs~14.4A/μs
	M	312uA/μs~108mA/μs	1.2mA/μs~432mA/μs	1.2mA/μs~432mA/μs	2.4mA/μs~432mA/μs	1.2mA/μs~432mA/μs	2.4mA/μs~432mA/μs	3.6mA/μs~1.08A/μs	4.8mA/μs~1.44A/μs
	L	78uA/μs~27mA/μs	300uA/μs~108mA/μs	300uA/μs~108mA/μs	600uA/μs~108mA/μs	N/A	N/A	N/A	N/A
Current Accuracy		≦(±0.5 %)	≦(±0.5 %)	≦(±0.5 %)	≦(±0.5 %)	≦(±0.5 %)	≦(±0.5 %)	≦(±0.5 %)	≦(±0.5 %)
PROTECTION FUNCTION									
Functions		Over voltage protection (OVP) , Overcurrent protection (OCP), Overpower protection (OPP), Over heat protection (OHP), Undervoltage protection (UVP) , Reverse connection protection (REV)							
GENERAL									
Input Range		90VAC~132VAC/180VAC~264VAC Single phase, 47HZ~63HZ							
Power (Max.)		1.2KVA	1.5KVA	3.0KVA	3.5KVA	4.2KVA	5.0KVA	6.0KVA	7.5KVA
Interface		USB,RS232,Analog Control (Standard) , GPIB,LAN(Option)							
Dimensions & Weight		H88.9(3.5)*W213.4*D 550(21.65)mm Approx. 8.7Kg	H88.9(3.5)*W213.4*D 550(21.65)mm Approx. 8.9Kg	H88.9(3.5)*W213.4*D 550(21.65)mm Approx. 11Kg	H88.9(3.5)*W213.4*D 700(27.56)mm Approx. 17.7Kg	H88.9(3.5)*W213.4*D 700(27.56)mm Approx. 17Kg	H88.9(3.5)*W213.4*D 700(27.56)mm Approx. 18.3Kg	H88.9(3.5)*W213.4*D 700(27.56)mm Approx. 22Kg	H88.9(3.5)*W213.4*D 700(27.56)mm Approx. 24Kg

SPECIFICATIONS

Model			PEL-1021H	PEL-3041H	PEL-3111H	PEL-3211H
Voltage			8V-80V	0V-80V	0V-80V	0V-80V
Current			8.75A	17.5A	52.5A	180A
Power			175W	350W	1050W	2100W
Input Resistance			1.2MΩ	1.2MΩ	1.2MΩ	1.2MΩ
Min. Operating Voltage(CC)(Typ.)			5V@0.75A 2.5V@0.75A	5V@1.75A 2.5V@0.75A	5V@5.25A 2.5V@0.75A	5V@18A 2.5V@0.75A
CONSTANT CURRENT MODE						
Operating Range	H, M, L		0~2.1A/0~8.75mA/0~875μA	0~4.2A/0~17.5mA/0~1.75mA	0~12.6A/0~52.5mA/0~5.25mA	0~43.2A/0~180mA/0~18mA
Accuracy of Setting	H, M		±(0.2 % of set + 21 % of F.S.) + Vin*(3.2mΩ)			±(1.2% of set+1.1% of F.S.)
Accuracy of Setting	L		±(0.2 % of set + 21 % of F.S.) + Vin*(3.2mΩ)			N/A
Accuracy of Setting(Parallel)			±(1.2% of set + 1.1% of F.S.)			N/A
Resolution	H, M, L		100μA 10μA 1μA	0.5mA 100μA 10μA	1mA 200μA 20μA	5mA 1mA 100μA
CR MODE						
Operating Range	Range	H	1.75Ω~30kΩ (571 mΩ~33.3kΩ)	3.5Ω~60kΩ (286mΩ~16.6kΩ)	10.5Ω~180kΩ (95.2mΩ~5.55kΩ)	21Ω~360kΩ (47.6mΩ~2.77kΩ)
		M	17.5Ω~0.3kΩ (5.71Ω~333Ω)	35Ω~0.6kΩ (2.86Ω~166Ω)	105Ω~1.8kΩ (952mΩ~55.5Ω)	210Ω~3.6kΩ (476mΩ~27.7Ω)
		L	175Ω~3.03kΩ (571Ω~33.3Ω)	350Ω~6.0kΩ (28.5Ω~1.66Ω)	1050Ω~18kΩ (9.52Ω~555Ω)	2100Ω~36kΩ (4.76Ω~277.7Ω)
Accuracy of Setting	H, M		±(2.5% set + 4.5% F.S.) + Vin*(0.3mΩ)			±(120 of set +11% of F.S.)*Vin
Accuracy of Setting	L		±(2.5% set + 4.5% F.S.) + Vin*(0.2mΩ)			N/A
Parallel			±(1.2 % of set + 1.1% of F.S.)			N/A
Resolution	H, M, L		10μΩ 2μΩ 0.5μΩ	60μΩ 4μΩ 0.6μΩ	180μΩ 18μΩ 1.8μΩ	N/A
CONSTANT VOLTAGE MODE						
Operating Range	Range	H	1V~80V			3V~80V
		L	1V~8V			3V~80V
Accuracy of Setting	Range	H, L	±(0.2% of set + 0.2% of F.S.)			±(0.2% of set + 0.2% of F.S.)
	Parallel	TYP	±(0.2% of set + 0.2% of F.S.)			±(0.2% of set + 0.2% of F.S.)
Resolution	Range	H, L	20mV/20mV			N/A
CONSTANT POWER MODE						
Operating Range	Range	H	1~175W~1125W	2~350W~2250W	5~1050W~6750W	210W~2100W
		M	1~175W~112.5W	2~350W~225W	5~105W~675W	21W~210W
		L	0.1~17.5W~1.125W	0.2~35W~22.5W	0.5~105W~67.5W	2.1W~21W
Accuracy of Setting	H, M		±(2.5 % of set + 1.4 % of F.S.) + Vin*(2.2mΩ)			±(2.5 % of set)*VP
Resolution	H, M, L		10mW 1mW 0.1mW	10mW 1mW 0.1mW	100mW 10mW 1mW	N/A
PARALLEL Mode						
Capacity			8*175W	1*350W	3*350W	PEL-3111H with 1 booster units : 3Pcs 9.450W
SLEW RATE						
Operation Mode			CC, CR	CC, CR	CC, CR	N/A
Setting Range (CC mode)	Range	H	0.1 x 10⁻³ mA/μs~140mA/μs	0.2 x 10⁻³ mA/μs~280.0mA/μs	0.6 x 10⁻³ mA/μs~840mA/μs	N/A
		M	0.01 x 10⁻³ mA/μs~14mA/μs	0.02 x 10⁻³ mA/μs~28.0mA/μs	0.06 x 10⁻³ mA/μs~84.0mA/μs	
		L	1 x 10⁻³ mA/μs~1.4mA/μs	2 x 10⁻³ mA/μs~2.8mA/μs	0.006 x 10⁻³ mA/μs~8.4mA/μs	
Setting Range (CR mode)	Range	H	0.01 x 10⁻³ mA/μs~14mA/μs	0.02 x 10⁻³ mA/μs~28.0mA/μs	0.06 x 10⁻³ mA/μs~84.0mA/μs	N/A
		M	0.001 x 10⁻³ mA/μs~1.4mA/μs	0.002 x 10⁻³ mA/μs~2.8mA/μs	0.006 x 10⁻³ mA/μs~8.4mA/μs	
		L	0.1 x 10⁻³ mA/μs~140μA/μs	0.2 x 10⁻³ mA/μs~280μA/μs	0.006 x 10⁻³ mA/μs~840μA/μs	
Accuracy of Setting	H, M, L		±(10.0 of set + 20μs)			N/A
Resolution (Setting Range)			20 x 10⁻³ mA/μs 14 x 10⁻³ mA/μs~140mA/μs 5 x 10⁻³ mA/μs 7 x 10⁻³ mA/μs~70 x 10⁻³ mA/μs 2.5 x 10⁻³ mA/μs 350 x 10⁻³ mA/μs~3.5 x 10⁻³ mA/μs 100 x 10⁻³ mA/μs 14 x 10⁻³ mA/μs~140 x 10⁻³ mA/μs 5 x 10⁻³ mA/μs 7 x 10⁻³ mA/μs~70 x 10⁻³ mA/μs 2.5 x 10⁻³ mA/μs 0.7 x 10⁻³ mA/μs~7.0 x 10⁻³ mA/μs	100 x 10⁻³ mA/μs 28 x 10⁻³ mA/μs~280.0 mA/μs 10 x 10⁻³ mA/μs 14 x 10⁻³ mA/μs~23 x 10⁻³ mA/μs 5 x 10⁻³ mA/μs 280 x 10⁻³ mA/μs~2.3 x 10⁻³ mA/μs 80 x 10⁻³ mA/μs 23 x 10⁻³ mA/μs~280 x 10⁻³ mA/μs 10 x 10⁻³ mA/μs 2.8 x 10⁻³ mA/μs~23 x 10⁻³ mA/μs 1 x 10⁻³ mA/μs 28.0 x 10⁻³ mA/μs~2.8 x 10⁻³ mA/μs	300 x 10⁻³ mA/μs 84 x 10⁻³ mA/μs~840mA/μs 30 x 10⁻³ mA/μs 84 x 10⁻³ mA/μs~84 x 10⁻³ mA/μs 3 x 10⁻³ mA/μs 840 x 10⁻³ mA/μs~8.4 x 10⁻³ mA/μs 0.3 x 10⁻³ mA/μs 84 x 10⁻³ mA/μs~840 x 10⁻³ mA/μs 30 x 10⁻³ mA/μs 8.4 x 10⁻³ mA/μs~84 x 10⁻³ mA/μs 3 x 10⁻³ mA/μs 0.84 x 10⁻³ mA/μs~8.4 x 10⁻³ mA/μs	N/A
METER						
Voltmeter Ammeter Ammeter(Parallel Operation)	Accuracy Accuracy Accuracy		±(0.1 % of rdg + 0.1 % of F.S.) ±(0.2 % of rdg + 0.3 % of F.S.) ±(1.2% of rdg + 1.1% of F.S.)			±(0.1 % of rdg + 0.1 % of F.S.) N/A ±(1.2% of rdg + 1.1% of F.S.)*VP
OPP/SAFE MODE						
Operation Mode (H & L) Accuracy			CC, CR, CP 6.00.0sec~10hrs/1sec. / 1pc. , 10min~99s/1sec. / 1pc.			N/A N/A 2.500pcs of setting
Slew Rate (CC Mode)	Range	H	0.140mA/μs~1.40.0mA/μs	0.280mA/μs~280.0mA/μs	0.840mA/μs~840.0mA/μs	N/A
		M	0.014 mA/μs~14.00mA/μs	0.028mA/μs~28.00mA/μs	0.084mA/μs~84.00mA/μs	
		L	1.400μA/μs~1.400.0μA/μs	2.800μA/μs~2.800μA/μs	0.008mA/μs~8.400mA/μs	
Slew Rate (CR Mode)	Range	H	0.014 mA/μs~14.00mA/μs	0.028mA/μs~28.00mA/μs	0.084 mA/μs~84.00mA/μs	N/A
		M	0.001 mA/μs~1.400mA/μs	2.8μA/μs~2.800mA/μs	8.400mA/μs~8.400mA/μs	
		L	0.1400μA/μs~140.0μA/μs	0.280μA/μs~280.0μA/μs	0.840mA/μs~0.840mA/μs	
Current Accuracy			20.48V/0.5	20.48V/0.5	20.48V/0.5	20.48V/0.5
PROTECTION FUNCTION						
Function			Overvoltage protection (OVP), Overcurrent protection (OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection (UVP), Reverse connection protection (REV)			
GENERAL						
Input Range			Model : 100VAC/180VAC~250VAC, Single phase, 47Hz~63Hz			
Power(Max.)			180VA	370VA	1180VA	2300VA
Interface			Std.: USB,RS232/Analog Control ; Opt.: GPIB,LAN			
Dimensions & Weight			212.6(W)x124.2(H)x450.3(D)mm Approx. 4kg	212.6(W)x124.2(H)x450.3(D)mm Approx. 7kg	427.8(W)x124.2(H)x450.3(D)mm Approx. 13kg	561.7(W)x132.8(H)x450.3(D)mm Approx. 23kg

Programmable D.C. Electronic Load

SPECIFICATIONS

Model	PEL-1212H	PEL-3323H	PEL-3620H	PEL-3535H	PEL-3322H	PEL-3533H	PEL-3764H	PEL-3955H
Voltage	0~500V	0~800V	0~800V	0~800V	0~800V	0~800V	0~800V	0~800V
Current	0~30A	0~15A	0~20A	0~35A	0~15A	0~35A	0~60A	0~47.5A
Power	2000W	1500W	2000W	3500W	1500W	3500W	7500W	4650W
Input Resistance	1.65MΩ	3.33MΩ	6.67MΩ	6.64MΩ	3.34MΩ	3.34MΩ	1.26MΩ	2.31MΩ
Min. Operating Voltage(CC)(CV)	0.5V@1.05A 2.5V@15.75A	0.5V@1.5A 2.5V@15.75A	0.5V@2.0A 2.5V@126A	0.5V@2.0A 2.5V@220.5A	0.5V@1.5A 2.5V@15.75A	0.5V@3.5A 2.5V@220.5A	0.5V@6.0A 2.5V@378A	0.5V@4.75A 2.5V@298.25A
CONSTANT CURRENT MODE								
Operating Range	H,M,L	0~30A / 0~3A / 0~300mA	0~15A / 0~1.5A / 0~150mA	0~20A / 0~2A / 0~200mA	0~35A / 0~3.5A / 0~350mA	0~15A / 0~1.5A / 0~150mA	0~35A / 0~3.5A / 0~350mA	0~60A / 0~6A / 0~600mA	0~47.5A / 0~4.75A / 0~475mA
Accuracy of Setting	H,M,L	±(0.2% of set + 0.1% of F.S.) + Vin * [0.2/0.5]* mΩ							
Resolution	H,M,L	1mA / 0.1mA / 0.01mA	1mA / 0.1mA / 0.01mA	1mA / 0.1mA / 0.01mA	1mA / 0.1mA / 0.01mA	1mA / 0.1mA / 0.01mA	1mA / 0.1mA / 0.01mA	1mA / 0.1mA / 0.01mA	1mA / 0.1mA / 0.01mA
2W MODE									
Operating Range*	H	1.75~30Ω/2 17.5Ω/9~42~ 2.75KΩ)	3.33~240Ω/2 35~960Ω/9~ 1.80~300KΩ)	4.55~0.15mS (25.60Ω/9~0. 1.50MΩ)	12.35~0.4mS (1.78KΩ/9~0. 1.77175KΩ)	4.55~0.15mS (25.60Ω/9~0. 1.80~300KΩ)	12.35~0.4mS (1.78KΩ/9~0. 1.77175KΩ)	21.35~1.56mS (11.60Ω/9~0. 184.42KΩ)	24.56~1.92mS (10.26Ω/9~0. 167.28KΩ)
	M	3.75~960Ω 375~16mΩ~ 37.73KΩ)	7.703~240Ω (77.16mΩ~ 18.9.80KΩ)	4.24~32mS (236.0Ω/9~0. 11.68MΩ)	11.33~95.6S (188.37mΩ~ 11.77175Ω)	4.55~0.15mS (211.6mΩ~ 18.0.83KΩ)	3.433~95mS (292.65~Ω~ 11.1175KΩ)	7.133~720mS (139.35mΩ~ 7.8431KΩ)	7.955~765mS (125.67mΩ~ 6.1258KΩ)
	L	37.5~9KΩ 3.75KΩ~ (377.78KΩ)	77.5mS~1.4kS (1.1776Ω~ 785.95KΩ)	420mS~1.2kS (2.380KΩ~ 139.69KΩ)	823mS~1.6kS (1.9847KΩ~ 111.1176KΩ)	310mS~1.4kS (3.1176Ω~ 80.1.83KΩ)	823mS~1.6kS (1.9847KΩ~ 111.1176KΩ)	1.51mS~2.3kS (1.9847KΩ~ 79.1431KΩ)	1.45mS~2.2kS (1.0582Ω~ 61.1258KΩ)
Accuracy of Setting*	H,M,L	±(0.5% of set + 0.3% of F.S.) + Vin * [0.35/9* KΩ] (Above operation specifications)							
Resolution	H,M,L	16bit / 14bit / 12bit	16bit / 14bit / 12bit	16bit / 14bit / 12bit	16bit / 14bit / 12bit	16bit / 14bit / 12bit	16bit / 14bit / 12bit	16bit / 14bit / 12bit	16bit / 14bit / 12bit
CONSTANT VOLTAGE MODE									
Operating Range	H	3V~500V							
	L	3V~80V							
Accuracy of Setting	Range(H,L)	±(0.2% of set + 0.1% of F.S.)							
Resolution	Range(H,L)	30mV/2mV							
CONSTANT POWER MODE									
Operating Range	H	2.99W~2100W	2.17W~2100W	4.00W~4200W	2.25W~2205W	0.15W~2100W	0.25W~2100W	0.25W~5250W	0.23W~4650W
	M	2.19W~1399W	0.23W~1.51W	4.00~4.00W	0.15W~0.25W	0.15W~0.25W	0.23W~0.25W	0.23W~0.25W	84.24~9.01W
	L	2.19W~210W	0.15W~0.15W	4.00~420W	0.25W~0.25W	0.15W~0.25W	0.23W~0.25W	0.23W~0.25W	9.01W~0.25W
Accuracy of Setting	H,M,L	±(0.5% of set + 0.3% of F.S.) + Vin * Vin [0.35/9 * mΩ] (Above operation specifications)							
Resolution	H,M,L	20mW / 2mW / 1mW	30mW / 3mW / 1mW	80mW / 8mW / 4mW	30mW / 3mW / 1mW	30mW / 3mW / 1mW	30mW / 3mW / 1mW	30mW / 3mW / 1mW	30mW / 3mW / 1mW
PARALLEL Mode									
Capacity		—	—	—	—	—	—	—	—
STEP RATE									
Operation Mode		CC, CR	CC, CR	CC, CR	CC, CR	CC, CR	CC, CR	CC, CR	CC, CR
Setting Range (CC mode)	H	1.6mA/μs~480mA/μs	2.5mA/μs~800.1mA/μs	3.4mA/μs~640mA/μs	6.4mA/μs~640mA/μs	12.5mA/μs~800.1mA/μs	6.4mA/μs~640mA/μs	1.6mA/μs~640mA/μs	1.6mA/μs~501.1mA/μs
	M	160μA/μs~48mA/μs	250μA/μs~80.01mA/μs	330μA/μs~64mA/μs	480μA/μs~64mA/μs	2.5μA/μs~80.01mA/μs	480μA/μs~64mA/μs	160μA/μs~64mA/μs	160μA/μs~50.11mA/μs
	L	16μA/μs~4.8mA/μs	25.2μA/μs~8.01mA/μs	33.2μA/μs~6.4mA/μs	48μA/μs~6.4mA/μs	25.2μA/μs~8.01mA/μs	48μA/μs~6.4mA/μs	16μA/μs~6.4mA/μs	19.8μA/μs~2.501mA/μs
Setting Range (CR Mode)	H	80μA/μs~24.1A/μs	25.2mA/μs~2.01A/μs	170μA/μs~3.2A/μs	480μA/μs~4.8A/μs	25.2μA/μs~2.01A/μs	480μA/μs~4.8A/μs	160μA/μs~4.8A/μs	19.8μA/μs~2.501A/μs
	M	16.8μA/μs~4.8mA/μs	25.2μA/μs~2.01mA/μs	33.2μA/μs~640μA/μs	48μA/μs~640mA/μs	25.2μA/μs~8.01mA/μs	48μA/μs~640mA/μs	16.8μA/μs~640mA/μs	19.8μA/μs~250.1mA/μs
	L	1.68μA/μs~480μA/μs	2.52μA/μs~801.0μA/μs	3.32μA/μs~640μA/μs	4.8μA/μs~640μA/μs	2.52μA/μs~801.0μA/μs	4.8μA/μs~640μA/μs	1.68μA/μs~640μA/μs	1.98μA/μs~25.01mA/μs
Accuracy of Setting	H,M,L	±(0.1% of set + 2bit)							
Resolution (Setting Range)		40bit 1.6mA/μs~480mA/μs 4bit 160mA/μs~48mA/μs 1.6mA/μs~4.8mA/μs 1.6mA/μs~480mA/μs 40mA 1.6mA/μs~480mA/μs 40mA 1.6mA/μs~480mA/μs	80bit 2.5mA/μs~800.1mA/μs 80bit 25.2mA/μs~8.01mA/μs 2.5mA/μs~8.01mA/μs 2.5mA/μs~800.1mA/μs 80mA 2.5mA/μs~800.1mA/μs 80mA 2.5mA/μs~800.1mA/μs	1.2mA 3.4mA/μs~640mA/μs 160bit 33.2mA/μs~6.4A/μs 3.4mA/μs~64mA/μs 3.4mA/μs~640mA/μs 160mA 3.4mA/μs~640mA/μs 160mA 3.4mA/μs~640mA/μs	1.2mA 6.4mA/μs~640mA/μs 160bit 48mA/μs~6.4A/μs 6.4mA/μs~64mA/μs 6.4mA/μs~640mA/μs 160mA 6.4mA/μs~640mA/μs 160mA 6.4mA/μs~640mA/μs	800μA 12.5mA/μs~800.1mA/μs 800μA 2.5mA/μs~80.01mA/μs 12.5mA/μs~80.01mA/μs 12.5mA/μs~800.1mA/μs 800mA 12.5mA/μs~800.1mA/μs 800mA 12.5mA/μs~800.1mA/μs	1.2mA 6.4mA/μs~640mA/μs 160bit 48mA/μs~6.4A/μs 6.4mA/μs~64mA/μs 6.4mA/μs~640mA/μs 160mA 6.4mA/μs~640mA/μs 160mA 6.4mA/μs~640mA/μs	1.2mA 6.4mA/μs~640mA/μs 160bit 48mA/μs~6.4A/μs 6.4mA/μs~64mA/μs 6.4mA/μs~640mA/μs 160mA 6.4mA/μs~640mA/μs 160mA 6.4mA/μs~640mA/μs	1.2mA 6.4mA/μs~640mA/μs 160bit 48mA/μs~6.4A/μs 6.4mA/μs~64mA/μs 6.4mA/μs~640mA/μs 160mA 6.4mA/μs~640mA/μs 160mA 6.4mA/μs~640mA/μs
METER									
Voltage/ Current Accuracy	Accuracy	±(0.1% of rdg + 0.1% of F.S.)							
DYNAMIC MODE									
Operation Mode T1 & T2 Setting		CC and CR 0.02.0ms~30ms/Rep. 1μs / 10ms~30s/Rep. 1ms 1μs/1ms 0.100μs/ms							
Slew Rate (CC Mode)	H	1.6mA/μs~480mA/μs	2.5mA/μs~800.1mA/μs	3.4mA/μs~640mA/μs	6.4mA/μs~640mA/μs	12.5mA/μs~800.1mA/μs	6.4mA/μs~640mA/μs	1.6mA/μs~640mA/μs	1.6mA/μs~501.1mA/μs
	M	160μA/μs~48mA/μs	250μA/μs~80.01mA/μs	330μA/μs~64mA/μs	480μA/μs~64mA/μs	2.5μA/μs~80.01mA/μs	480μA/μs~64mA/μs	160μA/μs~64mA/μs	19.8μA/μs~2.501mA/μs
	L	16.8μA/μs~4.8mA/μs	25.2μA/μs~8.01mA/μs	33.2μA/μs~6.4mA/μs	48μA/μs~6.4mA/μs	25.2μA/μs~8.01mA/μs	48μA/μs~6.4mA/μs	16.8μA/μs~6.4mA/μs	1.98μA/μs~25.01mA/μs
Slew Rate (CR Mode)	H	80μA/μs~24.1A/μs	25.2mA/μs~2.01A/μs	170μA/μs~3.2A/μs	480μA/μs~4.8A/μs	25.2μA/μs~2.01A/μs	480μA/μs~4.8A/μs	160μA/μs~4.8A/μs	19.8μA/μs~2.501A/μs
	M	16.8μA/μs~4.8mA/μs	25.2μA/μs~2.01mA/μs	33.2μA/μs~640μA/μs	48μA/μs~640mA/μs	25.2μA/μs~8.01mA/μs	48μA/μs~640mA/μs	16.8μA/μs~640mA/μs	19.8μA/μs~250.1mA/μs
	L	1.68μA/μs~480μA/μs	2.52μA/μs~801.0μA/μs	3.32μA/μs~640μA/μs	4.8μA/μs~640μA/μs	2.52μA/μs~801.0μA/μs	4.8μA/μs~640μA/μs	1.68μA/μs~640μA/μs	1.98μA/μs~25.01mA/μs
Current Accuracy		±(4.0% F.S.	±(4.0% F.S.	±(4.0% F.S.	±(4.0% F.S.	±(4.0% F.S.	±(4.0% F.S.	±(4.0% F.S.	±(4.0% F.S.
PROTECTION FUNCTION									
Functions		Overvoltage protection(OVP), Overcurrent protection (OCP), Overpower protection (OPP), Overheat protection(OHP), Undervoltage protection (UVP), Reverse connection protection (REV)							
GENERAL									
Input Range		90VAC~132VAC/180VAC~250VAC Single-phase 47Hz~63Hz							
Power(Watts)		600VA	2.1kVA	2.4kVA	3.6kVA	4.2kVA	9.0kVA	9.6kVA	11.5kVA
Interface		Std - USB/RS232/Analog Control / Opt - GPIB/LAN							
Dimensions & Weight		280(W)x87(H)x 390(D)mm; Approx. 8.7kg	280(W)x87(H)x 390(D)mm; Approx. 8.7kg	280(W)x87(H)xm 390(D)mm; Approx. 11kg	280(W)x87(H)xm 390(D)mm; Approx. 11.1kg	280(W)x87(H)xm 390(D)mm; Approx. 11kg	280(W)x87(H)xm 390(D)mm; Approx. 11kg	280(W)x87(H)xm 390(D)mm; Approx. 11kg	280(W)x87(H)xm 390(D)mm; Approx. 11kg

ORDERING INFORMATION

PEL-3021 (150V/15A/150W) Single Channel Programmable D.C. Electronic Load
PEL-3041 (150V/30A/300W) Single Channel Programmable D.C. Electronic Load
PEL-3111 (150V/120A/1200W) Single Channel Programmable D.C. Electronic Load
PEL-3211 (150V/240A/2400W) 2100W Booster for PEL-3111 only
PEL-3212 (150V/240A/2400W) Single Channel Programmable D.C. Electronic Load
PEL-3122 (150V/500A/5100W) Single Channel Programmable D.C. Electronic Load
PEL-3125 (150V/500A/5100W) Single Channel Programmable D.C. Electronic Load
PEL-3424 (150V/840A/4200W) Single Channel Programmable D.C. Electronic Load
PEL-3151 (150V/1200A/2250W) Single Channel Programmable D.C. Electronic Load
PEL-3131 (150V/1200A/2250W) Single Channel Programmable D.C. Electronic Load
PEL-3746 (150V/1470A/3150W) Single Channel Programmable D.C. Electronic Load
PEL-3751 (150V/1890A/4650W) Single Channel Programmable D.C. Electronic Load
PEL-3021H (800V/6.75A/1.7W) Single Channel Programmable D.C. Electronic Load
PEL-3041H (800V/12.5A/3000W) Single Channel Programmable D.C. Electronic Load
PEL-3111H (800V/12.5A/10000W) Single Channel Programmable D.C. Electronic Load
PEL-4211H (800V/100A/21000W) 20000W Booster for PEL-3111H only
PEL-3212H (800V/100A/21000W) Single Channel Programmable D.C. Electronic Load
PEL-3122H (800V/150A/31500W) Single Channel Programmable D.C. Electronic Load
PEL-3125H (800V/150A/31500W) Single Channel Programmable D.C. Electronic Load
PEL-4424H (800V/210A/42000W) Single Channel Programmable D.C. Electronic Load
PEL-3131H (800V/300A/63000W) Single Channel Programmable D.C. Electronic Load
PEL-3151H (800V/300A/63000W) Single Channel Programmable D.C. Electronic Load
PEL-3746H (800V/375A/78750W) Single Channel Programmable D.C. Electronic Load
PEL-3751H (800V/475.5A/94500W) Single Channel Programmable D.C. Electronic Load

ACC-3251-00-E3 :
Quick Start Guide, CD(User Manual,Programming Manual), Power Cord
PEL-011 Load Input Terminal Cover PEL-012 Terminal Protrip Kit
CTL-201 Power Link Cable 300mm Front Terminal Washers
PEL-014 Flexible Terminal Cover PEL-016 2 (-) Protection Plug

OPTIONAL ACCESSORIES

GRV-05A 5V Lithium Battery for Clock
GRA-413 Rack Mount Bracket for Chassis PEL-3211(H), (3241)
GRA-414-E Rack Mount Frame for PEL-3021(H),PEL-3041(H),PEL-3111(H),PEL-3211(H),PEL-3212(H)
GRA-414-J Rack Mount Frame for PEL-3021(H),PEL-3041(H),PEL-3111(H),PEL-3211(H),PEL-3212(H)
CTL-108 Test Lead (Mat. 40A)
CTL-240 GPIB Cable, 2.0m
CTL-245 USB Cable Type-A - Type-B
PEL-003 Dust Filter
PEL-004 L-Pin Upsize
PEL-005 Connect Cu Plate
PEL-006 Connect Cu Plate
PEL-007 Connect Cu Plate
PEL-008 Isolator Cu Plate
PEL-009 Contact Cu Plate
PEL-015 LAN Card

FREE DOWNLOAD

Driver LabView Driver

PEL-3211(H) PEL-3212(H) PEL-3746(H) PEL-3751(H)

PEL-3021(H) PEL-3041(H) PEL-4424(H) PEL-3151(H)

GRA-413 Rack Mount Kit (EIA+(IS)
For : PEL-3211(H)

GRA-414-J Rack Mount Kit (IS)
For : PEL-3021(H)/3041(H)/3111(H)/3211(H)

GRA-414-E Rack Mount Kit (EIA)
For : PEL-3021(H)/3041(H)/3111(H)/3211(H)

Programmable D.C. Electronic Load

PEL-3031E

PEL-3032E

CE | 2Y | GPIB | Analog Control | LAN | RS-232

FEATURES

- 0~150V/PEL-3031E Min. Operating Voltage(dc) : 1V at 60A, 0.5V at 30A
  0~340V/PEL-3032E Min. Operating Voltage(dc) : 2.5V at 15A, 1.25V at 7.5A
- 7 Operating Modes : CC, CV, CR, CP, CC+CV, CR+CV, CP+CV
- Normal Sequence Function: Max Steps: 1000 steps/Step Time: 1ms~999h 59m59s(3599940 sec)/Fast Sequence Function: Max Steps: 1000 steps/Step Time: 25us~60Sec
- Soft Start
- BATT Test Automation/Max Test Time: 999h 59m1s (3599940 sec)/ Max Test Ah: 999Ah/9Ah
- OCP, OPP Test Automation
- Max. Slew Rate : 2.5A/μs
- Dynamic Mode
- Protection : OVP, OCP, OPP, OTP, RVP, UVP
- Remote Sense
- Integrate Voltage, Current and Power Measurement Functions
- External Voltage or Resistance Control
- Rear Panel BNC, Trigger IN/OUT
- Analog External Control
- USB (Std.)/GPIB & LAN (Opt.)/RS-232 (Manufacturer Installed Only)

CHI Mate launches new PEL-3000E series programmable single-channel electronic load. In the series, PEL-3031E provides 300W (1V~150V/60A) and PEL-3032E provides 300W(2.5V~340V/15A) current sink capability when used from the PEL-3000 series. PEL-3000E has an easy-to-read LCD panel and user-friendly interface. This model features high-speed and accurate measurement capability for electronic components, battery, portable charger and power products that require low-to-medium power consumption.

The PEL-3000E series is designed for current sink operation starting from 60mA and aims at measurement applications, including chargers, adapters, various power supply equipment, and portable chargers.

The PEL-3000E has seven operating modes. Among them, four basic operating modes are constant current, constant voltage, constant resistance, and constant power. These other combined operating modes are constant current + constant voltage, constant resistance + constant voltage, constant power + constant voltage. Users can select operating modes based upon products' test requirements. For C.C. mode, electronic load will sink a constant current according to the set current value; for C.V. mode, electronic load will attempt to sink sufficient current to control the source voltage to the programmed value; for C.R. mode, electronic load will sink a current linearly proportional to input voltage according to the set resistance value; for C.P. mode, electronic load will sink load power (=sensed load voltage x load current) in accordance with the programmed power setting.

To meet the requirements of different test conditions, the Static function is to sink a constant current; the Dynamic function is to periodically switch between two sink conditions; and the Sequence function is to provide tests for more than two sink conditions. The sequence function can be divided into Normal Sequence and Fast Sequence. Normal Sequence is the most flexible mean of generating complex sequences that can facilitate users to establish a series of changing current sink conditions based upon different sinking conditions (CC, CR, CV or CP modes) and time/adjustable range: 1ms to 999h 59min 59s. Fast sequence allows time resolution of 25us to be set for the smallest step. Testing parameters for multiple steps can emulate consecutive current changes of various real load conditions. For instance, while using an electronic load to test a power-driven tool's power supply, we can first allow it to perform by an oscilloscope and a current probe from the load, and subsequently, use the obtained waveforms to edit a simulated current waveform, via electronic load's sequence function, to test the power-driven tool and to analyze its operational status. The Soft Start function allows users to determine the rise time of current sink that, is to decide the required time in each electronic load's set current, resistance or power value. Setting a proper rise time for Soft Start is effective to counter output voltage fluctuation caused by DUT's (power supply) transient output current. It is worth noting, General DC loads do not have the soft start function. When conducting high speed current sink operations, the inductance effect on the cable connecting electronic load and DUT will lead to transient voltage drop on electronic load's input terminal, therefore, that will result in voltage then transients increase. PEL-3000E's soft start function not only allows output voltage to be Monotonic increase, but also prevents inrush current and surge voltage from happening on DUT. For instance, test using a power supply UUT and a DC load just uses the soft start function can prevent inrush current and surge voltage from causing damages on UUT.

The built-in BATT Test Automation of PEL-3000E provides battery discharge applications with more flexible discharge stop setting as well as rise and fall Slew Rate for discharge current settings. OCP, OPP Test Automation for DUT (ex. Power Supply), provide users with high resolution measurement values to verify DUT's activation point. Provide users with measurement results so as to help them determine whether DUT's actual over protection activation point meets the regulations. Other than that, PEL-3000E provides users with analog control terminal to control PEL-3000E from external voltage, external resistance and switch. Analog control terminal can also monitor electronic load's status and display protective alarms.

SPECIFICATIONS

Model	PEL-3031E		PEL-3032E	
Power	300W	300W	300W	300W
Range	Low	High	Low	High
Voltage	0 ~ 150V	0 ~ 150V	0 ~ 340V	0 ~ 340V
Current	0 ~ 6A	0 ~ 60A	0 ~ 1.5A	0 ~ 15A
Min. Operating Voltage(dc)	1V ~ 6A	1V ~ 60A	2.5V ~ 1.5A	2.5V ~ 15A
STATIC MODE				
Constant Current Mode				
Range	0 ~ 6A	0 ~ 60A	0 ~ 1.5A	0 ~ 15A
Setting Range	0 ~ 3.15A	0 ~ 63.0A	0 ~ 1.58A	0 ~ 16.5A
Resolution	0.1mA	1mA	0.1mA	1mA
Accuracy	(1^st)±(0.1% of set + 0.1% of FS) Vin(600V) (for auto-ranging)	(1^st)±(0.1% of set + 0.2% of FS) Vin(600V) (for auto-ranging)	(1^st)±(0.1% of set + 0.1% of FS) Vin(600V) (for auto-ranging)	(1^st)±(0.1% of set + 0.2% of FS) Vin(600V) (for auto-ranging)
Constant Resistance Mode				
Range	60~0.0033Ω/0.16A@2~300Ω/1.5A@	15~0.0008Ω/60A@2~300Ω/15A@	340~0.0189Ω/1.5A@2~1.7kΩ/0.2A@	85~0.0047Ω/15A@2~1.7kΩ/0.2A@
Setting Range	60~0.0033Ω/0.16A@2~1.7kΩ/0.2A@	15~0.0008Ω/60A@2~1.7kΩ/0.2A@	340~0.0189Ω/1.5A@2~1.7kΩ/0.2A@	85~0.0047Ω/15A@2~1.7kΩ/0.2A@
Resolution(600 Steps)	60~0.0033Ω/0.16A@2~300Ω/1.5A@	15~0.0008Ω/60A@2~300Ω/15A@	340~0.0189Ω/1.5A@2~1.7kΩ/0.2A@	85~0.0047Ω/15A@2~1.7kΩ/0.2A@
Accuracy	0.0033Ω/0.16A@2~300Ω/1.5A@	0.0008Ω/60A@2~300Ω/15A@	0.0189Ω/1.5A@2~1.7kΩ/0.2A@	0.0047Ω/15A@2~1.7kΩ/0.2A@
	(1^st)±(0.3% of set + 0.3%FS) + 0.002mΩ	(1^st)±(0.3% of set + 0.3%FS) + 0.002mΩ	(1^st)±(0.3% of set + 0.3%FS) + 0.002mΩ	(1^st)±(0.3% of set + 0.3%FS) + 0.002mΩ
Constant Voltage Mode				
Range	1 ~ 15V	1 ~ 150V	2.5 ~ 34V	2.5 ~ 340V
Setting Range	0 ~ 15.3V	0 ~ 153V	0 ~ 34.1V	0 ~ 340V
Resolution	0.5mV	5mV	1mV	10mV
Accuracy	(1^st)±(0.1% of set + 0.1% of FS) (for auto-ranging)	(1^st)±(0.1% of set + 0.2% of FS) (for auto-ranging)	(1^st)±(0.1% of set + 0.1% of FS) (for auto-ranging)	(1^st)±(0.1% of set + 0.2% of FS) (for auto-ranging)
Constant Power Mode				
Range	0W ~ 180W(60A)	0W ~ 1485W(60A)	0W ~ 90W(1.5A)	0W ~ 2805W(15A)
Setting Range	0W ~ 18.0W	0W ~ 198W	0W ~ 90.4W	0W ~ 1989W
Resolution	1mW	10mW	1mW	10mW
Accuracy	(1^st)±(0.4 % of set + 1.4 % of FS) (full scale of 11 range) + 0mV/600 Ω/1			

PEL-3032E

Rear Panel

PEL-010 Dust Filter

PEL-004 GPIB Option

PEL-018 LAN Card

GRA-414-J Rack Mount Kit (JIS)

For : PEL-3031E/3032E

GRA-414-E Rack Mount Kit (EIA)

For : PEL-3031E/3032E

SPECIFICATIONS

Model	PEL-3031E	PEL-3032E
DYNAMIC MODE		
General **T1& T2**	0.03ms~30ms/ Res:1μs;30ms~3Hs/Res:1ms	0.03ms~30ms/Res:1μs;30ms~3Hs/Res:1ms
Accuracy Slew Rate(Rise/Fall) Slew Rate Resolution Slew Rate Accuracy of Setting	1μs/1ms±200ppm 0.001 ~ 0.25A/μs 0.001A/μs ±(10% + 1)(μs) *1Time increase from 10 % to 90 % when the current is varied from 2 % to 100 % (0 % to 100 % at L range) or the rated current.	1μs/1ms±300ppm 0.01 ~ 2.5A/μs 0.01A/μs	1μs/1ms±300ppm 0.15 ~ 62.5mA/μs 0.25mA/μs	1μs/1ms±200ppm 2.5 ~ 625mA/μs 2.5mA/μs
Constant Current Mode Current Setting Range Current Resolution Current Accuracy	0 ~ 6A 0 ~ 0.12A 0.2mA ±(0.1% FS	0 ~ 60A 0 ~ 41.3A 2mA ±(0.1% FS	0 ~ 7.5A 0 ~ 1.23A 0.05mA ±(0.1% FS	0 ~ 15A 0 ~ 15.3A 0.5mA ±(0.1% FS
Constant Resistance Mode Range Setting Range Resistance Resolution Resistance Accuracy	60Ω~0.0012Ω (0.5A@60Ω ~ 500Ω; 20A@7.5V) 15Ω~0.0003Ω (2A@60Ω ~ 15Ω; 300A@1.5V) 60Ω~0.0012Ω (0.5A@60Ω ~ 300Ω; 300A@7.5V) 60Ω~0.0003Ω (2A@60Ω ~ 15Ω; 300A@1.5V) 32000 steps (Ⅰ*)±(1%rdg + 0.6Ω ~ 0.003Ω)	45~0.0009Ω (0.5A@45Ω ~ 562.5Ω; 225A@0.4V) 0.6Ω~0.0003Ω (60A@0.4Ω ~ 0.6Ω; 300A@0.2V) 45~0.0009Ω (0.5A@45Ω ~ 562.5Ω; 225A@0.4V) 0.6Ω~0.0003Ω (60A@0.4Ω ~ 0.6Ω; 300A@0.2V) 30000 steps (Ⅰ*)±(1%rdg + 0.6Ω ~ 0.003Ω)
MEASUREMENT		
Voltage Readback Range Resolution Accuracy	0 ~ 15V 0.5mV (Ⅰ*)±(0.1% of rdg +0.1% of FS) (Not suit for Low range)	0 ~ 150V 5mV (Ⅰ*)±(0.1% of rdg +0.1% of FS) (Not suit for Low range)	0 ~ 80V 2mV (Ⅰ*)±(0.1% of rdg +0.1% of FS) (Not suit for Low range)	0 ~ 300V 20mV (Ⅰ*)±(0.1% of rdg +0.1% of FS) (Not suit for High range)
Current Readback Range Resolution Accuracy	0 ~ 6A 0.2mA (Ⅰ*)±(0.1% of rdg + 0.1% of FS) (Not suit for Low range)	0 ~ 60A 2mA (Ⅰ*)±(0.1% of rdg + 0.2% of FS) (Not suit for High range)	0 ~ 7.5A 0.03mA (Ⅰ*)±(0.1% of rdg + 0.1% of FS) (Not suit for Low range)	0 ~ 15A 0.5mA (Ⅰ*)±(0.1% of rdg + 0.2% of FS) (Not suit for High range)
Power Read back H&L Range CP Mode L Range	0 ~ 300W 0 ~ 30W	0 ~ 900W 0 ~ 90W	0 ~ 300W 0 ~ 30W	0 ~ 900W 0 ~ 90W
FUNCTION		
Sequence(Normal/Fast)	Normal sequence function: Max steps: 1000 steps/Step time: 1ms ~ 999s 59m59s(999Hrs) max Fast sequence function: Max steps: 1000 steps/Step time: 25us ~ 600ms	
BATT Test Automation	Discharge time: 999h 59m 59s(999Hrs) max Max test No: 999 (FIFO)	
Trig Function	OCP Monitor function, OPP Monitor Function	
Soft-Start	Yes	
In/Out Terminal	Analog External Control, Current Monitor Output, Trigger In/Out Terminal(BNC)	
Power Data	10 Sets	
Protection	OCP, OPP, UVP, OVP, OTP, RVP	
OTHER		
Power Source	100 ~ 120VAC, 200 ~ 240VAC, 47 ~ 63Hz	
Interface	USB (Std.) / CAN Bus (Opt.) / RS-232 (Mono Remote Installed Only)	
Dimensions & Weight	213.4(W) x 132.6(H) x 408.5(D)mm, Approx. 7.0Kg	

Note : (*) If the ambient temperature is over 40°C or below 20°C, then T = (± 10°C) x (Ripple/10) x (0.1 x FS)
If the ambient temperature is in the range of 20°C~40°C, then T = ± 2 x (the ambient temperature)

ORDERING INFORMATION

PEL-3031E 150V/60A/300W Programmable Single-channel D.C. Electronic Load
PEL-3032E 300V/15A/300W Programmable Single-channel D.C. Electronic Load

ACCESSORIES

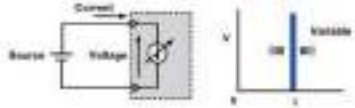
Quick Start Guide, CD ROM (User Manual, Programming Manual), Power Cord (Region dependent), Front Terminal Washer-spring Washer &Nut, GTL-105A Remote Sense Cable x1, Fuse x 1

OPTIONAL ACCESSORIES

GTL-248	GPIB Cable, 1m	PEL-010	Dust Filter	GRA-414-J	Rack Mount Kit (JIS)
GTL-246	USB Cable, Type A - Type B	PEL-004	GPIB Option	GRA-414-E	Rack Mount Kit (EIA)
PEL-018	LAN Card				

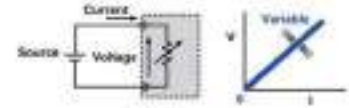
A. OPERATING MODE

The PEL-3000 series provides four fundamental operating modes and three added-on modes of CC, CR and CP separately combining with CV. Users can set different load conditions under different operating modes such as setting operating range for load test, Current Slew Rate, input voltage and load current. The input voltage range has two levels - high and low. The load current operating range has two levels - high and low current levels, which passes different resolution to meet test requirements of different power product specifications.



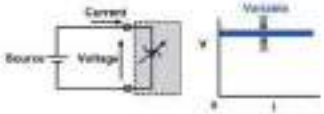
CC Mode

Under constant current mode, electronic load will sink the amount of current users has set. Different current settings via CC mode allow users to test the voltage changes of DC power supply which is called load regulation test.



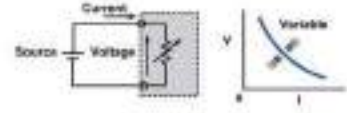
CR Mode

Under constant resistance mode, electronic load will sink load current, which is linearly direct proportion to input voltage. This mode can be utilized in testing voltage or the activation and current limit of power supply.



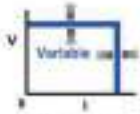
CV Mode

Under constant voltage mode, electronic load will sink sufficient current to regulate the voltage source to the set value. This mode allows users not only to test current limit function of power supply, but also to simulate battery operation in testing battery chargers.



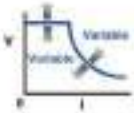
CP Mode

Under constant power mode, electronic load will sink load current, which is indirect proportion to input voltage to reach preset constant power requirement. Hence, the changes of input voltage will have indirect proportion effect on current sinking so as to reach constant power control.



CC+CV Mode

CR+CV Mode



CP+CV Mode

+CV mode can be selected under CC, CR or CP mode. When +CV mode function is turned on and electronic load sinks more current than the maximum current of power supply under test, electronic load will automatically switch to CV mode. It is because that the current sank is the maximum current of power device. Therefore, power supply will switch to CC mode and PEL-3000 will switch to CV mode to limit electronic load from sinking the total current of power supply so as to prevent power supply under test from damaging. Electronic load will cease operation once the voltage of DUT is lower than the set voltage under +CV mode.

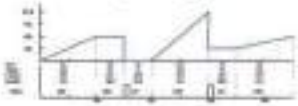
B. STATIC/DYNAMIC/SEQUENCE MODE

Operation Mode / Function	Static	Dynamic	Sequence	
			Basic	Advanced
Operating Condition Selection	Single fixed condition	Selection between two conditions	Selection from more than two conditions	Selection from more than two conditions
Operating Modes	All modes	• Two conditions using same mode • Support CC or CR	• Each condition must use same mode • Support CC or CR mode	• Each condition is able to be used in different mode • All modes
Adjustable Condition Setting	• Width A/ Value A • Slew Rate	• Level 1/Level 2 • Time 1/Time 2 • Slew Rate 1/Slew Rate 2	• Level • Time • Slew Rate • 20 step...	• Level • Time • Slew Rate • 20 step...
Sequence Step Combination	N/A	N/A	• 1 Sequence • 1,000 steps • 10 sequence	• 10 Sequence • 1,000 steps • 1 sequence
Other Functions	N/A	Trigger Out function	• Trigger Out function	• Trigger Out function • Ramp function

The PEL-3000E series, according to different test conditions, step or continuous changes, test speeds, and selectable modes, has three operating functions: Static, Dynamic and Sequence.

C. FAST SEQUENCE & NORMAL SEQUENCE

Fast Sequence Diagram



Normal Sequence Diagram

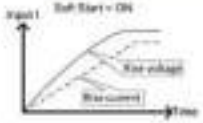
Power-driven Tools Simulation Test

Set a complete sequence editing function to obtain following waveforms. Users can save development cost and time without using a PC to control electronic load and writing programs.

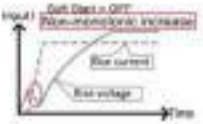
When operating the Sequence Function, PEL-3000E Series follows the time and load settings of step1, step2, step3, etc. so as to realize different load current variation.

Ramp function of PEL-3000E Series is able to set the current transition. When turned on, the current takes on a slope form; when turned off, the current takes on a step form.

D. SOFT START

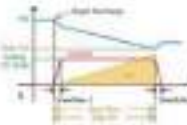


The Soft Start function of PEL-3000E Series allows users to determine the rise time of current (ramp) that is to decide how much time is required to reach electronic load's set current, resistance or power value. PEL-3000E's soft start function prevents inrush current and surge voltage from happening on OUT.

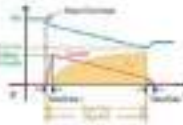


For instance, test applications using a power supply, LED and a DC load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.

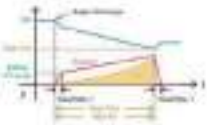
E. BATT TEST AUTOMATION



CC Mode



CR Mode



CP Mode

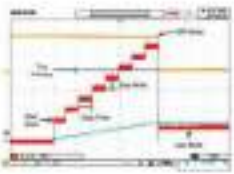
BATT Test Automation Editing

The built-in BATT Test Automation of PEL-3000E provides battery discharge applications with more flexible discharge stop condition setting as well as rise and fall Slew Rate for discharge current settings. Under CP, CC or CR mode, the conditions for stop discharge can be set respectively. For instance, set the input voltage for stop discharge current, the execution time for discharge current or total discharge current*time[Ah] to satisfy the verification of battery capability.

F OCP TEST AUTOMATION

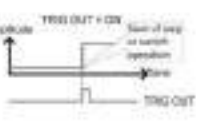
OCP test Automation for DUT(Power Supply), provide users with high resolution OCP measurement values to verify DUT's OCP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OCP activation point meets the regulations. Test the value of OCP by setting load current increment from start current to stop current. OCP's activation point can be accurately measured.

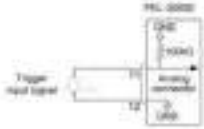
G OPP TEST AUTOMATION



OPP test Automation for DUT(Power Supply), Provide users with high resolution OPP measurement values to verify DUT's OPP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OPP activation point meets the regulations. Test the value of OPP by setting power increment from start power to stop power. OPP's activation point can be accurately measured.

H TRIGGER IN/OUT BNC





Trigger In/Out function could be turned on or off by CONFIGURE setting of PEL-3008E. The Trigger Input can be set the delay time while the Trigger Out Pulse Width can be set as well.

The trigger output signal is generated every time a switching operation is performed such as Dynamic mode or Pass/Normal sequence is executed when the trig out parameter is enabled. The trigger output signal from TRIG OUT BNC is a 4.5V pulse of at least 2us with an impedance of 50ohm. The common potential is connected to the chassis potential. The signal threshold level is TTL.

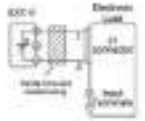
The TRIG IN BNC on the rear panel is used to resume a sequence after a pause. This action is useful to synchronize the execution of a sequence with another device. To resume a pause sequence, apply a high signal for 10us or more. The TRIG IN BNC is pulled down to earth internally using a 1000ohm resistor.

I PROTECTION MODES

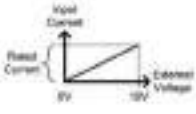
Protection / Function	OCP	OVP	OPP	OTP	UVP
Adjustable Thresholds	✓	✓	✓	N/A	✓
Load Off	✓	✓	✓	Fixed	✓
Limit Function	✓	N/A	✓	N/A	N/A

The PEL-3008E series provides many protective functions including over current protection (OCP), over voltage protection (OVP), over power protection (OPP), over temperature protection (OTP) and under voltage protection (UVP). Except for OTP, all thresholds of protective functions are adjustable. When protective function is activated, electronic load will send out warning signal and terminate operation. Other than protection functions, Limit function can also be utilized to maintain electronic load in operation at a preset value.

1 ANALOG EXTERNAL CONTROL

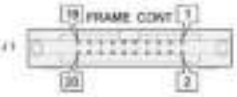


External Voltage Control

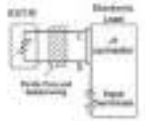


CC Mode

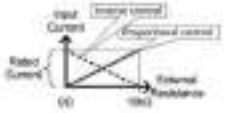
Input current = rated current x (external voltage/10)



J1 Connector



External Resistance Control



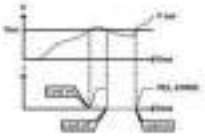
CC Mode

Proportional Control:Input current = rated current x (external resistance/10K ohm)

Inverse Control:Input current = rated current x (1- external resistance/10k ohm)

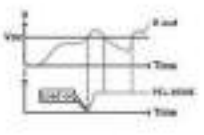
The PEL-3000E series provides the external analog channel control function, which allows users to connect J1 connectors on the rear panel to input voltage or to connect resistance to control electronic load operation. Users can integrate this function into test system and utilize signals generated from the test system to control PEL-3000E.

2 VonN VOLTAGE AND Von LATCH FUNCTION



Von Latch = OFF

Von Voltage is the threshold voltage for electronic load to activate or terminate sinking current. When Von Latch is set to off, electronic load operation will be activated if input voltage is higher than Von Voltage and electronic load operation will be terminated if input voltage is lower than Von Voltage. When Von



Von Latch = ON

Latch is set to on, electronic load operation will be activated if input voltage is higher than Von Voltage and will continue operation even input voltage is lower than Von Voltage. Von Voltage function can test the transient maximum current capability provided by power supply.

3 TIMER FUNCTIONS

Elapsed Time

The PEL-3000E series provides count time and cut off time functions. The display screen will show present activation time when electronic load is activated. When electronic load operation is terminated count time will stop and the total operation time will be shown on the display screen.
The activation time of cut off time can be set to the maximum length of 99h 59min 59s. When electronic load is activated

Voltage at Cut Off Time

this function will start counting time. Electronic load will cease operation (load off) and show the final input voltage on the screen when preset time is reached. Timer function can provides information and application related to time. Users can obtain the total time of limiting electronic load operation to increase the agility of electronic load tests.

PEL-2004A(B)

NEW

PEL-2002A(B)

NEW

CE | RS-232 | GPIB | USB | GPIB+ Ether | LAN

FEATURES

- **Sequence Function to do High Speed Load Simulations**
- **Flexible Configuration with Mainframes and Plug-in Modules**
- **Multiple Independent Load Inputs up to: 8 Channels in a Mainframe**
- **Parallel Connection of Inputs for Higher Load Capacity**
- **Program Mode to Create Work Routines for Repetitive Tests**
- **OPP/OCP/OVP/OTP/RVP/UVP Protections**
- **External Channel Control/Monitoring via Analog Control Connector**
- **Multi Interface :**
  PEL-2000A Series: USB, RS-232, LAN, GPIB (Opt.)
  PEL-2000B Series: USB, RS-232, LAN and GPIB (Opt.)

The PEL-2004A(B) and PEL-2002A(B) are multiple channel, programmable DC electronic loads with a modularized structure. The PEL-2000A(B) Series is designed to meet the continuing shift toward high speed operation in today's semiconductor market. As the power supply units, DC-DC converters, and batteries that drive semiconductor circuits need to follow this shift, power supply design, quality inspection and characteristic certification using high-speed performance loads have become necessary. The PEL-2000A(B) Series includes two types of mainframes and 4 types of load modules to accommodate users' requirements in a flexible manner. Any load module combination can be used with a mainframe to make a test system based on the number of channels, and the maximum load power, voltage and current of each channel. Multiple loads can be connected in parallel to provide a higher-power load to test higher power supply outputs. This flexibility significantly reduces the investment needed for future projects that have different power requirements.

PEL-2004A(B) is a 4 slot mainframe with a master control unit to hold 4 load modules, while PEL-2002A(B) is a 2-slot mainframe with master control unit to hold 2 load modules. When PEL-2006A(B) is configured with 4 load modules rated at 150W each, the PEL-2004A(B) Series is able to rank up to 1.4kW of power.

For higher load capacities, mainframes can be linked together in parallel with standard MIL 20-pin connectors. A maximum of 5 mainframes, including one master and 4 slaves, can be chained together to create a total load capacity of 7kW for high current and high power applications. Using 4 dual channel load modules, PEL-2004A(B) is able to test 8 power supply outputs simultaneously.

The Sequence function allows each channel to change its load sink according to a predefined sequence at a rate of up to 100µs per step. Each sequence is able to run concurrently, under the control of one clock. This is one of the most powerful features of the PEL-2000A(B) Series as it is able to realistically simulate a multi-output power supply load. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a predefined speed up to 25µs per step. This is often used as the standard test procedure to verify the response of a power supply to quick load changes. Most remarkably, multiple load channels can be connected in parallel to run Dynamic tests synchronously under a single clock. The Parallel Dynamic functionality gives the flexibility to perform dynamic tests for a high-power power supply without the need of another high-power load.

The PEL-2000A(B) Series includes a number of protection modes. Over Current Protection (OCP), Over Voltage Protection (OVP), Over Power Protection (OPP), Reverse Voltage Protection (RVP), and Under Voltage Protection (UVP). The protection modes are useful to protect both the load modules and the DUT (s).

A beware can be set for when a protection setting has been tripped. When a protection mode has been tripped, the load unit will display an alarm and stop sinking current/voltage. When a load unit is operating in CR or CV mode, the unit may read Over Current Protection to prevent excessive current being sunk. Over Current Protection stops the load from sinking more current than its recommended limit and prevents the load from thermal damage. Over Voltage Protection is used to limit the amount of voltage sunk. If the OVP trips, the PEL-Series load will stop sinking voltage. Over Power Protection is used when the input power exceeds the specifications of the load. When OPP is tripped, the power will cease to be sunk. Reverse Voltage Protection prevents reverse voltage damage to the PEL-2000A(B) Series up to the specified rating. When Reverse Voltage Protection has been tripped, an alarm icon will be set until the reverse voltage is removed. Under Voltage Protection will turn off the load when the voltage drops below a set limit.

The Go/No Go function is available to monitor test results all the time. When a test result goes beyond a preset limit range, a "No Go" indication will be shown on the display and a "No Go" signal can be sent out through the D-Sub interface for external device control. This Go/No Go function is available for CC mode, CV mode and CR mode. Under "Program" mode, 10 programs each containing 10 panel setup instructions, can be edited to create work routines for repetitive tests. After a program has been executed, the results of all test steps, along with the Go/No Go judgments, will be shown on the screen. For external control and system configuration, the PEL-Series has USB and RS-232 interfaces as standard and LAN as well as GPIB as an option. The LabView driver and IVI-C Logging PC software are both supported for all the available interfaces. Each channel has an analog control/monitoring connector on the rear panel to externally turn a load on/off and to externally monitor load input current and voltage.

PEL-001 GPIB Card

PEL-002 Rack Mount Kit

PEL-003 Panel Cover

PEL-016 LAN Card

(for PEL-2000A Main Frame)

GTL-249 Frame Link Cable

GTL-120 Test Lead

GTL-121 Sense Lead

SPECIFICATIONS

		PEL-2035A(B)		PEL-2035B(B)			PEL-2060A(B)		PEL-2061A(B)	
CHANNEL		1ch	2ch	1ch	2ch	3ch	one channel	one channel	one channel	one channel
RANGE		350W	700W	1kW	2kW	3kW	2kW	4kW	1.2kW	2.4kW
POWER		350W	700W	1kW	2kW	3kW	2kW		1.2kW	
CURRENT		35A	70A	100A	200A	300A	60A		120A	
VOLTAGE		350V		350V			600V		600V	
MIN.OPERATING VOLTAGE(Typ.)		0.4V@1A	0.4V@2A	0.6V@1A	0.6V@2A	0.6V@3A	0.6V@1A	0.6V@4A	0.6V@1A	0.6V@2A
		0.5V@10A	0.5V@20A	0.7V@10A	0.7V@20A	0.7V@30A	0.7V@10A	0.7V@40A	0.7V@10A	0.7V@20A
CC MODE										
CONSTANT CURRENT MODE										
	Operating Range	0~35A	0~70A	0~100A		0~300A	0~60A		0~120A	
	Setting Range	0~35.7A	0~71.4A	0~102A		0~306A	0~61.2A		0~122.4A	
	Resolution	1mA	1mA	1mA		1mA	1mA		1mA	
	Accuracy	±(0.1%rd+0.1%f.s.)@(0.1~1)f.s. ±(0.1%rd+0.05%f.s.)@(1~100)f.s.		±(0.1%rd+0.1%f.s.)@(0.1~1)f.s. ±(0.1%rd+0.05%f.s.)@(1~100)f.s.			±(0.1%rd+0.1%f.s.)@(0.1~1)f.s. ±(0.1%rd+0.05%f.s.)@(1~100)f.s.		±(0.1%rd+0.1%f.s.)@(0.1~1)f.s. ±(0.1%rd+0.05%f.s.)@(1~100)f.s.	
CONSTANT RESISTANCE MODE										
	Operating Range	0.05Ω~10Ω/100kΩ~1Ω		0.03Ω~3.3Ω/30kΩ~0.3Ω			0.03Ω~3.3Ω/60kΩ~0.3Ω		0.03Ω~3.3Ω/120kΩ~0.3Ω	
		3.75Ω~750Ω/1.33Ω~0.133Ω		11Ω~1.1kΩ/10Ω~1Ω			11Ω~1.1kΩ/20Ω~1Ω		11Ω~1.1kΩ/40Ω~1Ω	
	Setting Range	0.05Ω~10Ω/100kΩ~1Ω		0.03Ω~3.3Ω/30kΩ~0.3Ω			0.03Ω~3.3Ω/60kΩ~0.3Ω		0.03Ω~3.3Ω/120kΩ~0.3Ω	
		3.75Ω~750Ω/1.33Ω~0.133Ω		11Ω~1.1kΩ/10Ω~1Ω			11Ω~1.1kΩ/20Ω~1Ω		11Ω~1.1kΩ/40Ω~1Ω	
	Resolution[1]	0.01Ω/0.1Ω/1Ω/10Ω/100Ω		0.01Ω/0.1Ω/1Ω/10Ω/100Ω			0.01Ω/0.1Ω/1Ω/10Ω/100Ω		0.01Ω/0.1Ω/1Ω/10Ω/100Ω	
		0.001Ω/0.01Ω/0.1Ω/1Ω/10Ω		0.001Ω/0.01Ω/0.1Ω/1Ω/10Ω			0.001Ω/0.01Ω/0.1Ω/1Ω/10Ω		0.001Ω/0.01Ω/0.1Ω/1Ω/10Ω	
	Accuracy[2]	10kΩ~1Ω: ±(0.5%rd+4.5%f.s.) 1Ω~0.05Ω: ±(1.0%rd+1.0%f.s.)		10kΩ~1Ω: ±(0.5%rd+4.5%f.s.) 1Ω~0.05Ω: ±(1.0%rd+1.0%f.s.)			10kΩ~1Ω: ±(0.5%rd+4.5%f.s.) 1Ω~0.05Ω: ±(1.0%rd+1.0%f.s.)		10kΩ~1Ω: ±(0.5%rd+4.5%f.s.) 1Ω~0.05Ω: ±(1.0%rd+1.0%f.s.)	
	Voltage Drop/Range	10kΩ~1Ω: 0.2V 1Ω~0.05Ω: 0.6V		10kΩ~1Ω: 0.2V 1Ω~0.05Ω: 0.6V			10kΩ~1Ω: 0.2V 1Ω~0.05Ω: 0.6V		10kΩ~1Ω: 0.2V 1Ω~0.05Ω: 0.6V	
	NOTE: [1] 3 decimal, in the unit of milliohm(s), used in low resistance area. [2] Accuracy must be calculated in operating rate.									
CONSTANT VOLTAGE + CONSTANT CURRENT MODE										
	Operating Range	1~35V	1~70V	1~35V	1~70V	1~105V	1~70V	1~140V	1~35V	1~70V
	Setting Range	0.4~35.7V	0.4~71.4V	0.6~35.7V	0.6~71.4V	0.6~107.1V	0.6~71.4V	0.6~142.8V	0.6~35.7V	0.6~71.4V
	Resolution	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV	1mV
	Accuracy	±(0.05%rd+0.1%f.s.)		±(0.05%rd+0.1%f.s.)			±(0.05%rd+0.1%f.s.)		±(0.05%rd+0.1%f.s.)	
	Current Setting Range	0~3.5A	0~35mA	0~5.1A		0~15A	0~3.6A		0~7.2A	
	Resolution	0.1mA	1mA	0.1mA		1mA	0.1mA		0.1mA	
	Accuracy	±(0.1%rd+0.1%f.s.)@(0.1~1)f.s. ±(0.1%rd+0.05%f.s.)@(1~100)f.s.		±(0.1%rd+0.1%f.s.)@(0.1~1)f.s. ±(0.1%rd+0.05%f.s.)@(1~100)f.s.			±(0.1%rd+0.1%f.s.)@(0.1~1)f.s. ±(0.1%rd+0.05%f.s.)@(1~100)f.s.		±(0.1%rd+0.1%f.s.)@(0.1~1)f.s. ±(0.1%rd+0.05%f.s.)@(1~100)f.s.	
	NOTE: [1] 3 decimal, in the unit of milliohm(s), used in low resistance area. [2] Accuracy must be calculated in operating rate.									
DYNAMIC MODE										
	Width	0.02ms~10ms/1ms~1s		0.02ms~10ms/1ms~1s			0.02ms~10ms/1ms~1s		0.02ms~10ms/1ms~1s	
		10ms~1s/1ms~100sec		10ms~1s/1ms~100sec			10ms~1s/1ms~100sec		10ms~1s/1ms~100sec	
	Accuracy	typ./1ms~100sec		typ./1ms~100sec			typ./1ms~100sec		typ./1ms~100sec	
SHORT CIRCUIT MODE										
	Slew Rate	0.01~80mA/μs	0.1~160mA/μs	0.01~100mA/μs	0.04~180mA/μs	0.1~300mA/μs	0.01~120mA/μs	0.07~240mA/μs	0.01~120mA/μs	0.04~240mA/μs
	Slew Rate Resolution	0.01mA/μs	0.1mA/μs	0.01mA/μs	0.04mA/μs	0.1mA/μs	0.01mA/μs	0.07mA/μs	0.01mA/μs	0.04mA/μs
	Slew Rate Accuracy of Setting	±(10%~15μs)	±(10%~15μs)	±(10%~15μs)	±(10%~15μs)	±(10%~15μs)	±(10%~15μs)	±(10%~15μs)	±(10%~15μs)	±(10%~15μs)
	Current Setting Range	0~3.5A	0~35mA	0~5.1A	0~15A	0~30A	0~7.2A	0~7.2A	0~7.2A	0~7.2A
	Current Resolution	0.1mA	1mA	0.1mA	1mA	1mA	0.1mA	1mA	0.1mA	1mA
	Current Accuracy	±(0.1%F.S.)		±(0.1%F.S.)			±(0.1%F.S.)		±(0.1%F.S.)	
CONSTANT RESISTANCE MODE										
	Slew Rate	1.2~300mA/μs		0.6~180mA/μs		0.1~300mA/μs		0.07~240mA/μs		1.4~480mA/μs
	Slew Rate Resolution	1.2mA/μs		0.6mA/μs		0.1mA/μs		0.07mA/μs		1.4mA/μs
	Slew Rate Accuracy of Setting	±(10%~15μs)		±(10%~15μs)			±(10%~15μs)		±(10%~15μs)	
	Resistance Setting Range	0.05Ω~10Ω/100kΩ~1Ω		0.03Ω~3.3Ω/30kΩ~0.3Ω			0.03Ω~3.3Ω/60kΩ~0.3Ω		0.03Ω~3.3Ω/120kΩ~0.3Ω	
		3.75Ω~750Ω/1.33Ω~0.133Ω		11Ω~1.1kΩ/10Ω~1Ω			11Ω~1.1kΩ/20Ω~1Ω		11Ω~1.1kΩ/40Ω~1Ω	
	Resistance Resolution	0.01Ω/0.1Ω/1Ω/10Ω/100Ω		0.01Ω/0.1Ω/1Ω/10Ω/100Ω			0.01Ω/0.1Ω/1Ω/10Ω/100Ω		0.01Ω/0.1Ω/1Ω/10Ω/100Ω	
		0.001Ω/0.01Ω/0.1Ω/1Ω/10Ω		0.001Ω/0.01Ω/0.1Ω/1Ω/10Ω			0.001Ω/0.01Ω/0.1Ω/1Ω/10Ω		0.001Ω/0.01Ω/0.1Ω/1Ω/10Ω	
	Resistance Accuracy	10kΩ~1Ω: ±(0.5%rd+4.5%f.s.) 1Ω~0.05Ω: ±(1.0%rd+1.0%f.s.)		10kΩ~1Ω: ±(0.5%rd+4.5%f.s.) 1Ω~0.05Ω: ±(1.0%rd+1.0%f.s.)			10kΩ~1Ω: ±(0.5%rd+4.5%f.s.) 1Ω~0.05Ω: ±(1.0%rd+1.0%f.s.)		10kΩ~1Ω: ±(0.5%rd+4.5%f.s.) 1Ω~0.05Ω: ±(1.0%rd+1.0%f.s.)	
MEASUREMENT										
VOLTAGE MEASURE										
	Range	0~35V	0~70V	0~35V	0~70V	0~105V	0~70V	0~140V	0~35V	0~70V
	Resolution	0.01mV	1mV	0.01mV	1mV	0.01mV	1mV	0.01mV	0.1mV	1mV
	Accuracy	±(0.05%rd+0.025%f.s.)		±(0.05%rd+0.025%f.s.)			±(0.05%rd+0.025%f.s.)		±(0.05%rd+0.025%f.s.)	
CURRENT MEASURE										
	Range	0~3.5A	0~35A	0~5.1A	0~15A	0~30A	0~7.2A	0~7.2A	0~7.2A	0~7.2A
	Resolution	0.01mA	1mA	0.01mA	1mA	1mA	0.1mA	1mA	0.01mA	0.1mA
	Accuracy	±(0.05%rd+0.05%f.s.)		±(0.05%rd+0.05%f.s.)			±(0.05%rd+0.05%f.s.)		±(0.05%rd+0.05%f.s.)	
POWER MEASURE										
	Range	0~350W	0~700W	0~350W	0~700W	0~1050W	0~700W	0~1400W	0~350W	0~700W
	Accuracy	±(0.1%rd+0.1%f.s.)		±(0.1%rd+0.1%f.s.)			±(0.1%rd+0.1%f.s.)		±(0.1%rd+0.1%f.s.)	
NOTE: [1] Power(W) = Voltage(V) x Current(A). [2] Accuracy of Range.										

PEL-2000A(B) Series

PEL-2000A Rear Panel

PEL-2020A Rear Panel

PEL-2000B Rear Panel

PEL-2020B Rear Panel

SPECIFICATIONS

		PEL-2020A(B)	PEL-2030A(B)		PEL-2040A(B)	PEL-2041A(B)
Mainframe						
Dual Power Protection						
	Range	1-420W	0.5-630W	1.25-945W	1.75-1.05W	1.75-1.05W
	Resolution	1.0W	1.5W	2.5W	2.5W	2.5W
	Accuracy	±(2%rd + 0.2%f.s.)	±(2%rd + 0.2%f.s.)	±(2%rd + 0.2%f.s.)	±(2%rd + 0.2%f.s.)	±(2%rd + 0.2%f.s.)
Over Current Protection						
	Range	0.5-10.5A	0.625-13.1A	1.25-42A	0.625-21.0A	0.125-10.5A
	Resolution	0.05A	0.125A	0.1A	0.125A	0.025A
	Accuracy	±(0.2%rd + 0.2%f.s.)	±(0.2%rd + 0.2%f.s.)	±(0.2%rd + 0.2%f.s.)	±(0.2%rd + 0.2%f.s.)	±(0.2%rd + 0.2%f.s.)
Over Voltage Protection						
	Range	1-21.5V	1.875-31.5V	1.25-84V	1.875-84V	11.25-84V
	Resolution	0.01	0.025	0.05	0.05	0.05
	Accuracy	±(0.2%rd + 0.2%f.s.)	±(0.2%rd + 0.2%f.s.)	±(0.2%rd + 0.2%f.s.)	±(0.2%rd + 0.2%f.s.)	±(0.2%rd + 0.2%f.s.)
	Over Temperature Protection	≥60°C	≥60°C		≥60°C	≥60°C
Rated Power Protection						
	Value	420W	630W	945W	1050W	1050W
	Accuracy	±2%rd	±2%rd	±2%rd	±2%rd	±2%rd
CONTROL						
CIRCUIT CIRCUIT						
	Current (CV)	0-21A / ±(0.2%rd + 0.2%f.s.)	0-31.5A / ±(0.2%rd + 0.2%f.s.)		0-84A / ±(0.2%rd + 0.2%f.s.)	0-84A / ±(0.2%rd + 0.2%f.s.)
	Voltage (CC)	0-21V / ±(0.2%rd + 0.2%f.s.)	0-31.5V / ±(0.2%rd + 0.2%f.s.)		0-84V / ±(0.2%rd + 0.2%f.s.)	0-84V / ±(0.2%rd + 0.2%f.s.)
	Resistance (CR)	4-2.5Ω / ±(0.5%rd + 0.5%f.s.)	4-2.5Ω / ±(0.5%rd + 0.5%f.s.)	2-1.25Ω / ±(0.5%rd + 0.5%f.s.)	16-10Ω / ±(0.5%rd + 0.5%f.s.)	16-10Ω / ±(0.5%rd + 0.5%f.s.)
INPUT POWER CABLE (3M/9.8ft)		18AWG (3-core)				
POWER SOURCE		100-120VAC, 200-240VAC, 50/60Hz, 20A/10A				
WEIGHT		Approx. 3.5kg				
DIMENSIONS W×H×D (MM/INCH)		212W × 88H × 450D mm, Approx. 3.5kg (Net weight)				
DIMENSIONS W×H×D (MM/INCH)		423W × 88H × 450D mm, Approx. 8.0kg (Net weight)				

ORDERING INFORMATION

PEL-2030A(B): Dual Channel Module, (0-80V, 0-20A, 300W) x 2

PEL-2030A(B): Dual Channel Module, (1-80V, 0-5A, 300W) + (1-80V, 0-40A, 3200)

PEL-2040A(B): Single Channel Module, (0-80V, 0-70A, 350W)

PEL-2041A(B): Single Channel Module, (0-500V, 0-10A, 350W)

PEL-2004A(B): 4 Slot Programmable D.C. Electronic Load Mainframe

PEL-2002A(B): 2 Slot Programmable D.C. Electronic Load Mainframe

Note: Load module cannot be used without a mainframe

ACCESSORIES

PEL-2002A(B)/2004A(B): User Manual x1, Power Cord x1

PEL-2020A(B)/2030A(B)/2040A(B)/2041A(B): GTL-120 Test Leads x 1, GTL-121 Sense Leads x 1

* PEL-001 x 1 (PEL-2004A(B)), PEL-002 x 1 (PEL-2002A(B))

OPTIONAL ACCESSORIES

PEL-001	GPIB Card	**GTL-118**	GPIB Cable (2m)
PEL-002	PEL-2000A(B) Series Rack Mount Kit	**GTL-249**	Power Line Cable
PEL-005	Power Cover	**GTL-246**	USB Cable, USB 2.0 A-B TYPE CABLE, 4P
PEL-016	LAN Card (for PEL-2000A(B) Main Frame)	**GTL-232**	RS-232C Cable, 9-pin, P-P Type, null modem, 2000mm

A MODULARIZED STRUCTURE/PROGRAM & INTERFACE

Modularized Structure

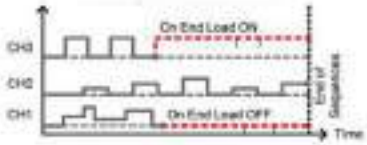
PEL-2004A(B) is a 4-slot mainframe with a master control unit made to hold 4 load modules, and PEL-2003A(B) is a 3-slot mainframe with a master control unit made to hold 3 load modules. The modularized structure of the PEL-2000A(B) Series allows any combination of mainframe and load modules (PEL-2004A(B), PEL-1035A(B), PEL-2040A(B), PEL-2041A(B)) to be integrated into a custom-tailored system.

Multiple loads within the same mainframe can be connected in parallel to perform both static and dynamic tests. This flexibility makes the PEL-2000A(B) Series a very cost effective instrument for testing a broad range of power supply outputs.

Program & Interface

The PEL-2000A(B) Series supports a total of 12 different programs and 99 sequences in each program. With a total of up to 120 different configurations. For external control and system configuration, the PEL Series has USB and RS-232 interfaces as standard and GPIB as an option. The LabView driver and Data Logging PC software are supported for all the interfaces available. Each channel has an analog control/monitoring connector to externally turn a load on/off and to externally monitor load input current and voltage.

B AUTOMATICALLY SEQUENCE FUNCTION



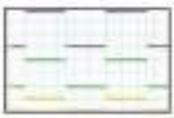
Sequence - On End Load

The figure above shows the current waveform of a simulation using the sequence function.

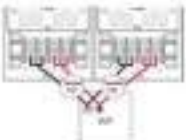
The Sequence Function allows each channel to change its load value according to a predefined sequence at a rate of up to 100μs per step. Each sequence is able to run concurrently, under the control of one clock. This is one of the most powerful features of the PEL-2000B Series as it is able to realistically simulate a multi-output power supply load. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a pre-defined speed up to 25μs per step. This is often used as the standard test procedure to verify the response of a power supply to quick load changes.

The picture above is an example of a sequence used as a load profile for a single output switching power supply. A load profile is programmed to simulate the current drawn of a power supply load.
By using a current probe to acquire a current waveform, PEL-2000A(B) Series is able to evaluate the performance of a power supply based on the load sequence that is programmed. An oscilloscope is then used to display the result.

C PARALLEL DYNAMIC LOADING



Dynamic Test



Wire Connection

All the load channels in a PEL-2000A(B) Series mainframe can be connected in parallel to perform any combination of static or dynamic loading. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a predefined speed of up to 25μs per step. When the channels are connected in parallel, dynamic tests are synchronously clocked. The ability to perform parallel dynamic loading gives you the flexibility to perform dynamic tests to high-power power supplies without the need for a dedicated high power electronic load.

D PARALLEL

The PEL-2000A(B) Series allows multiple mainframes to be linked together with standard MIL 20-pin connectors to provide higher power load capacity. A maximum of 5 mainframes, including one master and 4 slaves, can be chained together to give a 1kW load capacity for high current and high power applications.

High Power DC Electronic Load

PEL-5000C Series NEW

CE | RS-232 | GPIB | USB | LAN

FEATURES

- Maximum Power up to 102kW
- Up to 8 units of Master/Slave Parallel Control
- 5-digit Digital Voltage, Current and Power Meter
- Large LCD Display
- Display Voltage Value, Current Value, Watt Value at the Same Time
- Suitable for Power Factor Regulator (PFC) Testing (600V, 1200V Models)
- Automatically Perform OCP, OPP Test
- The Power-on State Value Can be Set
- Constant Current, Constant Resistance, Constant Voltage, Constant Power, Constant Current + Constant Voltage, Constant Power + Constant Voltage, Dynamic and Short Circuit Modes
- Short Circuit Time Can be Set During Short Circuit Test
- Over Current, Over Power, Over Temperature Protection and Over Voltage Warning
- Voltage Polarity Display Can be Set to Positive Value ("+") or Negative Value ("-")
- Support Solar Panel MPPT Test
- Optional Interface: GPIB, RS232, USB, LAN

DAWEI brand PEL-5000C series single channel electronic load provides 150V/ 600V/ 1200V models with a power range of 600~204kW. PEL-5000C has a total of 24 models featuring different combinations of power, voltage, and current. It can test and verify the specifications of batteries, electric vehicle chargers/charging stations, electric vehicle batteries and solar panels. PEL-5000C supports parallel connection for same voltage specification and different power models. PEL-5000C can support up to 8 units connected in parallel to provide a maximum power of 102kW.

For the scenario of battery testing, PEL-5000C specifically provides four battery discharge modes, namely CC+CV battery discharge test mode, CP+CV battery discharge test mode, CC+ LVP battery discharge test mode, and CP+ LVP battery discharge test mode. Users can choose a suitable test mode according to the test requirements. In addition to the four battery discharge modes, PEL-5000C also provides Time period discharge, Pulse discharge, and RAMP discharge modes. Users can set the discharge time, or discharge in the pulse current mode, or even set the rising/falling slew rate of the discharge current. These functions can be very flexible in the simulation of the battery discharge current waveform when an electric vehicle is running.

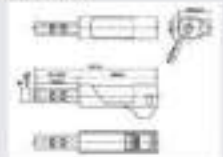
In order to meet the verification requirements of different DUTs, PEL-5000C provides a variety of test functions, including high current test mode, solar panel MPPT test mode, automated OCP, OPP test functions and 150 sets of parameter storage function. The 1200V model of PEL-5000C not only provides full power output at 1000V, but also provides 60% power output at 1200V output, which is higher than the 50% power output of other manufacturers of similar electronic loads. High-voltage batteries or chargers directly connected to the electronic load may cause damage to the electronic load. PEL-5000C has a built-in slow startup switch, which not only protects the DC load, but also saves the user's installation cost and setting time for measurement.

The communication interfaces supported by PEL-5000C include GPIB, RS232, USB, and LAN. The power, voltage and current of each model are shown in the following table:

ORDERING INFORMATION

PEL-5060C-150-600	150V/600A/6kW	High Power DC Electronic Load
PEL-5060C-150-800	150V/800A/8kW	High Power DC Electronic Load
PEL-5010C-150-1000	150V/1000A/10kW	High Power DC Electronic Load
PEL-5012C-150-1200	150V/1200A/12kW	High Power DC Electronic Load
PEL-5015C-150-1500	150V/1500A/15kW	High Power DC Electronic Load
PEL-5018C-150-1800	150V/1800A/18kW	High Power DC Electronic Load
PEL-5020C-150-2000	150V/2000A/20kW	High Power DC Electronic Load
PEL-5024C-150-2400	150V/2400A/24kW	High Power DC Electronic Load
PEL-5060C-600-400	600V/400A/6kW	High Power DC Electronic Load
PEL-5080C-600-560	600V/560A/8kW	High Power DC Electronic Load
PEL-5010C-600-700	600V/700A/10kW	High Power DC Electronic Load
PEL-5012C-600-840	600V/840A/12kW	High Power DC Electronic Load
PEL-5015C-600-1050	600V/1050A/15kW	High Power DC Electronic Load
PEL-5018C-600-1260	600V/1260A/18kW	High Power DC Electronic Load
PEL-5020C-600-1400	600V/1400A/20kW	High Power DC Electronic Load
PEL-5024C-600-1680	600V/1680A/24kW	High Power DC Electronic Load
PEL-5060C-1200-340	1200V/340A/6kW	High Power DC Electronic Load
PEL-5080C-1200-520	1200V/520A/8kW	High Power DC Electronic Load
PEL-5010C-1200-400	1200V/400A/10kW	High Power DC Electronic Load
PEL-5012C-1200-480	1200V/480A/12kW	High Power DC Electronic Load
PEL-5015C-1200-600	1200V/600A/15kW	High Power DC Electronic Load
PEL-5018C-1200-720	1200V/720A/18kW	High Power DC Electronic Load
PEL-5020C-1200-800	1200V/800A/20kW	High Power DC Electronic Load
PEL-5024C-1200-960	1200V/960A/24kW	High Power DC Electronic Load

PEL-5015C-1200-600



STANDARD ACCESSORIES
PEL-5000C Series operation manual
GW Instek PCD22 - Power cable (1.5m)
BNC - BNC CABLE, BNC to BNC CABLE, 1.5m
HDD CABLE - DB9 to Banana plug Parallel wire (1.5m)

OPTIONAL ACCESSORIES

PEL-002	GPIB Card	**PEL-030**	GPIB+RS-232 Card
PEL-003	RS-232 Card	**GTL-248**	USB Cable, USB 2.0, A-B Type, 1.2M
PEL-004	LAN Card	**GTL-246**	GPIB Cable, Double Shielded, 2.0M
PEL-005	USB Card	**GTL-250**	GPIB Cable, Double Shielded, 4.0M
PEL-006	Hook Ring		
PEL-007-1	Rack Mount Kit For PEL-5000C		
PEL-007-2	Rack Mount Kit For PEL-5010C, PEL-5012C, PEL-5015C		
PEL-007-3	Rack Mount Kit For PEL-5018C, PEL-5020C		
PEL-007-4	Rack Mount Kit For PEL-5024C, PEL-5060C		
PEL-008	HANDLE(L), U-shaped Handle (fixed on the bracket)		

Note: *Regarding the product delivery date, please contact our agent for more information.

Rear Panel

Power / Voltage	150V	600V	1200V
60/80	PEL-5006C-150-400 (400A)	PEL-5006C-600-420 (420A)	PEL-5006C-1200-240 (240A)
80/100	PEL-5008C-150-600 (600A)	PEL-5008C-600-560 (560A)	PEL-5008C-1200-320 (320A)
100/120	PEL-5010C-150-1000 (1000A)	PEL-5010C-600-700 (700A)	PEL-5010C-1200-400 (400A)
120/150	PEL-5012C-150-1200 (1200A)	PEL-5012C-600-840 (840A)	PEL-5012C-1200-480 (480A)
150/180	PEL-5015C-150-1500 (1500A)	PEL-5015C-600-1050 (1050A)	PEL-5015C-1200-600 (600A)
180/240	PEL-5018C-150-1800 (1800A)	PEL-5018C-600-1260 (1260A)	PEL-5018C-1200-720 (720A)
300/360	PEL-5030C-150-3000 (3000A)	PEL-5030C-600-1400 (1400A)	PEL-5030C-1200-800 (800A)
240/300	PEL-5024C-150-2000 (2000A)	PEL-5024C-600-1680 (1680A)	PEL-5024C-1200-960 (960A)

PEL-503 GPIB Card

PEL-433 RS-232 Card

PEL-004 LAN Card

PEL-433 USB Card

PEL-006 Hook Ring

PEL-0211-I Rack Mount Kit

PEL-038 I-Guides

High Power DC Electronic Load

SPECIFICATIONS

Model	PEL-3000C-150-600		PEL-3000C-150-1000		PEL-3010C-150-1000		PEL-3012C-150-1200	
Power[*1]	4 kW		4 kW		10 kW		12 kW	
Current	0 ~ 600	0 ~ 6000	0 ~ 1000	0 ~ 10000	0 ~ 1000	0 ~ 10000	0 ~ 1200	0 ~ 12000
Voltage	0 ~ 600							
Min. Operating Voltage	0.7V @ 600A		0.7V @ 1000A		0.7V @ 1000A		0.7V @ 1200A	
Protections								
Over Power Protection (OPP)	110%							
Over Current Protection (OCP)	110%							
Over Voltage Protection (OVP)	110%							
User Safety Protection (USP)	30 (sec)							
Constant Current Mode								
Range[*2]	60A	600A	100A	800A	100A	1000A	120A	1200A
Resolution	0.06 mA	0.6 mA	1.25 mA	12.5 mA	1.6 mA	16 mA	1.92 mA	19.2 mA
Accuracy[*3]	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	1.6000Ω ~ 0.133Ω	0.250Ω ~ 0.013Ω	1.1600Ω ~ 0.075Ω	0.1870Ω ~ 0.009Ω	600.0Ω ~ 0.75Ω	0.150Ω ~ 0.0080Ω	750.0Ω ~ 0.11Ω	0.125Ω ~ 0.0060Ω
Resolution	66.666μS	4.167mΩ	48.888μS	3.115mΩ	111.111μS	2.5mΩ	133.333μS	2.083mΩ
Accuracy	±0.05 of (Setting + Range)							
Constant Voltage Mode								
Range	150V							
Resolution	2.5mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	600W	6000W	800W	8000W	1000W	10000W	1200W	12000W
Resolution	9.6mW	96mW	12.8mW	128mW	16mW	160mW	19.2mW	192mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	150V	600A	150V	800A	150V	1000A	150V	1200A
Resolution	2.5mV	9.6mA	2.5mV	12.8mA	2.5mV	16mA	2.5mV	19.2mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	150V	6000W	150V	8000W	150V	10000W	150V	12000W
Resolution	2.5mV	96mW	2.5mV	128mW	2.5mV	160mW	2.5mV	192mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~600A		0~800A		0~1000A		0~1200A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~3							
SHORT Mode								
Short On-Off	Key							
Load mode	CV							
Short response	5000ns (50000ns)							
Dynamic Mode								
Timing								
Thigh & Tlow	0.01~0.099 / 0.1~0.99 / 1~9.9 / 10~99ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	Typ.: (10μs / 100μs / 1ms + 50ppm							
Rise Rate	0.01A/μs~0.8A/μs	0.1A/μs~8A/μs	0.01A/μs~1A/μs	0.1A/μs~10A/μs	0.01A/μs~1A/μs	0.1A/μs~10A/μs	0.01A/μs~1.2A/μs	0.1A/μs~12A/μs
Resolution	0.0004A/μs	0.004A/μs	0.0004A/μs	0.004A/μs	0.0004A/μs	0.004A/μs	0.0012A/μs	0.012A/μs
Min. Rise Time	80 (μs/A)+1							
Current								
Range	6.00A	60.00A	6.00A	80.00A	6.00A	100.00A	6.00A	120.00A
Resolution	0.96mA	9.6mA	1.28mA	12.8mA	1.6mA	16mA	1.92mA	19.2mA
Measurements								
Voltage Read Back								
Range (1 Digital)	6.00V	15.00V	6.00V	15.00V	6.00V	15.00V	6.00V	15.00V
Resolution	0.96mV	2.4mV	0.128mV	2.2mV	0.32mV	2.5mV	0.32mV	2.5mV
Accuracy	±0.05% of (Reading + Range)							
Current Read Back								
Range (1 Digital)	6.00A	60.00A	6.00A	80.00A	6.00A	100.00A	6.00A	120.00A
Resolution	0.96mA	9.6mA	1.28mA	12.8mA	1.6mA	16mA	1.92mA	19.2mA
Accuracy	±0.05% of (Reading + Range)							
Power Read Back								
Range (1 Digital)	600W		800W		1000W		1200W	
Accuracy	± 0.05% of (Reading + Range)							
General								
Typical Short Resistance	0.001Ω		0.0008Ω		0.0001Ω		0.0008Ω	
Maximum Short Current	600A		800A		1000A		1200A	
Load ON Voltage	0.35 ~ 62.5V							
Load OFF Voltage	0 ~ 62.5V							
Power Consumption	2100W		4200VA		4200VA		4200VA	
Dimension (H×W×D)	44.5×426×621.5mm		177.8×482.6×621.5mm		177.8×482.6×621.5mm		177.8×482.6×621.5mm	
Weight	32 kg		33.5 kg		34.5 kg		40 kg	
Temperature[*4]	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

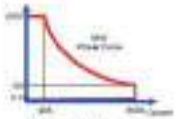
Input AC Power : 100~240 Vac ±10% ; 50,60Hz, Single-phase

Note *1 : The power rating specification is applied at ambient temperature < 35°C

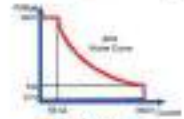
Note *2 : The range in automatically or forcing to range C not to DC Mode

Note *3 : If the operating current is below range C (1%), the accuracy specification is 0.1% F.S.

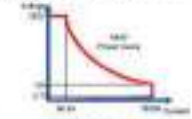
Note *4 : Operating temperature range is 0~40°C , all specifications apply for 0°C~40°C



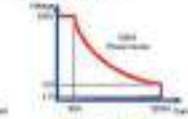
PEL-3000C-150-600



PEL-3000C-150-1000



PEL-3010C-150-1000



PEL-3012C-150-1200

SPECIFICATIONS

MODEL	PEL-3010C-150-1500		PEL-3010C-150-1800		PEL-3020C-150-3000		PEL-3030C-150-3000	
Power[*1]	150 W		180 W		300 W		450 W	
Current	0 ~ 15A	0 ~ 150A	0 ~ 18A	0 ~ 180A	0 ~ 30A	0 ~ 300A	0 ~ 30A	0 ~ 300A
Voltage	0 ~ 150V							
Min. Operating Voltage	3.7V @ 150A		3.7V @ 180A		3.7V @ 300A		3.7V @ 300A	
Protections								
Over Power Protection (OPP)	110%							
Over Current Protection (OCP)	110%							
Over Voltage Protection (OVP)	110%							
Over Temp Protection (OTP)	85°C(±5°C)							
Constant Current Mode								
Range[*2]	150A	1500A	180A	1800A	300A	3000A	300A	3000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	4.8mA	48mA	4.8mA	48mA
Accuracy[*3]	± 0.2% of (Setting + Range)							
Constant Resistance Mode								
Range	6000Ω~0.1Ω	0.1Ω~0.0005Ω	6000Ω~0.083Ω	0.083Ω~0.0004Ω	4000Ω~0.07Ω	0.07Ω~0.0004Ω	4000Ω~0.07Ω	0.07Ω~0.0004Ω
Resolution	144.66kΩ	1.447Ω	096Ω	1.99Ω	111.11kΩ	1.03Ω	111.11kΩ	1.07Ω
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	150V							
Resolution	3.2mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	150W	1500W	180W	1800W	300W	3000W	450W	4500W
Resolution	3.2mW	32mW	28.8mW	288mW	72mW	720mW	28.44mW	284mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	150V	1500A	150V	1800A	150V	3000A	150V	3000A
Resolution	3.2mV	24mA	3.2mV	28.8mA	3.2mV	48mA	3.2mV	48mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	150V	1500W	150V	1800W	150V	3000W	150V	4500W
Resolution	3.2mV	340mW	3.2mV	288mW	3.2mV	720mW	3.2mV	284mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~1500A		0~1800A		0~3000A		0~3000A	
Surge time	10~3600ms		10~3600ms		10~3600ms		10~3600ms	
Surge step	1~5							
OPPT Mode								
Algorithm	MAX							
Load mode	CR							
MAX time(s)	1000hrs(~4000hrs) / Resolution 1000hrs							
Dynamic Mode								
Timing								
T1&T2 Time	0.01S~9.99S / 10.0S ~ 999.9 / 1000S~							
Resolution	0.00S / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms ~ 10ppm							
Rise Time	0.04A~1.5A/μs	0.04A~15A/μs	0.04A~1.5A/μs	0.02A~15A/μs	0.04A~1A/μs	0.08A~10A/μs	0.06A~1A/μs	0.6A~15A/μs
Resolution	0.0004A/μs	0.004A/μs	0.0004A/μs	0.0144A/μs	0.0144A/μs	0.144A/μs	0.0144A/μs	0.144A/μs
Min. Rise Time	1μs/μs(typical)							
Current								
Range	0~150A	150~1500A	0~180A	180~1800A	0~300A	300~3000A	0~300A	300~3000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	4.8mA	48mA	4.8mA	48mA
Measurement								
Voltage Read Back								
Range (0 ~Full Scale)	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V
Resolution	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV
Accuracy	±0.025% of (Reading + Range)							
Current Read Back								
Range (0 ~Full Scale)	0~150A	150~1500A	0~180A	180~1800A	0~300A	300~3000A	0~300A	300~3000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	4.8mA	48mA	4.8mA	48mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (0 ~Full Scale)	1500W		1800W		3000W		3000W	
Accuracy	± 0.05% of (Reading + Range)							
General								
Typical Short Resistance	0.0005Ω		0.0004Ω		0.0004Ω		0.0004Ω	
Maximum Short Current	1500A		1800A		3000A		3000A	
Load-ON Voltage	0.25 ~ 10.5V							
Load-OFF Voltage	0 ~ 12.5V							
Power Consumption	150VA		150VA		150VA		150VA	
Dimension (HxWxD)	765.6x440.2x757.5mm		765.6x440.2x757.5mm		866.6x440.2x757.5mm		866.6x440.2x757.5mm	
HS/W(Net weight/Gross weight)	880.6x440.2x757.5mm		880.6x440.2x757.5mm		980.6x440.2x757.5mm		980.6x440.2x757.5mm	
Weight	116.1 kg		124 kg		148.5 kg		159 kg	
Temperature[*4]	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specification is at ambient temperature = 25 °C.

Note *2 : The range is automatically or forcing to range 4 only in CV Mode.

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1%+0.1%.

Note *4 : Operating temperature range = 0~40 °C (~ 32 °F) all specifications apply for 25°C±5°C.

PEL-3010C-150-1500

PEL-3010C-150-1800

PEL-3020C-150-3000

PEL-3030C-150-3000

High Power DC Electronic Load

SPECIFICATIONS

MODEL	PEL-5000C-600-420		PEL-5000C-600-560		PEL-5010C-600-700		PEL-5012C-600-840	
Power[1]	5 kW		5 kW		10 kW		12 kW	
Current	0 ~ 42A	0 ~ 420A	0 ~ 56A	0 ~ 560A	0 ~ 70A	0 ~ 700A	0 ~ 84A	0 ~ 840A
Voltage	0 ~ 600V							
Min. Operating Voltage	1V @ 42A		1V @ 56A		1V @ 70A		1V @ 84A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	105%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	85°C ± 3°C							
Constant Current Mode								
Range[1]	42A	420A	56A	560A	70A	700A	84A	840A
Resolution	0.67mA	6.7mA	0.89mA	8.9mA	1.12mA	11.2mA	1.34mA	13.4mA
Accuracy[1]	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	30Ω/30 ~ 1.429Ω/1.429kΩ	1.429Ω/1.429kΩ ~ 142.9Ω/142.9kΩ	21.43Ω/21.43kΩ ~ 1.339Ω/1.339kΩ	1.339Ω/1.339kΩ ~ 133.9Ω/133.9kΩ	21.43Ω/21.43kΩ ~ 1.429Ω/1.429kΩ	1.429Ω/1.429kΩ ~ 142.9Ω/142.9kΩ	15Ω/15 ~ 1.071Ω/1.071kΩ	1.071Ω/1.071kΩ ~ 107.1Ω/107.1kΩ
Resolution	11.44kΩ	23.4mΩ	12.255kΩ	12.4kΩ	16.6mΩ	1.665kΩ	23.333kΩ	11.5kΩ
Accuracy	±(0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	600V							
Resolution	10mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	420W	4200W	560W	5600W	700W	7000W	840W	8400W
Resolution	1.12mW	16mW	1.49mW	19mW	1.87mW	26mW	2.24mW	32mW
Accuracy	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	60V	420A	60V	560A	60V	700A	60V	840A
Resolution	10mV	6.7mA	15mV	8.9mA	12mV	11.2mA	13mV	13.4mA
Accuracy	± 1.05% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	60V	4200W	60V	5600W	60V	7000W	60V	8400W
Resolution	10mV	16mW	15mV	19mW	12mW	26mW	13mW	32mW
Accuracy	± 1.05% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~420A		0~560A		0~700A		0~840A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	100ms~5000ms (resolution: 100ms)							
Dynamic Mode								
Timing								
Thigh & Tlow	0.01~0.100 / 10.10 ~ 999.9 / 1000~							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1us (10us ~ 100s) / 1ms (>100s)							
Slew Rate	0.084A/us ~ 1.68A/us	0.008A/us ~ 1.68A/us	0.084A/us ~ 84A/us	0.008A/us ~ 1.4A/us	0.105A/us ~ 2.1A/us	0.008A/us ~ 2.1A/us	0.084A/us ~ 2.5A/us	0.008A/us ~ 2.5A/us
Resolution	0.00042A/us	0.0042A/us	0.00042A/us	0.0042A/us	0.00042A/us	0.0042A/us	0.00042A/us	0.0042A/us
Current								
Range	0~42A	42~420A	0~56A	56~560A	0~70A	70~700A	0~84A	84~840A
Resolution	0.67mA	6.7mA	0.89mA	8.9mA	1.12mA	11.2mA	1.34mA	13.4mA
Measurement								
Voltage Read Back								
Range (1 Digital)	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V
Resolution	1mV	10mV	1mV	10mV	1mV	10mV	1mV	10mV
Accuracy	±(0.05% of (Reading + Range)							
Current Read Back								
Range (1 Digital)	0~42A	42~420A	0~56A	56~560A	0~70A	70~700A	0~84A	84~840A
Resolution	0.67mA	6.7mA	0.89mA	8.9mA	1.12mA	11.2mA	1.34mA	13.4mA
Accuracy	±(0.05% of (Reading + Range)							
Power Read Back								
Range (1 Digital)	4200W		5600W		7000W		8400W	
Accuracy	± 0.05% of (Reading + Range)							
General								
Typical Short Resistance	0.013Ω		0.013Ω		0.013Ω		0.013Ω	
Maximum Short Current	420A		560A		700A		840A	
Load ON Voltage	0.4 ~ 10V							
Load OFF Voltage	0 ~ 10V							
Power Consumption	5120W		8200VA		8200VA		8200W	
Dimension (HxWxD)	441.8x483.4*747.5mm		441.8x483.4*747.5mm		441.8x483.4*747.5mm		441.8x483.4*747.5mm	
H'xW'xD'(Dimension with handle)	507.8x483.4x747.5mm		507.8x483.4x747.5mm		507.8x483.4x747.5mm		507.8x483.4x747.5mm	
Weight	37 kg		37.2 kg		37.8 kg		38 kg	
Temperature[4]	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

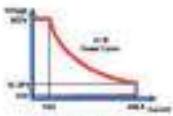
Input: AC Power : 100~240 Vac ±10% ; 50/60Hz, Single-phase

Note 1 : The power rating specification is at ambient temperature = 25 °C

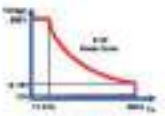
Note 2 : The range is automatically or forcibly no longer ready to DC Mode

Note 3 : If the operating current is below range (<1%), the accuracy specification is 0.1% FS.

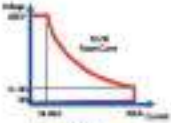
Note 4 : Operating temperature range is 0~40°C ; all specifications apply for 25°C±5°C.



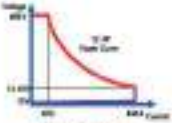
PEL-5000C-600-420



PEL-5000C-600-560



PEL-5010C-600-700



PEL-5012C-600-840

SPECIFICATIONS

MODEL	PEL-3015C-600-1050		PEL-3015C-600-1200		PEL-3030C-600-1400		PEL-3030C-600-1680	
Power[1]	15 kW		18 kW		30 kW		36 kW	
Current	0 ~ 1050A	0 ~ 1050A	0 ~ 1200A	0 ~ 1200A	0 ~ 1400A	0 ~ 1400A	0 ~ 1680A	0 ~ 1680A
Voltage	0 ~ 600V							
Min. Operating Voltage	12V @ 1050A		12V @ 1200A		12V @ 1400A		12V @ 1680A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	105%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	90°C(±5°C)							
Constant Current Mode								
Range	105A	1050A	120A	1200A	140A	1400A	168A	1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Accuracy[2]	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	1.429Ω ~ 11.43Ω	0.143Ω ~ 1.143Ω	1.667Ω ~ 13.33Ω	0.167Ω ~ 1.667Ω	2.5Ω ~ 20Ω	0.25Ω ~ 2.5Ω	3.33Ω ~ 26.67Ω	0.333Ω ~ 3.333Ω
Resolution	28.167mΩ	2.133mΩ	33.333mΩ	3.333mΩ	49.167mΩ	5.133mΩ	66.667mΩ	6.667mΩ
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	600V							
Resolution	12mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	1.5kW	15.00kW	2.00kW	18.00kW	3.00kW	27.00kW	4.00kW	36.00kW
Resolution	24mW	240mW	28.8mW	288mW	42mW	336mW	48.4mW	480mW
Accuracy	± 0.2% of (Setting +Range)	± 0.1% of (Setting +Range)	± 0.2% of (Setting +Range)	± 0.1% of (Setting +Range)	± 0.2% of (Setting +Range)	± 0.1% of (Setting +Range)	± 0.2% of (Setting +Range)	± 0.1% of (Setting +Range)
Constant Voltage Mode + Constant Current Mode								
Range	600V	1050A	600V	1200A	600V	1400A	600V	1680A
Resolution	12mV	16.8mA	12mV	20.16mA	12mV	22.4mA	12mV	26.88mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	600V	15000W	600V	18000W	600V	27000W	600V	36000W
Resolution	12mV	240mW	12mV	288mW	12mV	336mW	12mV	480mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~1050A		0~1200A		0~1400A		0~1680A	
Surge time	10~1000ms		1s~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O Interval	2000ms~60000ms , resolution 1000ms							
Dynamic Mode								
Timing								
T1&T2 & T(on	0.010~6.000 / 10.50 / 999.0 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 25μs / 100μs / 1ms + 50ppm							
Slew Rate	0.001A/μs~2.13A/μs	0.419A/μs~200A/μs	0.008A/μs~2.56A/μs	0.484A/μs~240A/μs	0.012A/μs~3.33A/μs	0.558A/μs~266A/μs	0.015A/μs~4.44A/μs	0.576A/μs~266A/μs
Resolution	0.0139A/μs	0.139A/μs	0.0167A/μs	0.133A/μs	0.0139A/μs	0.133A/μs	0.0244A/μs	0.1944A/μs
Current								
Range	0~105A	120~1260A	0~120A	116~1260A	0~140A	140~1400A	0~168A	160~1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Measurement								
Voltage Read Back								
Range (1 Digital)	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V
Resolution	1mV	10mV	1mV	10mV	1mV	10mV	1mV	10mV
Accuracy	±0.025% of (Reading + Range)							
Current Read Back								
Range (1 Digital)	0~105A	120~1260A	0~120A	120~1260A	0~140A	140~1400A	0~168A	160~1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (1 Digital)	15000W		18000W		30000W		36000W	
Accuracy	± 0.08% of (Reading + Range)							
General								
Typical Shut Resistance	0.005Ω		0.004Ω		0.0071Ω		0.006Ω	
Maximum Short Current	1050A		1260A		1400A		1680A	
Load ON Voltage	0.5 ~ 10V							
Load OFF Voltage	0 ~ 10V							
Power Consumption	1230VA		1230VA		1350VA		1750VA	
Dimension (H*W*D)	765.6x441.5x751.2mm		765.6x441.5x751.2mm		866.6x441.5x751.2mm		866.6x441.5x751.2mm	
Net/Ship Dimension (H*W*D)	653.6x441.5x751.2mm		653.6x441.5x751.2mm		753.6x441.5x751.2mm		753.6x441.5x751.2mm	
Weight	114.1 kg		124 kg		140.3 kg		151 kg	
Temperature[4]	0~40°C							
Safety & EMC	CE							

Cooling : Advanced fan Cooled

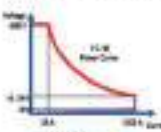
Input AC Power : 100~240 Vac ±10% ; 48/60Hz, Single-phase

Note 1 : De-power rating specification at ambient temperature > 25°C

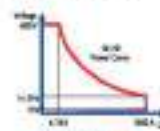
Note 2 : The range is customized per the rang in range 1 only in AC Mode

Note 3 : With operating current is below range 3.75A, the accuracy specification is 0.1% F.S.

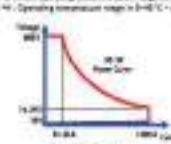
Note 4 : Operating temperature range is 0~40 °C ~ of specifications apply for 25 °C±5°C



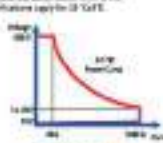
PEL-3015C-600-1050



PEL-3015C-600-1200



PEL-3030C-600-1400



PEL-3030C-600-1680

High Power DC Electronic Load

SPECIFICATIONS

MODEL	PEL-5006C-1200-240		PEL-5006C-1200-120		PEL-5010C-1200-600		PEL-5012C-1200-480	
Power[*1]	6 kW		6 kW		10 kW		12 kW	
Current	0 ~ 240	0 ~ 240A	0 ~ 120	0 ~ 120A	0 ~ 600	0 ~ 600A	0 ~ 480	0 ~ 480A
Voltage	0 ~ 1200V							
Min. Operating Voltage	1V @ 240A		1V @ 120A		1V @ 600A		1V @ 480A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	105%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	85°C (±5°C)							
Constant Current Mode								
Range[*2]	24A	240A	12A	120A	60A	600A	48A	480A
Resolution	0.24mA	2.4mA	0.12mA	1.2mA	0.6mA	6.0mA	0.48mA	4.8mA
Accuracy[*3]	± 0.5% of (Setting + Range)							
Constant Resistance Mode								
Range	10kΩ ~ 1Ω	83.3 Ω ~ 0.083Ω	20.16Ω ~ 1.71Ω	1.71Ω ~ 0.168Ω	10kΩ ~ 1Ω	83.3 Ω ~ 0.17Ω	143Ω ~ 2.1Ω	2.1Ω ~ 0.17Ω
Resolution	3.333Ω	30.1mΩ	4.444Ω	30.1mΩ	3.333Ω	10mΩ	0.8666Ω	47.6mΩ
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	1200V							
Resolution	20mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	600W	6000W	60W	1200W	100W	10000W	100W	12000W
Resolution	0.2mW	1.6mW	12.8mW	128mW	1mW	10mW	25.2mW	192mW
Accuracy	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)
Constant Voltage Mode + Constant Current Mode								
Range	1200V	240A	1200V	120A	1200V	480A	1200V	480A
Resolution	20mV	2.4mA	20mV	1.2mA	20mV	4.8mA	20mV	1.68mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	1200V	6000W	1200V	6000W	1200V	10000W	1200V	12000W
Resolution	20mV	16mW	20mV	128mW	20mV	160mW	20mV	192mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0 ~ 240A		0 ~ 120A		0 ~ 600A		0 ~ 480A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~9							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms, 4000ms, 16sec, 32sec, 64sec							
Dynamic Mode								
Timing	0.01S~9.99S / 10.0S ~ 999.9 / 1000sec							
Rise/Fall	0.001 / 0.01 / 0.1 / 1 A/s							
Accuracy	Typ. / Max. / 100μs / 1ms ~ 30μs~							
Slew Rate	0.015A~1.5A/μs	0.15A~15A/μs	0.015A~1.5A/μs	0.15A~15A/μs	0.025A~4.4A/μs	0.22A~44A/μs	0.025A~1.6A/μs	0.22A~16A/μs
Resolution	1.5mA/μs	0.04A/μs	1.5mA/μs	0.04A/μs	3.125mA/μs	0.08A/μs	0.104mA/μs	0.01mA/μs
Current								
Range	0~24A	24~240A	0~12A	12~120A	0~60A	60~600A	0~48A	48~480A
Resolution	0.24mA	1.8mA	0.12mA	1.1mA	0.6mA	4.6mA	0.48mA	1.68mA
Measurement								
Voltage Read Back								
Range (5 Digits)	0~120V	120.1~1200V	0~120V	120.1~1200V	0~120V	120.1~1200V	0~120V	120.1~1200V
Resolution	1mV	20mV	1mV	20mV	1mV	20mV	1mV	20mV
Accuracy	±0.05% of (Reading + Range)							
Current Read Back								
Range (5 Digits)	0~24A	24~240A	0~12A	12~120A	0~60A	60~600A	0~48A	48~480A
Resolution	0.24mA	1.8mA	0.12mA	1.1mA	0.6mA	4.6mA	0.48mA	1.68mA
Accuracy	±0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digits)	6000W		6000W		10000W		12000W	
Accuracy	± 2.0% of (Reading + Range)							
General								
Typical Short Resistance	0.04Ω		0.04Ω		0.01Ω		0.01Ω	
Maximum Short Current	240A		120A		480A		480A	
Load ON Voltage	0.06 ~ 24V							
Load OFF Voltage	0 ~ 24V							
Power Consumption	110VA		500VA		920VA		920VA	
Dimension (W×H×D)	445.8×87.5*517.5mm		371.8×87.5*517.5mm		371.8×87.5*517.5mm		371.8×87.5*517.5mm	
mm/inch	17.5×3.4×20.4 inch		14.6×3.4×20.4 inch		14.6×3.4×20.4 inch		14.6×3.4×20.4 inch	
Weight	12 kg		11.1 kg		11.4 kg		12 kg	
Temperature[*4]	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

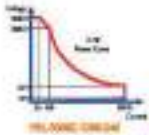
Input AC Power : 180~240 Vac ±10% ; 50/60Hz, Single-phase

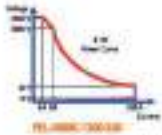
Note *1 : The power rating specifications at ambient temperature = 25°C

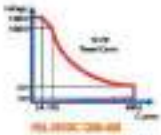
Note *2 : The range is automatically switching or changing to adapt only to CR Mode

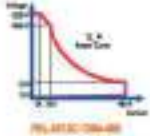
Note *3 : If the operating current is below range (1/10), the accuracy specification is 0.1% F.S.

Note *4 : Operating temperature range is 0~40°C + voltage/features apply for 15°C to 35°C









SPECIFICATIONS

MODEL	PEL-9311C (200-600)		PEL-9312C (300-720)		PEL-9320C (300-600)		PEL-9321C (300-960)	
Power[1]	1.1 kW		1.8 kW		2.4 kW		3.6 kW	
Current	0 ~ 60A	0 ~ 600A	0 ~ 72A	0 ~ 720A	0 ~ 96A	0 ~ 600A	0 ~ 96A	0 ~ 960A
Voltage	0 ~ 1200V							
Min. Operating Voltage	11V @ 600A		11V @ 720A		11V @ 600A		11V @ 960A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	105%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	95°C±5°C							
Constant Current Mode								
Range[2]	60A	600A	72A	720A	96A	600A	96A	960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	9.6mA	1.152mA	11.52mA
Accuracy[3]	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	120~1Ω	20~0.2000Ω	100Ω~1.666Ω	1.666Ω~0.0278Ω	60Ω~1Ω	1.2Ω~0.2100Ω	7.500Ω~1.2Ω	1.200Ω~0.2100Ω
Resolution	8.333mΩ	83.33mΩ	10mΩ	138.9mΩ	11.11mΩ	25mΩ	13.33mΩ	83.33mΩ
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	1200V							
Resolution	20mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	1.1kW	1.1kW	1.8kW	1.8kW	2.4kW	2.4kW	3.6kW	3.6kW
Resolution	24mW	240mW	38.8mW	388mW	52mW	830mW	78.4mW	784mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	120V	60A	120V	72A	120V	96A	120V	96A
Resolution	20mV	9.6mA	20mV	1.2mA	20mV	1.64mA	20mV	11.52mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	120V	1.1kW	120V	1.8kW	120V	2.4kW	120V	3.6kW
Resolution	20mV	240mW	20mV	388mW	20mV	830mW	20mV	784mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~60A		0~72A		0~600A		0~960A	
Surge Time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1 A							
MPPT Mode								
Algorithm	P&O							
Load mode	CR							
P&O interval	100ms~4000ms (resolution 100ms)							
Dynamic Mode								
Timing								
T-High & T-low	0.03~1.000 / 0.1~9.999 / 10~99.99 ms							
Resolution	0.001 / 0.01 / 0.1 ms							
Accuracy	1μs / 10μs / 100μs / 1ms ~ 50ppm							
Slew Rate	0.0185~1.84 μs	0.188~18.4μs	0.013A~2A/μs	0.13A~20A/μs	0.0153A~2.56μs	0.153A~25A/μs	0.038A~5.46μs	0.384A~54A/μs
Resolution	0.0013A/μs	0.013A/μs	0.0018A/μs	0.018A/μs	0.0028A/μs	0.028A/μs	0.0056A/μs	0.056A/μs
Current								
Range	0~60A	60~600A	0~72A	72~720A	0~96A	96~600A	0~96A	96~960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	11.6mA	1.536mA	15.36mA
Measurement								
Voltage Read Back								
Range [1 Digital]	0~15V	15~1200V	0~15V	15~1200V	0~15V	15~1200V	0~15V	15~1200V
Resolution	1mV	20mV	1mV	20mV	1mV	20mV	1mV	20mV
Accuracy	±0.05% of (Reading + Range)							
Current Read Back								
Range [1 Digital]	0~60A	60~600A	0~72A	72~720A	0~96A	92~600A	0~96A	96~960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	11.6mA	1.536mA	15.36mA
Accuracy	±0.05% of (Reading + Range)							
Power Read Back								
Range [1 Digital]	1.1kW		1.8kW		2.4kW		3.6kW	
Accuracy	± 0.05% of (Reading + Range)							
General								
Typical Short Resistance	0.0210Ω		0.0210Ω		0.0150Ω		0.0112Ω	
Maximum Short Current	600A		720A		600A		960A	
Load ON Voltage	0.9V ~ 240V							
Load OFF Voltage	0 ~ 240V							
Power Consumption	1200VA		1920VA		2400VA		3720VA	
Dimension (W×H×D)	260.6x44.2x751.3mm		260.6x44.2x751.3mm		434.6x44.2x751.3mm		434.6x44.2x751.3mm	
H×W×D (with handle and protrusions)	330.6x44.2x751.3mm		330.6x44.2x751.3mm		330.6x44.2x751.3mm		330.6x44.2x751.3mm	
Weight	13.3 kg		13.4 kg		14.9.2 kg		15.0 kg	
Temperature[4]	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

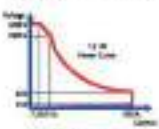
Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note 1 : Max power rating auto-Foldback at ambient temperature > 35°C

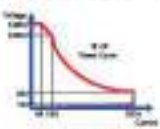
Note 2 : Min range is automatically set to 1/10 of its range (1 unit in 10 steps)

Note 3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% of F.S.

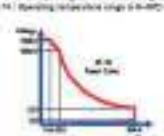
Note 4 : Operating temperature range is 0~40°C ; all specifications apply for 25°C±5°C



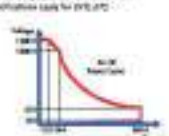
PEL-9311C (200-600)



PEL-9312C (300-720)



PEL-9320C (300-600)



PEL-9321C (300-960)

PEL-503-80-50

PEL-507-80-140

FEATURES

- 3-digit Digital Voltage, Current and Power Meter
- Simultaneous Display of Voltage, Current, and Watts
- Short-circuit Time Can be Set During Short-circuit Test
- Automatic Test Function of Overcurrent Protection/Overpower Protection
- The Battery Discharge Test Function Can Set the Discharge Stop Voltage(Vtest), Discharge Capacity(AH, WH) and Stop Discharge Time
- Surge Test Can Simulate Boot Overshoot Current and Transient Current From Hot Plugging
- Constant Current, Constant Resistance, Constant Voltage, Constant Power and Dynamic Mode
- Overvoltage, Overcurrent, Overpower, Over Temperature Protection and Reverse Polarity Detection
- Voltage Polarity Display Can be set to Positive Value "+" or Negative Value "-"
- Communications Interface: RS232, USB

The PEL-500 series single-channel electronic load has a total of 5 models and provides 0-80V/ 0-500V voltage operating ranges and 210~700W power operating range. The series can be applied to R&D, quality control, ATE system and production test, including voltage source/current source test, switching power supply transient response, constant voltage mode to current limiting test, battery simulation and battery discharge test.

The PEL-500 series provides a 3-digit digital display of voltage, current and power. Users can monitor the measurement data of the DUT at the same time. In order to facilitate users to evaluate whether the DUT can withstand the overshoot current, the PEL-500 series provides Surge test, which can simulate the boot overshoot current and the transient current from hot plugging. The built-in battery discharge test function can determine the conditions for stopping the discharge according to the test requirements of the DUT, including setting the discharge stop voltage (Vtest), discharge capacity (AH, WH) and stop discharge time.

Users can set the loading voltage/unloading voltage of the PEL-500 series for testing according to the characteristics of the DUT. When the output voltage of the DUT rises to the loading voltage value, the loading starts. When the output voltage drops to the unloading voltage, the loading ends. Users can use the C.O.) NC function to pre-set the judgment conditions according to the function and specifications of the DUT. The PEL-500 series will automatically generate the judgment results according to the set judgment conditions during the test.

Under the safety test requirements of the power supply, the PEL-500 series not only provides the Short test function, but also provides the automatic test function of overcurrent protection/overpower protection to simplify users' complicated manual operation and verify the OCP/OPP of the DUT's action points. The generated measurement results help users confirm whether the actual operating action points of the DUT for OCP/OPP are within the measurement regulations.

In addition to the function of providing load current waveforms to the oscilloscope via the BNC output terminal of Inventor, the PEL-500 series also provides overvoltage, overcurrent, overpower and over temperature protection, and reverse polarity detection. When any one of these generates a trigger action, the PEL-500 series will have protective or reminding measures to protect the PEL-500 from damage due to abnormal operating ranges.

ORDERING INFORMATION

PEL-503-80-50	80V/50A/1500W DC Electronic Load
PEL-504-80-70	80V/70A/1500W DC Electronic Load
PEL-504-500-15	500V/15A/2000W DC Electronic Load
PEL-507-80-140	80V/140A/700W DC Electronic Load
PEL-507-500-30	500V/30A/7000W DC Electronic Load

PEL-507-500-30

OPTIONAL ACCESSORIES

CTL-232	RS-232 Cable, 9-pin, M-F Type, 1080mm
CTL-USB	USB Cable, USB 2.0, A-B Type, 1200mm

Note: * Regarding the product delivery date, please contact your regional sales representative.

CTL-232: RS-232 Cable, 9-pin, M-F Type, 1080mm

Rear Panel

Model	PEL-103-80-53	PEL-104-80-70	PEL-104-320-70	PEL-107-80-140	PEL-107-320-70
INPUT RATINGS					
Power(Watt)	300 W	400W	400W	560 W	560 W
Current(Amperes)	80A	80 A	320 A	140A	320A
Voltage(Volt)	80V	80 V	80V	80 V	80V
Min. Operating Voltage	1.0V @ 10A	1.0V @ 10A	4V @ 10A	0.5V @ 10A	4V @ 10A
PROTECTIONS					
Over Power Protection(OPP)	110%,1W	110%,1W	110%,1W	110%W	110%W
Over Current Protection(OCP)	110%A	110%A	110%A	110%A	110%A
Over Voltage Protection(OVP)	110%V	110%V	110%V	110%V	110%V
Over Temp. Protection(OTP)	75°C	75°C	75°C	75°C	75°C
CC Mode					
Range	0~20A~80.0A	0~70A~70.0A	0~1.2~12A	0~14.0A~140.0A	0~8~70A
Resolution	0.05mA/0.01mA	0.17mA/1.1mA	0.05mA/0.22mA	0.23mA/0.33mA	0.08mA/0.4mA
Accuracy	±0.1% of (SETTING + RANGE)				
CR Mode					
Range	0.05 Ω ~ 1.2~1000Ω	0.2 Ω ~ 1.14~800Ω	0.1~40~2000Ω	0.05Ω~0.01~1.429Ω	0.2~20~1000Ω
Resolution	30.5Ω/2.0Ω,152.0Ω/10mΩ/zero	10Ω/0.01Ω/1.6Ω/1mΩ/zero	60.0Ω/0.02Ω/3.81Ω/2mΩ/zero	9.5Ω/0.01Ω/0.95Ω/zero	0.6.1Ω/0.01Ω/0.61Ω/zero
Accuracy	±0.2% of (SETTING + RANGE)				
CV Mode					
Range	0~0.1~80V	0~0.1~80V	0~80~500V	0~0.1~81V	0~80~500V
Resolution	0.15mV/1.25mV	0.15mV/1.25mV	1mV/10mV	0.15mV/1.25mV	1mV/10mV
Accuracy	±0.05% of (SETTING + RANGE)				
CP Mode					
Range	0~20.0W~280.2W (max.I = 20A, 0.05A)	0~70.0W~700.0W (max.I = 70A, 0.17A)	0~70.0W~700.0W (max.I = 12A~0.03A)	0~14.0W~700.0W (max.I = 14A, 0.01W)	0~70.0W~700.0W (max.I = 70A, 0.03A)
Resolution	0.4.7mW/6.71mW	0.66mW/9.34mW	0.04mW/0.64mW	1.16mW/16.24mW	1.11mW/15.51mW
Accuracy	±0.2% of (SETTING + RANGE)				
Dynamic Mode					
T1/T2(ms)/T.LOW	10μS to 60000 sec				
Resolution	10μS/0.1mS @ 1~1ms				
Slew rate (A/μs)	0.001~0.1A/μs	0.004~0.28A/μs	1~80.2mA/μs	0.006~0.01A/μs	3~720mA/μs
	1.2~280mA/μs	140~980mA/μs	70~4.2A/μs	0.28~0.5A/μs	80~1.72A/μs
Accuracy	±10μs /1μs				
Measurements					
Voltage Read Back	Range (I=1rgital)	0~0.1~81V	0~0.1~81V	0~80~500V	0~0.1~81V	0~80~500V
	Resolution	0.15mV/1.25mV	0.15mV/1.25mV	1mV/10mV	0.15mV/1.25mV	1mV/10mV
	Accuracy	±0.05% of (Reading + RANGE)				
Current Read Back	Range (I=1rgital)	0~0.05~80.0A	0~0.02~80.0A	0~1.2~12A	0~14.0A~140.0A	0~8~70A
	Resolution	0.66mA/0.01mA	0.17mA/1.1mA	0.02mA/0.26mA	0.24mA/0.34mA	0.08mA/0.4mA
	Accuracy	±0.1% of (READING+ RANGE)				
Power Read Back	Range (I=1rgital)	1.6W / 0.02W	4.8W / 0.06W	1.6W / 0.02W	4.8W / 0.06W	1.6W / 0.02W	4.8W / 0.06W	16W / 0.2W	48W / 0.6W
	Resolution	0.20 W	0.07 W	0.07 W	0.21W	0.07 W	0.21W	0.07 W	0.21W
	Accuracy	±0.1% of (Reading + RANGE)							
Surge Test									
Surge & Normal current		0~10A		0~70A		0~12A		0~140A		0~70A	
Surge time		10.1~999ms		10.1~999ms		10.1~999ms		10.1~999ms		10.1~999ms	
Surge step		1~0		1~0		1~0		1~0		1~0	
Battery Discharge Test									
UVP		0~81V		0~81V		0~500V		0~81V		0~500V	
Time		1~99999 Sec		1~99999 Sec		1~99999 Sec		1~99999 Sec		1~99999 Sec	
Capacity		0.1~9999.9Ah or 1~9999.9Wh									
Others									
Load On Voltage		0.1~81V				0.1~500V		0.1~81V		0.1~500V	
Accuracy		±0.1% of (SETTING + RANGE)									
Load OFF Voltage		0~81V				0~500V		0~81V		0~500V	
Accuracy		±0.1% of (SETTING + RANGE)									
Inverter (Rev. current)		0.8A/81V		7.0A/81V		1.2A/81V		14.0A/4V		7.0A/4V	
Current Monitor		Full scale: 5V									
Accuracy		±0.5% of (SETTING + RANGE)									
Typical Short Resistance		50mΩ		30mΩ		5.5mΩ		0.55mΩ		0.3mΩ	
Max. short Current		80A		70A		12A		140A		70A	
Power Input		110/220 Vac±10%, 50/60 Hz									
Interface (Standard)		USB/RS232									
Power Consumption		450VA						900VA			
Dimension (HxWxD)		88 x 133 x 475mm		88 x 133 x 475mm		88 x 133 x 475mm		220 x 221 x 480mm		220 x 221 x 480mm	
Weight		3.5 kg		5.2 kg		5.2 kg		14.0 kg		15.0kg	

AEL-5000 Series

NEW

CE | RS-232 | GPIB | USB | LAN

FEATURES

- Turbo Mode (Multiplier Mode) Can Withstand up to 2 Times the Rating Current and Power of the Electronic Load in a Short Period of Time
- Operating Mode: CC, Linear CC, CR, CV, CP and AC Rectifier Load
- Measurement Items: Voltage Value(Vrms, Vpeak, Vmax., Vmin), Current Value(Arms, Ipeak, Imax., Imin.), Watt Value, Volt-ampere Value(VA), Frequency Value, Crest Factor, Power Factor, Voltage Total Distortion (I THD, V%), Current Total Distortion (I THD, I%), Etc
- Eight Units Connected in Parallel up to 16kW for Single-phase and 48kW for Three-phase
- Support Leading and Unloading Angle Control, Loading can Unloading Angle Control Can be set at the Full Range of 0-359 Degrees
- Support Positive Half Cycle or Negative Half Cycle Load
- Support SCR/TRIAC Current Phase Modulation Waveform, 90-degree Trailing Edge and Leading Edge
- Support the Capacitive Load (Inrush Current)when the Power Supply is Turned on and the Transient Current (Surge Current) Test when the Load is Suddenly Connected (Hot Plug-in) During Operation
- Crest Factor Range: 1.414-3.0
- Power Factor Range: 0.1 ~ 1.0 Leading or Trailing
- Frequency Range: DC, 40-440Hz (AEL-5001/5002: 16.7Hz/DC, 5000-5020: DC, 45-70Hz and 400Hz and 1400Hz Need to be Customized
- Optional Control Interfaces: GPIB, RS-232, USB, LAN

GW Instek launches 10 models of the AEL-5000 series AC/DC electronic loads depending on the power range. The power range of a single unit is from 1.875W to 2250W and up to 8 units can be connected in parallel. The maximum power of single phase parallel connection can reach 18kVA, and the total power of 3-phase can reach 54kVA, which are suitable for UPS, Inverter/Adapter, AC Power Source, Battery, Fuse/Breaker, DC Power Source and other applications.

The AEL-5000 series has built-in precision measurement circuits such as 16-bit A/D and DSP to provide accurate measurement items, which include voltage root mean square value (Vrms), current root mean square value (Arms), and watt value (Watt), volt-ampere (VA), crest factor (CF), power factor (PF), total harmonic distortion (THD), voltage total harmonic distortion (VTHD), current total harmonic distortion (ITHD), peak current, (Ipeak), maximum current (Imax), minimum current (Imin), maximum voltage (Vmax), minimum voltage (Vmin), Etc measurements. In addition, built-in test modes include OPP (Power), HV (Hardware), UPS Back-up Time, Battery Discharge Time, UPS Transfer time, Fuse/Breaker Trip/Non-Trip, short circuit simulation, OCP, OPP and other test modes.

The AEL-5000 series has the Turbo mode (OM) or (OPT can be selected) design, which can increase the current and power of the electronic load by 1 times in one second, for test applications that require transient high power and large current such as transient overload test of protective components of short circuit of Fuse/Breaker and AC power supply, OCP and OPP tests etc. The Turbo mode provides the most economical solution.

The AEL-5000 series also supports the Load On start-up function (Default Load On). When the inverter or uninterruptible power supply is turned on, the series directly loads the set load current to verify that whether start-up of the inverter or uninterrupted power supply connecting to the electrical appliances is stable. At the same time, the Load On start function can also set positive half cycle or negative half load to verify whether the output voltage of the inverter or uninterruptible power supply terminal is stable when the actual electrical appliance with the a positive half cycle or negative half cycle load current. Control lead angle and unload angle can also be set (range 0-359 degrees) to verify the waveform of the transient response of the inverter or uninterruptible power supply when the appliance is plugged in and unplugged. In addition, the series also supports SCR/TRIAC current phase modulation waveform, 90 degree Trailing Edge and Leading Edge settings.

For the application of the adjustable bandwidth (BW) function, when the bandwidth of the OUT does not match the bandwidth of the AEL-5000 series, there will be oscillations. Users can reduce the BW setting value accordingly to meet the response speed of the OUT. Inrush Current verifies whether the transient response of the inverter output voltage is stable when the electrical appliance is turned on (Inrush Current) and when the electrical appliance is suddenly connected (Surge Current).

The entire series of AEL-5000 provides over voltage warning, over current, over power, and over temperature protection. Analog input terminal can control constant current, constant power and other working modes through external voltage. Voltage/Current monitor terminal is used to connect external voltage/current monitoring device. In addition, a variety of optional control interfaces are provided such as GPIB, RS-232, USB, and LAN to meet the needs of system integrator.

ORDERING INFORMATION

AEL-5002-350-18.75	350V/18.75A/1875W AC & DC Electronic Load
AEL-5003-350-28	350V/28A/2800W AC & DC Electronic Load
AEL-5004-500-37.5	350V/37.5A/3750W AC & DC Electronic Load
AEL-5008-500-56	500V/56A/5600W AC & DC Electronic Load
AEL-5008-350-75	350V/75A/7500W AC & DC Electronic Load
AEL-5012-350-112.5	350V/112.5A/11250W AC & DC Electronic Load
AEL-5015-350-112.5	350V/112.5A/15000W AC & DC Electronic Load
AEL-5019-350-112.5	350V/112.5A/18750W AC & DC Electronic Load
AEL-5023-350-112.5	350V/112.5A/22500W AC & DC Electronic Load
AEL-5003-425-18.75	425V/18.75A/1875W AC & DC Electronic Load
AEL-5003-425-28	425V/28A/2800W AC & DC Electronic Load
AEL-5004-425-37.5	425V/37.5A/3750W AC & DC Electronic Load
AEL-5008-500-56	425V/56A/5600W AC & DC Electronic Load
AEL-5008-425-75	425V/75A/7500W AC & DC Electronic Load
AEL-5012-425-112.5	425V/112.5A/11250W AC & DC Electronic Load
AEL-5015-425-112.5	425V/112.5A/15000W AC & DC Electronic Load
AEL-5019-425-112.5	425V/112.5A/18750W AC & DC Electronic Load
AEL-5023-425-112.5	425V/112.5A/22500W AC & DC Electronic Load
AEL-5003-480-18.75	480V/18.75A/9000W AC & DC Electronic Load
AEL-5004-480-25	480V/25A/12000W AC & DC Electronic Load

AEL-5015-425-112.5

STANDARD ACCESSORIES

AEL-5000 Series operation manual

PEL-013E : 15pin MALE to 9pin FEMALE cable (1.13m x1)

2501-1 (1.8m 70A) : Please refer to Fig 1 x4

AEL-5002-xxx-15.75/AEL-5003-xxx-23/AEL-5004-xxx-37.5

PEL-14 9-PIN CONNECTOR : Please refer to Fig 4 x 2

PEL-013-4 9-PIN CABLE : Please refer to Fig 5 x 1

AEL-5008-xxx-56/AEL-5008-xxx-75/AEL-5012-xxx-112.5/
AEL-5015-xxx-112.5/AEL-5019-xxx-112.5/AEL-5023-xxx-112.5

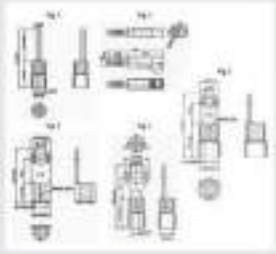
31.8188.8K0 PLUG CONN 500 PKG : Please refer to Fig 2

The terminal is used for Vsense x 1

31.8188.8L0 PLUG CONN 250 PKG : Please refer to Fig 3

The terminal is used for Vsense x 1

2501-1 (1.8m 70A) : Please refer to Fig 1 x 1



OPTIONAL ACCESSORIES

PEL-013 GPIB Card	CPL-010 GPIB Cable, IEEE-488, 1m
PEL-013 RS-232 Card	CPL-011 USB Cable, USB 2.0, A-B Type, 1.2m
PEL-014 LAN Card	CPL-012 CAN Cable, Double Shielded, 1.2m
PEL-015 USB Card	CPL-013 CAN Cable, Double Shielded, 3.0m
PEL-018 HANDLES, Unshaped handle(fixed to the header) for AEL-5008/5008/5012/5015	
PEL-019 HANDLES, Rack Accessories(for AEL-5002/5003/5004)	

Note: * Regarding the product delivery day, please contact your regional sales representative.

AEL-6002-350-18.75
AEL-6003-350-28
AEL-6004-350-37.5
AEL-6003-425-18.75
AEL-6003-425-28
AEL-6004-425-37.5
AEL-6003-480-18.75
AEL-6004-480-28

AEL-6008-350-56
AEL-6008-350-75
AEL-6008-425-56
AEL-6008-425-75

AEL-6012-350-112.5
AEL-6012-425-112.5

AEL-6015-350-112.5
AEL-6015-480-112.5

AEL-6018-350-112.5
AEL-6018-425-112.5

AEL-6025-350-112.5
AEL-6025-425-112.5

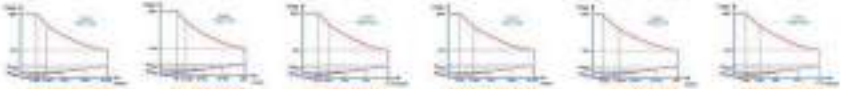
MODEL	Power (W)		Current(Ampere)		Voltage(Volt)
	Turbo OFF	Turbo ON	Turbo OFF	Turbo ON	
AEL-6002-350-18.75	1875 W	3750W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	
AEL-6003-350-28	2800W	5600W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	
AEL-6004-350-37.5	3750 W	7500W (x2)*	37.5 Arms / 112.5Apeak	75.0Arms/112.5Apeak (x2)*	50~350Vrms / 500Vdc
AEL-6002-425-18.75	1875 W	3750W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	
AEL-6003-425-28	2800W	5600W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	
AEL-6004-425-37.5	3750 W	7500W (x2)*	37.5 Arms / 112.5Apeak	75.0Arms/112.5Apeak (x2)*	50~425Vrms / 600Vdc
AEL-6006-350-56	5600 W	11200W (x2)*	56.0 Arms / 168Apeak	112.0Arms/ 168Apeak (x2)*	
AEL-6008-350-75	7500 W	15000W (x2)*	75.0 Arms / 225Apeak	150.0Arms/225Apeak (x2)*	
AEL-6012-350-112.5	11250W	22500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-6015-350-112.5	15000W	30000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-6018-350-112.5	18750W	37500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-6025-350-112.5	22500W	45000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	50~350Vrms / 500Vdc
AEL-6006-425-56	5600 W	11200W (x2)*	56.0 Arms / 168Apeak	112.0Arms/ 168Apeak (x2)*	
AEL-6008-425-75	7500 W	15000W (x2)*	75.0 Arms / 225Apeak	150.0Arms/225Apeak (x2)*	
AEL-6012-425-112.5	11250W	22500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-6015-425-112.5	15000W	30000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-6018-425-112.5	18750W	37500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-6025-425-112.5	22500W	45000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	50~425Vrms / 600Vdc
AEL-6003-480-18.75	1800W	5600W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	
AEL-6004-480-28	1750 W	7500W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	50~480Vrms / 700Vdc

* Power and current based rate of Turbo OFF

SPECIFICATIONS

Models	AEL-5002-510-15-75	AEL-5005-105-30	AEL-5004-310-17.5	AEL-5002-425-15-75	AEL-5005-425-30	AEL-5004-425-17.5
Static Mode						
Dynamic Mode						
Load Connection						
Load On/Off						
Operating Voltage Range						
Short Circuit Simulation						
Rise Current Slew Rate						
Fall Current Slew Rate						
Short Circuit Duration						
Short Circuit Accuracy						
Short Circuit Protection						
Constant Current Mode Operation						
Range						
Resolution						
Accuracy						
Constant Resistance Mode Operation						
Range						
Resolution						
Accuracy						
Constant Voltage Mode Operation						
Range						
Resolution						
Accuracy						
Constant Power Mode Operation						
Range						
Resolution						
Accuracy						
Dynamic Operation Mode						
Frequency						
Resolution						
Duty Cycle						
Resolution						
Accuracy						
Current Slew Rate						
Resolution						
Accuracy						
Measurement Accuracy						
Voltage						
Resolution						
Accuracy						
Current						
Resolution						
Accuracy						
Power						
Resolution						
Accuracy						
Protection Function						
Over Temperature Protection						
Over Voltage Protection						
Over Power Protection						
Reverse Voltage Protection						
Remote Control						
Remote Sense						
Trigger In/Out						
Interface						
Isolation Voltage						
Power Requirement						
Dimensions (W x H x D)						
Net Weight						
Accessories						
Optional Accessories						

- *1 rms (millisecond) is the unit of semiconductor, one second equal to 1/3
- *2 Operating temperature range is 0~40°C, all specification apply for 23°C±5°C, Except as noted
- *3 Turns made for up to 3X Current rating & Power rating support Fuse, Over(OC/OVP) set function
- *4 All specifications apply for 30/60Hz
- *5 All specifications subject to change without notice
- * High AC Power : 50A-440Vac | 3PH, Stackable, Single phase



SPECIFICATIONS

MODEL	ATL-3006-310-1K	ATL-3008-150-7K	ATL-3012-150-11K3	ATL-3015-150-11K3	ATL-3019-310-11K3	ATL-3025-150-11K3
Series No.	3006	3008	3012	3015	3019	3025
Power Consumption	1.1kVA / 1.1kW	1.1kVA / 1.1kW	1.1kVA / 1.1kW	1.1kVA / 1.1kW	1.1kVA / 1.1kW	1.1kVA / 1.1kW
Voltage Range	0V ~ 310V or 0V ~ 150V					
Current Range	0.6A ~ 6A or 0.3A ~ 3A					
Power Rating	1.1kW					
Over Power Protection	1.08kW or Programmable	1.08kW or Programmable	1.08kW or Programmable	1.08kW or Programmable	1.08kW or Programmable	1.08kW or Programmable
Over Current Protection	6.12A or Programmable	6.12A or Programmable	6.12A or Programmable	6.12A or Programmable	6.12A or Programmable	6.12A or Programmable
Over Voltage Protection	340V or Programmable					
Over Temp. Protection	Yes					
Remote Sense	Yes					
Constant Current Mode for Rectifier						
Range	0.6A	0.3A	0.6A	0.6A	0.6A	0.6A
Resolution	1mA/10mA	0.5mA/5mA	1mA/10mA	1mA/10mA	1mA/10mA	1mA/10mA
Accuracy	±(0.2%F.S.+0.2%rdg.)					
Constant Current Mode for Rectifier (Applied for 3 Quadrant Regulation Mode)						
Range	0.6A	0.3A	0.6A	0.6A	0.6A	0.6A
Resolution	1mA/10mA	0.5mA/5mA	1mA/10mA	1mA/10mA	1mA/10mA	1mA/10mA
Accuracy	±(0.2%F.S.+0.2%rdg.)					
Constant Resistance Mode						
Range	0.05Ω~10Ω/0.1Ω~20Ω	0.05Ω~10Ω/0.1Ω~20Ω	0.05Ω~10Ω/0.1Ω~20Ω	0.05Ω~10Ω/0.1Ω~20Ω	0.05Ω~10Ω/0.1Ω~20Ω	0.05Ω~10Ω/0.1Ω~20Ω
Resolution	0.05Ω/0.1Ω	0.05Ω/0.1Ω	0.05Ω/0.1Ω	0.05Ω/0.1Ω	0.05Ω/0.1Ω	0.05Ω/0.1Ω
Accuracy	±(0.5%F.S.+0.5%rdg.)					
Constant Voltage Mode						
Range	0~310V					
Resolution	10mV					
Accuracy	±(0.05%F.S.+0.05%rdg.)					
Constant Power Mode						
Range	1.08kW	1.08kW	1.08kW	1.08kW	1.08kW	1.08kW
Resolution	0.1W	0.1W	1W	1W	1W	1W
Accuracy	±(0.5%F.S.+0.5%rdg.)					
Constant Resistance Mode (Applied for 3 Quadrant Regulation Mode)						
Range	0~1.08kW					
Resolution	0.1W					
Accuracy	±(0.5%F.S.+0.5%rdg.)					
Slew Rate						
Rise Time	0.1~1A/μs					
Fall Time	0.1~1A/μs					
Soft Start						
Soft Start Time	0.1~10Sec					
Measurement						
Voltage Measurement	16bit A/D					
Current Measurement	16bit A/D					
Measurement Range						
Voltage	0.6A	0.3A	0.6A	0.6A	0.6A	0.6A
Current	0~6A					
Accuracy	±(0.1%F.S.+0.1%rdg.)					
Protection						
Over Voltage Protection (OVP) Range	0~340V					
Over Voltage Protection (OVP) Accuracy	±(0.5%F.S.+0.5%rdg.)					
Over Current Protection (OCP) Range	0.6A	0.3A	0.6A	0.6A	0.6A	0.6A
Over Current Protection (OCP) Accuracy	±(0.5%F.S.+0.5%rdg.)					
Over Power Protection (OPP) Range	0~1.08kW					
Over Power Protection (OPP) Accuracy	±(0.5%F.S.+0.5%rdg.)					
Over Temperature Protection (OTP)	Yes					
Short Circuit Protection (SCP)	Yes					
Reverse Polarity Protection (RPP)	Yes					
Digital Interface						
Standard Interface	RS-232 / USB					
Optional Interface	GPIB					
Isolation	2500VDC					
Analog Control						
Control Voltage	0~5V or 0~10V					
Control Resistance	0~5kΩ or 0~10kΩ					
Isolation	2500VDC					
Front Panel Control						
Keypad	Yes					
Rotary Knob	Yes					
Display	4.3" TFT LCD					
Front Panel Lock	Yes					
Memory	100 Groups					
Power Supply						
Input Voltage	1Φ3W 110/220VAC ±10%					
Input Frequency	47~63Hz					
Power Factor	>0.99					
Efficiency	>85%					
Cooling	Fan Cooling					
Dimension (W x H x D)	430 x 88 x 450mm	430 x 88 x 450mm	430 x 88 x 450mm	430 x 88 x 450mm	430 x 88 x 450mm	430 x 88 x 450mm
Weight	8.5kg	8.5kg	8.5kg	8.5kg	8.5kg	8.5kg

*1 ATL (milliseconds) is the unit of simulated real life, time interval equal to 1.2.3

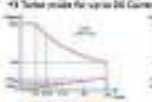
*2 Operating temperature range is 0~40°C, all specification apply for 18°C~28°C. Derate as stated

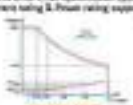
*3 Turbo mode for up to 2X Current rating & Power rating support Fuse, Short (SCP)/OPP see function

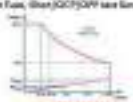
*4 All specifications apply for 60~80Hz

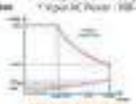
*5 All specifications subject to change without notice

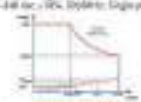
* Input AC Power : 100~240 VAC ± 10%, 50/60Hz Single phase











SPECIFICATIONS

Model	AEL-9084-425-50	AEL-9084-425-75	AEL-9813-425-112.5	AEL-9815-425-112.5	AEL-9819-425-112.5	AEL-9821-425-112.5
Input (W)	4500	6750	11250	11250	11250	11250
Input Connector	Screw + Wrench	Screw + Wrench	Screw + Wrench	Screw + Wrench	Screw + Wrench	Screw + Wrench
Operation Mode			CC, CV, CR, CP			
CC Mode Operating Range			0.5% of rated current + 0.5% of rated current (0.5% of rated)			
CC Mode Accuracy	≤ 0.05% of rated current	≤ 0.05% of rated current	≤ 0.05% of rated current	≤ 0.05% of rated current	≤ 0.05% of rated current	≤ 0.05% of rated current
Over Current Protection	≤ 105.5 amps ± 1% of rated current	≤ 158.25 amps ± 1% of rated current	≤ 263.75 amps ± 1% of rated current	≤ 263.75 amps ± 1% of rated current	≤ 263.75 amps ± 1% of rated current	≤ 263.75 amps ± 1% of rated current
Over Voltage Protection			≤ 450V, ± 1% of rated			
Over Power Protection			Yes			
Current Slew Rate						
Current Slew Rate Resolution			0.001A/μs			
Current Slew Rate Accuracy			10%			
Minimum Rise Time (0% to 90% of rated current)	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA
Minimum Fall Time (100% to 10% of rated current)	0.1mA/μs	0.1mA/μs	0.1mA/μs	0.1mA/μs	0.1mA/μs	0.1mA/μs
CC Mode Transient Mode						
Minimum Transient Width	20μs	20μs	20μs	20μs	20μs	20μs
Transient Mode Resolution	20μs	20μs	20μs	20μs	20μs	20μs
Transient Mode Accuracy	10%	10%	10%	10%	10%	10%
CV Mode						
Voltage Operating Range	0.5% of rated voltage + 0.5% of rated voltage (0.5% of rated)					
Voltage Accuracy	≤ 0.05% of rated voltage					
Voltage Resolution	0.1mV					
Voltage Slew Rate						
Voltage Slew Rate Resolution	0.001V/μs					
Voltage Slew Rate Accuracy	10%					
CR Mode						
Resistance Range	0.04Ω ~ 25Ω	0.04Ω ~ 25Ω	0.04Ω (Rmin) ~ 25.6MΩ (Rmax)	0.04Ω (Rmin) ~ 6.4MΩ (Rmax)	0.04Ω (Rmin) ~ 3.2MΩ (Rmax)	0.04Ω (Rmin) ~ 1.6MΩ (Rmax)
Resistance Accuracy	0.5% of rated resistance (@1.5Ω, 0.5% of rated)					
CP Mode						
Power Operating Range	0.5% of rated power + 0.5% of rated power (0.5% of rated)					
Power Accuracy	≤ 0.05% of rated power					
Power Resolution	0.1mW					
Power Slew Rate						
Power Slew Rate Resolution	0.001W/μs					
Power Slew Rate Accuracy	10%					
Measurement						
Voltage Measurement Accuracy	0.05% of reading + 0.05% of range					
Voltage Measurement Resolution	0.1mV					
Current Measurement Accuracy	0.05% of reading + 0.05% of range					
Current Measurement Resolution	0.1mA					
Power Measurement Accuracy	0.1% of reading + 0.1% of range					
Power Measurement Resolution	0.1mW					
Protection						
Over Temperature Protection	Yes					
Over Voltage Protection	Yes					
Over Current Protection	Yes					
Over Power Protection	Yes					
Reverse Voltage Protection	Yes					
Remote Sense						
Remote Sense Compensation	5V					
Remote Sense Range	5V					
Remote Sense Protection	Yes					
Interface						
Standard	RS-232 / RS-485					
Optional	GPIB					
Trigger In/Out	Yes					
Digital I/O	16					
Analog Control						
Voltage Programming Accuracy	0.5% of rated voltage					
Voltage Programming Resolution	0.1%					
Current Programming Accuracy	0.5% of rated current					
Current Programming Resolution	0.1%					
Resistance Programming Accuracy	0.5% of rated resistance					
Resistance Programming Resolution	0.1%					
Power Programming Accuracy	0.5% of rated power					
Power Programming Resolution	0.1%					
Analog Monitor						
Voltage Monitor Accuracy	0.5% of rated voltage					
Voltage Monitor Resolution	0.1%					
Current Monitor Accuracy	0.5% of rated current					
Current Monitor Resolution	0.1%					
Power Monitor Accuracy	0.5% of rated power					
Power Monitor Resolution	0.1%					
Resistance Monitor Accuracy	0.5% of rated resistance					
Resistance Monitor Resolution	0.1%					
Digital Control						
Voltage Programming Accuracy	0.05% of rated voltage					
Voltage Programming Resolution	0.1mV					
Current Programming Accuracy	0.05% of rated current					
Current Programming Resolution	0.1mA					
Resistance Programming Accuracy	0.05% of rated resistance					
Resistance Programming Resolution	0.1mΩ					
Power Programming Accuracy	0.1% of rated power					
Power Programming Resolution	0.1mW					
Digital Monitor						
Voltage Monitor Accuracy	0.05% of rated voltage					
Voltage Monitor Resolution	0.1mV					
Current Monitor Accuracy	0.05% of rated current					
Current Monitor Resolution	0.1mA					
Power Monitor Accuracy	0.1% of rated power					
Power Monitor Resolution	0.1mW					
Resistance Monitor Accuracy	0.05% of rated resistance					
Resistance Monitor Resolution	0.1mΩ					
Measurement Synchronization (Trigger In/Out)						
Voltage Measurement Accuracy	0.1% of reading + 0.1% of range					
Voltage Measurement Resolution	0.1mV					
Current Measurement Accuracy	0.1% of reading + 0.1% of range					
Current Measurement Resolution	0.1mA					
Power Measurement Accuracy	0.2% of reading + 0.2% of range					
Power Measurement Resolution	0.1mW					
Measurement Synchronization	0.1mS					
Trigger Delay Time	0.1mS					
Trigger Source Command	0.1mS					
Trigger Source Bus (Command Processing Time)	0.1mS					
Trigger Source External (Processing Time)	0.1mS					
Trigger Source Timer	0.1mS					
Trigger Source Manual	0.1mS					
Trigger Source Hold	0.1mS					
Trigger Source Sequence	0.1mS					
Trigger Source Pass/Fail	0.1mS					
Trigger Source Output Trigger	0.1mS					
Trigger Source Trigger Delay	0.1mS					
Trigger Source Trigger Count	0.1mS					
Trigger Source Trigger Period	0.1mS					
Trigger Source Trigger Width	0.1mS					
Trigger Source Trigger Level	0.1mS					
Trigger Source Trigger Slope	0.1mS					
Trigger Source Trigger Source	0.1mS					
Trigger Source Trigger Output	0.1mS					
Trigger Source Trigger Input

SPECIFICATIONS

MODEL		AEL-5005-480-18.75	AEL-5005-480-18
Power (W)		360W	360W
Cooling method		0.8 fans / 30 thousand	40 mm / 1 fan
Temperature		0~40°C (Refer to "Derating")	
Humidity range		10~90% RH non-condensing	
Input Section	Input Voltage Range	180~528VAC	
	Input Frequency Range	47~63Hz	
	Power Factor (Typical)	PF≥0.98/380VAC, PF≥0.95/480VAC at full load	
	Input Current (Typical)	3.1A/380VAC, 2.6A/480VAC	
	Inrush Current (Typical)	60A/380VAC, 70A/480VAC	
	Leakage Current	<3mA/480VAC	
Output Section	Output Voltage	18.75V	18V
	Rated Current	19.2A	20A
	Current Range	0~19.2A	0~20A
	Rated Power	360W	360W
	Ripple & Noise (max.) Note.2	150mVp-p	150mVp-p
	Voltage Adj. Range	18.75~20V	18~20V
	Voltage Tolerance Note.3	±2.0%	±2.0%
	Line Regulation	±0.5%	±0.5%
	Load Regulation	±1.0%	±1.0%
	Setup, Rise Time	1000ms, 50ms/230VAC 2000ms, 50ms/480VAC at full load	
	Hold Up Time (Typical)	20ms/230VAC 20ms/480VAC at full load	
Protection	Over Voltage	20.7~24V	19.8~24V
	Protection Type	Shut down o/p voltage, re-power on to recover	
	Over Load	105~150% rated output power	
	Protection Type	Hiccup mode, recovers automatically after fault condition is removed	
	Short Circuit	Hiccup mode, recovers automatically after fault condition is removed	
Function	Remote Control	5V/100mA	5V/100mA
	Remote Sense	Not Support	Not Support
	Remote ON-OFF Control	5V/100mA	5V/100mA
	Parallel Operation	Yes	Yes
	Series Operation	Yes	Yes
	Active Current Share	Yes	Yes
	Auxiliary Power	5V/1A	5V/1A
	Alarm Signal	Yes	Yes
	Signal Type	Open collector signal	Open collector signal
Environment	Working Temp.	-20~+60°C (Refer to "Derating")	
	Working Humidity	20~90% RH non-condensing	
	Storage Temp., Humidity	-40~+85°C, 10~95% RH	
	Temp. Coefficient	±0.03%/°C (0~50°C)	
	Vibration	10~500Hz, 5G 10min./1cycle, period for 60min. each along X, Y, Z axes	
Safety & EMC	Safety Standards	UL62368-1, TUV BS EN/EN62368-1, BSMI CNS15598-1, EAC TP TC 004, IP22 approved	
	Withstand Voltage	I/P-O/P:3.75KVAC I/P-FG:2.5KVAC O/P-FG:1.5KVAC	
	Isolation Resistance	I/P-O/P, I/P-FG, O/P-FG:100M Ohms/500VDC/25°C/70% RH	
	EMC Emission	Compliance to EN55032 (CISPR32) Class B, EN61000-3-2,-3, EAC TP TC 020	
	EMC Immunity	Compliance to EN61000-4-2,3,4,5,6,8,11, EN55024, EAC TP TC 020, light industry level, criteria A	
Others	MTBF	1,000.0K hrs min. MIL-HDBK-217F (25°C)	
	Dimension	215*115*30mm (L*W*H)	215*115*40mm (L*W*H)
	Packing	0.8Kg; 20pcs/17.6Kg/0.8CUFT	1.0Kg; 20pcs/22Kg/1.0CUFT
Note			

* All specifications apply for 60W+

* All specifications subject to change without notice

* Input AC Power : 100~240 for 230, 380/480, Single phase

AEL-5005-480-18.75 AEL-5005-480-18

PEL-020 CP18 Card

PEL-021 RS-232 Card

PEL-024 LAN Card

PEL-025 USB Card

PEL-028 I-APEL-115, U-shaped handle (for AEL-5004/5006/5012/5015)

PEL-029 I-APEL-115 Rack Accessories (for AEL-5002/5003/5004)

High Power DC Electronic Load

PEL-5000G Series

NEW

CE | RS-232 | GPIB | USB | LAN | UKCA

GW Instek PEL-5000G series single-channel electronic load provides 150V/ 600V/ 1200V models with a power range of 4,5,6kW. PEL-5000G can test and verify the specifications of batteries, electric vehicle chargers/charging stations, electric vehicle batteries and solar panels. PEL-5000G supports parallel connection for same voltage specification and different power models. PEL-5000G can support up to 8 units connected in parallel.

PEL-5000G Series has its own control and display panel, CC / CR / CV / CP /Dynamic modes. The new Turbo mode is designed for overload or protection testing, which includes OCP, OPP, Short for AC/DC or DC/DC power source; Over Charge/Discharge and Short for Battery BMS protection; and Blow/Not Blow testing for Fuse, Breaker or PTC Current Protection Components.

Support Short, OCCP and OCDP protection tests for battery BMS protection testing, the peak current before protection and protection response time are measured. The BMS, Fuse, OCP and OPP single-key test functions on the module make test more efficient. The SHORT duration setting and SHORT_VH, SHORT_VL setting function, also can measure Short Voltage and Current. PEL-5000G also provides Programmable LOAD ON/OFF voltage, GO/NG meter check, Voltage meter display" + "or"–" is selectable.

Dynamic can be simulated under CC, CP mode. The current Rise / Fall slew rate can be adjusted individually and there is an external signal input so that load can have a simulated Specific Load Current Waveform. PEL-5000G also provides 150 sets Store / Recall larger memory is much advance feature for each different application. The 150 sets test parameter and status storage function can call the storage memory real time in accordance with the auto sequence requirement, at any time to tune out the stored memory for use.

The communication interfaces supported by PEL-5000G include GPIB, RS232, USB, and LAN. The power, voltage and current of each model are shown in the following table:

FEATURES

- 4U/6K High Power Density Design Also for Bench Testing
- Turbo Mode Function, Which Allows 1.5 Times the Rated Power or Current to be Used Within Two Seconds
- Turbo Mode can be Used with OCP/OPP/ BMS/Short Mode/Surge Mode/Hot Plug-In Testing
- High Tolerance to Environmental Temperature, with 4k/5kW Models not Affected by Environmental Temperature in Power Usage
- Can set the Power-on Status Value
- Short Circuit Duration Can be set Within Short Circuit Test Voltage Meter Display Can be Configured as Polarity Positive ("+") or Negative("-")
- Optional Interface : GPIB, RS232, USB, LAN
- Protection function Testing for Battery BMS
- Protection Against V, I, W, and ℃

PEL-022 GPIB Card

PEL-023 RS-232 Card

PEL-024 LAN Card

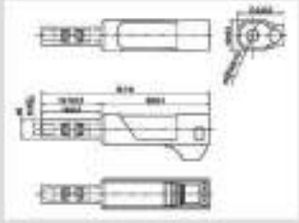
PEL-025 USB Card

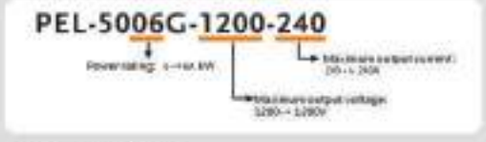
PEL-028 Handles

PEL-031 Rack Mount Kit

ORDERING INFORMATION

PEL-5004G-150-400	150V/400A/4000W High Power DC Electronic Load
PEL-5005G-150-500	150V/500A/5000W High Power DC Electronic Load
PEL-5006G-150-600	150V/600A/6000W High Power DC Electronic Load
PEL-5004G-600-280	600V/280A/4000W High Power DC Electronic Load
PEL-5005G-600-350	600V/350A/5000W High Power DC Electronic Load
PEL-5006G-600-420	600V/420A/6000W High Power DC Electronic Load
PEL-5004G-1200-160	1200V/160A/4000W High Power DC Electronic Load
PEL-5005G-1200-200	1200V/200A/5000W High Power DC Electronic Load
PEL-5006G-1200-240	1200V/240A/6000W High Power DC Electronic Load





STANDARD ACCESSORIES

PEL-5000G Series operation manual
BANANA PLUGS : Please refer to Fig.1 x 1
BNC – BNC CABLE : BNC to BNC CABLE, 1m x 1
HD-DSUB : 15PIN Parallel wire Parallel Wire x 1
PEL-028 HANDLES, U-shaped handle(fixed to the bracket)
PEL-031 Rack Mount Kit For PEL-5000G

OPTIONAL ACCESSORIES

PEL-022	GPIB Card	**PEL-030**	GPIB+RS-232 Card
PEL-023	RS-232 Card	**GTL-246**	USB Cable, USB 2.0, A-B Type, 1200mm
PEL-024	LAN Card	**GTL-248**	GPIB Cable, Double Shielded, 2000mm
PEL-025	USB Card	**GTL-250**	GPIB Cable, Double Shielded, 600mm
PEL-026	Hook Ring		

Note: * Regarding the product delivery date, please contact your regional sales representative.

Rear Panel

MODEL	PEL-3064C-150-480		PEL-3064C-150-600		PEL-3064C-150-840	
Power *	0~4800W	0~9600W max.**	0~6000W	0~12000W max.**	0~8400W	0~16800W max.**
Current	0~480A	0~1000A max.**	0~600A	0~1224 max.**	0~840A	0~1600A max.**
Voltage	0~150V		0~150V		0~150V	
Min. Operating Voltage	0.7V@480A		0.7V@600A		0.7V@840A	
Protection						
Over Power Protection (OPP)	105%					
Over Current Protection (OCP)	105%					
Over Voltage Protection (OVP)	105%					
Over Temp Protection (OTP)	90°C ± 3°C					
Constant Current Mode						
Range *	0~80A	0~480A	0~100A	0~600A	0~140A	0~840A
Resolution	0.0004A	0.0024A	0.0005A	0.0030A	0.0006A	0.0036A
Accuracy *	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	0.07~2.250Ω	0.01~0.375Ω	0.1~3.000Ω	0.017~0.5Ω	0.21~7.000Ω	0.031~0.67Ω
Resolution	0.0000014Ω	0.0000063Ω	0.0000140Ω	0.0000084Ω	0.0000197Ω	0.0000126Ω
Accuracy	± (1%+(Setting / 4.75)Ω)	± (0.5%+(Setting / Range))	± (1%+(Setting / 4.75)Ω)	± (0.5%+(Setting / Range))	± (1%+(Setting / 6.75)Ω)	± (0.5%+(Setting / Range))
Constant Voltage Mode						
Range	0~150V					
Resolution	0.0021V					
Accuracy	± 0.2% of (Setting + Range)					
Constant Power Mode						
Range	0~480W	0~4800W	0~600W	0~6000W	0~840W	0~8400W
Resolution	0.0024W	0.024W	0.003W	0.03W	0.0036W	0.036W
Accuracy *	± 0.2% of (Setting + Range)					
Constant Voltage + Current Limit Mode						
Range	10V	40V	10V	50V	15V	60V
Resolution	0.0021V	0.0044V	0.0021V	0.0054V	0.0031V	0.0058V
Accuracy	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)
Constant Voltage + Power Limit Mode						
Range	10V	40V/80V	10V	50V/100V	15V	60V/120V
Resolution	0.0021V	0.0041W	0.0021V	0.005W	0.0031V	0.7W
Accuracy	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)	± (0.2% of Setting+Range)
Turbo Mode**	OFF	ON	OFF	ON	OFF	ON
Short(OCP/OPP) Set Function						
Maximum Current	480A	960A	600A	1200A	840A	960A
Meas. Accuracy	± (1.0% of (Setting + Range))					
Short Time	10~1000ms or Continue	100~2000ms	10~1000ms or Continue	100~2000ms	10~1000ms or Continue	100~2000ms
Meas. Accuracy	5%					
OCP Time (Tdelay)	10ms	20ms	10ms	20ms	10ms	20ms
Meas. Accuracy	5%					
OPP Time (Tdelay)	10ms	20ms	10ms	20ms	10ms	20ms
Meas. Accuracy	5%					
OVP Set (Ref)**						
Short Test Current (Max)	480A	960A	600A	1200A	840A	960A
Meas. Accuracy	±(1.0% of (Reading + Range))					
Short Time	500ms~10ms					
Meas. Accuracy	±0.5ms					
OCP Time (Tdelay)	0.01ms~10ms, 11~999ms					
Meas. Accuracy	±(0.5% + 0.01ms)					
Surge Test Mode						
Surge Current	0~480A		0~600A		0~840A	
Restart Current	0~480A		0~600A		0~840A	
Surge Time	10~2000ms		10~2000ms		10~2000ms	
Surge Mod	1~5		1~5		1~5	
APP1 Mode						
Algorithm	Mod					
Load Mode	CR					
V&I Control	Non-adaptive					
Resolution	1.000ms					
Dynamic Mode						
Timing						
T&H & Tlow	0.010~9.999 / 10.00~100.0 / 101~999 (s)					
Resolution	0.001 / 0.01 / 0.1 / 1ms					
Accuracy	± (0.1% / 100 / 1000 μs+10ms)					
Rise Time	0.015~1.000A/μs	0.060~4.000A/μs	0.020~1.000A/μs	0.080~4.000A/μs	0.028~1.000A/μs	0.038~4.000A/μs
Resolution	0.0041A/μs	0.0164A/μs	0.0055A/μs	0.0219A/μs	0.0076A/μs	0.0296A/μs
Min. Rise Time	2μs (Typ.)					
Current						
Range	0~4A	40~480A	0~6A	60~600A	0~8A	80~800A
Resolution	0.0001mA	0.0016mA	0.0002mA	0.0020mA	0.0003mA	0.0026mA
Measurement						
Voltage Read Back						
Range (5 Digits)	0~15V	0~150V	0~15V	0~150V	0~15V	0~150V
Resolution	0.0001V	0.0021V	0.0001V	0.0021V	0.0001V	0.0021V
Accuracy	± 0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digits)	0~4A	40~480A	0~6A	60~600A	0~8A	80~800A
Resolution	0.0001mA	0.0016mA	0.0002mA	0.0020mA	0.0003mA	0.0026mA
Accuracy	± 0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digits)	480W		600W		840W	
Resolution	0.01 W					
Accuracy *	± 0.05% of (Reading + Range)					
General						
Typical Short Resistance	0.05~0.2Ω		0.05~0.2Ω		0.05~0.2Ω	
Maximum Short Current	120A		150A		210A	
Load On Voltage	0.27~42.7V					
Load Off Voltage	0~42.7V					
Power Consumption	5200W					
Dimension(H×W×D)	177mm x 483mm x 742mm					
Weight	33kg					
Temperature *	0~40°C					
Safety & EMC	CE					

Note *1: The model rating specifications at ambient temperature = 25°C.

Note *2: The range is selectable or fixed by a range (L range/H range) DC mode.

Note *3: : If the operating current is below range 0.1%, the accuracy specification is ±0.05%FS.

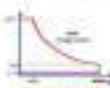
Note *4: Meas. range = Range / range

Note *5: Power range = Range / range

Note *6: Turbo mode for up to 1.1X current rating & Power rating support 60S. Recommend OPP set function.

Note *7: PEL-3064C-150-480 and PEL-3064C-150-600 and PEL-3064C-150-840 are limited.

Note *8: Dynamic temperature range is 0~40°C, H and Positive applicable for 20~26°C, Rated or relief.



High Power DC Electronic Load

MODEL	PEL-2040G-600-288		PEL-2080G-600-576		PEL-2160G-600-1152	
Power [1]	0~2880W	0~3000W (max.)*	0~5760W	0~6000W (max.)*	0~11520W	0~12000W (max.)*
Current	0~288A	0~450A (max.)*	0~576A	0~1134 max. **	0~1152A	0~1454A max.**
Voltage	0~600V		0~600V		0~600V	
Min. Operating Voltage	12V @ 10A		12V @ 10A		12V @ 10A	
Protections						
Over Power Protection (OPP)	105%					
Over Current Protection (OCP)	105%					
Over Voltage Protection (OVP)	105%					
Over Temp Protection (OTP)	80°C ± 5°C					
Constant Current Mode						
Range [2]	0~28A	0~280A	0~57A	0~355A	0~42A	0~428A
Resolution	0.0004mA	0.004mA	0.0008mA	0.004mA	0.0006mA	0.006mA
Accuracy [3]	± 0.05% of Setting + Range					
Constant Resistance Mode						
Range	0.15Ω~150mΩ	0.015Ω~1.125Ω	1.714Ω~150mΩ (2)	0.0468Ω~1.714Ω	1.43Ω~82.71Ω	0.014Ω~1.143Ω
Resolution	0.0005Ω	0.0045Ω	0.0001Ω	0.0005Ω	0.0003Ω	0.0003Ω
Accuracy	±(1.5%Setting + 0.1% F.S)	±(2% of Setting + Range)	±(1.5%Setting + 0.1% F.S)	±(2% of Setting + Range)	±(1.5%Setting + 0.1% F.S)	±(2% of Setting + Range)
Constant Voltage Mode						
Range	6.400V					
Resolution	0.01V					
Accuracy	± 0.05% of Setting + Range					
Constant Power Mode						
Range	0~600W	0~6000W	0~1200W	0~12000W	0~2400W	0~24000W
Resolution	0.0004W	0.004W	0.0008W	0.004W	0.0006W	0.006W
Accuracy [4]	± 0.1% of Setting+Range					
Constant Voltage + Current Limit Mode						
Range	600V	288A	600V	576A	600V	1152A
Resolution	0.01V	0.004mA	0.01V	0.008mA	0.01V	0.0047mA
Accuracy	± 0.05% of Setting+Range	± 1.5% of Setting+Range	± 0.05% of Setting+Range	± 1.5% of Setting+Range	± 0.05% of Setting+Range	± 1.5% of Setting+Range
Constant Voltage + Power Limit Mode						
Range	600V	4800W	600V	9600W	600V	9600W
Resolution	0.01V	0.044W	0.01V	0.08W	0.004V	0.094W
Accuracy	± 0.05% of Setting+Range	± 1.5% of Setting+Range	± 0.05% of Setting+Range	± 1.5% of Setting+Range	± 0.05% of Setting+Range	± 1.5% of Setting+Range
Turn On Delay*	OFF	20s	OFF	20s	OFF	20s
Short/OCP/OPP Test Function						
Maximum Current	20A	450A	20A	720A	40A	1454
Mode, Accuracy	± 1.5% of Reading + Range					
Short Time	10s~10000s(2) or Continue	1ms~9999ms	10s~10000s(2) or Continue	1ms~9999ms	10s~10000s(2) or Continue	1ms~9999ms
Short, Accuracy	1ms					
OCP Time [Step]	100ms	50ms	100ms	50ms	100ms	50ms
Mode, Accuracy	1ms					
OPP Time [Step]	100ms	50ms	100ms	50ms	100ms	50ms
Mode, Accuracy	1ms					
Built-Test Mode [5]						
Short Peak Current Mode	20mA	450A	20mA	720A	40mA	1454A
Mode, Accuracy	±1.5% of (Reading + Range)					
Short Time	1ms~10ms					
Mode, Accuracy	±1.5%FS					
OCP Time [Step]	0~10ms, 10ms [1~1000ms					
Mode, Accuracy	±(1.5%Reading+0.2ms)					
Surge Test Mode						
Surge Current	0~120A		0~720A		0~1454A	
Normal current	0~110A		0~660.0A		0~1334A	
Surge Time	10~2000ms		10~2000ms		10~2000ms	
Surge Step	1~5		1~5		1~5	
List(P) Mode						
Repetition	65,535					
Load Mode	CV					
Next Interval	1ms~4200ms					
Resolution	1ms					
Dynamic Mode						
Timing						
T1@T2 Time	0.01~9.999 / 10.00 ~ 999.9 (100ms)					
Resolution	0.001 / 0.01 / 0.1 / 1ms					
Accuracy	1/2μ TRUE RMS μSec 60ppm					
Slew Rate	0.01A/μs ~ 0.25A/μs	0.01A/μs ~ 2.5A/μs	0.02A/μs ~ 0.5A/μs	0.02A/μs ~ 5.0A/μs	0.04A/μs ~ 1.0A/μs	0.04A/μs ~ 10.0A/μs
Resolution	0.001A/μs	0.01A/μs	0.002A/μs	0.02A/μs	0.001A/μs	0.04A/μs
Min. Max Time	25 μs (2 μs)					
Current						
Range	0~28A	28~280A	0~57A	57~560A	0~42A	42~420A
Resolution	0.0004A	0.004mA	0.0008A	0.008mA	0.0006A	0.006mA
Measurement						
Voltage Read Back						
Range [1] Digital	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V
Resolution	0.001V	0.01V	0.001V	0.01V	0.001V	0.01V
Accuracy	± 0.03% of (Reading + Range)					
Current Read Back						
Range [1] Digital	0~28A	28~280A	0~57A	57~560A	0~42A	42~420A
Resolution	0.0004A	0.004mA	0.0008A	0.004mA	0.0006A	0.006mA
Accuracy	± 0.05% of (Reading + Range)					
Power Read Back						
Range [1] Digital	2880W		5760W		11520W	
Resolution	0.04W					
Accuracy [6]	± 0.05% of (Reading + Range)					
General						
Typical Short Resistance	5Ω		2Ω		1Ω	
Maximum Short Current	20A		11A		40A	
Load ON Voltage	0.4~10V					
Load OFF Voltage	0.4~10V					
Power Consumption	1200VA					
Dimension (HxWxD)	177mm x 438mm x 735mm					
Weight	25kg					
Temperature [7]	0~40°C					
Safety & EMC	CE					

Note 1: The power rating specification is at ambient temperature = 25°C

Note 2: The range is automatically or manually change in unit in CC mode

Note 3: The operating current in value range 0~5A, the accuracy specification is 0.15% F.S.

Note 4: Slew rate = 1/4 of full load

Note 5: Turbo mode is up to 1.1X current rating without using a good heat dissipation

Note 6: With Test Button to Master/Slave/Parallel System Model 2040G, 2080G and 2160G Test

Note 7: Operating temperature range 0 to 40°C & All specifications apply for 0~5 and 75°C (except as noted)

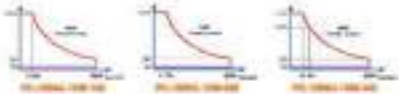
PEL-2040G-600-288

PEL-2080G-600-576

PEL-2160G-600-1152

MODEL	PEL-2084L-1208-150		PEL-2082Q-1208-300		PEL-2085L-1208-150	
Power [1]	0~600W	0~600W (Opt.) [2]	0~1200W	0~1200W (Opt.) [2]	0~600W	0~600W (Opt.) [2]
Current	0~150A	0~2400 (Opt.) [2]	0~300A	0~4800 (Opt.) [2]	0~150A	0~2400 (Opt.) [2]
Voltage	0.7~80V		0~120V		0.7~80V	
Min. Operating Voltage	35V @ 150A		35V @ 300A		35V @ 150A	
Protections						
Over Power Protection (OPP)	110%					
Over Current Protection (OCP)	110%					
Over Voltage Protection (OVP)	110%					
Over Temp Protection (OTP)	85°C ± 3°C					
Constant Current Mode						
Range [3]	0.15A	0.15A~	0.30A	0.30A~300A	0.15A	0.15A~
Resolution	0.0037.5A	0.0037.5A	0.0075A	0.0075A	0.00625A	0.00625A
Accuracy [4]	± 0.25% of Setting + Range					
Constant Resistance Mode						
Range	7.5~4000Ω	0.001%~7.5Ω	3.75~2000Ω	0.001%~3.75Ω	7.5~4000Ω	0.001%~3Ω
Resolution	0.0625Ω	0.0001.25Ω	0.0625Ω	0.0001.25Ω	0.0625Ω	0.0001.25Ω
Accuracy	± (1.0% of Setting at 10.1 Ω, ± 0.2% of Setting + Range), ± (1.0% of Setting at 10.1 Ω, ± 0.2% of Setting + Range)				± (1.0% of Setting at 7.5 Ω, ± 0.2% of Setting + Range)	
Constant Voltage Mode						
Range	0~120V					
Resolution	0.01V					
Accuracy	± 0.25% of Setting + Range					
Constant Power Mode						
Range	0~600W	0~600W	0~1200W	0~1200W	0~600W	0~600W
Resolution	0.2344W	0.2344W	0.469W	0.469W	0.2500W	0.2500W
Accuracy [4]	± 0.5% of Setting + Range					
Constant Voltage + Current Limit Mode						
Range	0.00V	150A	0.00V	300A	0.00V	150A
Resolution	0.01V	0.0037.5A	0.01V	0.0075A	0.01V	0.00625A
Accuracy	± (1.0% of Setting+Range)	± (1.0% of Setting+Range)	±(1.0% of Setting+Range)	± (1.0% of Setting+Range)	± (1.0% of Setting+Range)	± (1.0% of Setting+Range)
Constant Voltage + Power Limit Mode						
Range	0.00V	600W	0.00V	1200W	0.00V	600W
Resolution	0.02V	0.2344W	0.02V	0.469W	0.02V	0.2500W
Accuracy	± (1.0% of Setting+Range)	± (1.0% of Setting+Range)	±(1.0% of Setting+Range)	± (1.0% of Setting+Range)	± (1.0% of Setting+Range)	± (1.0% of Setting+Range)
Turbo Mode [5]	0.1	0.5	0.1	0.5	0.1	0.5
Short/OCP/OPP Test Function						
Maximum Current	150A	2400A	300A	4800A	150A	2400A
Meas. Accuracy	± (1.0% of Reading + Range)					
Short Time	100~10000ms or Continous	100~2000ms	100~10000ms or Continous	100~2000ms	100~10000ms or Continous	100~2000ms
Meas. Accuracy	N/A					
OCP Time (Step)	150ms	20ms	150ms	20ms	150ms	20ms
Meas. Accuracy	N/A					
OPP Time (Step)	150ms	20ms	150ms	20ms	150ms	20ms
Meas. Accuracy	N/A					
SRC Test Mode [6]						
Short Test Current Step.	50A	240A	150A	600A	240A	240A
Meas. Accuracy	±1.0% of Reading + Range					
Short Time	3.00ms~10ms					
Meas. Accuracy	±0.05ms					
OCP Trip (%Set)	0.00%~(Max.)~(Max.)+100%					
Meas. Accuracy	±0.05%+(±0.5%)					
Surge Test Mode						
Surge Current	0~240A		0~600A		0~240A	
Normal Current	0~150A		0~150A		0~150A	
Surge Time	10~2000ms		10~2000ms		10~2000ms	
Surge Step	1~5		1~5		1~5	
APPT Mode						
Algorithm	MPPT					
Load Mode	CV					
MPP Interval	5min, 60min					
Resolution	100ms					
Dynamic Mode						
Timing	0.010~9.999 / 10.00 / 100.0 / 1000 sec					
Resolution	0.001 / 0.01 / 0.1 / 1 sec					
Slewrate	1.25 / 2.5 / 5 / 10 / 20 / 50 / 100 / 250 / 500 / 1000 / 2500 / 5000 / 10000 / 25000 / 50000 mA/μs					
Rise Time	0.01334~0.0401/μs	0.133~0.4005/μs	0.0126~0.0600/μs	0.126~0.2998/μs	0.0133~0.1905/μs	0.133~0.6999/μs
Resolution	0.000133/μs	0.00134/μs	0.000125/μs	0.0013/μs	0.000190/μs	0.00140/μs
Min. Rise Time	20 μs / 5ms					
Current						
Range	0~15A	15~150A	0~30A	30~300A	0~24A	24~240A
Resolution	0.000366	0.003.66A	0.000.61A	0.0061A	0.000.58A	0.005.84A
Voltage						
Voltage Read Back						
Range 1 (Higher)	0~120V	120~120V	0~120V	120~120V	0~120V	120~120V
Resolution	0.0030V	0.0030V	0.0030V	0.0030V	0.0030V	0.0030V
Accuracy	± 0.05% of Reading + Range					
Current Read Back						
Range 2 (Higher)	0~15A	15~150A	0~30A	30~300A	0~24A	24~240A
Resolution	0.000366A	0.003.66A	0.000.61A	0.0061A	0.000.58A	0.005.84A
Accuracy	± 0.05% of Reading + Range					
Power Read Back						
Range 3 (Higher)	600W		1200W		600W	
Resolution	0.3F W		0.3F W			
Accuracy [4]	± 0.05% of Reading + Range					
Others						
Typical Short Resistance	0.0015Ω		0.0.9Ω		0.0015Ω	
Maximum Short Current	160A		320A		240A	
Load On Voltage	1~120V					
Load Off Voltage	0~120V					
Power Consumption	320VA					
Dimension (HxWxD)	177mm x 440mm x 784mm					
Weight	20kg					
Temperature [7]	0~40 °C					
Safety & EMC	CE					

Note [1] : The power rating specification is at environment temperature = 40 °C.
Note [2] : The range is customizable or during ouverge. Only in CC mode.
Note [3] : : With operating current below range 10 % it's accuracy specification is 0.5% F.S.
Note [4] : Error range = Range + Range.
Note [5] : Turbo mode is up to 1.1 of current rating & Power rating, support 1ms, the default mode is 1ms. Current.
Note [6] : SRC Test function for Green Management Saver Save SHORT, OCP and OCP Test
Note [7] : Operating temperature range is 0~40 °C. All specifications apply for 25 °C/77 °F unless noted.



ACCESSORIES

MODEL	DISCRIPTION	APPLICABLE DEVICE
APA-001	GPIB Interface Card	APA-1000 Series
APA-002	RS-232/422/485 Interface Card	APA-1000, APA-7100
APA-003	Output Voltage Capacity (0-600Vrms)	APA-1000 Series
APA-004	Output Frequency Capacity (45-1000 Hz)	APA-1000 Series
APS-001	RS-232 Interface Card	APS-7100, APS-7200
APS-002	Air Inlet Filter	ASR-3000 Series
ASR-001	Air Inlet Filter	ASR-3000 Series
ASR-003	Extended Three Phase Control Unit	ASR-3000 Series, ASR-3000 Series
CET-001	Extended Terminal with max.60A for 5KL/6KL/10KH models	PPR Series
CET-002	Extended Terminal with max.70A for 2000/3000 models	PPR Series
CET-003	Extended Universal Power Socket	ASR-2000 Series
CET-004	Extended European Power Socket	ASR-2000 Series
CET-005	Extended European Terminal with max.60A for 3KH/6KH with models	PPR Series
CPE-001	Earth, Voltage/Current Protection Unit	CPE-1000 Series, SPH-5000
CPW-001	Australia Power Cord, 1000mm	PSL-Series
CPW-002	VDE Power Cord, 1000mm	PSL-Series
CPW-003	PSE Power Cord, 1000mm	PSL-Series
CPW-004	Power cord, for 15A, 250V type	ASR-3000 Series
CPW-005	Power cord, for 15A, 125V type	ASR-3000 Series
CPW-006	Power cord, for 15A, PSE type	ASR-3000 Series
CRA-A01	Rack Mount Kit, 9", 4U Size	CPC Series, CPW-R Series, PPC-1K01, PPC-A01, PPT Series, PPT-1K
CRA-B01	Rack Mount Kit, 9", 4U Size	PSW Series
CRA-H01	Rack Mount Kit, 19", 4U Size	PSW Series
CRA-H02	Rack Mount Kit, 19", 4U Size	PSS Series
CRA-H03	Rack Mount Kit, 19", 3U Size	APS-1500
CRA-H04	Rack Mount Kit (EIA), 19", 1U Size	PPR Series
CRA-H05	Rack Mount Kit (EIA), 19", 1U Size	PPR Series
CRA-H10	Rack Mount Kit (EIA), 19", 2U Size	PPC-2K01(H)/(V)
CRA-H11	Rack Mount Kit (EIA), 19", 1U Size	PPC-1K01(H)/(V)
CRA-H12	Rack Mount Kit (EIA), 19", 2U Size	PC-3K01(H)/(V)/(H_E)/(V_E), PC-6K01 Series
CRA-H13	Rack Mount Kit (EIA), 19", 1U Size	PC-3K01(H)/(V)/(H_E)/(V_E), PC-6K01 Series
CRA-H14	Rack Mount Kit (EIA), 19", 2U Size	PPR-1K01 Series
CRA-H15	Rack Mount Kit (EIA), 19", 1U Size	PPR-1K01 Series
CRA-H16	Rack Mount Kit (EIA), 19", 2U Size	PCS-1000
CRA-H17	Rack Mount Kit (EIA), 19", 2U Size	PCS-1000
CRA-K02	Rack Mount Kit, 19", 2U Size	APS-7000,10000 Series
CRA-K04	Rack Mount Kit, 19", 3U Size	PSS-1000 Series
CRA-K05	Rack Mount Kit (EIA), 19", 5U Size	PSP-Series
CRA-K06	Rack Mount Kit, 19" Size	APS-7000 Series
CRA-K08	Rack Mount Kit, 19" Size	APS-7000 Series
CRA-K07-1	Rack Mount Kit (UR)	PPS-Series
CRA-K07-2	Rack Mount Kit (UR)	PPR-Series
CRA-K09-1	Rack Mount Kit (UR), 19", 3U Size	ASR-3000 Series
CRA-K09-2	Rack Mount Kit (UR), 19", 3U Size	ASR-7000 Series
CRA-K11-1	Rack Mount Kit (EIA), 19", 2U Size	PPS-Series
CRA-K11-2	Rack Mount Kit (EIA), 19", 2U Size	PPS-Series
CRA-K12-1	Rack Mount Kit (UR), 19", 3U Size	ASR-3000 Series
CRA-K12-2	Rack Mount Kit (UR), 19", 3U Size	ASR-3000 Series
CRA-K13-1	Rack Mount Kit (UR), 19", 3U Size	CPR Series, CPT-3000,3001
CRA-K13-2	Rack Mount Kit (UR), 19", 3U Size	CPR Series, CPT-3000,3002
CRA-L01	Rack Mount Slide (L Size)	PSB-1000 Series
CSR-001	Side Bracket (pair) Set	PSL-Series
CT-1-1M5	Test Lead, Crimp to Alligator Test Lead, Max. Current 10A, 1500mm	PPS(PSM), PSP, PPT(PPT-CP)/(PPT-CPS)/(PPT-CPE)/(PPT-CPH)/(PPT-CPV) Series, PPC-2K01, SPC-1000, PPC Series, PPC-6K01(H)/(V)
CT-1-5M5	Test Lead, Alligator to Banana Test Lead, Max. Current 10A, 1500mm	PPS(PSM),PPT(PPT-CP)/(PPT-CPS)/(PPT-CPE)/(PPT-CPH)/(PPT-CPV) Series, PC-3000(H)/(V)/(H_E)/(V_E), SPC-1000, PCS-1000, PPC Series
CT-1-111	Test Lead, Banana to Probe Test Lead, 1,000mm	PPC-1K01(H)/(V)/(H_E)/(V_E) Series
CT-1-1M	Test Lead, Crimp to Crimp Test Lead, Max. 60A, 1,000mm	PPC-3K01(H)/(V), PPC-6K01(H)/(V) Series, PPC-6K01(H)/(V) Series
CT-1-101	Screw Lead, Crimp to Screw Lead, 1,000mm	PPC-3K01(H)/(V) Series
CT-1-1S5	Test Lead, Crimp to Alligator Test Lead, Max. Current 60A, 1,200mm	PSH Series, CPR-U Series, CPR-H Series
CT-1-1S5	Test Lead, D-Sub to Crimp Test Lead, 1,000mm	PSW Series, APS-7300 Series, PSB-1300 Series
CT-1-1M5	Test Lead, 1.1 mm, 2.1mm, for 3.5KL/6KH models, 1,000mm	PPW Series
CT-1-1S5	Test Lead, for Max. Power 10KW/min, 60A, 14 AWG	PPR Series
CT-1-1S7	Source Power extension wire, 18AWG/10A, 600V, brass wire, 18AWG/20A, 300V	ASR-3000 Series
CT-1-2M04	Ground Lead, Banana to Banana, European Terminal, 200mm	APC-3001 MF Series, PPM Series, CPS Series, CPR Series, EPS-3150 Series, SPS-9000, PPS Series, CPR-9000,9001
CT-1-201	Screw Lead, Banana to Banana Lead, European Terminal, 200mm	PSW Series
CT-1-2M4	Test Lead, Banana to Alligator, European Terminal, Max. Current 20A, 1200mm	PPS(PSM),PPT(PPT-CP)/(PPT-CPS)/(PPT-CPE)/(PPT-CPH)/(PPT-CPV) Series, PPC-2K01, PPC-1K01(H)/(V)/(H_E)/(V_E), PPC-6K01(H)/(V) Series, CPR-9000,9001
CT-1-2M4A	Test Lead, Banana to Alligator, European Terminal, Max. Current 10A, 1000mm	PPS(PSM),PPT(PPT-CP)/(PPT-CPS)/(PPT-CPE)/(PPT-CPH)/(PPT-CPV) Series, PPC-2K01, PPC-1K01(H)/(V)/(H_E)/(V_E), PPC-6K01(H)/(V) Series, CPR-9000,9001
CT-1-2M5	Temperature Probe (required Thermal Coupling, K Type), about 1000mm	PPR Series
CT-1-2M54	Test Lead, Banana to Probe Test Lead, 800mm	PCS-1000, 2000,3000
CT-1-2T5	Test Lead, D-Sub to Crimp Test Lead, Max. 60A, 1200mm	PSL-9PW(1P2), 6000 Series
CT-1-2T7	Test Lead, D-Sub to Crimp Test Lead, Max. 60A, 3000mm	PSL-9PW(1P2), 6000 Series
CT-1-2W5	Test Lead, Crimp to Crimp Test Lead, Max. 60A, 1000mm	PSL-9PW(1P2), 6000 Series
CT-1-2W7	Test Lead, D-Sub to Crimp Test Lead, Max. 60A, 3000mm	PSL-9PW(1P2), 6000 Series
CT-1-2W8	Test Lead, D-Sub to Crimp Test Lead, Max. 60A, 1200mm	PSL-9PW(1P2), 6000 Series
CT-1-2X5	Test Lead, D-Sub to Crimp Test Lead, Max. 60A, 3000mm	PSL-9PW(1P2), 6000 Series
CT-1-2X7	63-220C Cable, 6-pin, 1-1 type, wall mounted, 2000mm	PSB-9PW(1P2),6000 Series, APS-7300 Series, PCL-3000(H) Series, ASR-2000 Series, ASR-3000 Series
CT-1-2X8	63-220C Cable, 6-pin, 1-1 type, wall mounted, 2000mm	PSW Series
CT-1-2Z4	63-220C Cable, 6-pin, 1-1 type, 2000mm	APS-7300
CT-1-2Z5	63-220C Cable, 6-pin, 1-1 type, 3000mm	PPC-3000
CT-1-2Z6	20A cable, USB 3.0, A-B Type, 1-1 type, 1,000mm	PPW Series, PPC-Series, APS-7300, APS-7000 Series, PCS-1000
CT-1-2Z8	20A cable, USB 3.0, A-B Type, 1,800mm	PPS Series, PSC Series, PSB-9000 Series, PPT(1500) Series, CPC Series, CPP Series, APS-7300, APS-7000 Series, PPC-6K01(H)/(V) Series, PPC-3000, PPC-6000(H)/(V) Series, PPC Series, ASR-3000 Series, PPC-3K01(H)/(V) Series, ASR-2000 Series, CPP-7000,9000, CPR-9000,9001 Series, PPC-1K01(H)/(V)/(H_E)/(V_E), PPC-6K01(H)/(V) Series, PPC-3000, PPC-6000(H)/(V) Series, PPC Series, ASR-3000

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE SERIES
CTL-449	Power Link Cable, 300mm	PEL-3000A/B Series
CTL-451	GPIB Cable, Parallel Adapter, 300mm	PSW Series, PEL-3000 Series, PSB-3000 Series, APS-7000 Series, PEL-3000C Series, APS-3000 Series
CTL-453	Power Link Cable, 300mm	PEL-3000/3000H Series
CTL-455	CP-IB Cable, 2m, pin Micro-B Connector	PSW Series, PPS Series, ASR-3000 Series, PEL-Series
CTL-456	RS-232 Cable with DB9 Connector (L-Shift)	PPS Series, PPS-Series, PSA-Series
CTL-458	RS-485 Cable with DB9 Connector (L-Shift)	PPS Series, PPS-Series, PSA-Series
CTL-461	Sync Master Cable (1 Terminator, 0.3M)	PEL Series, PPS Series, PEL-Series, PPS Series
CTL-463	RS-485 Slave Cable	PPS Series, PPS-Series, PEL-Series
CUC-001	CP-IB-USB Adapter, CP-IB to USB Adapter	CSC-3000 Series, PPS Series
CUS-M10	10/23.1 dB Cable, 300mm	PSW Series
CUS-M10	RS-232 to 232 Adapter with RS-485/RS Wall Nut	PSW Series
PCS-001	Rack Accessory Kit	PCS-1000
PCL-001	CP-IB Card	PCL-3000A/B Series
PCL-002	Rack Mount Kit, PEL-2000 Series Rack Mount Kit	PCL-3000A/B Series
PCL-003	Panel Cover	PCL-3000A/B Series
PCL-004	CP-IB Card	PCL-3000, 3000H Series, PCL-3000 Series
PCL-005	Terminal Kit, Plate	PCL-3000, 3000H Series
PCL-006	Terminal Cu Plate	PCL-3000, 3000H Series
PCL-007	Terminal Cu Plate	PCL-3000, 3000H Series
PCL-008	Terminal Cu Plate	PCL-3000, 3000H Series
PCL-009	Terminal Cu Plate	PCL-3000, 3000H Series
PCL-010	Dust Filter	PCL-3000, 3000H Series, PCL-3000 Series
PCL-011	Load Input Terminal Cover	PCL-3000, 3000H Series
PCL-012	Terminal Fixings, M3	PCL-3000, 3000H Series
PCL-013	Flexible Terminal Cover	PCL-3000, 3000H Series
PCL-014	LXI Protection Plug	PCL-3000, 3000H Series
PCL-015	LAN Card	PCL-3000A/B Series
PCL-016	LAN Card	PCL-3000, 3000H Series, PCL-3000 Series
PCL-017	CP-IB Card	PCL-3000C Series, ASC-3400 Series, PCL-3000C Series
PCL-020	RS-232 Card	PCL-3000C Series, ASC-3400 Series, PCL-3000C Series
PCL-021	LAN Card	PCL-3000C Series, ASC-3400 Series, PCL-3000C Series
PCL-022	USB Card	PCL-3000C Series, ASC-3400 Series, PCL-3000C Series
PCL-024	Hook Ring	PCL-3000C Series
PCL-2211-1	Rack Mount Kit	PCL-3000C Series
PCL-025	HANDLE (1 shipped from factory)	PCL-3000C Series, ASC-3400 Series
PCL-027	HANDLE (1 Rack Accessory Kit: for 1800, 3000, 5000)	ACL-3000 Series
PCL-030	GPIB-RS232 Card	PCL-3000C Series, ASC-3400 Series, PCL-3000C Series
PCL-031	Rack Mount Kit	PCL-3000C
PPS-C	GPIB Interface(Factory Installed)	PPS Series
PSB-001	GPIB Card	PSB-3000 Series, PSB-1000 Series
PSB-002	Parallel Connection Kit (for Horizontal Installation), Kit includes: (PSB-007)x4 Kit, Horizontal Bus Bar (x1, 750-870 x8)	PSB-3000 Series, PSB-1000 Series
PSB-003	Parallel Connection Kit (for Vertical Installation) Kit includes: (PSB-007)x4 Kit, Vertical Bus Bar (x1, 750-870 x 2)	PSB-3000 Series, PSB-1000 Series
PSB-005	Parallel Connection Signal Cable	PSB-3000 Series, PSB-1000 Series
PSB-006	Series Connection Signal Cable	PSB-3000 Series, PSB-1000 Series
PSB-007	Joint Kit, for Side-by-Side Mounting, 4 Units (Joint x 4 + Bolt-Washer x 8	PSB-3000 Series
PSB-008	Blocking Plate (PSB-3000 Only)	PSB-3000 Series
PSB-101	Cable for 2 units of PSB-1000 units in Parallel Mode Connection	PSB-1000 Series
PSB-102	Cable for 3 units of PSB-1000 units in Parallel Mode Connection	PSB-1000 Series
PSB-103	Cable for 4 units of PSB-1000 units in Parallel Mode Connection	PSB-1000 Series
PSB-104	Cable for 5 units of PSB-1000 units in Series Mode Connection	PSB-1000 Series
PSB-105	GPIB Card	PSB-1000 Series
PSB-106	Rack Accessory Kit: (M4 Terminal Screw and Washer x 2, M8 Terminal Bolt, Nut and Washer x 2, Analog Control Protection Connector 1, Analog Control Jack Lever x 2, Short Bar x 1	PSB-1000 Series
PSG-001	Front Panel Filter (Factory Installed)	PSG Series
PSA-001A	Series operation mode of 2 PSA units together. (Bi-directional Handles x 2, joining plates x 2	PSA Series
PSA-001B	Bus Bar for 2 units in parallel operation	PSA Series
PSA-001C	Cable for 2 units in parallel operation	PSA Series
PSG-002A	Series operation mode of 3 PSA units. Together. (Bi-directional Handles x 2, joining plates x 2	PSG Series
PSG-002B	Bus Bar for 3 units in Parallel Operation	PSG Series
PSG-002C	Cable for 3 units in Parallel Operation	PSG Series
PSA-003A	Series operation mode of 4 PSA units Together. (Bi-directional Handles x 2, joining plates x 3	PSA Series
PSA-003B	Bus Bar for 4 units in Parallel Operation	PSA Series
PSA-003C	Cable for 4 units in Parallel Operation	PSA Series
PSA-004	RS232 Cable with DB9 Connector Kit	PSG Series, PPS Series
PSG-005	RS485 Cable with DB9 Connector Kit	PSG Series, PPS Series
PSA-GPIB	GPIB Interface Card (Factory Installed)	PSA Series
PSA-RS232	Isolated Current Remote Control Card (Factory Installed)	PSA Series
PSA-RS232	Isolated Voltage Remote Control Card (Factory Installed)	PSA Series
PSW-001	Accessory Kit(s)	PSW Series, PSB-1000 Series
PSW-002	Simple LOC Test	PSW Series, PSB-1000 Series
PSW-003	Contact Removal Tool	PSW Series, PSB-1000 Series
PSW-004	Rack Accessory Kit for 3U GPIB/LAN module	PSW Series
PSW-005	Series Operation Cable for 2 Units (with/without loop)	PSW Series
PSW-006	Parallel Operation Cable for 2 units	PSW Series
PSW-007	Parallel Operation Cable for 3 units	PSW Series
PSW-008	Basic Accessory Kit for 2U/3U/4U models	PSW Series
PSW-009	Output Terminal Cover for 2U/3U/4U models	PSW Series
PSW-010	Logic I/Mon Cover 1(1U)	PSW Series
PSW-011	Output Terminal Cover for 1500/3000 models	PSW Series
PSW-012	High Voltage Output Terminal for 2U/3U/4U model	PSW Series

ACCESSORIES

CTL-121	CTL-105A	CTL-184A
CTL-120	CTL-121	CTL-122
CTL-123	CTL-301A	CTL-282
CTL-203A	CTL-284A	CTL-210
CTL-219	CTL-228/CTL-222	CTL-221/CTL-223
CTL-232/CTL-232A	CTL-248	CTL-246
CTL-268	CTL-249	CTL-230

ACCESSORIES

GTL-208

GTL-248

GTL-249

GTL-250

GTL-251

GTL-252

GRA-407 Rack Mount Kit

GRA-408 Rack Mount Kit

RCL-802 Rack Mount Kit

GRA-409 Rack Mount Kit

GRA-403 Rack Mount Kit

GRA-419 | Rack Mount Kit (3U)

GRA-407 Rack Mount Kit

GRA-419-E Rack Mount Kit (4U)

GRA-415 | Rack Mount Kit (3U)

GRA-414 | Rack Mount Kit (3U)

ACCESSORIES

GRA-413-E Rack Mount Kit (EIA)

GRA-414-E Rack Mount Kit (EIA)

GRA-403 Rack Mount Kit

GRA-424 Rack Mount Kit

GRA-418-J Rack Mount Kit (JIS)

GRA-419- Rack Mount Kit (JIS)

GRA-418-E Rack Mount Kit (EIA)

GRA-419 EIA Rack Mount Kit

GRA-424 Rack Mount Kit

GRA-420 Rack Mount Kit (EIA)

GRA-429 Rack Mount Kit

GRA-430 Rack Mount Kit

GRA-451-J Rack Mount Kit (JIS) with AC 100V/200V

GRA-451-E Rack Mount Kit (EIA) with AC 100V/200V

ACCESSORIES

GRA-439-J Rack Mount Kit (JIS)

GRA-439-E Rack Mount Kit (EIA)

GRA-441-J Rack Mount Kit (JIS)

GRA-441-E Rack Mount Kit (EIA)

GRA-443-J Rack Mount Kit (JIS)

GRA-443-E Rack Mount Kit (EIA)

GRA-445-J Rack Mount Kit (JIS)

GRA-445-E Rack Mount Kit (EIA)

DIGITAL MULTIMETER

Digital Multimeters are the most commonly utilized instruments on many engineering workbenches. GW Instek provides a variety of digital multimeters ideal for you to satisfy the requirements of your customers in different situations.

The GDM-9000 series, 6 ½ DMM, has become the best asset for users in R&D verification, production testing and high-end educational institutions by its excellent performance and high-precision design.

The GDM-8200A series is divided into 6 ½ digits and 5 ½ digits. The GDM-8200A series has become the best tool for engineers in various multi-point measurement applications by adopting the design of a plug-in scanner card on the rear panel.

The GDM-8300 series and GDM-8245 feature 5 ½ digits and 4 ½ digits (30,000 counts). The GDM-8300 series and GDM-8245 have become the best tools for technicians in service and maintenance, production testing and education institutions by the characteristics of low cost, excellent performance and ease of use.

PRODUCTS

- **Digital Multimeter**

DIGITAL MULTIMETER OVERVIEW

From 6 1/2 to 4 3/4 digits, the GDM-8000/8000 Series can deliver a measurement accuracy of up to 0.0035% and with high current fuse protection can withstand up to 12A. With the design focused on superior performance and ease of use, the GDM-9000/8000 Series has become some of the best assets for engineers and technicians in service & repair, production testing and educational institutions. USB, RS-232C, GPIB, LAN and Scanner card interfaces all make the series ideal for PC controlled applications.

BENCH-TOP DIGITAL MULTIMETER

Model	GDM-9061	GDM-8060	GDM-8261A	GDM-8255A
Display	6 1/2 (1200000 Counts) TFT LCD Dual Measurement	6 1/2 (1200000 Counts) TFT LCD Dual Measurement	6 1/2 (1200000 Counts) VFD Dual Measurement	5 1/2 (199999 Counts) VFD Dual Measurement
Autoranging	✓	✓	✓	✓
DCV Basic Accuracy	0.0035%	0.0035%	0.0035%	0.012%
Major Measurement Functions	AC & DC Voltage AC & DC Current (3A/10A) 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (RTD/ Thermocouple/Thermistor) Capacitance	AC & DC Voltage AC & DC Current (3A) 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (RTD) Thermocouple(Thermistor) Capacitance	AC & DC Voltage AC & DC Current 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (RTD/Thermocouple)	AC & DC Voltage AC & DC Current 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (Thermocouple)
Advanced Functions	Math, (REL, dB, dBm, Compare, MX+B, Percent, 1/X); STAT (Min/Max/Average/P-P, STDEV); Display (Number, Trend Chart, Bar Meter, Histogram); Bear Input	Math, (REL, dB, dBm, Compare, MX+B, Percent, 1/X); STAT (Min/Max/Average/P-P, STDEV); Display (Number, Trend Chart, Bar Meter, Histogram)	REL, dB, dBm, Hold, Math, Max./Min., Compare, Store, Recall, AC+DC True RMS	REL, dB, dBm, Hold, Math, Max./Min., Compare, Store, Recall, AC+DC True RMS
Interface (Std.)	USB device (USBTMC/USBCDC) RS-232C, LAN, Digital I/O USB host	USB device (USBTMC/USBCDC) RS-232C, LAN, Digital I/O USB host	USB device (USBCDC) RS-232C, Digital I/O	USB device (USBCDC) RS-232C, Digital I/O
Optional	GPIB	GPIB	Scanner Card/GPIB/LAN	Scanner Card
Page	E3-6	E3-8	E3-8	E3-10

BENCH-TOP DIGITAL MULTIMETER

Model	GDM-8351	GDM-8341	GDM-8241	GDM-8045
Display	5 1/2 (110000 Counts) VFD Dual Measurement	50000 Counts VFD Dual Measurement	50000 Counts VFD Dual Measurement	50000 Counts LED Dual Display
Autoranging	✓	✓	✓	✓
DCV Basic Accuracy	0.012%	0.02%	0.02%	0.05%
Major Measurement Functions	AC & DC Voltage AC & DC Current 2- & 4-wires resistance Continuity & Diode Frequency & Period Capacitance Temperature (Thermocouple)	AC & DC Voltage AC & DC Current 2-wires resistance Continuity & Diode Frequency & Period Capacitance Temperature (Thermocouple)	AC & DC Voltage AC & DC Current 2-wires resistance Continuity & Diode Frequency & Period Capacitance	AC & DC Voltage AC & DC Current 2-wires resistance Continuity & Diode Frequency Capacitance
Advanced Measurement Functions	REL, dB, dBm, Hold, Math, Max./Min., Compare, AC+DC True RMS	REL, dB, dBm, Hold, Math, Max./Min., Compare, AC+DC True RMS	REL, dB, dBm, Hold, Math, Max./Min., Compare, AC+DC True RMS	REL, dBm, Hold, Max./Min., AC+Hz, AC+DC True RMS
Interface (Std.)	USB device (support USBTMC/ USB CDC) RS-232C, Digital I/O	USB device (USBCDC) USB host	USB device (USBCDC)	–
Optional	–	GPIB	–	–
Page	E11-12	E11-14	E13-14	E15

6 ½ Digit Dual Measurement Multimeter

CDM-906X Series

FEATURES

- 6 ½ Digit Display: 1,100,000 Counts
- 4.3" TFT Graphic LCD
- DCV Basic Accuracy: 0.0035% (CDM-9861); 0.0070% (CDM-9860)
- 12 Measurement Functions: DCV, ACV, DCI, ACI, 2-wire and 4-wire Resistance, Frequency, Period, Diode, Continuity, Temperature and Capacitance
- Sampling Rate up to 10k SPS (CDM-9861)
- Dual Measurements to Perform Two Selected Measurement Simultaneously
- Offer Graphical Capabilities including Histogram, Bar Meter and Trend
- Temperature Measurement Support RTD, Thermistor as well as Thermocouple
- Standard Interface: USB Host/Device, RS-232C, LAN, Digital I/O
- Optional Interface: GPIB

SPECIFICATIONS

DC CHARACTERISTICS

DC Voltage

Range	Resolution	Input Impedance	Accuracy (1 Year) [(% of reading) + (% of range)]	
			CDM-9061	CDM-9060
100.0000 mV	0.1μV	10MΩ or >10GΩ	0.0050 + 0.0035	0.0090 + 0.0060
1.000000 V	1μV	10MΩ or >10GΩ	0.0040 + 0.0007	0.0080 + 0.0012
10.00000 V	10μV	10MΩ or >10GΩ	0.0040 + 0.0006	0.0070 + 0.0008
100.0000 V	0.1mV	10MΩ ± 1%	0.0045 + 0.0008	0.0085 + 0.0016
1000.000 V	1mV	10MΩ ± 1%	0.0050 + 0.0010	0.0090 + 0.0020

Resistance

Range	Resolution	Test Current	Accuracy (1 Year) [(% of reading) + (% of range)]	
			CDM-9061	CDM-9060
100.0000 Ω	100μΩ	1mA	0.010 + 0.004	0.014 + 0.007
1.000000 kΩ	1mΩ	1mA	0.010 + 0.001	0.014 + 0.002
10.00000 kΩ	10mΩ	100μA	0.010 + 0.001	0.014 + 0.002
100.0000 kΩ	100mΩ	10μA	0.010 + 0.001	0.014 + 0.002
1.000000 MΩ	1Ω	5μA	0.010 + 0.001	0.014 + 0.002
10.00000 MΩ	10Ω	500nA	0.020 + 0.001	0.040 + 0.002
100.0000 MΩ	100Ω	500nA (10 MΩ)	0.060 + 0.010	0.600 + 0.010

DC Current

Range	Resolution	Burden Volt	Accuracy (1 Year) [(% of reading) + (% of range)]	
			CDM-9061	CDM-9060
100.0000 μA	100pA	< 0.01 V	0.03 + 0.004	0.05 + 0.005
1.000000 mA	1nA	< 0.1 V	0.03 + 0.004	0.05 + 0.005
10.00000 mA	10nA	< 0.1 V	0.03 + 0.002	0.05 + 0.002
100.0000 mA	100nA	< 0.1 V	0.03 + 0.002	0.05 + 0.002
1.000000 A	1μA	< 0.7 V	0.10 + 0.010	0.10 + 0.010
3.000000 A	1μA	< 2.5 V	0.10 + 0.004	0.10 + 0.004
10.00000 A	10μA	< 0.3 V	0.15 + 0.010	----------

Continuity

Range	Resolution	Test Current	Accuracy (1 Year) [(% of reading) + (% of range)]	
			CDM-9061	CDM-9060
1000.000 Ω	0.001Ω	1 mA	0.010 + 0.004	0.014 + 0.007

Diode Test

Range	Resolution	Test Current	Accuracy (1 Year) [(% of reading) + (% of range)]	
			CDM-9061	CDM-9060
5.000000 V	1μV	1 mA	0.010 + 0.001	0.014 + 0.002

DC Ratio

Accuracy (see Below) = (DCV Input Accuracy) + (DCV Reference Accuracy)

TEMPERATURE CHARACTERISTICS

RTD

(Accuracy based on PT100)

Range	Resolution	Accuracy (1 Year) [(% of reading) + (% of range)]
-200 °C ~ 100 °C	0.001 °C	0.04 °C
100 °C ~ 300 °C	0.001 °C	0.05 °C
300 °C ~ 400 °C	0.001 °C	0.06 °C
400 °C ~ 500 °C	0.001 °C	0.08 °C
500 °C ~ 600 °C	0.001 °C	0.11 °C
600 °C ~ 800 °C	0.001 °C	0.13 °C

Thermocouples

(Accuracy based on ITS-90)

Type	Range	Resolution	Accuracy (1 Year) [(% of reading) + (% of range)]
B	250 °C ~ 1,000 °C	0.002 °C	0.2 °C
J	-210 °C ~ +1,200 °C	0.002 °C	0.3 °C
T	-200 °C ~ +400 °C	0.002 °C	0.3 °C
K	-200 °C ~ +1,372 °C	0.002 °C	0.3 °C
N	-200 °C ~ +1,300 °C	0.002 °C	0.4 °C
R	-50 °C ~ +1,768 °C	0.01 °C	1 °C
S	-50 °C ~ +1,768 °C	0.01 °C	1 °C
C	+100 °C ~ +2,315 °C	0.01 °C	1 °C

Thermistor

(2.252 kΩ, 5k Ω or User Type)

Range	Resolution	Accuracy (1 Year) [(% of reading) + (% of range)]
-80 °C ~ 150 °C	0.01 °C	0.01 °C

Accuracy = (±0.1 Ω reading) + (0 Ω range)

AC CHARACTERISTICS

AC Voltage

(True RMS)

Range	Resolution	Frequency	Accuracy (1 Year) [(% of reading) + (% of range)]	
			CDM-9061	CDM-9060
100.0000 mV	0.1μV	20Hz ~ 45Hz	1.00 + 0.04	1.00 + 0.04
		45Hz ~ 1kHz	0.10 + 0.04	0.10 + 0.04
		1kHz ~ 20kHz	0.06 + 0.04	0.06 + 0.04
		20kHz ~ 50kHz	0.13 + 0.05	0.13 + 0.05
		50kHz ~ 100kHz	0.40 + 0.08	0.40 + 0.08
		100kHz ~ 300kHz	4.00 + 0.30	4.00 + 0.30

GDM-906X Series

SPECIFICATIONS

	1.000000 V to 750.000 V	1μV ~ 1mV	3Hz ~ 5Hz	1.0% + 0.04	1.0% + 0.04
			5Hz ~ 10Hz	0.3% + 0.04	0.3% + 0.04
			10Hz ~ 20kHz	0.04% + 0.04	0.04% + 0.04
			20kHz ~ 100kHz	0.11% + 0.01	0.11% + 0.01
			100kHz ~ 500kHz	0.45% + 0.05	0.50% + 0.05
			500kHz ~ 1MHz	0.85% + 0.10	0.90% + 0.10
AC Current [True RMS]	Range	Resolution	Frequency	Accuracy(±[% of reading] + [counts]) (CAL:23°C)	
				GDM-9061	GDM-9060
	100.0000 μA 1000.000 μA	100pA 1nA	3Hz ~ 5Hz	1.0% + 0.04	1.0% + 0.04
			5Hz ~ 10Hz	0.3% + 0.04	0.3% + 0.04
			10Hz ~ 20kHz	0.04% + 0.04	0.04% + 0.04
			20kHz ~ 50kHz	0.11% + 0.01	0.11% + 0.01
			50kHz ~ 100kHz	0.45% + 0.05	0.50% + 0.05
	1.000000 mA 10.00000 mA	1nA 10nA	3Hz ~ 5Hz	1.0% + 0.04	1.0% + 0.04
			5Hz ~ 10Hz	0.3% + 0.04	0.3% + 0.04
			10Hz ~ 20kHz	0.04% + 0.04	0.04% + 0.04
			20kHz ~ 50kHz	0.11% + 0.01	0.11% + 0.01
			50kHz ~ 100kHz	0.45% + 0.05	0.50% + 0.05
	100.0000 mA	100nA	3Hz ~ 5Hz	1.0% + 0.04	1.0% + 0.04
			5Hz ~ 10Hz	0.3% + 0.04	0.3% + 0.04
			10Hz ~ 20kHz	0.04% + 0.04	0.04% + 0.04
			20kHz ~ 50kHz	0.11% + 0.01	0.11% + 0.01
			50kHz ~ 100kHz	0.45% + 0.05	0.50% + 0.05
	1.000000 A	1μA	3Hz ~ 5Hz	1.0% + 0.04	1.0% + 0.04
			5Hz ~ 10Hz	0.3% + 0.04	0.3% + 0.04
			10Hz ~ 20kHz	0.04% + 0.04	0.04% + 0.04
			20kHz ~ 50kHz	0.11% + 0.01	0.11% + 0.01
			50kHz ~ 100kHz	0.45% + 0.05	0.50% + 0.05
	3.000000 A	1μA	3Hz ~ 5Hz	1.0% + 0.04	1.0% + 0.04
			5Hz ~ 10Hz	0.3% + 0.04	0.3% + 0.04
			10Hz ~ 20kHz	0.04% + 0.04	0.04% + 0.04
			20kHz ~ 50kHz	0.11% + 0.01	0.11% + 0.01
			50kHz ~ 100kHz	0.45% + 0.05	0.50% + 0.05
	10.00000 A	10μA	3Hz ~ 5Hz	1.0% + 0.04	———
			5Hz ~ 10Hz	0.3% + 0.04	———
			10Hz ~ 20kHz	0.04% + 0.04	———
			20kHz ~ 50kHz	0.11% + 0.01	———
			50kHz ~ 100kHz	0.45% + 0.05	———

CAPACITANCE CHARACTERISTICS			Accuracy ~ [% of reading] + [counts]
Capacitance	Range	Resolution	Accuracy([% of reading] + [counts]) (CAL:23°C)
	1.000 nF	0.001nF	2.0% + 3.00
	10.00 nF	0.01nF	2.0% + 3.00
	100.0 nF	0.1nF	2.0% + 0.40
	1.000 μF	0.001μF	2.0% + 0.40
	10.00 μF	0.01μF	2.0% + 0.40
	100.0 μF	0.1μF	2.0% + 0.40

FREQUENCY AND PERIOD CHARACTERISTICS			Accuracy ~ [% of reading]
Frequency/Period	Range	Frequency	Accuracy([% of reading]) (CAL:23°C)
	100.0000 mV to 750.000V	3Hz ~ 5Hz	0.1
		5Hz ~ 10Hz	0.03
		10Hz ~ 40Hz	0.02
		40Hz ~ 10MHz	0.005

GENERAL INFORMATION		
	Display	4.3" Color TFT-TFT/VGA (480 x 272)
	Standard Interface	RS-232C, USB Host/Device, GPIB, Digital I/O
	Power Source	AC 100 V/120 V/220 V/240 V ±10%
	Power Line Frequency	50 Hz/60 Hz/400 Hz(GDM-9061)
	Power Consumption	Max. 22VA
	Dimensions & Weight	267(W) x 107(H) x 303(D) mm, Approx. 3.0kg

ORDERING INFORMATION

GDM-9061 6½ (1200000 counts) Digit Dual Measurement Multimeter
GDM-9060 6½ (1200000 counts) Digit Dual Measurement Multimeter

ACCESSORIES:
Safety instructions 1, Power cord 1, USB cable (CTL-246) 1, Test lead (CTL-217) 1,
CD (including the complete user manual, upgrade program and PC software, DMM Viewer) 1

OPTION

GDM-9061 : GPIB card (GPIB-USB-HS) can be installed at customer site

OPTIONAL ACCESSORIES

GTL-205A	Temperature Probe Adapter with Thermocouple (K type), approx. 1000mm		
GTL-204	RS-232C Cable, 9-pin female/female cable, approx. 2000mm		
GTL-246	GPIB Cable, approx. 2000mm		
GDM-01	4 Wire Jack (4 clip, test lead, RS probe), approx. 1100mm		
GRA-412	Rack Mount Kit (1U 2U)	GDM-TL1	Test Lead Set
GRA-414	Rack Mount Kit (1U 2U) for Side-by-Side	GSC-014	Soft Carrying Case for DMM Accessory

GDM-9061 Rear Panel

GDM-9060 Rear Panel

GTL-217 Test Lead

GSC-014 Soft Carrying Case for DMM Accessory

GDM-TL1 Test Lead Set

GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m

6 ½ Digit Dual Measurement Multimeter

A IDEAL BENCHTOP PARTNER

DCV Accuracy	0.0015%	0.0075%
Sampling Rate	1 kS/sec	1 kS/sec
Memory	100k	10k
Rear Input	Yes	Yes
Current Terminal (Front)	3A, 10A	3A
Current Terminal (Rear)	3A	—
Display	Number, Trend Chart, Bar Meter, Histogram	
Function	Voltage/Current - AC, DC Resistance - 2-Wire, 4-Wire, Diode, Continuity Temperature, Frequency, Period, Capacitance	
Math	REL, dB, dBm, Compare, M+/-/0, Percent, LIM	
ETC	MIN/Max/Average/ P-P, STDEV	
Interface	RS-232C, USB Host/ Device, LAN	

The CDM-9060 series provides all fundamental measurement functions engineers require to design, develop, and test electronic circuits or products, including voltage, current, resistance, diode, and continuity beeper, frequency, temperature and capacitance. In addition, the series also features mathematical functions (dB, dBm, Compare, M+/-/0, LIM and Percent), statistical functions (Min/Max/Average/P-P/STDEV), and a variety of standard communications interfaces. The series can meet specific measurement requirements and complex measurement applications whether for the benchtop operation or to be installed in the system.

B DIVERSE DISPLAY MODE

In addition to the standard numeric display mode, it also provides a variety of graphical functions such as bar meter, trend chart and histogram, so that the measurement results are no longer just a series of numbers, but a swift insight into the panoramic measurement.

C DUAL MEASUREMENT AND DUAL TREND LINE

The dual measurement function has always been a unique feature of GW Instek digital multimeters, allowing two measurement functions to be performed simultaneously and displaying the test results separately so as to greatly improve the test speed of the multi-functional measurement tasks.

D HIGH MEASUREMENT RESOLUTION AND HIGH SAMPLING RATE

GDM-9061 MEASUREMENT TYPE - DCV/DCI/CON/FR								
Refresh Rate Available								
6½ Resolution				5½ Resolution			4½ Resolution	
5/s	20/s	80/s	100/s	480/s	1.2k/s	2.4k/s	4.8k/s	7.2k/s	10k/s

GDM-9060 MEASUREMENT TYPE - DCV/DCI/CON/FR								
Refresh Rate Available								
6½ Resolution				5½ Resolution			4½ Resolution	
5/s	20/s	80/s	100/s	480/s	1k/s	—	—	—	—

The GDM-9060 series provides high resolution of 0.1µV for voltage measurement, 100pA for current measurement, and 100µΩ for resistance measurement to meet the necessary requirements for precision measurement in specific applications. In addition, GDM-9061 is capable of achieving 10k readings per second with a display resolution of 4½ digits, while GDM-9060 achieves 1k measurement readings per second with a display resolution of 5½ digits; such a fast sampling rate is sufficient for current measurement needs.

E TEMPERATURE MEASUREMENT

The GDM-906X series conducts temperature measurement and is ideal for a variety of temperature sensors, such as thermistors, RTDs, and thermocouples. The GDM-906X's temperature measurement supports commonly used thermocouple types (e.g. J / T / K ... etc), using voltage measurement terminals as thermocouple inputs, and calculating temperature based on voltage fluctuations; the function can be used as a temperature recorder if collocated with internal memory capacity and the trend chart function.

F DIVERSE COMMUNICATIONS INTERFACE AND FAST TRANSFER RATE

For system integration applications, the GDM-906X series is equipped with RS232, USB and LAN as standard communications interfaces, and GPIB is an option (can be installed by customer) to meet the requirements of different system integrations. Data transfer rate is up to 10k readings per second (GDM-9861) or 1k readings per second (GDM-9060) via USB/LAN/GPIB interfaces.

G CONVENIENT PC SOFTWARE

The PC software DMM Viewer2 is suitable for any computer communications interfaces (RS232/GPIB/LAN/USB). Provided by the GDM-906X series for long-term data acquisition. The software not only allows users to control the settings of the GDM-906X series but also provides the observation mode or the recording mode for the captured data. For the observation mode, the measurement result is directly presented as the result of the trend plot or the histogram and the result is not saved. For the recording mode, the measurement result is directly saved into the log file, but only the current display is shown in the process. The measured data and trend plot can be viewed after the recording mode is stopped. In addition, the GDM-906X series also provides LabVIEW driver to meet the software application requirements of system integration.

6 ½ Digit Dual Measurement Multimeter

GDM-8261A

CE | RS-232 | USB Device | Digital I/O | GPIB | LAN | PC Software | LabVIEW Driver

FEATURES

- 6½ Digit Display : 1,260,000 Counts
- DCV Basic Accuracy : 0.0035%
- Dual Measurements to Perform Two Selected Measurements Simultaneously
- Bright Vacuum Fluorescent Display (VFD)
- 11 Measurement Functions & 10 Math Functions
- High Resolution : Up to 100pA Resolution with DCI and 1nA with ACI Measurements
- Temperature Measurement (RTD & Thermocouple) From -200°C ~ +1820°C
- High Data Transmission Speed : Up to 2,400 readings/s Through USB Interface
- Standard Interfaces : USB, RS-232C, Digital I/O
- Optional Interfaces : GPIB or LAN
- Optional Scanner Card : GDM-SC1A (9 ch x 15, 1 ch x 2)
- Free PC Software : Excel ADD-in, LabVIEW Driver

GDM-8261A is a high precision 6.5 digit Digital Multimeter with dual measurement displays, 11 measurement functions and 10 math functions at high-accuracy (35ppm DC voltage accuracy) to accommodate the most frequently performed parameter measurements in various application fields today. GDM-8261A adopts a scanner card, which carries 16 V-Channels and 2 I-Channels, to facilitate the measurements of multiple test points on either a device or multiple devices all at a press of a button. With this multi-point measurement capability, GDM-8261A can be used as a semi-auto ATE System to increase the throughput of manufacturing test or as a data logger to perform long term monitoring or characterization of a DUT. A PC Software, EasyMDWM, is available with GDM-8261A to support multi-channel panel setting and data logging of the scanner card. Besides, a LabVIEW driver is also supported to help user create his/her own virtual instrument on the PC screen for easy programming. For ATE system measurements or remote control applications, both USB and RS-232C interfaces are provided as standard, and either GPIB or LAN can be selected as optional interface for GDM-8261A.

SPECIFICATIONS

Accuracy ± (% of reading + % of range) x Temperature Coefficient / °C (18°C ~ 28°C, 65% RH, after 1 hour warm-up)

FUNCTION

Range (*1)	Resolution	Test Current or etc.	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°~18°C, 28°~55°C
DC VOLTAGE						
100.0000 mV	0.1 µV	10MΩ or >10GΩ	0.0030 + 0.0030	0.0045 + 0.0035	0.0050 + 0.0035	0.0005 + 0.0001
1.000000 V	1 µV	10MΩ or >10GΩ	0.0015 + 0.0004	0.0030 + 0.0005	0.0035 + 0.0005	0.0005 + 0.0001
10.00000 V	10 µV	10.1MΩ (±1%)	0.0020 + 0.0006	0.0035 + 0.0006	0.0040 + 0.0007	0.0005 + 0.0001
100.0000 V	0.1 mV	10.1MΩ (±1%)	0.0020 + 0.0006	0.0044 + 0.0010	0.0050 + 0.0010	0.0005 + 0.0001
1000.000 V	1mV	10.1MΩ (±1%)	0.0035 + 0.0006	0.0044 + 0.0010	0.0050 + 0.0010	0.0005 + 0.0001
RESISTANCE (*1)						
100.0000 Ω	100 µΩ	1 mA	0.0040 + 0.0010	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
1.000000 kΩ	1 mΩ	1 mA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
10.00000 kΩ	10mΩ	150 µA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
100.0000 kΩ	100mΩ	15 µA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
1.000000 MΩ	1Ω	2.5 µA	0.0020 + 0.0010	0.008 + 0.001	0.010 + 0.001	0.0010 + 0.0002
10.00000 MΩ	10Ω	410 nA	0.0130 + 0.0010	0.020 + 0.001	0.040 + 0.001	0.0020 + 0.0004
100.0000 MΩ	100Ω	410 nA // 10 MΩ	0.3000 + 0.0100	0.800 + 0.010	0.800 + 0.010	0.1500 + 0.0002
DC CURRENT						
100.0000 µA	100pA	< 0.01 V	0.010 + 0.020	0.04 + 0.025	0.05 + 0.025	0.002 + 0.0010
1.000000 mA	1nA	< 0.15 V	0.007 + 0.008	0.03 + 0.008	0.03 + 0.008	0.002 + 0.0003
10.00000 mA	10nA	< 0.07 V	0.008 + 0.010	0.03 + 0.020	0.03 + 0.020	0.002 + 0.0010
100.0000 mA	0.1 µA	< 0.7 V	0.010 + 0.008	0.03 + 0.008	0.03 + 0.008	0.002 + 0.0001
1.000000 A	1 µA	< 0.3 V	0.010 + 0.008	0.08 + 0.010	0.10 + 0.010	0.003 + 0.0010
3.000000 A	10 µA	< 0.1 V	0.100 + 0.008	0.12 + 0.008	0.12 + 0.008	0.003 + 0.0008
CONTINUITY						
1000.000 Ω	0.001 Ω	1 mA	0.002 + 0.010	0.008 + 0.010	0.010 + 0.010	0.001 + 0.001
DIODE TEST (*1)						
1.000000 V	1 µV	1 mA (typ.)	0.002 + 0.010	0.008 + 0.010	0.010 + 0.010	0.001 + 0.001

SPECIFICATIONS

Accuracy ± (% of reading + % of range) x Temperature Coefficient / °C (18°C ~ 28°C, 65% RH, after 1 hour warm-up)

FUNCTION

Range (*1)	Resolution	Frequency or etc.	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°~18°C / 28°~55°C
TRUE RMS AC VOLTAGE (*1)						
100.0000 mV	0.1 µV	3Hz~5Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
		5Hz~10Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
		10Hz~20kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.004
		20kHz~50kHz	0.10 + 0.08	0.11 + 0.08	0.12 + 0.08	0.011 + 0.008
		50kHz~100kHz	0.55 + 0.08	0.58 + 0.08	0.60 + 0.08	0.060 + 0.008
		100kHz~300kHz(*1)	4.00 + 0.08	4.00 + 0.10	4.00 + 0.08	0.400 + 0.008
1.000000 V~ 700.000 V (*1)	1 µV~ 1mV	3Hz~5Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.03	0.100 + 0.004
		5Hz~10Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.03	0.035 + 0.003
		10Hz~20kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.03	0.005 + 0.003
		20kHz~50kHz	0.10 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
		50kHz~100kHz	0.55 + 0.08	0.58 + 0.08	0.60 + 0.08	0.060 + 0.008
		100kHz~300kHz(*1)	4.00 + 0.08	4.00 + 0.10	4.00 + 0.08	0.400 + 0.008
TRUE RMS AC CURRENT (*1)						
1.000000 mA	1 nA	3Hz~5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
		5Hz~10Hz	0.35 + 0.04	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
		10Hz~5kHz	0.10 + 0.04	0.10 + 0.04	0.11 + 0.04	0.011 + 0.004
		5kHz~10kHz	0.20 + 0.15	0.20 + 0.15	0.21 + 0.15	0.021 + 0.015
10.00000 mA	10 nA	3Hz~5Hz	1.10 + 0.08	1.10 + 0.08	1.10 + 0.08	0.100 + 0.008
		5Hz~10Hz	0.35 + 0.08	0.35 + 0.08	0.35 + 0.08	0.100 + 0.008
		10Hz~5kHz	0.13 + 0.08	0.15 + 0.08	0.15 + 0.08	0.015 + 0.008
		5kHz~10kHz	0.35 + 0.78	0.35 + 0.78	0.35 + 0.78	0.035 + 0.078
100.0000 mA	100 nA	3Hz~5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
		5Hz~10Hz	0.35 + 0.04	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
		10Hz~5kHz	0.15 + 0.04	0.15 + 0.04	0.16 + 0.04	0.015 + 0.004
		5kHz~10kHz	0.25 + 0.25	0.25 + 0.25	0.26 + 0.25	0.026 + 0.025

DIGITAL METERS

GDM-SC1A Scanner card

Multi-point Testing can be facilitated by simple insertion of scanner card.

GTL-247 USB Cable

A-A type cable, Approx. 1.2m

GDM-01 Calibration key

GDM-8261A

Rear Panel

GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m

GTL-207A Test Lead

Approx. 0.8m

GTL-108A 4W Type Test Lead

Approx. 1.1m

GTL-232 RS-232C Cable

Approx. 3m

GSC-014 Soft Carrying Case for DMM Accessory

GDM-TL1 Test Lead Set

TRUE RMS AC CURRENT (*1)

Range (*1)	Resolution	Frequency or min.	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°~18°C/28°~55°C
1.000000 A	1µA	1Hz~5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
		1Hz~10Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.030 + 0.006
		10Hz~5kHz	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.010 + 0.006
		5kHz~10kHz	0.20 + 0.10	0.20 + 0.10	0.20 + 0.10	0.020 + 0.006
10.00000 A	10µA	1Hz~5Hz	1.30 + 0.06	1.30 + 0.06	1.30 + 0.06	0.130 + 0.006
		1Hz~10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
		10Hz~5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
		5kHz~10kHz	0.25 + 0.10	0.25 + 0.10	0.25 + 0.10	0.025 + 0.006

FREQUENCY PERIOD (*1)

100.0000 mV~ 750.0000 V (*2)	–	1 Hz~2 Hz	0.1	0.1	0.1	0.001
		1 Hz~10 Hz	0.02	0.03	0.05	0.001
		10 Hz~40 Hz	0.01	0.02	0.03	0.001
		40 Hz~300 kHz	0.006	0.01	0.02	0.001

TEMPERATURE (RTD) (*3)

-200 °C ~ 600 °C	0.001°C	–	–	–	0.05°C (1year)	0.003°C/°C (1year)

TEMPERATURE (THERMOCOUPLE) (*3)

-200 °C ~ 1370 °C	0.001°C	(J,K,N,T,E Type)	–	–	0.2°C (1year)	0.004°C/°C (1year)
-50 °C ~ 1820 °C	0.01°C	(R,S,B Type)			1.0°C	0.01°C/°C

DISPLAY

VFD, Two Colors Display

INTERFACE

RS-232C, USB, Digital I/O

POWER SOURCE

AC 198 V~264 V, 220 V, 240 V ±10%, 47 Hz ~ 66 Hz and 360 Hz ~ 440 Hz, Power Consumption : Max. 25VA

DIMENSIONS & WEIGHT

340 (W) x 105 (H) x 398 (D) mm, Approx. 3.7 kg

Note : (*1) 10% overrange on all ranges, except 1000 Vdc/ac, 10A range, and continuity.
(*2) Specifications are for sinewave inputs, >1.2 volts rms using 10:1 function.
(*3) Accuracy specifications are for the voltage measured at the input terminals only.
(*4) Variation in the current source will cause some variation in the voltage drop across a connection.
(*5) Specifications are for sinewave input >5% of range.
(*6) 750 Vac range limited to 100 kHz.
(*7) Typically 200 of reading error at 1 MHz.
(*8) Input < 100 mV: For 10 mV to 100 mV inputs, multiply % of reading error x10.
(*9) Specifications do not include probe accuracy and relative to temperature.

ORDERING INFORMATION

GDM-8261A 6 ½ Digit Dual Measurement Multimeter

ACCESSORIES:

Quick start guide x 1, Power cord x 1, Test lead GTL-207A x 1, USB cable GTL-247 x 1, CD x 1 (including complete user manual, upgrade program and PC software), Calibration key GDM-01 x 1 (for firmware upgrade)

OPTION

GDM-SC1A	Scanner Card (Y-Dx4 Ch. 1 ch. x 2)
GDM-GBIB	GPIB Card
GDM-LAN	LAN Card

* Either GPIB or LAN can be installed in each GDM-8261A

OPTIONAL ACCESSORIES

GTL-108A	4W Type test lead	GRA-403	Rack Mount Kit (7" 1U)
GTL-246	GPIB Cable, Approx. 2m	GRA-404	Rack Mount Kit (7" 3U size for two sets)
GTL-205A	Temperature Probe Adaptor with Thermocouple (K type), Approx. 1m		
GTL-232	RS-232C Cable, 9-pin Female to 9-pin, null Modem, Approx. 3m		
GSC-014	Soft Carrying Case for DMM Accessory	GDM-TL1	Test Lead Set for 4½ DMM

FREE DOWNLOAD

PC Software	Excel VCCI v.x, RS-232C, USB Interface Supported
Driver	USB IVI-C Driver

* These are examples, not adding accessories

5 ½ Digit Dual Display Digital Multimeter

CDM-8255A

FEATURES

- 5 ½ Digits(199,999 Counts Max.)
- VFD Two Colors Display
- 0.012% DCV Accuracy
- True RMS (AC, AC+DC)
- 9 Major Measuring Functions and 10 Advanced Measurement Functions
- DK/VK Resistance Measurement
- High Voltage 1000V and 10A Current Range
- Standard Interface : RS-232C, USB Device, Digital I/O
- Free PC Software (DMM-VIEWER), LabVIEW Driver
- Optional 16+2 Channels Scanner Card

CDM-8255A portable precision multimeters feature 199,999 counts, a dual display, a 0.012% DCV accuracy and fast measurement. The VFD display technology provides the excellent observation of contrast and brightness.

CDM-8255A carries an extensive list of standard measurement items with a dual display allowing two measurement items to be displayed simultaneously. Advanced measurement functions, such as Max/Min, Hold, Relative value and Compare, are available for a majority of applications such as production testing, research and field verification. The USB, RS-232C and 9-pin digital I/O interface are included as standard features for remote control and data capturing for ATE applications.

For convenient PC-based remote control and extensive data capture, CDM-8255A includes DMM-Viewer software at no additional cost. DMM-Viewer mirrors the operations of the multimeters on the PC, allowing you to quickly use the software with little effort.

The optional scanner card (CDM-SC16) creates a self-contained multipoint measurement solution with plug-in design. This approach eliminates the complexities of multipoint measurements and data processing. This scanner lets users effectively measure multiple channels connected to a single CDM-8255A. Each scanner card has 16 general purpose channels and 2 extra channels for current (ACI, DCI) measurements. All channels are fully isolated (Hi and Lo). Up to two scanner cards can be inserted into each multimeter for a maximum of 18 channels. These optional modules not only provide customers with a complete hands-free multiple measurement solution, but also provide a cost effective upgrade path compared with purchasing dedicated instruments.

CTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m

CTL-247 USB Cable

A-A type cable, Approx. 1.8m

CDM-01 Calibration key

CDM-SC1A Scanner card

Multipoint Testing can be Performed by simple insertion of scanner card.

SPECIFICATIONS	
FULL SCALE	
	5 ½ Digits (199,999 Counts Max.)
SAMPLE RATE	
	Slow : 2 ½ digits, 10 readings/second Medium : 4 ½ digits, 10 readings/second Fast : 3 ½ digits, 60 readings/second
DC VOLTAGE	
Range **Accuracy** **Input Resistance**	100mV, 1V, 10V, 100V, 1000V, 5 ranges 100mV : ±(0.012% rdg + 3 digits) 1V ~ 1000V : ±(0.012% rdg + 1 digits) 10MΩ
AC VOLTAGE True RMS	
Range **Accuracy** **Input Resistance**	100mV, 1V, 10V, 100V, 750V, 5 ranges 100mV range : 20Hz ~ 45Hz : ±(1% rdg + 100 digits) 45Hz ~ 10kHz : ±(0.2% rdg + 100 digits) 10kHz ~ 30kHz : ±(1.5% rdg + 300 digits) 30kHz ~ 100kHz : ±(11% rdg + 300 digits) 1V, 10V, 100V, 750V ranges : 20Hz ~ 45Hz : ±(1% rdg + 100 digits) 45Hz ~ 10kHz : ±(0.2% rdg + 100 digits) 10kHz ~ 30kHz : ±(1% rdg + 100 digits) 30kHz~100kHz : ±(3% rdg + 200 digits) 1.1MΩ in parallel with approx. 100pF
DC CURRENT	
Range **Accuracy**	10mA, 100mA, 1A, 10A, 4 ranges 10mA : ±(0.05% rdg + 15 digits) 100mA : ±(0.05% rdg + 5 digits) 1A, 10A range : ±(0.2% rdg + 3 digits)
AC CURRENT TRUE RMS	
Range **Accuracy**	10mA, 100mA, 1A, 10A, 4 ranges 10mA, 100mA ranges : 20Hz ~ 50Hz : ±(1.5% rdg + 100 digits) 50Hz ~ 10kHz : ±(0.5% rdg + 100 digits) 10kHz~20kHz : ±(1% rdg + 200 digits) 1A , 10A range : 50Hz ~ 10kHz : ±(1% rdg + 100 digits)
RESISTANCE	
Range **2W Accuracy** **4W Accuracy**	100Ω, 1kΩ, 10kΩ, 100kΩ, 1MΩ, 10MΩ, 100MΩ, 7 ranges 100Ω range : ±(0.1% rdg + 8digits)(*) 1kΩ range : ±(0.08% rdg + 5 digits)(*) 10kΩ range : ±(0.08% rdg + 5digits)(*) 100kΩ ~ 1MΩ range : ±(0.08% rdg + 5digits) 10MΩ range : ±(0.5% rdg + 8 digits) 100MΩ range : ±(1% rdg + 8 digits) 100Ω range : ±(0.05% rdg + 8 digits) 1kΩ ~ 1MΩ range : ±(0.05% rdg + 5 digits) 10MΩ range : ±(0.2% rdg + 5 digits) 100MΩ range : ±(1% rdg + 8 digits)

GDM-8255A

Rear Panel

Specifications

DIGITS TEST

Open-Circuit Voltage: 20V, Test Current: 0.5mA, Accuracy: ±(0.03%rdg + 4 digits)

FREQUENCY

1Hz~10MHz : Sensitivity 0.1V, Accuracy: ±(0.01%rdg + 1 digits)
10Hz~100kHz : Sensitivity 1V, Accuracy: ±(0.01%rdg + 5 digits)
50Hz~300kHz : Sensitivity 2.5V, Accuracy: ±(0.01%rdg + 5 digits)

CONTINUITY BEEPER

1 ~ 1000Ω, Define by user, Accuracy: ±(0.08%rdg + 1 digits)

TEMPERATURE

0 °C ~ 300 °C, J, K, T Type

OTHER FUNCTIONS

Auto range / Manual, Math : mX + B / %, / 1/X Max, Min, dBm, dB, REL, Hold, Compare, Store, Recall

DISPLAY

VFD, Two Colors Display

INTERFACE

Digital : I/O, USB, RS-232C

POWER SOURCE

AC 198V~242V ± 10%, 50/60Hz, Power Consumption : Max. 30VA

DIMENSIONS & WEIGHT

260(W) x 140(H) x 330(D) mm, Approx. 3.0 kg

Note: 1. 4-Wire, 1Hour Mode

ORDERING INFORMATION

GDM-8255A 5.5 Digit Dual Display Digital Multimeter

ACCESSORIES :
Quick start user manual x 1, Power cord x 1, Test lead GTL-207A x 1, USB Cable GTL-247
CD x 1 (including complete user manual, upgrade program and PC software (DMM Viewer))
Calibration key (GDM-C1 x 1)

OPTION

GDM-8ETA Scanner Card (14-ch x 1, 7-ch x 2)

OPTIONAL ACCESSORIES

GTL-168A	4W Type test lead
GTL-232	RS-232C Cable, 9-pin female to 9-pin, null modem for computer, Approx. 2.0m
GTL-235A	Temperature probe adapter with thermocouple (K type), Approx. 1.0m
GRA-422	Rack mount kit (1U, 2U)
GRA-436	Rack mount kit, 19" (1U size for two sets)
GDM-TL1	Test Lead Set
GSC-814	Soft Carrying Case for DMM Accessory

FREE DOWNLOAD

PC Software	GW Instek DMM Viewer
Driver	LabVIEW Driver USB Driver

GDM-TL1 Test Lead Set

GTL-168A 4W Type Test Lead

Approx. 1.2m

GTL-232 RS-232C Cable

Approx. 2m

GSC-814 Soft Carrying Case for DMM Accessory

GTL-207A Test Lead

Approx. 0.8m

5 ½ Digit Dual Measurement Multimeter

GDM-8351

FEATURES

- 5 ½ Digit (120,000 Counts), VFD Display
- Dual Measurement/Dual Display
- The Basic Precision of DC Voltage : 0.012%
- Selectable Measurement Speeds, the Maximum : 100 Readings/s
- True RMS (AC, AC+DC) Measurements
- Auto/Manual Selection
- 12 Different Measurement Functions : AC/DC Voltage, AC/DC Current, AC+DC Voltage/Current, 2W/4W Resistance, Continuity Beeper, Diode Test, Capacitance, Frequency, Temperature
- Many Auxiliary Functions : Max./Min., REL/REL#, Compare, Hold, dB, dBm, Math (MX+B, %, 1/X)
- Digital I/O Provides Dual Mode(Standard Compare and User Definition Modes)
- Standard RS-232C and USB Device Interface (Support USB CDC and USB TMC Modes)

GW Instek presents the brand new 5 1/2 Digit Dual Measurement Multimeter GDM-8351 to replace GDM-8251A of the same category. GDM-8351 features VFD dual display, maximum 120,000 counts, 0.012% basic DC voltage accuracy and USB/RS232C connectors to provide users with measurement precision, quick data observation, and the convenient connection with the personal computer. In addition to the fundamental measurement items such as AC/DC voltage, AC/DC current, AC+DC voltage measurement, 2W/4W resistance, frequency, temperature measurement, continuity beeper and diode test, GDM-8351 is also equips with the capacitance measurement function. Furthermore, the GDM-8351 also provides many auxiliary functions, including maximum/minimum values, dB, dBm, compare, reading hold, algorithm (MX+B, 1/X, %) etc. to meet the measurement requirements for manufacturing process tests, educational experiments and testing facilities. For the external control, the pin of digital I/O interface not only provides the signal output frequently used by the compare function, but also allows users to define signal output for each pin. Under the self-definition mode, users can apply the I/O as a simple digital hardware. The internal control requirement can be achieved by signals from each pin so as to help users reduce trouble of making hardware. With respect to remote control and retrieving data, GDM-8351, taking consideration of users' habitual practice and universal system interface, provides standard RS-232C and USB interfaces to edit control programs and read measurement results. It is worth noting that for utilizing the USB interface, users have options of selecting either USB CDC or USBTMC mode. While USBTMC is selected, users are able to control instrument with the USB interface exactly the same as controlling instrument with the GPIB interface; therefore, the relatively expensive GPIB connection cable is no longer required.

SPECIFICATIONS [1]

Range [2]	Resolution	Test Current or Burden	Accuracy (±% of Reading + Digits) 1 Year (23°C±5°C)
DC VOLTAGE			
100.000mV	1μV	10MΩ or >10GΩ	0.012 + 5
1.00000V	10μV	10MΩ or >10GΩ	0.012 + 3
10.0000V	100μV	11.1kΩ	0.012 + 3
100.000V	1mV	10.1kΩ	0.012 + 5
1000.00V	10mV	10MΩ	0.012 + 5
RESISTANCE			
100.000Ω	1mΩ	1mA	0.05 + 8
1.00000kΩ	10mΩ	1mA	0.05 + 5
10.0000kΩ	100mΩ	100μA	0.05 + 5
100.000kΩ	1Ω	10μA	0.05 + 5
1.00000MΩ	10Ω	1μA	0.05 + 5
10.0000MΩ	100Ω	0.5μA	0.30 + 5
100.000MΩ	1kΩ	0.5μA/10MΩ	3.00 + 8
DC CURRENT			
10.0000mA	100nA	1.1Ω	0.05 + 10
100.000mA	1μA	1.1Ω	0.05 + 5
1.00000A	10μA	0.1Ω	0.20 + 5
10.0000A	100μA	0.01Ω	0.20 + 5
CONTINUITY			
1000.00Ω	10mΩ	1mA	0.05 + 5
DIODE TEST			
6.0000V	100μV	1mA@6V	0.05 + 15
CAPACITANCE			
10.00nF	0.01nF	10μA	2.0 + 10
100.0nF	0.1nF	10μA	2.0 + 4
1.000μF	0.001μF	100μA	2.0 + 4
10.00μF	0.01μF	1mA	2.0 + 4
100.0μF	0.1μF	1mA	2.0 + 4

General	
Display	VFD, Two Colors Display
Interface	RS-232C, USB device (USB CDC & USBTMC)
Power Source	AC 100 V / 120 V / 220 V / 240 V ±10%, 50-60Hz Power Consumption: Max. 15VA
Dimensions & Weight	265 (W) x 107 (H) x 300 (D) mm, approx. 2.0kg

Note

1. All specifications are applicable to the main (1st) display only and warmed up for at least 30 minutes and operated in the slow rate.
2. 20% overrange on all ranges, except 100V/1kV range.
3. Accuracy = (% of Reading + Digits)

GTL-107A Test Lead

Approx. 0.2m

GDM-8351

Rear Panel

GENERAL SPECIFICATIONS

Range(*1)	Resolution	Frequency or Etc.	Accuracy 1 Year (23°C±5°C)
True RMS AC (or AC+DC – AC Coupled) Voltage			
100.0000mV	1μV	20Hz – 45Hz 45Hz – 10kHz 10kHz – 50kHz 50kHz – 100kHz	1.0 + 100 0.5 + 100 1.5 + 100 3.0 + 300
1.000000V	10μV	20Hz – 45Hz 45Hz – 10kHz 10kHz – 50kHz 50kHz – 100kHz	1.0 + 100 0.2 + 100 1.0 + 100 3.0 + 300
10.00000V	100μV	20Hz – 45Hz 45Hz – 10kHz 10kHz – 50kHz 50kHz – 100kHz	1.0 + 100 0.2 + 100 1.0 + 100 3.0 + 300
100.0000V	1mV	20Hz – 45Hz 45Hz – 10kHz 10kHz – 50kHz 50kHz – 100kHz	1.0 + 100 0.2 + 100 1.0 + 100 3.0 + 300
750.000V	10mV	20Hz – 45Hz 45Hz – 10kHz 10kHz – 50kHz 50kHz – 100kHz	1.0 + 100 0.2 + 100 1.0 + 100 3.0 + 300
True RMS AC (or AC+DC – AC Coupled) Current			
10.00000mA	100nA	20Hz – 45Hz 45Hz – 2kHz 2kHz – 10kHz	1.5 + 100 0.5 + 100 2.0 + 200
100.0000mA	1μA	20Hz – 45Hz 45Hz – 2kHz 2kHz – 10kHz	1.5 + 100 0.5 + 100 2.0 + 200
1.000000A	10μA	20Hz – 45Hz 45Hz – 2kHz 2kHz – 10kHz	1.5 + 100 0.5 + 100 2.0 + 200
10.00000A	100μA	20Hz – 45Hz 45Hz – 2kHz 2kHz – 10kHz	1.5 + 100 1.0 + 100 -----
FREQUENCY			
(Voltage) 10Hz – 1MHz (Current) 2Hz – 10kHz	----- -----	----- -----	0.01 + 5 0.01 + 5
TEMPERATURE (Thermocouple)			
-200 °C – 0 °C 0 °C – +200 °C	0.01 °C 0.01 °C	J / T / K J / T / K	0.6 °C(typical) 0.3 °C(typical)

ORDERING INFORMATION

GDM-8351 5 ½ Digit Dual Measurement Multimeter

ACCESSORIES:

Safety Instruction Sheet x 1, Power cord x 1, Fuse (not GTL-205A) x 1, CD x 1 (including complete user manual, demo and software)

OPTIONAL ACCESSORIES

GTL-106A	4-Wire Test Lead (Refer to Ch.3), Approx. 1.1800mm
GTL-205A	Temperature probe adaptor with thermocouple (K type), Approx. 1.1800mm
GTL-232	RS-232C Cable, 9-pin female to 9-pin, null modem for computer, Approx. 3.0000mm
GTL-246	USB Cable, A-B type, Approx. 1.2000mm
GRA-403	Rack Mount Kit (19", 2U)
GDM-TL1	Test Lead Set
GSC-014	Soft Carrying Case for GDM Accessory

GSC-014 Soft Carrying Case for GDM Accessory

GDM-TL1 Test Lead Set

GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1.m

50000 Counts Dual Measurement Multimeter

Item No. 21BF0041AN1

GDM-8341
GDM-8342

CE | USB Host | USB Device | PC Software | GPIB | LXI/VXI Other

FEATURES

- 50000 Counts Vacuum Fluorescent Display with Two Colors
- Dual Measurement
- Fast Measurement Rate Up to 48 readings/s for DCV
- 0.02% DCV Basic Accuracy
- Auto/Manual Ranging
- True RMS (AC, AC+DC)
- 11 Measurement Functions
- Max./Min., REL, MX+B, %DC, Ref%, Compare, Hold, dB, dBm
- Standard USB Device for Communicating to PC
- Temperature Measurement (GDM-8342 only)
- USB Storage for Data Collection (GDM-8342 only)
- Optional GPIB (Factory install for GDM-8342 only)

GW Instek rolls out the new generation Dual Measurement Multimeter – the GDM-8300 Series, which has two models - GDM-8341 and GDM-8342. Its exceptional features include 50,000 counts, VFD dual display, 0.02% basic DC voltage accuracy and a USB protocol converter to provide users with measurement precision, build data observation, and the convenience to connect with the personal computer.

The GDM-8300 Series not only supports the fundamental measurement items provided by general multimeters, but also equips with capacitance and temperature measurement functions. Furthermore, the GDM-8300 Series also provides many auxiliary functions to meet the measurement requirements for manufacturing process tests, educational experiments and testing facilities.

With respect to storing and retrieving data, the GDM-8300 Series has two methods to offer first, the USB flash drive storage function – operating alone without connecting with a computer; second, USB interface (virtual COM port) and optional GPIB interface (must be installed in factory) for automatic measurement system users to conveniently save and retrieve data.

SPECIFICATIONS (1/2)

FUNCTION Range[*1]	Resolution	Test Current or etc.	Accuracy 1 Year [23°C±5°C]
DC VOLTAGE			
500.000mV	10μV	10MΩ or >10GΩ	0.02 + 4
5.0000V	100μV	10MΩ or >10GΩ	0.02 + 4
50.000V	1mV	11.1MΩ	0.02 + 4
500.00V	10mV	10.1MΩ	0.02 + 4
1000.0V	100mV	10MΩ	0.02 + 4
RESISTANCE			
500.000Ω	10mΩ	0.81mA	0.10 + 1 [*4]
5.0000kΩ	100mΩ	0.82mA	0.10 + 1 [*4]
50.000kΩ	1Ω	82μA	0.10 + 1
500.00kΩ	10Ω	8.2μA	0.10 + 1
5.0000MΩ	100Ω	820nA	0.10 + 1
50.000MΩ	1kΩ	340nA/10 MΩ	0.30 + 1
DC CURRENT			
500.00μA	10nA	0.06Vmax.	0.05 + 3
5.0000mA	100nA	0.06Vmax.	0.05 + 4
50.000mA	1μA	0.18Vmax.	0.05 + 4
500.00mA	10μA	1.4Vmax.	0.10 + 4
5.0000A	100μA	0.3Vmax.	0.30 + 4
10.000A	1mA	0.8Vmax.	0.30 + 4
CONTINUITY			
1000.0Ω	100mΩ	0.81mA	0.10 + 1
DIODE TEST			
5.0000V	100μV	0.82mA	0.08 + 1
CAPACITANCE			
5.000nF - 0.5~ 5nF	0.001nF	8.2μA	3.00 + 30
5.000nF - 1~5nF	0.001nF	8.2μA	3.00 + 30
50.00nF - 5~50nF	0.01nF	8.2μA	3.00 + 30
50.00nF - 10~50nF	0.01nF	8.2μA	3.00 + 30
500.0nF	0.1nF	82μA	3.00 + 4
5.000μF	1nF	0.81mA	3.00 + 4
50.00μF	10nF	0.82mA	3.00 + 4

SPECIFICATIONS (2/2)

FUNCTION Range[*1]	Resolution	Test Current or etc.	Accuracy 1 Year [23°C±5°C]
True RMS AC (or AC+DC – AC Coupled Voltage [*3])			
500.000mV	10μV	20Hz ~ 50Hz 50Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	1.00 + 40 0.30 + 40 1.00 + 60 3.00 + 120
5.0000V	100μV	20Hz ~ 50Hz 50Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	1.00 + 20 0.30 + 15 1.00 + 30 3.00 + 30
50.000V	1mV	20Hz ~ 50Hz 50Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	1.00 + 20 0.30 + 15 1.00 + 30 3.00 + 30
500.00V	10mV	20Hz ~ 50Hz 50Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	— 0.30 + 15 1.00 + 30 3.00 + 30
1000V	100mV	20Hz ~ 50Hz 50Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	— 0.30 + 15 — —

GTL-207A Test Lead

Approx. 0.8m

CDM-8300 Series

Rear Panel

SPECIFICATIONS			
True RMS AC (on AC+DC – AC Coupled) Current (*1*6)			
100.00μA	10nA	30Hz – 10kHz 10kHz – 20kHz 20kHz – 50kHz 50kHz – 200kHz	1.00 + 80 0.50 + 40 1.50 + 50 5.00 + 70
1.0000mA	100nA	30Hz – 10kHz 10kHz – 20kHz 20kHz – 50kHz 50kHz – 200kHz	1.00 – 40 0.50 – 20 1.50 – 40 5.00 – 60
10.000mA	1μA	30Hz – 10kHz 10kHz – 20kHz 20kHz – 50kHz 50kHz – 200kHz	1.00 + 80 0.50 + 30 1.50 + 80 5.00 + 80
100.00mA	10μA	30Hz – 10kHz 10kHz – 20kHz 20kHz – 50kHz 50kHz – 200kHz	1.00 – 40 0.50 – 20 1.50 – 40 5.00 – 60
1.0000 A	100μA	30Hz – 10kHz 10kHz – 20kHz	2.00 – 40 0.50 – 30
10.000A	1mA	30Hz – 10kHz 10kHz – 20kHz	2.00 – 40 0.50 – 30
FREQUENCY / PERIOD			
10Hz – 100kHz 100Hz – 300kHz 300kHz – 1MHz	–	–	0.01 – 3 0.01 – 3 0.01 – 3
TEMPERATURE (T/C) 88(K) (K-TYPE)			
-200°C – +200°C	0.1°C	J / T / K type	2°C (3°F)
DISPLAY			
VFD, Two Colors Display			
INTERFACE			
USB device, USB Host (CDM-8341 only)			
POWER SOURCE			
AC 100V/120V/220V/240V ±10%, 50 – 60Hz , Power Consumption : Max. 15VA			
DIMENSIONS & WEIGHT			
240 (W) x 107 (H) x 300 (D) mm, Approx. 2.9kg			

Note: The specifications apply when the DMM is warmed up for at least 30 minutes and operates in slow rate.

1. All specifications are assured only under room (23±5) degree.
2. Accuracy = ±(% of reading + digits)
3. 0% error range on all ranges, except 10A, is 20% overrange.
4. REL function is on.
5. The accuracy of AC+DC is equal to AC with 10 more digits added.
6. AC characteristics are for sinewave input > 5% of range.
7. Specifications do not include probe accuracy.

ORDERING INFORMATION

CDM-8342-with-IRW	50000 counts Dual-Measurement Multimeter with USB Host/Device and opt.IR-CRW
CDM-8342	50000 counts Dual-Measurement Multimeter with USB Host/Device
CDM-8341	50000 counts Dual-Measurement Multimeter with USB Device

ACCESSORIES:
Safety Instruction Sheet x 1, Power cord x 1, Test lead CTL-205A x 1, CD x 1
(excluding: samples, user manual, USB driver and PC software)

OPTIONS:		
CDM-IRC1	CP90 Interface	* Factory installed for CDM-8342-with-

OPTIONAL ACCESSORIES	
CTL-205A	Temperature probe adaptor with thermocouple (K type), Approx. 1800mm
CTL-USB	USB Cable, USB 2.0, A/B Type, 1.2Meter
CTL-IRB	GPIB Cable, Double Shielded, 3000mm
CRA-402	Rack Mount Kit (19", 2U)
CDM-TL1	Test Lead Set
CSC-014	Soft Carrying Case for DMM Accessory

CSC-014 Soft Carrying Case for DMM Accessory

CDM-TL1 Test Lead Set

CTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m

50000 Counts Dual Display Digital Multimeter

CDM-8245 is an economical bench-top DMM equipped with a rich set of features. CDM-8245 has large 7 segment LED dual display features up to 50,000 counts and the ability to show two measurements at extensive list of measurement items - DC Voltage/Current, AC Voltage/Current with true RMS, Resistance, Capacitance, Frequency, Continuity (with beeper), Diode Test, and dBm. Additional measurement functions, such as Max/Min, Hold and Relative value. With great range, good accuracy and ability to accept up to 20A of current, CDM-8245 is the perfect general purpose DMM.

CDM-8245 (50000 Counts)

CE

FEATURES

- 50000 Counts Display
- Multi-Function: ACV, DCV, ACA, DCA, R, C, Hz, Continuity Beeper, Diode Test, Max/Min, REL, Hold, dBm
- Dual Display Indicate ACV and Hz, DCV/ACV and dBm
- Manual or Auto Ranging
- 0.03% DCV Accuracy
- ACV Measuring Frequency Up to 30MHz
- AC True RMS or AC + DC True RMS

Rear Panel

CTL-117 Test Lead

Approx. 1.1m

SPECIFICATIONS	
DC VOLTAGE	
Range	500mV, 5V, 50V, 500V, 1000V, 5 ranges
Accuracy	± (0.03% rdg + 4 digits)
Input Impedance	10MΩ
AC VOLTAGE TRUE RMS (AC OR AC + DC TRUE RMS)	
Range	500mV, 5V, 50V, 500V, 1000V, 5 ranges
Accuracy	500mV ~ 50V, 3 ranges : 20Hz ~ 45Hz : ±(1% rdg + 15 digits) 45Hz ~ 20kHz : ±(0.5% rdg + 15 digits) 20kHz ~ 30kHz : ±(1% rdg + 15 digits) 100V/1000V range : 45Hz ~ 1kHz : ±(0.5% rdg + 15 digits)
Input Impedance	10MΩ
DC CURRENT	
Range	500 µA, 5mA, 50mA, 500mA, 2A, 20A, 6 ranges
Accuracy	500uA~500mA 4 ranges: ±(0.2% rdg+2 digits) 2A~20A 2 ranges: ±(0.5% rdg+2digits)
AC CURRENT TRUE RMS (AC OR AC + DC TRUE RMS)	
Range	500 µA, 5mA, 50mA, 500mA, 2A, 20A, 6 ranges
Accuracy	500 µA ~ 20A 6 ranges 20Hz ~ 45Hz : ±(1% rdg + 15 digits) ; 45Hz ~ 2kHz : ±(0.5% rdg + 15 digits) 500 µA ~ 50mA 3 ranges 2kHz ~ 10kHz : ±(1% rdg + 15 digits) ; 10kHz ~ 20kHz : ±(2% rdg + 15 digits)
RESISTANCE	
Range	500Ω, 5kΩ, 50kΩ, 500kΩ, 5MΩ, 50MΩ, 6 ranges
Accuracy	500Ω : ±(0.1% rdg + 4 digits); 5kΩ ~ 500kΩ : 3 ranges : ±(0.1% rdg + 2 digits) 5MΩ : ±(0.2% rdg + 2 digits); 50MΩ : ±(0.5% rdg + 3 digits)
DIODE TEST	
	The one range can check the forward voltage of diode. Maximum forward voltage 1.5V open voltage 2.8V
CAPACITANCE	
Range	5nF, 50nF, 500nF, 5µF, 50µF, 5 ranges
Accuracy	±(2% rdg + 4 digits)
FREQUENCY	
Input Level (Sine Wave)	mV range : 10Hz ~ 50kHz : >30mV ; 50k ~ 150kHz : >200mV 5V ~ 50V range : 10Hz ~ 200kHz : >1.2V ; 500V range : 20Hz ~ 1kHz : >12V
FUNCTIONS	
	Auto/Manual/Range, Max, Min, dBm, REL, Hold
CONTINUITY BEEPER	
	50Ω or lower sounds when conductance is less than 10Ω
DISPLAY	
Dual Display 0.4" and 0.3", 7 segment LED display	
POWER SOURCE	
AC 100V/120V/230V ±10%, 50/60Hz ; Power Consumption : Max. 8VA	
DIMENSIONS & WEIGHT	
251 (W) x 91 (H) x 251 (D) mm, Approx. 2.0kg	

ORDERING INFORMATION

GDM-8245 50,000 Counts Dual Display Digital Multimeter

ACCESSORIES :
User manual x 1, Power cord x 1, Test lead CTL-117 x 1

OPTIONAL ACCESSORIES

GRA-414 Soft Carrying Case for GDM-8000 Series

HAND-HELD DIGITAL MULTIMETER

MODEL	GDM-841	GDM-830	GDM-820	GDM-810
Max. Display	22000	6080	9999	6000
Auto Ranging	✓	✓	✓	
Analog Bar	✓	✓		
True RMS	✓	✓	✓	
Display Backlight	✓	✓	✓	✓
Auto Power off	✓	✓	✓	✓
Curr. Range Protection	PTS & Fuse	PTS & Fuse	Fuse	Fuse
DC Voltage	1000V	1000V	999.9V	600V
AC Voltage	1000V	1000V	999.9V	600V
DC Current	20A	20A	9.99A	10A
AC Current	20A	20A	9.99A	
Resistance	220MΩ	60MΩ	99.99MΩ	60MΩ
Capacitance	220mF	60mF	9.999mF	9.999mF
Frequency	220MHz	10MHz	9.9MHz	
Diode	✓	✓	✓	✓
Continuity	✓	✓	✓	✓
Temperature		✓	✓	
Duty Cycle (%)	✓	✓	✓	
Transistor (hFE)	✓			
NCV Function	✓	✓	✓	✓
RSL	✓	✓	✓	
Data Hold	✓	✓	✓	✓
Peak Hold	✓	✓		
MAX MIN	✓	✓		
LoZ ACV		✓		
LPF ACV	✓			
Audible / Visual Alarm	✓	✓	✓	✓
AC+DC Measurement	✓			
Interface	USB	USB		
Safety Rating	CAT III 1000V CAT IV 600V	CAT III 1000V CAT IV 600V	CAT II 1000V CAT III 600V	CAT III 600V
Page	E17-18	E17-18	E17-18	E17-18

GDM-541

GDM-533

GDM-532

The GDM-500 Series Hand Held DMM are a compact, high precision, battery operated multimeter series designed to meet of service engineers. The GDM-500 Series design is driven by mobile-oriented features: automatic power off to preserve battery life, a large backlight display for crisp viewing, a rotary selector and push buttons to ease operation, and then NCV (Non-Contact Voltage) function for outdoor use.

The basic functions match the depth of bench-top multimeters: fuse-protected current input, true RMS for accurate AC measurements, Audible/Visual Alarm when Overload, Auto ranging, Duty cycle and Relative mode. The compact, reliable and economical devices are ideal for any engineer.

Specifications

DC VOLTAGE	
Range	220.00mV, 2.1000V, 21.000V, 220.00V, 1000V (GDM-541) 66.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V (GDM-533) 9.999mV, 99.99mV, 999.9mV, 9.999V, 99.99V, 999.9V (GDM-532) 600.0mV, 6.000V, 60.00V, 600.0V (GDM-531)
Best Accuracy	±(0.05%rdg + 5 digits) for GDM-541 ; ±(0.5%rdg + 3 digits) for GDM-533 ±(0.8%rdg + 3 digits) for GDM-532 ; ±(0.7%rdg + 3 digits) for GDM-531
Input Impedance	10 MΩ (6 mV range : 1GΩ) for GDM-541/533, 3GΩ for GDM-532
AC VOLTAGE	
Range	220.00mV, 2.1000V, 21.000V, 220.00V, 1000.0V(GDM-541) 66.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V (GDM-533) 9.999mV, 99.99mV, 999.9mV, 9.999V, 99.99V, 999.9V (GDM-532) 600.0V(GDM-531)
Best Accuracy	±(0.8%rdg + 10 digits) for GDM-541 ; ±(1.0%rdg + 3 digits) for GDM-533 ±(1.0%rdg + 3 digits) for GDM-532 ; ±(1.2%rdg + 3 digits) for GDM-531
Frequency Response	40Hz~10kHz for GDM-541/ 40Hz~1kHz for GDM-533 45Hz~400Hz for GDM-532, 40Hz~400Hz for GDM-531
Input Impedance	10 MΩ
DC CURRENT	
Range	220.00μA, 2200.0μA, 22.000mA, 220.00mA, 20.000A(GDM-541) 600.0μA, 6000μA, 60.00mA, 600.0mA, 6.000A, 20.00A(GDM-533) 999.9μA, 9999μA, 9.999A(GDM-532) 600.0μA, 6000μA, 60.00mA, 600.0mA, 10.00A(GDM-531)
Best Accuracy	±(0.05%rdg + 10 digits) for GDM-541 ; ±(1.0%rdg + 3 digits) for GDM-533 ±(1.8%rdg + 3 digits) for GDM-532
AC CURRENT	
Range	220.00μA, 2200.0μA, 22.000mA, 220.00mA, 20.000A(GDM-541) 600.0μA, 6000μA, 60.00mA, 600.0mA, 6.000A, 20.00A(GDM-533) 999.9μA, 9999mA, 9.999A(GDM-532)
Best Accuracy	±(0.8%rdg + 10 digits) for GDM-541 ; ±(1.2%rdg + 3 digits) for GDM-533 ±(1.8%rdg + 3 digits) for GDM-532
RESISTANCE	
Range	220.00Ω, 2.2000kΩ, 22.000kΩ, 220.00kΩ, 2.2000MΩ, 22.000MΩ, 220.00MΩ(GDM-541) 600.0Ω, 6.000kΩ, 60.00kΩ, 600.0kΩ, 6.000MΩ, 60.00MΩ(GDM-533) 999.9Ω, 9.999kΩ, 99.99kΩ, 999.9kΩ, 9.999MΩ, 99.99MΩ(GDM-532) 600.0Ω, 6.000kΩ, 60.00kΩ, 600.0kΩ, 6.000MΩ(GDM-531)
Best Accuracy	±(0.05%rdg + 10 digits) for GDM-541 ; ±(1.0%rdg + 2 digits) for GDM-533 ±(0.8%rdg + 2 digits) for GDM-532 ; ±(0.8%rdg + 3 digits) for GDM-531
CONTINUITY BUZZER	
	Buzzer sounds if conductance less than 30Ω for GDM-541/533 Buzzer sounds if conductance less than 30Ω for GDM-532 Buzzer sounds if conductance less than 10Ω for GDM-531
DIODE TEST	
Open Circuit Voltage	GDM-541/531 : 3V (Approx.), GDM-533 : 3.3V (Approx.), GDM-532 : 2.7V (Approx.)
CAPACITANCE	
Range	22.000nF, 220.00nF, 2.2000μF, 22.000μF, 220.00μF, 2.2000mF, 22.000mF, 220.00mF(GDM-541) 66.00nF, 660.0nF, 6.600μF, 66.00μF, 660.0μF, 6.600mF, 66.00mF(GDM-533) 9.999nF, 99.99nF, 999.9nF, 9.999μF, 99.99μF, 999.9μF, 9.999mF(GDM-532/531)
Best Accuracy	±(5.0%rdg + 5 digits) for GDM-541/533, ±(8.0%rdg + 5 digits) for GDM-532/531
FREQUENCY	
Range	10Hz ~ 220kHz(GDM-541), 10Hz ~ 10kHz(GDM-533), 99.99Hz ~ 9.999MHz(GDM-532)
Best Accuracy	±(0.01%rdg + 5 digits) for GDM-541 ; ±(0.1%rdg + 4 digits) for GDM-533 ±(0.1%rdg + 5 digits) for GDM-532
Input Amplitude	≤5Vrms
TEMPERATURE	
Range	-40°C ~ 1000°C, -40°F ~ 1832°F
Best Accuracy	±(1.0%rdg + 3°C) for GDM-533, ±(1.0%rdg + 1°C) for GDM-532 ±(1.0%rdg + 1°F) for GDM-533, ±(1.0%rdg + 1°F) for GDM-532

GDM-541 FEATURES

- 22000 Counts Auto/Manual Ranging
- 46 Segments Analogue Bar
- ACV Measurement up to 1000V
- AC+DC Voltage Measurement
- Current Measurement up to 20A
- Transistor (hFE) Measurement
- Audible/Visual Alarm when Overload
- True RMS/USB Interface

GDM-533 FEATURES

- 6000 Counts Auto/Manual Ranging
- 31 Segments Analogue Bar
- LoZ ACV Measurement
- ACV Measurement up to 1000V
- Current Measurement up to 20A
- Temperature Measurement
- Audible/Visual Alarm when Overload
- True RMS/USB Interface

GDM-532 FEATURES

- 9999 Counts Auto/Manual Ranging
- Display Backlight/Auto Power Off
- Continuity Beeper/Diode Test
- Temperature Measurement
- Non-Contact Voltage (NCV) Detection
- Data Hold and Relative Mode

SERIES FEATURE

SPECIAL FUNCTION

Auto Ranging(CDM-541/533/532); True RMS(CDM-541/533); Analog Bar(CDM-541/533); USB(CDM-541/533/532); Display Backlight(CDM-541/533/531); NCV Function(CDM-541/533/532/531); Audible/Visual Alarm(CDM-541/533/531); AC/DC Voltage(CDM-541); LPF-ACV(CDM-541); VFC Test(CDM-541); LoZ ACV(CDM-531)

LCD DISPLAY

23000 counts (CDM-541); 6000 counts (CDM-533/531); 9999 counts (CDM-532)

POWER SOURCE

1.5V AAA x 4 (CDM-541/533); 1.5V AAA x 3 (CDM-532); 1.5V AAA x 2 (CDM-531)

DIMENSIONS & WEIGHT

[illegible] x 48 [illegible] mm, Approx. 400g (CDM-541/533)
[illegible] x 44 [illegible] mm, Approx. 400g (CDM-532)
76.5(W) x 170.5(H) x 49(D) mm, Approx. 370g (CDM-531)

ORDERING INFORMATION

CDM-541	23000 Counts Hand-Held DMM with True RMS Measurement and USB Interface
CDM-533	6000 Counts Hand-Held DMM with True RMS Measurement and USB Interface
CDM-532	9999 Counts Hand-Held DMM with True RMS Measurement
CDM-531	6000 Counts Hand-Held DMM

ACCESSORIES :
User manual, Test leads, Battery, USB cable & Adapter socket (CDM-541/533 only),
K-type thermocouple (CDM-533/532 only)

FREE DOWNLOAD

CDM-541 PC Software	Remote Software
CDM-533 PC Software	Remote Software

CDM-531

CE

CDM-531 FEATURES

- 6000 Counts Manual Ranging
- Display Backlight/Auto Power Off
- Capacitance Measurement
- Non-Contact Voltage (NCV) Detection
- Data Hold
- Audible/Visual Alarm when Overload

LCR METERS

GW Instek offers high-precision bench-top LCR meters, the LCR-8200/LCR-6000 series which are designed for a variety of applications such as production testing, QC inspection, and design verification, etc. Reliable operability, accurate results, user-friendly interfaces, and automatic testing functions make the LCR-8200/LCR-6000 series one of the best choices for passive component tests.

Other than the bench-top LCR meters, GW Instek also provides the LCR-900 series handheld LCR meters to make quick and basic LCR measurements at an affordable price.

PRODUCTS

- **Benchtop LCR Meter**
- **Handheld LCR Meter**

LCR METERS OVERVIEW

Test Frequency
Based on testing requirement, a test frequency can be set either as specificity frequency like component's datasheet specification or as the working frequency like component's real condition in circuit. Electrical components need to be tested at the frequency in which the final product/application is used.

Test Voltage
Most LCR meters can select the signal level applied to DUTs. Generally, the signal level is measured under an open circuit condition.

Accuracy and Speed
The testing speed of a LCR meter is actually a trade-off between testing accuracy. The more time it takes, the more accurate the measurement becomes. Conversely, the faster the measurement speed, the less accurate it becomes.

Measurement Parameters
Primary parameters L, C, R as well as Z, Y and DCR; Secondary parameters Q, D, B (Br or Bd) as well as K and G.

Range
In order to measure a wide range of impedance value, a measurement instrument must have several ranges. Selecting a range is usually done automatically according to the impedance of DUTs.

Averaging
Averaging is related to a LCR meter integration time. If the integration time is longer than cycles of the test signal, the measurement time will become longer, but the accuracy will be enhanced.

Bias Voltage and Bias Current
A LCR meter might include bias voltage or bias current function applicable to DUT which providing an extra source level to DUT when a LCR meter is taking measurement. Bias voltage uses with capacitance measurement commonly and bias current uses with inductance measurement.

BENCHTOP LCR METER

Model	Description (Main Function)	Page
LCR-8310G	100 Hz High Frequency LCR Meter	E23-24
LCR-8310GN	100 Hz High Frequency LCR Meter	
LCR-8320GN	200 Hz High Frequency LCR Meter	
LCR-8310A	100 Hz High Frequency LCR Meter	
LCR-8315A	100 Hz High Frequency LCR Meter	
LCR-8230	100 Hz High Frequency LCR Meter	
LCR-8220	100 Hz High Frequency LCR Meter	
LCR-8210	100 Hz High Frequency LCR Meter	
LCR-8205	5 MHz High Frequency LCR Meter	
LCR-8101	1 MHz High Frequency LCR Meter	
LCR-6300	10 Hz ~ 300 kHz Precision LCR Meter	E25-26
LCR-6200	10 Hz ~ 200 kHz Precision LCR Meter	
LCR-6100	10 Hz ~ 100 kHz Precision LCR Meter	
LCR-6020	10 Hz ~ 20 kHz Precision LCR Meter	
LCR-6002	10 Hz ~ 2 kHz Precision LCR Meter	

HANDHELD LCR METER

Model	Description (Main Function)	Page
LCR-916	100 Hz/120 Hz/1 kHz/10 kHz/100 kHz Hand-Held LCR Meter	E27-28
LCR-915	100 Hz/120 Hz/1 kHz/10 kHz Hand-Held LCR Meter	
LCR-914	100 Hz/120 Hz/1 kHz Hand-Held LCR Meter	

LCR-8200(A) Series

NEW

CE | USB Device | USB Host | LAN | RS-232 | Handler | Trigger | GPIB | PC Software

FEATURES

- **Wide Test Frequency :**
  LCR-8200A : DC, 10Hz ~ 30/20/10/5 MHz
  LCR-8200 : DC, 10Hz ~ 30/20/10/5/1 MHz
- 3" LCD color Display
- 0.08% Basic Accuracy
- Displaying Four Measurement Results Simultaneously From 17 Selectable Measurement Parameters Freely
- 15 Steps List Measurement
- Two Curves Sweep Mode
- Equivalent Circuit Model Analysis (LCR-8200A only)
- Internal DC Bias Voltage ±12V
- USB Storage Available
- ALC Function Available
- Standard Interfaces : RS-232C, USB Host/Device, LAN, GPIB and Handler
- Universal Power Input

GW Instek's high frequency LCR meter – LCR-8200 (A), which includes two series, LCR-8200A and LCR-8200, has two models and the maximum test frequency is up to 30MHz. The entire series adopts 7-inch color display and features a high measurement accuracy (0.08%). The measurement results can be presented numerically or graphically according to the selected measurement mode, allowing users to optimally interpret the characteristics of the DUT. At the same time, a full range of standard interfaces such as USB device / RS-232C / Handler and GPIB allow users to control the instrument by the most familiar interface without worrying about additional hardware investment costs. Furthermore, the series also provides USB storage function when operating in the graphics mode. The measured characteristic curves and values of the DUT are saved for subsequent analysis. The wide variety of features of the LCR-8200 (A) can help users easily respond to the test requirements of passive components in R&D, engineering, and production.

Under the numerical measurement mode, it is divided into MEAS measurement and LIST measurement. Under the MEAS measurement mode, users can select up to 4 (at least 1) desired measurement items from the 17 measurement parameters. Each selected measurement item can be set to compare (PASS/FAIL judgement) or to the BIN function to conduct judgement and sorting, so that users can easily learn the results of the measurement by color and sound. Under the LIST mode, users is allowed to set 15 test points and each test point can set parameters independently, including frequency/voltage/current, and in turn can set independent comparison function and numerical display mode (value, difference value, difference percentage). On top of that, under the LIST mode, the automatic trigger mode is also provided. After each LIST measurement is completed, the instrument will be in the mechanism of standby trigger. Users only need to place the next DUT, and the LIST test can be automatically performed that saves time of repeatedly pressing the trigger button.

Under the graphical measurement mode, the SWEEP measurement provides the ability to sweep two parameters simultaneously (TRACE A / TRACE B). The relative parameters of the sweep, including the sweep source (frequency, voltage, current or bias voltage), horizontal / vertical axis scale (LINEAR / LOG), speed...etc., even adding a bias, can be set and tested according to the actual needs of users. Besides, the LCR-8200A series provides 7 different equivalent circuit models which allows user analysis by 3 components or 4 components combination to observe and the operational characteristics of the circuit. After the sweep is completed, the scale can be automatically adjusted according to the selected TRACE, so that the whole observation is clearer and easier to read. Other than that, the swept graphics (tags and values) can be saved to the flash drive for subsequent analysis and application.

Whether it is for measurement data collection during the test process or the collocation for the system integration, the LCR-8200 (A) series offers the most comprehensive communications interfaces, including USB device, RS-232C, LAN for PC connection and even GPIB, which are all standard communications interfaces. Users can choose according to the habits of use and the convenience of the system architecture without any additional cost. In addition, the LCR-8200 (A) series also provides a Handler interface for system integration of PLCs or scanners.

OPTIONAL ACCESSORIES SELECTION GUIDE

ACCESSORY MODEL	BRIEF DESCRIPTION	LCR-8105A / LCR-8205A	LCR-8101A / LCR-8201A	LCR-8102A / LCR-8202A	LCR-8103A / LCR-8203A	LCR-8107A / LCR-8207A	– / LCR-8201
LCR-05A	Test Fixture for axial & radial lead components (up to 30MHz)	✓	✓	✓	✓	✓	✓
LCR-06B	Test Lead with Kelvin clip (4 wire type)	△	△	△	△	△	✓
LCR-07	Test Lead with Alligator clip (4 wire type)	△	△	△	△	△	✓
LCR-08	Test Fixture (Tweezers) for SMD / Chip components	△	△	△	△	△	✓
LCR-10A	Test Fixture for bottom electrode components (up to 30MHz)	✓	✓	✓	✓	✓	✓
LCR-10	Test Lead with Kelvin clip (4 wire type)	△	△	△	✓	✓	✓
LCR-10A	Test Fixture for SMD / Chip components (up to 30MHz)	✓	✓	✓	✓	✓	✓
GTL-234	RS-232C cable	✓	✓	✓	✓	✓	✓
GTL-248	GPIB Cable	✓	✓	✓	✓	✓	✓
GTL-246	USB Cable	✓	✓	✓	✓	✓	✓
GRA-445	Rack Mount Kit, 19" (4U size	✓	✓	✓	✓	✓	✓

Note : △ : Please do not use in circuits with frequency 1 MHz or greater (LCR-8200).

LCR-8200(A) Series

Rear Panel

SPECIFICATIONS

	LCR-8250A	LCR-8230A	LCR-8210A	LCR-8205A	-
	-	LCR-8250	LCR-8230	LCR-8210	LCR-8205	LCR-8201
TEST FREQUENCY						
	DC, 10Hz~50MHz, 6 Digits, ±0.005%	DC, 10Hz~30MHz, 6 Digits, ±0.005%	DC, 10Hz~20MHz, 6 Digits, ±0.005%	DC, 10Hz~10MHz, 6 Digits, ±0.005%	DC, 10Hz~1MHz, 6 Digits, ±0.005%	DC, 10Hz~1MHz, 6 Digits, ±0.005%
OUTPUT IMPEDANCE						
	25Ω / 100Ω SELECTABLE					
BASIC ACCURACY						
	±0.05%					
TEST SPEED						
	FAST: 2.3ms@10kHz, FAST: 18ms@300Hz, MED: 8ms, 10ms, SLOW: 300ms, SLOW2: 600ms					
TEST SIGNAL LEVEL						
AC Voltage	10mV ~ 2Vrms (FREQ. < 1MHz), 10mV ~ 1Vrms (FREQ. > 1MHz or FREQ. < 1MHz and BIAS > 2V)					
AC Current	100 μA ~ 20mArms (FREQ.<100Hz), 200 μA ~ 40mArms (FREQ.>2Hz)					
DCR Voltage	1Vdc (40mA max.)					
MEASUREMENT PARAMETERS						
	Maximum four parameters can be measured and displayed at the same time: Impedance (Z), Inductance (Ls / Lp), Capacitance (Cs / Cp), AC Resistance (Rs / Rp), Quality Factor (Q), Dissipation Factor (D), Admittance (Y), Conductance (G), Reactance (X), Phase Angle (θ / θ), Susceptance (B), DC Resistance (Rdc)					
LIST MEASUREMENT						
Listed Steps	10					
Listed Parameters	Freq/Vac/Idc/DC Bias/Delay/APH					
Trigger	AUTO, INTERNAL, MANUAL					
SWEEP MEASUREMENT						
Sweep Graphical	Two of measurement parameters					
Sweep Parameters	Freq/Vac/Idc/BIAS/Delay/Step/Point					
EQUIVALENT CIRCUIT MODEL ANALYSIS (9" series only)						
	7 different equivalent circuit models, 3 components, 4 type, 4 components, 1 type					
OTHER FUNCTIONS						
Auto Level Control (ALC)	Standard					
DC Bias	0 ~ ±12V					
Handler	BASE, PASS and FAIL, EOC, BOT, 5 Bin					
OTHER FEATURES						
Correction	Open/Short/9 Point/Load					
VT Monitor	Vac, Iac, Vdc, Idc					
Comparator	Value, Δ, Δ%					
Buzzer	OFF, Pass, Fail					
Average	1 to 64					
DISPLAY						
	7" LCD color display (800 x 480)					
INTERFACE						
	USB (CTRL), LAN, RS-232, Handler, GPIB (9" series only), TRIG IN & OUT					
POWER SOURCE						
	AC 198V~242V, 50/60Hz, Consumption: 120VA (max.)					
DIMENSIONS & WEIGHT						
	348 (W) x 141 (H) x 335 (D) mm, Approx. 5.1kg					

* Different between "9" series and "non-9" series is only the "9" series provides the functional equivalent circuit.

ORDERING INFORMATION

LCR-8250A	DC, 10Hz~50MHz High Frequency LCR Meter	**LCR-8210**	DC, 10Hz~10MHz High Frequency LCR Meter
LCR-8230A	DC, 10Hz~30MHz High Frequency LCR Meter	**LCR-8205**	DC, 10Hz~1MHz High Frequency LCR Meter
LCR-8250	DC, 10Hz~30MHz High Frequency LCR Meter	**LCR-8201**	DC, 10Hz~1MHz High Frequency LCR Meter
LCR-8230	DC, 10Hz~20MHz High Frequency LCR Meter		

ACCESSORIES:
User Manual (CD) x 1, AC Power Cord x 1, Test Fixture (LCR-8468) x 1, Safety Sheet x 1

OPTION

LCR-054	Test Fixture for Axial & Radial Lead Components (up to 50MHz)	**LCR-115**	Test Lead with Kelvin Clip (4 wire type)	**GTL-114**	RS-232C Cable
LCR-068	Test Lead with Kelvin Clip (4 wire type)	**LCR-154**	Test Fixture for SMD Chip Components (up to 50MHz)	**GTL-161**	USB Cable
LCR-07	Test Lead with Alligator Clip (2 wire type)			**GTL-246**	GPIB Cable
LCR-105	Test Fixture(Tweezers) for SMD Chip Components	**LCR-DB**	External DC Bias Voltage Box		
LCR-106	Test Fixture for Surface Mounted Components (up to 2GHz)	**GRA-441**	Rack Mount Kit, 19" 4U size		

A. THE PRESENTATION OF FLEXIBLE MEASUREMENT COMBINATIONS

LCR-8200[A] Series allows users to select and arrange measurement parameters. Users can select at least one parameter to maximum four parameters from the 17 measurement parameters according to the measurement requirements and the presentation order can also be arranged in a desired manner. The set parameters can be stored in internal/external memory groups for subsequent recalls.

B. INDEPENDENT SETTING JUDGMENT

Each selected test parameter can independently set judgement and comparison such as value, difference value or difference percentage. Additionally, the display method can also be based on value, difference value or difference percentage to self-define the presentation of test results, and the observation is more in line with the actual needs. In addition to using the warning sound, all the parameters set for comparison judgment will be displayed in different colors. "Red" means that the limit value is exceeded, and "Green" means that it is within the limit value, so that the judgment can be conducted smoothly under noisy environment.

C. LIST MEASUREMENT

The 10-point LIST measurement mode provides measurement values at a specific frequency or voltage of the DUT, and each set point can set independent comparison and judgement. When the trigger mode is set to "AUTO", the display "SHUT ON" will appear on the measurement screen and LCR-8200[A] Series will detect the contact status of the fixture. When the DUT is connected, the test will start automatically.

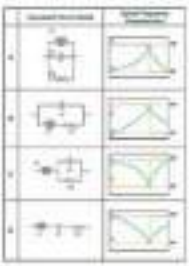
6 TWO CURVE SWEEP

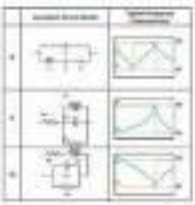
Up to 2 characteristic parameters of the DUT can be swept at the same time. Sweep type (frequency/Vac/Iac), axis form (LOG/LINEAR), sweep speed, even adding bias (internal), etc can be set according to the actual demands. After the sweep is completed, automatic adjustment can be used to obtain the best observation display. The movable cursor can be used to obtain the measurement result of the specific position. Swept displays and point values can be saved to the flash drive via the USB host on the panel for subsequent analysis.

7 BIN FUNCTION

BIN settings for one specific parameter of the selected measurement parameters provide up to 9 BIN positions. Set the judgment basis for individual classifications according to the desired BIN methods (EQUAL/SEQUENTIAL/TOLERANCE/RANDOM) and limit value mode (VALUE/delta/deltaΔ). The result of the sorting can be obtained through the Handler interface. If directly connected to an external device such as a sorter, an immediate sorting can be performed.

8 EQUIVALENT CIRCUIT MODEL ANALYSIS





This function, which adopts the algorithm based on resonance theory, consists of 7 different equivalent circuit models. The 5-components analysis model is composed of 4 types, A, B, C and D, whereas the 4-components analysis model covers 3 types, E, F and G. By selecting suitable equivalent circuit model, the instrument will automatically calculate approximate value of each component parameter after measurement, and generate simulated curve (TRACE A/B SIMULATION) to compare with the measured curve (TRACE A/B).

Also, it's available to choose equivalent circuit model followed by directly input value of each component parameter to generate a simulated curve (TRACE A/B SIMULATION) to further compare with the measured curve (TRACE A/B). The parameters of both resonance frequency (SRF) and quality factor (Qm) can be displayed simultaneously.

LCR-6000 Series

CE | RoHS | Made | USB Device | USB HOST

FEATURES

- 3.5" Color LCD
- 5 Models (1MHz ~ 3MHz/20MHz/100MHz/200MHz/500MHz)
- Convenient Test Frequency
- Basic Accuracy : 0.05%
- Measuring Speed up to 15ms (Max.)
- Full Frequency Range or Spot OPEN/SHORT
- 16 Major/Secondary Parameter Measurement Combinations and Two Additional Monitoring Parameters (Maximum Four Different Parameters Can be Show Simultaneously)
- DCR Measurement and Internal D.C. Bias Voltage (2.5V)
- PASS/FAIL Judgment
- Auto Level Control (ALC) Function
- BIN Function Provides 30BIN and 1AUX, Totally 100BIN
- 10 Steps Limit Tests to Select Different Frequency Voltage and Current Criteria
- Standard Interface : RS-232C, Handler and USB Host/Device
- Compact Size, Ideal for Automatic Integration (2U, 1/2 Rack)

GW Instek introduces the brand new high precision LCR meter : LCR-6000 series, which, with five models, has a test frequency range extending from 1kHz/20kHz/1.8MHz/200kHz/500kHz (maximum) and with 0.05% basic accuracy. The compact size design, 2U height and 1/2 rack, is one of the practical features of the series which is the optimum space saver suitable for either bench top or system rack. The comparator (CP) 6000 series with abundant features is absolutely the excellent tool for R&D, production line, IQC etc. on implementing each test stages for passive components.

The LCR-6000 series provides rich functionalities with the compact size. First of all, the entire series adopts 3.5 inch color LCD and features opulent display parameters. In addition to simultaneously displaying setting criteria and measurement results, the series is equipped with additional monitoring parameters. In other words, there are four parameters, primary parameters and two monitoring, simultaneously shown on the screen that tremendously enhances the measurement efficiency. The enlarge display mode not only emphasizes the measurement results, but also provides PASS/FAIL judgment to facilitate a rapid and convenient test result.

Convenience is one of the unique features. The LCR-6000 series comes equipped with two zero methods, which are full frequency range and spot. Users, without turning off the power and changing test fixture, can freely change frequency within the provided frequency range to conduct measurements. By so doing, tremendous time can be saved from repeatedly executing zero operation. Additionally, frequency range of the series is considerable that allows users to input precise frequency value in wanted, the most genuine test on components.

The LCR-6000 series also features diverse ancillary measurements to meet the measurement requirements of different materials. For instance, the series provides the automatic level control (ALC) function to satisfy the test voltage requirement of MLCC. For inductive component measurements, the series provides the adjustable test current function and the D.C. resistance measurement function. The optional external bias current adapter (T-2336) is to satisfy the measurement requirements. With respect to the D.C. bias voltage test for capacitive components requirements, the series allows users to conduct verification measurement on materials by its internal 2.5V adjustable voltage or via an optional external bias voltage adapter (T-115). Furthermore, 10 steps of limit test functionalities allow users to set testing parameters, either by frequency or voltage, as wanted, for each step based on users' requirements in order to observe the trend of DUT characteristics.

The LCR-6000 series has 10 memory sets defined by panel setting criteria to facilitate users in selecting test criteria and saving time in repeated settings. 15,000 measurement result storage capability can easily record measurement results instantaneously. The USB host allows easy access to recorded results without connecting the series to the PC. The USB host also allows USB to retrieve and load screen so as to assist users in compiling setting guidelines.

For the external control, the LCR-6000 series provides handler interface and will operate with the measurement sorting function (BIN). As to facilitate the connection with sorting machine so as to sort out the materials. For remote control and measurement result retrieval requirements, the LCR-6000 series provides RS-232C to assist setting control or measurement result retrieval via the PC commands. Additionally, the free PC software gives users an instant tool to store measurement results that saves time in developing programs.

The brand new compacted LCR-6000 series can effectively improve the limitation of space. Diverse measurement functionalities and display methods are making the series the high CP ratio choice in meeting the requirements of R&D, component assessment for engineering departments, category sorting requirements for component production and IQC for verification on component specifications.

SPECIFICATIONS

TEST FREQUENCY	
	LCR-6000 : 10Hz ~ 3000kHz(±0.01%) (4 digits resolution) LCR-6200 : 10Hz ~ 2000kHz(±0.01%) (4 digits resolution) LCR-6150 : 10Hz ~ 1000kHz(±0.01%) (4 digits resolution) LCR-6020 : 10Hz ~ 300kHz(±0.01%) (4 digits resolution) LCR-6003 : 10Hz ~ 2kHz(±0.01%) (4 digits resolution)
OUTPUT IMPEDANCE	
	30Ω / 50Ω / 100Ω selectable
BASIC ACCURACY	
Slow / Mid	0.05%
Fast	0.1%
TEST SPEED	
	FAST: 25ms / MED : 180ms / SLOW : 550ms
TEST SIGNAL LEVELS	
AC Voltage	10.00mV ~ 2.00V (±10%) CV: 10.00mV ~ 2.00V (±6%)
AC Current	100.0μA ~ 20.00mA (±10%) CC: 100.0μA ~ 20.00mA (±6%) (@1kHz)
DCR	±2V, 0.0Ω ~ 6.0MΩ (Max) (Output impedance fixed 100Ω)
DC BIAS	
Internal	±2.5V (0.5% ~ 0.05%)
DISPLAY RANGE	
R, X, |Z|	0.00001Ω ~ 99.9999MΩ
C, B, |Y|	0.01pS ~ 999.99S
L	0.00001μH ~ 9999.9H
C	0.00001pF ~ 9999.9mF
D	0.00001 ~ 9.9999
Q	0.00001 ~ 19999.9
θd	179.99° ~ 179.99°
θr	3.14159 ~ 3.14159
DCR	0.00001Ω ~ 99.9999MΩ
Δ %	-999.99% ~ 9999.9%
TEST MODE	
Combinations	Cs-Rs, Cs-D, Cp-Rp, Cp-D, Lp-Rp, Lp-Q, Ls-Rs, Ls-Q, Rs-Q, Rp-Q, R-X, DCR, Z-θ, Z-Rd, Y-D, Y-Q, Auto LCR
Monitor Parameter (3 Selectable)	Z, Θ, Q, Vac, Iac, Δ, Δ%, Sr, Rd, R, X, G, B, Y

Rear Panel

LCR-6000 Series

SPECIFICATIONS	
LISTED MODEL	
	10 models
BIN FUNCTION	
	Comparator (9BIN,AUX:1BIN)
MEMORY	
INT – Panel Setting	10 file name
INT – Measured Data	10000 Data(.csv)
USB Storage	10 file name for setting, 9999 file name for data, 999 Log File for LCD screen
OTHER FUNCTION	
Auto Level Control (ALC)	ON/OFF
Average	1~256 times
Trigger	INT / MAN / EXT / BUS
Delay	0ms~60s
Judgement	PASS / FAIL
Screen Capture	Saving into USB (Bmp format)
DISPLAY	
3.5" LCD, 画面サイズ (320x240)	
INTERFACE	
RS-232(SCPI), Handler, USB Host/USB Device	
POWER SOURCE	
AC 100V ~ 240V, 50 ~ 60Hz, 最大 35W	
DIMENSIONS & WEIGHT	
260 (W) x 107 (H) x 312 (D) mm, Approx. 3kg	

ORDERING INFORMATION

LCR-6308	1Hz~8 – 300kHz Precision LCR Meter
LCR-6300	1Hz~8 – 300kHz Precision LCR Meter
LCR-6310	1Hz~8 – 100kHz Precision LCR Meter
LCR-6020	1Hz~8 – 200kHz Precision LCR Meter
LCR-6002	1Hz~8 – 2kHz Precision LCR Meter

ACCESSORIES:
Safety Sheet x 1, Power Cord x 1, Test Fixture (LCR-04B x 1, CD x 1 (User manual/PC software)

OPTION	
LCR-10	±40V DC Bias Voltage Box
LCR-17	±2.5A DC Bias Current Box
OPTIONAL ACCESSORIES	
LCR-05	Test Fixture for Axial & Radial Lead Components
LCR-06B	Kelvin Clip Test Lead
LCR-07	Test Fixture, Test Wire with Alligator Clips
LCR-08	Test Fixture (Tweezers) for SMD/Chip Components
LCR-15	Test Fixture for SMD Chip Components (0201 to 1812)
CTL-232	RS232 Cable, 9-pin Female to 9-pin, null Modem for Computer, Approx. 2m
CTL-04B	LCD Cable, LCD 2.8 A B TYPE CABLE, 4P
QDA-423	Rack Mount Kit
QRM-434	Rack Mount Kit 19" 2U (can be two sets)
FREE DOWNLOAD	
PC Software	LCR-6000 Series
Driver	LabVIEW Driver

LCR-05

LCR-06B

LCR-07

LCR-08

LCR-15

LCR-16

LCR-17

LCR-916/915/914 (100kHz/10kHz/1kHz)

The LCR-916/915/914 is a smart, convenient and fully functional dual display handheld LCR meter. The test frequency extends as high as 100 kHz/10/1kHz, providing greater flexibility to test a wider range of components. The LCR-916/915/914 uses a dual 20,000/2000 count display. The 20000 count display is used for displaying primary parameters such as capacitance, inductance, resistance and resistance and a 2000 count display is for secondary parameters such as Q, D, ESR and RP measurements. Secondary measurements can also be combined with the primary measurement while the primary measurement is still being taken. The LCR-916/915/914 provides two measurement methods, 2-wire and 3-wire measurement. The LCR-916/915/914 also comes with a host of various standard or optional accessories to assist in testing a number of different component types. The meters also include handy functions such as data hold, tolerance sorting, zero mode, and Min/Max (LCR-916 only).

The meters' USB interface can be used to log data to a PC using the LCR-900 software and provide the DC 5V needed to power the meter.

With the LCR-916/915/914, you can perform quick and basic LCR measurements with precision at an affordable price.

FEATURES

- 20,000/2,000 Counts Dual Display
- Test Frequency : 100kHz(120Hz/1kHz/10kHz/100kHz Depend on Model
- Auto LCR Mode for DUT Measuring
- 0.2% Basic Accuracy
- Measurement Parameters : L, C, R(AC/DC), D, Q, ESR, θ
- Parallel/Series Testing Mode
- Sorting Mode for Quality Control
- 3-Wire or 4-Wire Measurement Available
- Data Hold and Zero Mode Supported
- Max and Min (LCR-916 Only)
- Auto Range, Auto Backlit
- Low Battery Indication
- Auto Power Off
- Data Collection or DC Power Operation (Optional for LCR-915)

SPECIFICATIONS

	LCR-916	LCR-915	LCR-914
TEST FREQUENCY			
	100kHz (120Hz/1kHz/10kHz/100kHz Selectable	10kHz/120Hz/1kHz/100Hz Selectable	1kHz/120Hz/1kHz Selectable
Auto SCALE			
	Main Display : 20,000/2,000 count Selectable, Sub Display : 2,000 count		
INDUCTANCE			
Range	10uH ~ 30kH depends on the selected test frequency		
Best Accuracy	1.0 (2% +dg ~ 2 dg/ct)		
Resolution	0.001uH ~ 0.001H depends on the selected range		
CAPACITANCE			
Range	20pF ~ 30mF depends on the selected test frequency		
Best Accuracy	1.0 (2% +dg ~ 2 dg/ct)		
Resolution	0.001 pF ~ 0.001 mF depends on the selected range		
RESISTANCE			
Range	20Ω ~ 200MΩ depends on the selected test frequency		
Best Accuracy	1.0 (2% +dg ~ 2 dg/ct)		
Resolution	0.001Ω ~ 0.01MΩ depends on the selected range		
DC RESISTANCE			
Range	20Ω ~ 200MΩ		
Best Accuracy	1.0 (2% +dg ~ 2 dg/ct)		
Resolution	0.01Ω ~ 0.01MΩ depends on the selected range		
QUALITY FACTOR (Q)			
Range	0.000 ~ 999		
Accuracy	2 x (main parameter accuracy)		
Best Resolution	0.001		
DISSIPATION FACTOR (D)			
Range	0.000 ~ 999		
Accuracy	2 x (main parameter accuracy)		
Best Resolution	0.001		
PHASE ANGLE (θ)			
Range	-90.0 ~ 90.0		
Accuracy	1.0 (2% +dg ~ 3 dg/ct)		
Resolution	0.1°		
MEASUREMENT CIRCUIT			
Parallel or Series Selectable			
AUTO LCR MODE			
Automatically identifies and measures the DUT when the meter is switched on			
SORTING MODE			
10 (1%, 2 (2%, 5 (5%, 10 (10%, 20 (20%, 30 (30%, 40 (40%, 50 (50%, 60 (60%, 70 (70%, 80 (80%, 90 (90%, 100 (100% and >100%/-100% Selectable			
OTHER FUNCTIONS			
Auto range, Auto back-light, Max, Min, Data Hold, Zero, 4½ segments Analogue bar, Auto power off			
DISPLAY			
LCD matrix display			
INTERFACE			
USB			
POWER SOURCE			
AA Battery (1.5V x 6, DC 5V (through AC adapter or USB cable : optional for LCR-915/914)			
DIMENSIONS & WEIGHT			
91 (W) x 197 (H) x 55 (D) mm, Approx. 600 g			

Note : Specifications are performed by automatic length mode

AUTO LCR MODE

4Wire & 2Wire Measurement Terminal

Full Accessories

ORDERING INFORMATION

LCR-916	100kHz Handheld LCR Meter
LCR-915	10kHz Handheld LCR Meter
LCR-914	1kHz Handheld LCR Meter

ACCESSORIES :
User manual x 1, Battery

OPTIONAL ACCESSORIES

Opt.01	4Wire DIP test lead
Opt.02	Accessory Pack for LCR-915
Opt.03	Accessory Pack for LCR-914
Opt.04	Magnetic Hang kit for LCR-914
CTL-259	USB Cable, USB 2.0 A-male B-type, Approx. 140mm

Note: 1. The accessory pack for LCR-915 includes 1kΩ test probe, AC adapter, USB cable and CD.

ACCESSORIES GUIDE

	MODEL	LCR-916	LCR-915	LCR-914
①	Shorting Cube	Standard	Standard	Standard
②	Alligator Clip	Standard	Standard	Standard
③	Magnetic Hang Kit	Standard	Standard	Opt. 04
④	4-Wire SMD Probe	Standard	Opt. 03	Opt. 03
⑤	AC Power Adapter	Standard	Opt. 03	Opt. 03
⑥	USB Cable	Standard	Opt. 03	Opt. 03
⑦	PC Software (CD)	Standard	Opt. 03	N/A
⑧	4-Wire DIP Clip	Opt. 01	Opt. 01	Opt. 01

SAFETY TESTERS

Safety testers are designed to ensure safe operation of DUTs under various operating conditions and environment. GW Instek's GPT-Series provides safe and quick measurement tools for AC/DC withstanding voltage tests, insulation resistance tests, and AC ground bond tests as well as ground continuity tests. These tests are required by many international safety regulations such as CE, UL, VDE, and etc.

A dedicated option, multiplex scanner box, for specific safety tester series. This multiplex scanner box, GSB-01/02, has a function that distributes the test voltage or current provided by the GPT-9600A/9900/9800 Series to multiple test points.

We also have leakage current tester, GLC-9000, which supports all the major leakage current test standards for general electronic equipment.

PRODUCTS

- **AC/DC/IR/GB Electrical Safety Analyzer**
- **AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester**
- **AC Ground Bond Tester**
- **Multiplex Scanner Box**
- **Leakage Current Tester**

SAFETY TESTERS OVERVIEW

A safety tester is designed to ensure safe operation of DUT's under a number of operating conditions and environments. That, many of the international safety regulation, such as UL in USA, VDE in Germany, CE in EU, BS in the Great Britain and CSA in Canada, are constituted to standardize safety testing. GW Instek offers a series of Safety Testers for manufacturers to meet the mentioned regulations. The Safety Testers offered by GW Instek, GPT-10000/12000/9900/9800/9600/9500 Series are general multifunction safety testers and cover a variety of different usages based models: AC Hi-Pot, DC Hi-Pot, Insulation Resistance and Ground Bond as well as Continuity tests.

TEST ITEMS EXPLANATION

Hi-Pot (Withstanding)	**Purpose:** Make sure users do not receive electrical shocks that might be caused by a breakdown of the electrical insulation when using product. **Method:** While operating the product under high voltage mode, measure the current leakage between AC primary circuits and low voltage secondary circuits, or between AC primary circuits and its ground, or between low voltage secondary circuits and its ground.
ARC Detection	**Purpose:** Check potential problems such as loose screws, bad material insulation, etc. **Method:** Measure the duration of a current spike caused by a dramatic change in voltage. Normally an ARC Detection is performed during a Hi-Pot test.
Insulation Resistance	**Purpose:** Check the quality of insulation. **Method:** Measure the resistance between AC primary circuits and low voltage secondary circuits, or between AC primary circuits and its ground, or between low voltage secondary circuits and its ground.
Ground Bond	**Purpose:** Verify if exposed conductive parts of product and its power system ground are well connected and be able to sustain high current, until the fuse or circuit breaker shuts off the power. **Method:** Measure the resistance of a ground circuit and verify the adequacy of the connection. A Ground Bond test is for measuring the ground path with low voltage and high current.
Continuity	**Purpose:** Verify that an electrical connection exists between the mains power ground and any conductive surface of the product. **Method:** A ground bond test is for measuring the ground path with low voltage and low current.

GPT-9000 FAMILY (GPT-9900 Series, GPT-9800 Series and GPT-9600 Series)

The GPT-9000 family is a fully automatic electrical tester with 500VA, 2000VA and 1000VA test capacity which combines AC/DC Hi-pot, Insulation Resistance and high current ground bond (up to 32Aac) tests. The GPT-9000 family complies with electrical equipment and appliance testing standards such as UL, CSA and. The safety compliance, reliable test results, user-friendly and fully automatic interface make the GPT-9000 Series family an advanced safety tester series that can perform up to four essential electrical safety tests and deliver fast and reliable test results from a single test connection.

No Load Set Up of Trip Current and Output Voltage

With the GPT-9900/9800 Series, the trip current and output voltage can be set without high voltage, or using a load resistor.

Safety Fault Interrupt

With the built-in Safety Fault Interrupt technology, the GPT-9900/9800/9600 Series are able to set the high limit current as a watchdog to detect whether the current is abnormal to shutoff the output power when tripped.

Flashing High voltage Indicator

A flashing red LED indicator outputs a warning when a high voltage is present at the output.

Highly Efficiency Voltage Output

The high-efficiency PWM power amplifier of the GPT-9900/9800/9600 Series provides a very stable HV output and avoids load affecting the DUT.

Zero Crossing Turn-On

The Zero Crossing Turn-On feature ensures that the output voltage will start from the zero crossing point of a sine wave. This function prevents unexpected occurrences of spikes or arcs, and ensures accurate cut-off current.

Selectable Arc Detection

An Arc is a short duration (>10uS) current spike occurring due to a dramatic change in voltage or current. The GPT-9900/9800/9600Series offer selectable Arc detection setting values depending on the cutoff range to identify the potential problems in product quality such as loose screws, bad insulation material etc.

Controllable Ramp Up Time

During a AC/DC Hi-pot and IR test, an undesirable condition such as spike in current might occur. The GPT-9900/9800 Series can control the ramp up time to prevent spikes, which might cause erroneous measurement results.

Memories of 100 AUTO, Each AUTO 16 Manu Steps of Test Set-Up

The GPT-9900/9800 Series provide 16 steps for test set-ups, each Manu step containing one electrical safety test. All 16 steps can be executed just by pressing a button. The GPT-9900/9800 Series offer 100 AUTO of memories to facilitate testing of up to 100 different products in a production line.

SAFETY TESTING INSTRUMENTS

MODEL	Description (Main Functions)	Page
GPT-15804	AC 500VA AC/DC/IR/GB Electrical Safety Analyzer	E03-38
GPT-15803	AC 500VA AC/DC/IR Electrical Safety Analyzer	E03-38
GPT-15802	AC 500VA AC/DC Electrical Safety Analyzer	E03-38
GPT-15801	AC 500VA AC Electrical Safety Analyzer	E03-38
GPT-12804	AC 200VA AC/DC/IR/GB Electrical Safety Analyzer	E03-38
GPT-12803	AC 200VA AC/DC/IR Electrical Safety Analyzer	E03-38
GPT-12802	AC 200VA AC/DC Electrical Safety Analyzer	E03-38
GPT-12801	AC 200VA AC Electrical Safety Analyzer	E03-38
GPT-9904	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester	E39-40
GPT-9903A	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E39-40
GPT-9902A	AC 500VA AC/DC Withstanding Voltage Tester	E39-40
GPT-9901A	AC 500VA AC Withstanding Voltage Tester	E39-40
GPT-9804	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester	E39-40
GPT-9803	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E39-40
GPT-9802	AC 200VA AC/DC Withstanding Voltage Tester	E39-40
GPT-9801	AC 200VA AC Withstanding Voltage Tester	E39-40
GSB-01	Multiplex Scanner Box - 8CH H.V.	E47-62
GSB-02	Multiplex Scanner Box - 4CH H.V.(2CH G.B.	E47-62
GCT-9060	AC Ground Bond Tester	E62-64
GPT-9683	AC 100VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E65-66
GPT-9613	AC 100VA AC Withstanding Voltage/Insulation Resistance Tester	E65-66
GPT-9682	AC 100VA AC/DC Withstanding Voltage Tester	E65-66
GPT-9681	AC 100VA AC Withstanding Voltage Tester	E65-66
GPT-9518	Multi-Channel Hipot Tester	E67-50
GPT-9583	Multi-Channel Hipot Tester	E67-50
GLC-10000	Leakage Current Tester	E51-52
GLC-9080	Leakage Current Tester	E55-56

GPT-SERIES QUICK SELECTION GUIDE

		Function					Option					
MODEL	Output Capacity	ACW	DCW	IR	GB	DC	SWEEP	ARC Detect	RAMP Up	RAMP Down	Rear Output	Barcode
GPT-19804	500VA	✓0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPT-19803	500VA	✓0.1	✓	✓		✓	✓	✓	✓	✓	✓	✓
GPT-19802	500VA	✓0.1	✓			✓	✓	✓	✓	✓	✓	✓
GPT-19801	500VA	✓0.1				✓	✓	✓	✓	✓	✓	✓
GPT-13804	200VA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPT-13803	200VA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
GPT-13802	200VA	✓	✓			✓	✓	✓	✓	✓	✓	✓
GPT-13801	200VA	✓				✓	✓	✓	✓	✓	✓	✓
GPT-9904	500VA	✓0.1	✓	✓	✓		✓	✓	✓		✓	
GPT-9903A	500VA	✓0.1	✓	✓			✓	✓	✓		✓	
GPT-9902A	500VA	✓0.1	✓				✓	✓	✓		✓	
GPT-9901A	500VA	✓0.1					✓	✓	✓		✓	
GPT-8804	200VA	✓	✓	✓	✓			✓	✓			
GPT-8803	200VA	✓	✓	✓				✓	✓			
GPT-8802	200VA	✓	✓					✓	✓			
GPT-8801	200VA	✓						✓	✓			
GPT-7603	100VA	✓	✓	✓				✓				
GPT-7613	100VA	✓		✓				✓				
GPT-7602	100VA	✓	✓					✓				
GPT-7601	100VA	✓						✓				
GPT-9313	150VA	✓	✓	✓		✓		✓	✓	✓	BCH Scanner	
GPT-9303	150VA	✓	✓	✓		✓		✓	✓	✓	BCH Scanner	

* Rear Output = 9904

AC/DC/IR/GB Electrical Safety Analyzer

GPT-15004

GPT-15003/15002/15001

GPT-12004

GPT-12003/12002/12001

CE | USB Host | RS-232 | GPIB | USB | Signal I/O | Key Output | LAN

FEATURES

- 500VA/500VA AC Test Capacity (500VA short circuit current > 200mA)
- 7" TFT LCD
- Comply with IEC 61010-1 Ed4 Design Requirement
- Manual Test Mode/Auto Test Mode
- Real Current Measurement
- Zero Crossing Turn-on Operation
- Controllable Ramp-up & Ramp-down Time
- Statistics & Analysis Function
- Capacitive Load Testing Capability up to 47uF
- Sweep Function for DUT Characteristic Analysis
- Convenience Linked AUTO Mode Easy to Read Result and Judge
- Internal Storage and USB Storage Available
- Barcode Function Available
- Setting Data Export/Import
- Rear Panel Output Available
- Standard Interface : RS-232C, USB host/device and Signal I/O
- Optional Interface : GPIB or LAN
- Universal Power Input

GW Instek introduces the flagship model 500VA/500VA output capacity safety analyzer the GPT-15000 Series, which is the first safety analyzer in the world to comply with IEC 61010-1:2010 (Safety requirement for electrical equipment for measurement, control and laboratory use – particular requirements for measurement equipment for insulation resistance and test equipment for electric strength), which stipulates that the requirements of the software and hardware interfaces must be followed while designing high voltage and insulation resistance test and measurement instruments so as to ensure that users are provided with maximum protection and warning while using the instruments.

The GPT-15000 Series safety analyzer has eight models. GPT-15004/GPT-12004 features AC/DC withstanding voltage test, insulation resistance test, IEC ground bond test and continuity test. GPT-15003/GPT-15002 contains AC/DC withstanding voltage test, insulation resistance test, and continuity test. GPT-15001/GPT-12001 comes our AC/DC withstanding voltage test and continuity test. GPT-12003/GPT-12002 excludes IEC withstanding voltage test and continuity test. The entire series utilizes a high efficient PWM amplifier to effectively exclude the influence from the fluctuating input voltage or distorted waveform so as to guarantee a stable high voltage output while conducting AC withstanding voltage test on the DUT to meet the safety regulations such as IEC、EN、UL、CSA、CB、JIS that demand the test requirements for various electronic/electrical products or parts.

To comply with IEC 61010-1:2010 requirements, the series takes into account of safety by adopting the double insulation design for input power supply and output voltage to enhance user safety. Additionally, the retracted on-off switch design (START key) and latches (optional), made to avoid the test activation (for instance, press and hold for 1 second to activate), activation by pressing double keys, etc.) are incorporated into the series to avoid accidentally touching the testers or high voltage/large current output causing damage and danger to products or users. High illumination LED lights (flashing or permanently lit) and a high-volume audio indicator are included in designing the series to provide warnings of the status of the on-going tests or judgement results from the safety analyzer. On top of that, the DUT will be automatically discharged to the safe voltage (approximately 30V) after each test to prevent high residual test voltage from causing harm to users.

The series utilizes 7 inch color TFT LCD and refers to the consistent simplicity key design style of the product family to allow users to experience easy operations and a clear observation of the test results. The major test functions include AC withstanding voltage test (AC 5kV), DC withstanding voltage test (DC 6kV), insulation resistance test (DC 50V~1,000V), ground bond test (IEC, GB), and grounding continuity test (DC 10mA fixed). The series also embodies with superb output adjustment resolution, measurement resolution (AC withstanding voltage: 1uA; DC withstanding voltage: 0.1uA; insulation resistance: 0.1 MΩ; groundbond: 0.1mΩ; continuity test: 0.01Ω), controllable voltage ramp-up and ramp-down time settings, and upper/lower limit judgment settings, and large capacitance test capability (up to 47uF) for DUT with large capacitance such as surge absorber and large capacitance on their input terminal of EMI/EMC prevention. For insulation resistance, provides 10mA pre-charged current (fixed) to first rapidly fully charge the DUT's capacitive load and then to conduct test and measurement so as to avoid misjudgment from fluctuating in-rush current. All the above features of the series facilitate a more flexible execution of the required tests so that users can obtain accurate test and measurement results.

The statistic function is the highlight of the series. Test items, number of tests, judgement results are recorded after testing and the test results can be shown by bar graph on the display. Users can immediately know the status of product tests and judgement distribution during the manufacturing process without using a PC. The other strong feature is the sweep function, which can be used for the analysis or conducts crash point. Users can use the sweep mode to see the curve diagram of the test results after finishing the functional tests. Users can also select any time point during the process to analyse the relation between voltage and current (when ACW or DCW is selected). The test result of the certain period of time can be swept by setting start and stop time points to analyse the relation between voltage and current under that time frame. Furthermore, the double continuity test function can combine 10 manual continuity tests to carry out automatic tests or 1 manual memory test will save all the connection objects to connect next automatic test so as to increase the test items of the continuity test. Users can obtain various test values and judgement results without switching to a different display screen.

Other functions and features of the GPT-15000 series include 100 sets of manual test, as well as 100 sets of auto test memory for the storage of different test conditions and the saved test conditions can be exported to another GPT-15000 through USB flash drive to quick application and expansion of production line equipment. Barcode scanner can be conducted to the front panel USB host of GPT-15000 for managing test condition of DUT and then be able to quick and correctly recall required test conditions; rear output terminal for system integrations; front panel remote control terminal mount/rear panel Signal I/O for users to conveniently control the analyzer's output/stop based upon the requirements. The USB storage function allows test results to be stored in the USB flash drive or internal memory to save the trouble of using a PC, and the function is conducive to the follow up data analysis. For users with the requirements of PC control and test results recording, the series also provides RS-232C, USB and option GPIB or LAN.

SPECIFICATIONS

MODEL	GPT-15000 Series	GPT-12000 Series
AC WITHSTAND MODE		
Output Voltage Range	0.050kV~5.000kV	0.050kV~5.000kV
Output Voltage Resolution	1V	1V
Output Voltage Accuracy	±(1% of setting + 5V) (no load)	±(1% of setting + 5V) (no load)
Maximum Rated Load	200 VA (5kV/100mA)	200 VA (5kV/40mA)
Maximum Rated Current	100mA (0.5kV~1.5kV); 70mA (0.5kV~1.5kV, > 1.5kV)	40mA (0.5kV~1.5kV); 30mA (0.5kV~1.5kV, > 1.5kV)
Output Voltage Waveform	Sine wave	Sine wave
Output Voltage Frequency	50 Hz / 60 Hz selectable	50 Hz / 60 Hz selectable
Voltage Regulation	±(1% + 5V) (maximum rated load ~ no load)	±(1% + 5V) (maximum rated load ~ no load)
Voltmeter Accuracy	±(1% of reading + 5V)	±(1% of reading + 5V)
Current Measurement Range	1μA~100.0mA	1μA~40.00mA
Current Best Resolution	1μA / 10μA / 100μA	1μA / 10μA
Current Measurement Accuracy	±(1.5% of reading + 10μA)	±(1.5% of reading + 10μA)
Current Offset	40μA Maximum	40μA Maximum
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP UP (Rise Time)	0.1s~999.9s	0.1s~999.9s
RAMP DOWN (Fall Time)	0.0s~999.9s	0.0s~999.9s
TEST TIME (Test Time)*	0.3s~999.9s	0.3s~999.9s
ARC TIME	0.0s~999.9s	0.0s~999.9s
ARC	ON/OFF	ON/OFF

SPECIFICATIONS

MODEL	GPT-11000 Series	GPT-12000 Series
DC WITHSTAND/ARC		
Output Voltage Range	0.05kV~6.000kV	0.05kV~6.000kV
Output Voltage Resolution	1V	1V
Output Voltage Accuracy	±(3% of setting + 1V) (no load)	±(3% of setting + 1V) (no load)
Maximum Rated Load	10W (2kV,10mA)	10W (2kV,10mA)
Maximum Rated Current	20mA (0.25kV< V ≤ 0.5kV); 10mA (0.5kV< V ≤ 1.0kV); 5mA (1.0kV< V ≤ 2.0kV)	20mA (0.25kV< V ≤ 0.5kV); 10mA (0.5kV< V ≤ 1.0kV); 5mA (1.0kV< V ≤ 2.0kV)
Voltage Regulation	±(3% + 2V) (maximum rated load ~ no load)	±(3% + 2V) (maximum rated load ~ no load)
Voltmeter Accuracy	±(3% of reading + 3V)	±(3% of reading + 3V)
Current Measurement Range	1μA~20.00mA	1μA~10.00mA
Current Unit Resolution	0.1μA / 1μA / 10μA	0.1μA / 1μA / 10μA
Current Measurement Accuracy	±(3.5% of reading + 5μA) when I Reading ≤ 1mA; ±(7.5% of reading + 30μA) when I Reading>1 mA	±(3.5% of reading + 5μA) when I Reading ≤ 1mA; ±(7.5% of reading + 30μA) when I Reading>1 mA
Current Offset	0μA Maximum	0μA Maximum
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP UP (Rise Time)	0.1s~999.9s	0.1s~999.9s
RAMP DOWN (Fall Time)	0.0s~999.9s	0.0s~999.9s
TIMER (Test Time)*	OFF, 0.3s~999.9s	OFF, 0.3s~999.9s
WAIT TIME	0.1s~999.9s	0.1s~999.9s
CHD	ON/OFF	ON/OFF
INSULATION RESISTANCE		
Output Voltage	50V~1200V dc	50V~1200V dc
Output Voltage Resolution	1V	1V
Output Voltage Accuracy	±(3% of setting + 1V) (no load)	±(3% of setting + 1V) (no load)
Resistance Measurement Test Voltage / Display Range	Measurement Range / Accuracy	
50V / 0.1~1MV 0.001MΩ~10GΩ	0.1MΩ~1MΩ ±(3% of readings (count)); 1.1MΩ~10MΩ ±(5% of readings (count)); 10.1MΩ~20GΩ ±(10% of reading (count))	0.1MΩ~1MΩ ±(3% of readings (count)); 1.1MΩ~10MΩ ±(5% of readings (count)); 10.1MΩ~20GΩ ±(10% of reading (count))
250V / 0.1~2.49V 0.001MΩ~20GΩ	0.1MΩ~1MΩ ±(3% of readings (count)); 1.1MΩ~100MΩ ±(5% of reading (count)); 101MΩ~5.99GΩ ±(10% of reading (count)); 6.00~10.00GΩ ±(20% of reading (count))	0.1MΩ~1MΩ ±(3% of readings (count)); 1.1MΩ~100MΩ ±(5% of readings (count)); 101MΩ~9.99GΩ ±(10% of reading (count)); 10.0~20.0GΩ ±(20% of reading (count))
500V / 0.1~1.00V 0.001MΩ~50GΩ	0.1MΩ~1MΩ ±(3% of readings (count)); 1.1MΩ~100MΩ ±(5% of reading (count)); 101MΩ~9.99GΩ ±(10% of reading (count)); 10.0~50.0GΩ ±(20% of reading (count))	0.1MΩ~1MΩ ±(3% of readings (count)); 1.1MΩ~100MΩ ±(5% of readings (count)); 101MΩ~9.99GΩ ±(10% of reading (count)); 10.0~50.0GΩ ±(20% of reading (count))
Voltage Regulation	±(3% + 1V) (maximum rated load ~ no load)	±(3% + 1V) (maximum rated load ~ no load)
Voltmeter Accuracy	±(3% of reading + 3V)	±(3% of reading + 3V)
Short-Circuit Current	0mA max.	0mA max.
Output Impedance	2kΩ	2kΩ
Window Comparator Method	Yes	Yes
RAMP UP (Rise Time)	0.1s~999.9s	0.1s~999.9s
RAMP DOWN (Fall Time)	0.0s~999.9s	0.0s~999.9s
TIMER (Test Time)*	0.3s~999.9s	0.3s~999.9s
WAIT TIME	0.0s~999.9s	0.0s~999.9s
CHD	ON/OFF	ON/OFF
GROUND BOND		
Output Current	0.10A~32.00A dc	0.10A~32.00A dc
Output Current Resolution	0.01A	0.01A
Output Current Accuracy	10.0~32.00A ±(3% of reading+0.3A); 3A~10.00A ±(3% of reading+0.05A)	10.0~32.00A ±(3% of reading+0.3A); 3A~10.00A ±(3% of reading+0.05A)
Test Voltage	8Vac max (open circuit)	8Vac max (open circuit)
Test Voltage Frequency	50Hz/60Hz selectable	50Hz/60Hz selectable
Ohmmeter Measurement Range	1mΩ~600mΩ	1mΩ~600mΩ
Ohmmeter Measurement Resolution	0.1mΩ	0.1mΩ
Ohmmeter Measurement Accuracy	±(3% of reading + 3 mΩ)	±(3% of reading + 3 mΩ)
Window Comparator Method	Yes	Yes
TIMER (Test Time)*	0.3s~999.9s	0.3s~999.9s
Test Method	Four Terminal	Four Terminal
CHD	ON/OFF	ON/OFF
CONTINUITY TEST		
Output Current	100mA dc (fixed)	100mA dc (fixed)
Ohmmeter Measurement Range	0.10Ω~10.00Ω	0.10Ω~10.00Ω
Ohmmeter Measurement Resolution	0.01Ω	0.01Ω
Ohmmeter Measurement Accuracy	±(3% of reading + 2Ω)	±(3% of reading + 2Ω)
Window Comparator Method	Yes	Yes
TIMER (Test Time)*	0.3s~999.9s	0.3s~999.9s
MEMORY		
Single Step Memory	MAX.: 100 block	MAX.: 100 block
Automatic Setting Memory	AUTO : 100 blocks, 99ea per each	AUTO : 100 blocks, 99ea per each
INTERFACE		
Standard (Front)	RS232C, USB Host	RS232C, USB Host
Standard (Rear)	Test Output, 8I 2I2C, LED device, Signal I/O, GPIB, LAN	Test Output, 8I 2I2C, LED device, Signal I/O, GPIB, LAN
Option		
DISPLAY		
	7" color LCD	7" color LCD
POWER SOURCE		
	AC 100V~240V ± 10%, 50Hz/60Hz; Power consumption : Max. 500VA	AC 100V~240V ± 10%, 50Hz/60Hz; Power consumption : Max. 400VA
DIMENSIONS & WEIGHT		
	GPT-11001/11002/11003 430(W)×144(H)×450(D)mm, Approx. 15kg(max.) GPT-11004 : 380(W)×144(H)×450(D)mm, approx. 21kg	GPT-12001/12002/12003 430(W)×144(H)×450(D)mm, Approx. 15kg (max.) GPT-12004 : 380(W)×144(H)×450(D)mm, Approx. 10kg

Note: *1 (MAX. Accuracy: ±(1.0%reading+20ms))

Interlock Key

GHT-119 Remote Cable

Approx. 180mm

GHT-205 High Voltage Test Probe

GHT-117/GHT-117(ELI)
High Voltage Adapter Box

GHT-118/GHT-118(ELI)
High Voltage/Ground Bond Adapter Box

AC/DC/IR/GB Electrical Safety Analyzer

GPT-15004/12004 Rear Panel

GPT-15003/15002/15001 Rear Panel
GPT-12003/12002/12001 Rear Panel

GPT-15004

SELECTION GUIDE

Model \ Function	Output Capacity	AC	DC	IR	GB	Continuity	Rear Output
GPT-15001	500VA	✓				✓	✓
GPT-15002	500VA	✓	✓			✓	✓
GPT-15003	500VA	✓	✓	✓		✓	✓
GPT-15004	500VA	✓	✓	✓	✓	✓	✓
GPT-12001	200VA	✓				✓	✓
GPT-12002	200VA	✓	✓			✓	✓
GPT-12003	200VA	✓	✓	✓		✓	✓
GPT-12004	200VA	✓	✓	✓	✓	✓	✓

Note : GPT-15000 Series ACW short current > 200mA

GHT-115 High Voltage/Contiunity Test Lead

GTL-215 Test Lead

GPT-10KG1/10KL1 GPIB & LAN card

ORDERING INFORMATION

GPT-15004 AC 500VA AC/DC/IR/GB Electrical Safety Analyzer
GPT-15003 AC 500VA AC/DC/IR Electrical Safety Analyzer
GPT-15002 AC 500VA AC/DC Electrical Safety Analyzer
GPT-15001 AC 500VA AC Electrical Safety Analyzer
GPT-12004 AC 200VA AC/DC/IR/GB Electrical Safety Analyzer
GPT-12003 AC 200VA AC/DC/IR Electrical Safety Analyzer
GPT-12002 AC 200VA AC/DC Electrical Safety Analyzer
GPT-12001 AC 200VA AC Electrical Safety Analyzer

ACCESSORIES :
Quick Start Guide x 1, Power cord x 1, CDx1 (complete user manual), Interlock Key x 1, Remote Terminal Cable GHT-119 x 1, Test lead GHT-115 x 1 for GPT-15001/15002/15003/12001/12002/12003, Test lead GHT-115 x 1, GTL-215 x 1 for GPT-15004/12004

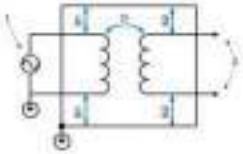
OPTION

GPT-10KG1 GPIB card **GPT-10KL1** LAN card

OPTIONAL ASSESSORIES

GHT-117/GHT-117(EU) High Voltage Adapter Box
GHT-118/GHT-118(EU) High Voltage/Ground Bond Adapter Box
GHT-113 High Voltage Test Pistol
GHT-205 High Voltage Test Probe
GTL-232 RS232C Cable, 9-pin Female to 9-pin, null Modem for Computer
GTL-246 USB Cable, A-B type, approx. 1.2m
GTL-248 GPIB Cable, approx. 2m
GTL-264 Signal I/O Converted Cable, 15-pin Male to 9-pin Female. Approx. 200mm
GRA-440 Rack Adapter Panel (19", 4U)

A. MEETS IEC 61010-2-034 DESIGN REQUIREMENTS



Providing the markets with safe electronic products is the responsibility of every manufacturer! Similarly, safety analyzer that tests whether electronic products meet safety regulations must attach the importance to the safety it provides! GPT-10000 Series is the world's first safety analyzer to comply with IEC 61010-2-034 (Safety requirement for electrical requirement for measurement, control and laboratory use – particular requirements for measurement equipment for insulation resistance and test equipment for electric strength). Apart from this, the safety considerations also include double insulation for input and output voltages, safe output/warning mechanism, post-test discharge mechanism, etc. to ensure user safety during the operation.

B. HIGH ACCURACY AND HIGH RESOLUTION TESTING PERFORMANCE

High Adjustment & Measurement Resolution

For production tests and characteristic verification, the GPT-10000 Series provides a withstand voltage test voltage (AC 5kV/DC 6kV) that can be adjusted in 1V steps with current measurement resolutions up to 1μA (AC/W) or 0.1μA (DC/W) to realize the small leakage current measurement for products or components. In addition, the insulation resistance test voltage can be adjusted in 50V steps from a DC output range of 50V to 1,000V, and the resistance measurement resolution can reach 0.1MΩ. Since most safety regulations require AC power supply for ground bond test, the GPT-10000 Series provides 8Vac (open) and 5A to 32Aac current for ground bond test with a resistance measurement resolution of 0.1mΩ. The entire series provides the continuity grounding test function with a 100mAdc (fixed) test source and a measurement resolution of 0.001Ω to detect if the tested equipment is correctly grounded. With these functions, users can perform various safety tests and verifications with high accuracy and reliability.

C. FLEXIBLE SUPPLEMENTARY TESTING MECHANISM

Testing Period Timing

To make tests compliant with the test requirements of relevant safety regulations, the GPT-10000 Series provides a more flexible output sequence setting starting from the start point of the test. Taking the AC/DC withstand voltage test as an example, the initial voltage can be set. Users determine the initial voltage ratio (i.e. the ratio of the rated test voltage), and then the voltage ramp up can also be set to reduce the risk of insulation breakdown or damage to the DUT caused by transient high voltages. After the rated test voltage is reached, the upper/lower limit judgment window, delay judgment and test timer mechanism can be set to assist users to conduct tests smoothly and correctly. The new voltage ramp down time setting allows users to test with a ramp down voltage to avoid the impact of excessively high rated test voltage to instantaneous discharge on the DUT.

With respect to the insulation resistance test, other than the newly added grounding mode to perform test in accordance with the actual grounding state of the DUT, the setting mechanism of the supplementary upper/lower limit judgment is also added to shorten the test time. The user-definable mode mechanisms include: STOP ON FAIL: The test is terminated as soon as the FAIL setting is met; STOP ON PASS: The test is terminated as long as the PASS setting is met, or TIMER: Judgment is conducted when the timer time is reached.

D STATISTIC AND ANALYSIS

Statistic

Analysis

The GPT-10000 Series provides the statistic function, which can record the test functions and judgement results in the temporary storage area (60,000 lots max.). Users can immediately learn the test of each function during the test without using a PC. The distribution of the good products can be analyzed to understand the quality of the batch based on the data. If most of them fall at the critical point that is close to be categorized as defect product, the results can be found in the test process in time so as to improve the manufacturing process and stop the defect products from entering the markets to ensure the reliability of products after leaving the factory.

E SWEEP AND TABULAR AUTOMATIC TEST

Sweep Function

Tabular Automatic Test

The GPT-10000 Series features a unique sweep function, which displays a curve diagram of the test results of the DUT. Test readings are recorded point by point based on the applied test voltage or current and relevant settings (such as initial voltage, ramp up time, test time, or ramp down time). After the test is completed, users can learn the amount of applied energy (voltage or current) at a specific time point and the results of measurement parameters by moving the cursor position so as to help users understand the changes of the measurement parameters (current or resistance) during the test. The function can also be used to determine the critical break down of the DUT. With respect to the automatic test function, each automatic test has up to 10 manual test items and all related settings and result judgement are presented in a table, so that users can easily obtain the results of all test items at a time. Other than that, if there are multiple automatic test connection requirements, users only need to select COM1 in the last item of the table to automatically connect the automatic measurement of the next position (such as AUTO 01 → AUTO 02).

F BARCODE FUNCTION

Barcode Setting

Barcode Execute

GPT-10000 Series supports the connection mechanism of the barcode machine. Users can manage the test conditions of each DUT through the use and setting of the barcode machine, which is especially suitable for mixed type production lines. By scanning the barcode of the DUT, GPT-10000 Series can automatically reveal the corresponding test conditions, which can avoid using wrong conditions and causing damage to the DUT.

G SETTING DATA EXPORT / IMPORT MECHANISM

Setting Data Export / Import

In order to expedite the deployment of the production line and achieve the consistency of test conditions, GPT-10000 Series provides a mechanism that can replicate test conditions. Users only need to set test conditions for one unit, and all settings can be copied via a USB flash drive. Other than the rapid setting of consistent test conditions, it can also avoid the difference while conducting settings.

H COMPLETE TEST DATA RETRIEVAL INTERFACE

Storage Function

In order to facilitate users to analyze the results of the safety test, GPT-10000 Series provides the USB storage function in addition to its own statistic and analysis functions. When a USB is inserted and the storage function is activated, each time the test button (START) is pressed, the test results of all tests (every manual or automatic test item) are automatically saved to the USB in the form of a text file (txt) for follow-up analysis. When there is no USB flash drive available, users can save on the internal memory storage function (up to 30,000 lots) to store the results of each test in the internal memory first, and then transfer them to an external device via a USB flash drive when available. Besides, the instrument is equipped with RS-232C and LAN interface (GPIB or LXI is optional) for data retrieval of test data and results by connecting a PC.

I USER DEFINED SIGNAL I/O

Self-defined Signal I/O

For interface connections, the GPT-10000 Series offers external control or a variety of remotely connected ports such as a signal I/O port that can be used to connect an external controller or PLC. The signal I/O's output signal pins can be self-defined so as to collocate with various PLC control requirements.

AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester

GPT-9904

GPT-9903A/9902A/9901A

GPT-9804

GPT-9803/9802/9801

FEATURES

- 1000VA and 2000VA AC Test Capacity
- 320 x 64 Dot Blue Dot Matrix LCD
- Manual/Auto Mode
- Function Key for Quick Selecting
- High Intensity Flash for Caution & Status Indication
- Safety Interlock Function
- Zero Crossing Turn-on Operation
- Controllable Ramp-up Time
- RMS Current Measurement
- High Resolution : 1μ A for Measuring Current, 1V for Setting Voltage
- PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
- Max. 100 Memory Block for Test Condition (Step) Setting, And Each Step can be Named individually
- Remote Terminal on the Front Panel for "Start" and "Stop" Control by External
- Interface : RS-232C, USB Device, Signal I/O and GPIB (Optional)

The GPT-9800 series is built upon a platform of AC 1000VA, and the GPT-9900 series is built upon a platform of AC 2000VA maximum power output. Each series with 4 models. The GPT-9904 and GPT-9804 are a 4 in 1 model capable of performing AC withstanding, DC withstanding, insulation resistance and ground bond tests. The GPT-9903A and GPT-9803 are a 3 in 1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9902A and GPT-9802 are capable of performing both AC and DC withstanding tests, whereas the GPT-9901A and GPT-9801 are able to perform AC withstanding test. The high efficiency PWM amplifier is the core of both series platform design to impede the influence from the voltage fluctuation of input AC source. Each series supports the maximum items among all the needed for the compliance of the safety standards such as IEC, EN, UL, CSA, GB, JIS and other safety regulations.

Following a tidy and easy-to-use design concept, the both series are equipped with a simple & clear panel layout, a high resolution dot matrix LCD display, and color LED indicators, allowing operators to interpret measurement results easily and quickly. All major test functions, including AC withstanding (AC 1kV), DC withstanding (DC 4kV), insulation resistance (DC 10V ~ 1000V) and ground bond (AC 32A max.) tests, are performed under a high-stability voltage or current output with high-resolution measurement results. Further more, the test duration, ramp up time and upper/lower limits of the tripping current/resistance are fully adjustable to accommodate a wide variety of safety tests with accurate measurement results.

The "Sweep" function of the GPT-9900 series is able to display the test results point by point all through the testing period to form a trend graph. This graphic display performs the characteristics verification of a DUT through observing the parameter response to the changes of the applied voltage or current in testing time.

Other significant functions and features are also incorporated with both series such as the output voltage is automatically cut off (within 1%) p.c. upon the detection of an abnormal output voltage or a trip of current limits during test to protect the operator from hazardous injury and automatically discharges a DUT after test to eliminate excessive voltage on a DUT, the open-circuit detection to ensure proper connections of apparatus for ground bond test, 100 sets of memory to save and recall the panel settings for individual or sequential tests, a remote output on/off terminal on the front panel and a signal I/O port is the rear panel provided as the means for remote start/stop control of the safety tester, and RS-232C, USB and GPIB (optional) interfaces available for PC remote control and test result logging.

SPECIFICATIONS

	GPT-9880 Series	GPT-9900 Series
AC WITHSTANDING		
Output Voltage Range	0.050kV~5.000kV ac	0.050kV~5.000kV ac
Output Voltage Resolution	1V/step	1V/step
Output Voltage Accuracy	±(1% of setting + 5V) (no load)	±(1% of setting + 5V) (no load)
Maximum Rated Load	300 VA (5kV/60mA)	300 VA (5kV/100mA)
Maximum Rated Current	60mA (0.1kV~1.0kV) 10mA (1.0kV~5.0kV)	100mA (0.1kV~1.0kV) 10mA (1.0kV~5.0kV)
Output Voltage Waveform	Sine wave	Sine wave
Output Voltage Frequency	50Hz/60Hz selectable	50Hz/60Hz selectable
Voltage Regulation	±(1% of rdg + 5V) (full load ~ no load)	±(1% of rdg + 5V) (full load ~ no load)
Voltmeter Accuracy	±(1% of rdg + 5V)	±(1% of rdg + 5V)
Current Measurement Range	0.001mA~40.0mA	0.001mA~100.0mA
Current Min. Resolution	0.001mA/0.01mA/0.1mA	0.001mA/0.01mA/0.1mA
AC Current Measurement Accuracy	±(1.5% of rdg+10count)when HI SET ≤1.1mA ±(3.5% of rdg+3count)when HI SET ≥1.1mA	±(1.5% of rdg+10count)when HI SET ≤1.1mA ±(3.5% of rdg+3count)when HI SET ≥1.1mA
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP (Ramp-Up Time)	0.1s~999.9s	0.1s~999.9s
TIMER (Test Time)	OFF, 0.3s~999.9s	OFF, 0.3s~999.9s
Sweep Function	NOT Support	Yes
GND	CHA/CHB	CHA/CHB
DC WITHSTANDING		
Output Voltage Range	0.050kV~4.000kV dc	0.050kV~4.000kV dc
Output Voltage Resolution	1V/step	1V/step
Output Voltage Accuracy	±(1% of setting + 5V) (no load)	±(1% of setting + 5V) (no load)
Maximum Rated Load	120W (2kV/60mA)	160W (2kV/100mA)
Maximum Rated Current	60mA (0.1kV~1.0kV) 10mA (1.0kV~4.0kV)	100mA (0.1kV~1.0kV) 10mA (1.0kV~4.0kV)
Voltage Regulation	±(1% of rdg + 5V) (full load ~ no load)	±(1% of rdg + 5V) (full load ~ no load)
Voltmeter Accuracy	±(1% of rdg + 5V)	±(1% of rdg + 5V)
Current Measurement Range	0.001mA~40.0mA	0.001mA~100.0mA
Current Min. Resolution	0.001mA/0.01mA/0.1mA	0.001mA/0.01mA/0.1mA
DC Current Measurement Accuracy	±(1.5% of rdg+10count)when HI SET ≤1.1mA ±(3.5% of rdg+3count)when HI SET ≥1.1mA	±(1.5% of rdg+10count)when HI SET ≤1.1mA ±(3.5% of rdg+3count)when HI SET ≥1.1mA
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP (Ramp-Up Time)	0.1s~999.9s	0.1s~999.9s
TIMER (Test Time)	OFF, 0.3s~999.9s	OFF, 0.3s~999.9s
Sweep Function	NOT Support	Yes
GND	CHA/CHB	CHA/CHB

SPECIFICATIONS

	GPT-9800 Series		GPT-9900 Series	
INSULATION RESISTANCE				
Output Voltage	50V~1000V dc		50V~1000V dc	
Output-Voltage Resolution	50V/step		50V/step	
Output-Voltage Accuracy	±(1% of setting +5V)(no load)		±(1% of setting +5V)(no load)	
Resistance Measurement Range	1MΩ ~ 9500MΩ		0.001GΩ ~ 50.00GΩ	
Test Voltage	Measurable Range	Accuracy	Measurable Range	Accuracy
50V≤V≤450V	1 ~ 50MΩ 51 ~ 2000MΩ	±(5% of rdg+1count) ±(10% of rdg+1count)	0.001~0.050GΩ 0.051~2.000GΩ	±(5% of rdg+1count) ±(10% of rdg+1count)
500V≤V≤1000V	1 ~ 500MΩ 501 ~ 9500MΩ	±(5% of rdg+1count) ±(10% of rdg+1count)	0.001~0.500GΩ 0.501~9.999GΩ 10.00~50.00GΩ	±(5% of rdg+1count) ±(10% of rdg+1count) ±(20% of rdg+1count)
Window Comparator Method	Yes		Yes	
Output Impedance	600kΩ		600kΩ	
RAMP (Ramp-Up Time)	0.1s~999.9s		0.1s~999.9s	
TIMER (Test Time)	0.5s~999.9s		0.5s~999.9s	
GND	OFF (fix)		OFF (fix)	
Sweep Function*	NOT Support		Yes	
GROUND BOND				
Output Current	03.00A~30.00A ac		03.00A~32.00A ac	
Output-Current Resolution	0.01A		0.01A	
Output-Current Accuracy	3A≤I≤8A : ±(1% of setting+0.2A), 8A< I≤30A : ±(1% of setting+0.05A)		3A≤I≤8A : ±(1% of setting+0.2A) 8A< I≤32A : ±(1% of setting+0.05A)	
Test Voltage	6Vac max (open circuit)		6Vac max (open circuit)	
Test-Voltage Frequency	50Hz/60Hz selectable		50Hz/60Hz selectable	
Resistance Measurement Range	10mΩ ~ 650.0mΩ		10mΩ~650.0mΩ	
Resistance Measurement Resolution	0.1mΩ		0.1mΩ	
Resistance Measurement Accuracy	±(1% of rdg + 2mΩ)		±(1% of rdg + 2mΩ)	
Window Comparator Method	Yes		Yes	
TIMER (Test Time)	0.5s~999.9s		0.5s~999.9s	
Sweep Function*	NOT Support		Yes	
Test Method	Four Terminal		Four Terminal	
MEMORY				
Single Step Memory	MANU : 100 blocks		MANU : 100 blocks	
Automatic Testing Memory	AUTO : 100 blocks, menu per auto:16		AUTO : 100 blocks, menu per auto:16	
INTERFACE				
Rear Output	NOT Support		Standard	
RS-232C	Standard		Standard	
USB	Standard		Standard	
GPIB	Option		Option	
Remote Terminal (Front)	Standard		Standard	
Signal I/O	Standard		Standard	
DISPLAY	240 x 64 Ice Blue Dot matrix LCD		240 x 64 Ice Blue Dot matrix LCD	
POWER SOURCE				
	AC100V/120V/220V/230V±10%,50/60Hz Power Consumption : Max. 500VA		AC100V/120V/220V/230V±10%,50/60Hz Power Consumption : Max. 1000VA	
DIMENSIONS & WEIGHT				
	330(W) x 148(H) x 452(D) mm Approx. 19kg max.		330(W)x148(H)x482(D)mm(GPT-9903A/9902A/9901A); 330(W)x148(H)x587(D)mm(GPT-9804); Approx. 27kg max.	

* The sweep function and timer off can only be performed when the tester is in the special MANU mode.

ORDERING INFORMATION

GPT-9904	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9903A	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9902A	AC 500VA AC/DC Withstanding Voltage Tester
GPT-9901A	AC 500VA AC Withstanding Voltage Tester
GPT-9804	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9803	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9802	AC 200VA AC/DC Withstanding Voltage Tester
GPT-9801	AC 200VA AC Withstanding Voltage Tester

ACCESSORIES :
Quick Start Guide x 1, Power cord x 1, CDs1(complete user manual), Interlock Key x 1, Remote Cable GHT-119 x 1, Test lead GHT-114 x 1 for GPT-9903A/9902A/9901A/9803/9802/9801.
Test lead GHT-114 x 1, GTL-215 x 1 for GPT-9904/9804

OPTION

GPT-98GT	GPIB card	**GSB-02**	Multiplex Scanner Box(6CH H.V,/2CH C.B.)
GSB-01	Multiplex Scanner Box(8CH H.V.)		

OPTIONAL ASSESSORIES

GHT-113	High Voltage Test Pistol	**GTL-247**	USB Cable, A-A type, approx. 1.8m
GHT-117/GHT-117(EU)	High Voltage Adapter Box	**GTL-232**	RS-232C Cable, 9-pin Female to 9-pin null Modem for Computer
GHT-118/GHT-118(EU)	High Voltage/Ground Bond Adapter Box	**GRA-417**	Rack Mount Kit
GHT-205	High Voltage Test Probe	**GRA-433**	Rack Mount Kit for GPT-9904 only
GTL-248	GPIB Cable, approx. 2m		

FREE DOWNLOAD

PC Software GPT-9000

Interlock Key

GHT-119 Remote Cable

Approx. 500mm

GHT-114 Clip High Voltage Probe

Approx. 1m

GTL-215 Test Lead

Approx. 1m

GHT-117/GHT-117(EU)

High Voltage Adapter Box

GHT-118/GHT-118(EU)

High Voltage/Ground Bond Adapter Box

Multiplex Scanner Box

GSB-01/02

The GSB-01/GSB-02, multiplex scanner box, is a dedicated option for GPT-9800/9900/9900A Series. The GSB-01 has connections for ACW, DCW and IR testing, while the GSB-02 also includes support for GB testing. It will provide reliable withstanding voltage, insulation resistance and ground bond testing for the electronic products and components.

This scanner box function withstanding voltage 5kVac / 6kVdc and insulation resistance voltage 1kVdc as well as the ground bond current 40Aac supplied from safety tester proper. Each scanner box extends the output to 8 channels, a potential H, LO or X can be set for each channel and AC/DC withstanding voltage, insulation resistance or ground bond test can be conducted depending on the model of scanner box.

A maximum 4 scanner boxes can be connected to one GPT-9800/9900/9900A series, it allows the output channel can be extended up to 32 channels. It is particularly well suited for multi-point safety testing as well for volume testing on factory floors.

FEATURES

- Model : GSB-01 (8CH High Voltage Scanner Box), GSB-02 (8CH High Voltage and 2CH Ground Bond Scanner Box)
- Multi-channel Outputs for Withstanding Voltage, Insulation Resistance, Ground Bond Tests
- High-intensity LED for Channel, Status & Judgment Indications
- Front & Rear Input Connector Design is Suitable for the GPT-9800/9900/9900A Series
- A Maximum of 4 Scanner Boxes (32 CH) can be Connected to One GPT-9800/9900/9900A Series

SPECIFICATIONS

	GSB-01	GSB-02
HIGH VOLTAGE RATING		
	5kVac / 6kVdc	5kVac / 6kVdc
HIGH CURRENT RATING		
	---	40Aac
NUMBER OF H.V. CHANNELS		
	8CH	6CH
NUMBER OF G.B CHANNELS		
	---	2CH
MAXIMUM NUMBER OF SCANNERS		
	4 Scanners (up to 32 channels)	
INTERFACE		
	RS-232C for connection between tester or scanner box	
POWER SOURCE		
	AC 198-242V ±10%, 50/60Hz, Power Consumption : Max. 50VA	
DIMENSIONS & WEIGHT		
	GSB-01 : 330(W) x 101(H) x 399(D) mm GSB-02 : 330(W) x 101(H) x 413(D) mm Approx. 5.3kg	

ORDERING INFORMATION

GSB-01 Multiplex Scanner Box – 8CH H.V.
GSB-02 Multiplex Scanner Box – 8CH H.V. / 2CH G.B

ACCESSORIES:
Quick Start Guide x 1, Power Cord x 1, CD x 1 (Complete user manual),
H.V. Wiring Lead GHT-108 x 1, G.B Wiring Lead GHT-108 x 1 (GSB-02 only),
Communication Cable CTL-235 x 1,
Test lead for GSB-01 : GHT-1188 x 8, GHT-1168 x 1
Test lead for GSB-02 : GHT-1168 x 6, GHT-1168 x 1, CTL-1168 x 2, GTL-1168 x 1

OPTIONAL ACCESSORIES:
GRA-438 Rack Mount Kit

CTL-235 Communication Cable

Approx. 130cm

GSB-01

GSB-02

GSB-01 Rear Panel

GSB-02 Rear Panel

GHT-108 H.V. Wiring Lead

Approx. 500mm

GHT-109 G.B Wiring Lead

Approx. 450mm

GTL-116R Test Lead

Approx. 1100mm

GTL-116B Test Lead

Approx. 1100mm

AC Ground Bond Tester

GW Instek rolls out 40A AC ground bond tester - GCT-9040 to augment the existing safety tester product line and to replace the legacy model GCT-6300. GCT-9040 provides the maximum AC test current of 40A and adopts the PWM design the same as other models to ensure test efficiency and reliability. Furthermore, large LCD display, 100 memory blocks from setting criteria, and programmable communications interface together deliver users with higher readability and convenience.

GCT-9040

In addition to the standalone ground bond test operation, GCT-9040, with 40A AC ground bond test capability, can also externally connect with GW Instek safety testers such as GPT-9800/9900/9900A series to augment users' product test requirements by the all-in-one test platform. For instance, GPT-9802 (AC/DC withstanding tester), via external connection, can be expanded to a safety tester system with three testing functionalities.

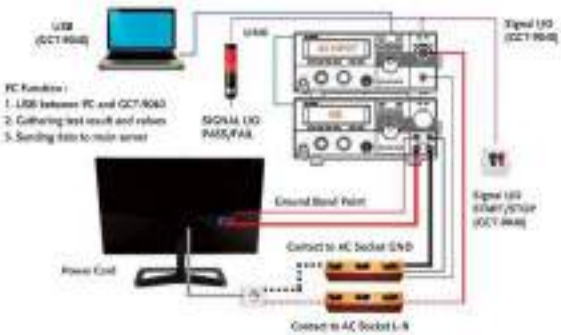
FEATURES

- AC 40A Ground Bond Tester
- Measuring Resistance from 1mΩ...600mΩ
- Connect with the GPT-9800/9900 Series to Become a Sequential Test or Simultaneous Test System
- 240x64 Ice Blue Dot Matrix LCD
- Function Key for Quick Selecting
- High Intensity Flash for Caution & Status Indication
- PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
- Max. 100 Memory Block for Test Condition Setting
- Remote Terminal on the Front Panel for "Start" and "Stop" Remote Action
- Interface : USB Device, Signal I/O and GPIB (optional)

Additionally, after the safety tester system has been assembled, not only the sequential test function for the original all-in-one models can be executed, but also the simultaneous output test can be conducted. The simultaneous output test allows two testers to simultaneously test DUT so as to shorten the overall test time. Whether the safety tester system executes sequential test or simultaneous output test, GCT-9040 will automatically obtain control over two testers, including activation control, Fail status indication light, and pin signal output from Digital I/O etc. to avoid confusion caused by each tester's indication light.

Last but not least, GCT-9040, with respect to remote control and data retrieval, not only provides standard USB (optional GPIB) interface to control all functionalities but also controls connected safety testers (GPT-9800/9900/9900A series) via commands to read measurement results.

SIMULTANEOUS TEST (SCHEMATIC DIAGRAM FOR CONNECTION)



GCT-9040

Rear Panel

SPECIFICATIONS	
GROUND BOND	
Output Current	0.1 30A ~ 40.0A ac
Output Current Resolution	0.01A
Output Current Accuracy	1A ≤ I ≤ 8A: ±(1% of setting + 0.1A) 8A< I ≤ 40A: ± 1% of setting + 0.05A)
Test Voltage	8Vac max (open circuit)
Test Voltage Frequency	50Hz/60Hz selectable
Resistance Measurement Range	1.0mΩ ~ 650.0mΩ
Resistance Measurement Resolution	0.1mΩ
Resistance Measurement Accuracy	±(1% of read ng + 2mΩ)
Window Comparator Method	Yes
TIMER (Test Time)	0.1s~99.9s
GND	OFF (Ex)
Test Method	Four Terminal
MEMORY	
Single Step Memory	MANU - 180 steps
INTERFACE	
LINE	For system connection
USB	Standard
GPIB	Option
Remote Terminal (Front)	Standard
Signal I/O	Standard
Display	240 x 64 Ice Blue Dot matrix LCD
POWER SOURCE & CONSUMPTION	
Source	AC 108 V / 130 V / 220 V / 255 V ± 10%, 50/60Hz
Consumption	Max. 300VA
DIMENSIONS & WEIGHT	
330(W) x 148(H) x 460(D) mm; Approx. 17kg nas.	

ORDERING INFORMATION

GCT-9040 40A AC Ground Bond Tester

ACCESSORIES:

Quick Start Guide x 1, Power cord x 1, Test lead GTL-215 x 1, LINK cable GTL-132 x 1,
USB cable GTL-247 x 1, Remote Cable GHT-119 x 1, Interlock key x 1,
CD x1 (complete user manual)

OPTION	
GPT-9901	GPIB card
OPTIONAL ASSESSORIES	
GTL-248	GPIB Cable, approx. 2m
GRA-417	Rack Mount Kit

GHT-119 Remote Cable

Approx. 500mm

GTL-215 Test Lead

GTL-132 LINK Cable

AC/DC Withstanding Voltage/Insulation Resistance Tester

GPT-9600 Series

FEATURES

- 100VA AC Test Capacity
- 240 x 64 Dot Blue Dot Matrix LCD
- Real Current Measurement
- ARC Detection
- Zero Crossing Turn-on Operation
- PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
- Automatically Switching Input Source for Wide/Guide Input Voltage
- Light Design and Easy to Operation

GW Instek launches new economical safety testers, the GPT-9600 Series, which offers an affordable solution for supporting routine tests of major items of the safety standards such as IEC, EN, UL, CSA, CB, JIS and other safety regulations.

The GPT-9600 Series is built upon a platform of 100VA AC maximum power output. The GPT-9603 is a 3 in 1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9612 is capable of performing AC withstanding and insulation resistance tests. The GPT-9602 is capable of performing AC and DC withstanding tests, and GPT-9601 is able to perform AC withstanding test. The GPT-9600 Series is equipped with the high-efficiency PWM amplifier, which is the core of the platform designed to regulate the influence from the input AC voltage fluctuation and ensure a stable voltage output.

Following a tidy and easy-to-use design concept, the GPT-9600 Series renders users an intuitive operation environment by a simple and clear panel layout, a large LCD display and color LED indicators. The switching power supply used as a universal input source, accommodates the power systems in most countries in the world. The GPT-9600 series, equipped with the same output voltage function as that of all GW Instek Safety Testers, indicates the expected output voltage before high voltage tests are applied. Furthermore, an AUTO mode, including test sequence selections of withstanding (hi-resistance or insulation) and withstanding, is designed for models carrying insulation resistance test function to reduce the testing time of dual test items.

Other functions and features of GPT-9600 include the zero crossing turn-on operation protects DUT from the impact of surge voltage output, the interlock function safeguards users from the hazardous shock of unintentional touch of the voltage output, a remote output on-off term inal in the front panel and a signal I/O port in the rear panel are provided as the means for remote start/stop control of the safety tester.

SPECIFICATIONS	
AC WITHSTANDING	
Output Voltage Range	0.10kV~5.00kV ac
Output Voltage Resolution	10V
Output Voltage Accuracy	±(1.5% of setting + 2 counts) with no load
Maximum Rated Load	100VA(5kV,20mA)
Maximum Rated Current	20mA (0.5kV≤V≤5kV); 5mA (0.1kV≤V≤0.5kV)
Output Voltage Waveform	Sine wave
Output Voltage Frequency	50Hz/60Hz selectable
Voltage Regulation	±(1.5% + 2 counts) (full load ↔ no load)
Voltmeter Accuracy	±(1.5% of rdg + 2 counts)
Current Measurement Range	0.01mA~20.0mA
Current Best Resolution	0.01mA/0.1mA
Current Measurement Accuracy	±(2.0% of rdg+10 counts)(when HI SET<1.00mA ; ±(2.0% of rdg+3counts)(when HI SET≥1.00mA
Current Judgment Accuracy	±(3.0% of setting+10 counts)(when HI SET<1.00mA ; ±(3.0% of setting+3counts)(when HI SET≥1.00mA
Window Comparator Method	Yes
ARC Detect	Yes
RAMP (Ramp Up Time)	0.1s fixed
TIMER (Test Time)	OFF, 1s~180s
GND	O/N
DC WITHSTANDING	
Output Voltage Range	0.10kV~6.00kV dc
Output Voltage Resolution	10V
Output Voltage Accuracy	± (1.5% of setting + 2 counts) with no load
Maximum Rated Load	25W(5kV,5mA)
Maximum Rated Current	6mA(0.5kV< V≤6kV); 2mA (0.1kV≤V≤0.5kV)
Voltage Regulation	±(1.5% + 2 counts)(full load ↔ no load)
Voltmeter Accuracy	±(1.5% of rdg + 2 counts)
Current Measurement Range	0.01mA~6.00mA
Current Best Resolution	0.01mA
Current Measurement Accuracy	±(2.0% of rdg+10 counts)(when HI SET<1.00mA ±(2.0% of rdg+3counts)(when HI SET≥1.00mA
Current Judgment Accuracy	±(3.0% of setting+10 counts)(when HI SET<1.00mA ±(3.0% of setting+3counts)(when HI SET≥1.00mA
Window Comparator Method	Yes
ARC Detect	Yes
RAMP (Ramp Up Time)	0.1s fixed
TIMER (Test Time)	OFF, 1s~180s
GND	O/N
INSULATION RESISTANCE	
Output Voltage	50V, 100V, 250V, 500V, 1000V dc
Output Voltage Accuracy	±(5.0% of setting +5 count)(no load)
Resistance Measurement Range	1MΩ ~ 2000MΩ

Test Voltage	Measurable Range	Accuracy
50V/100V/250V	1 ~ 50MΩ 51 ~ 200MΩ	±(5% of rdg + 3 VSD) ±(10% of rdg + 2MΩ)
500V/1000V	1 ~ 50MΩ 51 ~ 2000MΩ	±(5% of rdg + 3 VSD) ±(10% of rdg + 2MΩ)

GPT-9600 Series

Window Comparator Method	Yes
Output Impedance	600kΩ
RAMP (Ramp-Up Time)	0.1s fixed
TIMER (Test Time)	OFF, 0.5~999s
GND	OFF /for
TEST MODE *	
Single	ACW, DCW, IR
Auto	ACW+IR, ACW+IR, DCW+IR, IR+DC
INTERFACE	
Remote Terminal (Front)	Standard
Signal I/O	Standard
DISPLAY	
	240 x 45 Dot Blue Dot matrix LCD
POWER SOURCE	
	AC 100V~120V/220V~240V ±10%, 50/60Hz
POWER CONSUMPTION	
	400VA Max.
DIMENSIONS & WEIGHT	
	330(W)x148(H)x388.5(D)mm; Approx. 9kg max.

* The available "Test Mode" depends on selected model.

ORDERING INFORMATION

GPT-9601 AC 100VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9612 AC 100VA AC Withstanding Voltage/Insulation Resistance Tester
GPT-9603 AC 100VA AC/DC Withstanding Voltage Tester
GPT-9611 AC 100VA AC Withstanding Voltage Tester

ACCESSORIES:
Quick Start Guide x1, Power cord x1, CD x1 (complete user manual), Interlock Key x1, Remote Cable GHT-119 x1, Test lead GHT-114 x1

OPTIONAL ACCESSORIES

GHT-114 High Voltage Test Probe
GHT-117/GHT-117(EU) High Voltage Adapter Box
GHT-205 High Voltage Test Probe
GRA-417 Rack Mount Kit

Rear Panel

Interlock Key

GHT-119 Remote Cable

Approx. 580mm

GHT-114 Clip High Voltage Probe

Approx. 1m

GHT-117/GHT-117(EU)
High Voltage Adapter Box

Multi-Channel Hipot Tester

GPT-9500 Series

NEW

FEATURES

- 1100VA AC Test Capacity
- 3 in 1 Tester : AC, DC, IR
- Built-in 8-Channel Scanner
- 480 x 272 Color TFT LCD
- Test Parameter Export/Import Through USB Host
- Statistics (Counter) Function
- Insulation Resistance Measurement up to 50GΩ
- Open/Short Check (OSC)
- ARC Detection
- Multi-language : Traditional/Simplified Chinese, English
- Interface : RS-232C, USB Host/Device and Signal I/O

GW Instek introduces a new multi-channel withstanding voltage tester the GPT-9500 series. This series has 3 models and each model has a built-in 8-channel scanner. The series meets safety regulations: IEC, EN, UL, CSA, GB, JIS and other safety regulations. The series aims at the needs of the mass test items of general electronic components or winding components during routine tests.

The GPT-9500 series is a three-in-one multi-channel tester, providing AC withstanding voltage (5kV max.), DC withstanding voltage (6kV max.), and insulation resistance (50GΩ max.). The design of the series conforms to the latest IEC 61010-1 3rd standard requirements and it is built on the output platform of AC 1500VA. The status of the 8 channels of GPT-9103 can be set to H, L or X according to the test requirements, especially suitable for isolating components such as transformers to perform mutual testing of multiple points of single components. The status of the 8 channels of GPT-9501 only provides the setting of H or X, which is more suitable for general components such as passive components for high-voltage testing between two points.

The GPT-9500 series adopts 4.3" color LCD (480× 272 resolution), which provides users with complete measurement information and a user-friendly operation interface, making operation and setting parameters easier and more convenient. AUTO test supports tabular display, therefore, there is unnecessary to switch the screen to see all the test results. At the same time, the series provides the statistical counting functions. Users can quickly obtain the total number of tests and the number of NG-GOs without connecting an external counter. All scanning channels are all configured on the rear panel of the tester. Other than being relatively esthetic when the tester is mounted on the rack, the design can also avoid personal injury by preventing accidental contact during the output process. The disconnection detection function is provided for the series to avoid the misjudgment of the test caused by the disconnection of the wire.

Other functions and features of the GPT-9500 series include the export/import function of setting parameters, which can copy the settings of one tester to the same model testers on the production line through a USB flash drive. By so doing, the test stations of the production lines can be quickly expanded and the risk of errors caused by repeated inputs can also be avoided; the zero start function, which avoids the impact of instantaneous voltage on the DUT; the interlock function, which is a safety protection hardware structure to allow users to connect external protection devices; display in 3 languages, which include English, Traditional Chinese and Simplified Chinese; and the Signal I/O terminal and RS 232C/USB device on the rear panel, which can be used for external control and monitoring or measurement data acquisition.

Model	GPT-9513	GPT-9501
Channel	3 CH	1 CH
Channel Status	H, L or X	H or X

SPECIFICATIONS

AC WITHSTANDING	
Output Voltage Range	0.050kV ~ 5.000kV
Output Voltage Resolution	1V
Output Voltage Accuracy	±(1% of setting + 5V) (no load)
Maximum Rated Load	1100 VA (5kV/220mA)
Maximum Rated Current	20mA: 0.050 mA ~ 1 mA (5000V); 2mA: 0.050 mA ~ 2 mA (2500V); 5mA: 0.050 mA ~ 5mA (1000V); 10mA: 0.050 mA ~ 10mA (500V); 20mA: 0.050 mA ~ 20mA (250V)
Output Voltage Waveform	Sine wave
Voltage Regulation	±(1% + 5V) (maximum rated load ~ no load)
Output Voltage Frequency	50 Hz/60 Hz selectable
Voltmeter Accuracy	±(1% of reading + 5V)
Current Measurement Range	0.001 mA ~ 20.00 mA
Current Best Resolution	1 μA (0.001mA ~ 0.999mA); 10 μA (1.00mA ~ 20.00mA)
Current Measurement Accuracy	±(1.5% of reading + 20 μA)
Current Offset	80 μA maximum
ARC Detect	Yes
RAMP TIME (Rise Time)	0.1s~999.9s
FALL Time	OFF~999.9s
WAIT Time	OFF~999.9s
TIMER (Test Time)	CONT, 0.3s~999.9s
TIMER Accuracy	±(100ppm + 20ms)
GND	ON/OFF
DC WITHSTANDING	
Output Voltage Range	0.050kV~6.000kV
Output Voltage Resolution	1V
Output Voltage Accuracy	±(1% of setting + 5V) (no load)
Maximum Rated Load	80W (6kV/13mA)
Maximum Rated Current	10mA: 0.00 mA ~ 2mA (6000V); 2mA: 0.00 mA ~ 10mA (1500V); 10mA: 0.00 mA ~ 13mA (1000V); 13mA: 0.00 mA ~ 13mA (500V)
Voltmeter Accuracy	±(1% of reading + 5V)
Voltage Regulation	±(1% + 5V) (maximum rated load ~ no load)
Current Measurement Range	0.001 mA ~ 15.00 mA
Current Best Resolution	0.1 μA (0.1 μA ~ 999.9 μA); 1 μA (1 μA ~ 4.999mA); 10 μA (5.00mA ~ 15.00mA)
Current Measurement Accuracy	±(1% of reading + 1 μA when Reading ≤ 1mA; ±(2% of reading + 10 μA when Reading ≥ 1mA
Current Offset	5 μA maximum
ARC Detect	Yes
RAMP TIME (Rise Time)	0.1s~999.9s
FALL Time	OFF~999.9s
WAIT Time	OFF~999.9s
TIMER (Test Time)	CONT, 0.3s~999.9s
TIMER Accuracy	±(100ppm + 20ms)
GND	ON/OFF

GPT-9500 Series

SPECIFICATIONS	
INSULATION RESISTANCE	
Output Voltage	0.05kV~1.000kV dc
Output Voltage Resolution	1V
Output Voltage Accuracy	± (1% of setting + 5V) (no load)
Resistance Measurement	0.1MΩ~30GΩ
Test Voltage	Measurement Range / Accuracy
50V≤V<100V	0.10MΩ~10MΩ / ± (5% of reading + 3% fs) 11MΩ~50MΩ / ± (5% of reading + 7% fs) 55MΩ~2GΩ / ± (10% of reading + 7% fs)
100V≤V≤1000V	0.10MΩ~10MΩ / ± (3% of reading + 3% fs) 11MΩ~100MΩ / ± (3% of reading + 5% fs) 105MΩ~40GΩ / ± (10% of reading + 5% fs)
Voltage Regulation	± (5% + 5V) (maximum rated load ↔ no load)
Voltmeter Accuracy	± (1% of reading + 3V)
Short-Circuit Current	10mA max.
Output Impedance	2MΩ
RAMP TIME (Rise Time)	0.1s~999.9s
FALL Time	0.0s~999.9s
WAIT Time	0.0s~999.9s
TIMER (Test Time)	0.3s~999.9s
Timer Accuracy	±(0.1%prog.val. + 20ms)
GND	ON/OFF
CONTINUITY TEST	
Output Current	100mA dc
Ohmmeter Measurement	±(10% of reading+2Ω), ON/OFF
Accuracy	
INTERFACE	
Signal I/O	Standard
RS-232C	Standard
USB (Device)	Standard
USB (Host)	Standard (for Parameter/LCD Hardcopy)
Bar Output	Standard
DISPLAY	
	4.3" Color LCD
POWER SOURCE	
	AC 100V~240V ±10%, 50Hz/60Hz
POWER CONSUMPTION	
	400VA max.
DIMENSIONS & WEIGHT	
	330(W) x 128(H) x 450(D) mm; Approx. 11kg

* The specifications apply when the GPT-9000 is powered on for at least 30 minutes under +18°C~+28°C.

ORDERING INFORMATION

GPT-9513 AC 150VA Multi-Channel Hipot Tester
GPT-9503 AC 150VA Multi-Channel Hipot Tester

ACCESSORIES:
Quick Start Guide x 1, CD x 1 (Complete User Manual), Power Cord x 1,
Test Leads GHT-115 x 1, GHT-116B x 1, GHT-116R x 1

OPTIONAL ACCESSORIES	
GTL-232	RS-232C Cable, 9-pin F-M type, approx. 3m
GTL-246	USB Cable, A-B type, approx. 1.2m

Rear Panel

GTL-232 RS-232C Cable

GHT-115 High Voltage/Continuity Test Lead

GHT-116B Test Lead

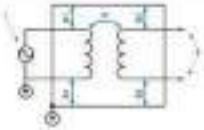
Approx. 1100mm

GHT-116R Test Lead

Approx. 1100mm

AC Multi-Channel Hipot Tester

A. MEETS IEC 61010-2-034 DESIGN REQUIREMENTS



Meets IEC 61010-2-034 Design Requirements

GPT-9900 is the world's first multi-channel hipot tester to comply with IEC 61010-2-034 (Safety requirement for electrical equipment for measurement, control and laboratory use – particular requirements for measurement equipment for insulation resistance and test equipment for electric strength).

Apart from this, the safety considerations also include double insulation for input and output voltages, safe output/warning mechanism, post-test discharge mechanism, etc. to ensure user safety during the operation.

B. FRIENDLY USER INTERFACE

4.3' Color LCD, High-brightness Indicator and Function Keys

Operation design is simplicity is incorporated into the tester through configuring the function keys at the bottom of the LCD screen to easily change the test function by just pressing the function keys, or by rotating the knob to change the measurement value, which greatly improves the convenience of operators updating various status indicators on the front panel immediately according to the status on the display, which not only provides users with a more comprehensive control of the test status, but also avoids unnecessary operation risks. For example, when the output is executed, the high voltage output indicator will keep flashing.

C. COMPLETE INFORMATION PRESENTATION

Rich Information

AUTO Mode Listed Result

The large-sized LCD clearly and simultaneously displays the test voltage, test parameters, test status, measurement value and judgment result. The channel usage status and statistical counting results (the total number of tests and the number of FAILs) can be displayed simultaneously. Hence, users can easily obtain complete information without switching the screen or connecting an external counter. In addition, AUTO mode also supports tolerance testing, which greatly improves the convenience of observation.

6. CONVENIENT PARAMETER DUPLICATION

Export/Import of Setting Parameters

The GPT-9500 series supports the export/import of setting parameters via a USB flash drive. Users only need to set one tester, and the settings can be quickly and massively copied to all testers on production lines that not only improves the efficiency of production testing, but also avoids errors caused by repeated inputs.

7. SETTING DATA EXPORT / IMPORT MECHANISM

Channels Configured on the Rear Panel

The channel outputs of the GPT-9500 series are all configured on the rear panel. Other than the aesthetics of the system configuration, it is more important to effectively reduce the possibility of accidental contact by personnel. Each channel provides disconnection detection to avoid performing an invalid test.

Leakage Current Tester

GLC-10000

NEW

CE | RS-232 | GPIB | USB Device | USB Host | LAN | Signal I/O

FEATURES

- Suitable for Medical Electrical & General Electrical of Leakage Current Measurement
- 7" Touch Pane with Color LCD
- 11 Different Measurement Network to Simulate the Resistance of Human Body (Including IEC 60601-1:2020 3.2rd)
- The Measurement of Maximum Allowable Leakage Current is Up to 50mA
- External Terminal for Extension MD Connection
- MD OUT Terminal can be Connected to an Oscilloscope for Convenient Comparison of Measured Waveforms
- 30 Sets Memories for Test Parameter; 1000 Sets Memories for Measured Data.
- Test Parameter Export/Import Function Through USB Host
- USB Storage for Measurement Data/ Screen Capture
- Various Standard Interfaces: RS-232C, USB Host & Device, LAN, Signal I/O and GPIB (Optional)

GTL-207A Test Lead

Approx. 0.8m

GLC-01 Alligator Clips

GLC-02 Foil Probe

GW Instek launches a new leakage current tester–GLC-10000, which features 11 simulated human impedance networks that comply with related safety regulations so as to conduct leakage current test for electric equipment under normal condition or single fault condition. These 11 simulated human impedance networks are comprised of networks for medical electric equipment and general electric and electronic equipment to ensure that the product design and manufacture are in compliance with requirements of safety regulations including IEC, EN, UL, etc.

GLC-10000 provides test requirements for most IT products, household appliances and other electronic and electric equipment, and even medical electronics in the measurement of leakage current (or touch current), including the required measurement network, measurement bandwidth of various current forms are all in compliance with the requirements of the latest version of the applicable regulations. Furthermore, in order to comply with the leakage current flow paths under different regulations, GLC-10000 provides 20 measurement options to meet the requirements of the old and latest versions of the standards.

GLC-10000 is equipped with a 7-inch TFT LCD touch screen, which makes the operation more convenient and fast, and the large screen allows setting information and test results to be displayed on the LCD at the same time, improving the readability of information observation. In addition, users can select the front socket output (10A max.) or the rear terminal block output (up to 20A) to measure the leakage current according to the current consumption of the DUT. 30 sets of internal memory can be used to store the measurement settings of users' products. In addition, 1000 sets of measurement results can be stored to conduct subsequent analysis.

For the rear panel configuration, GLC-10000 also provides a reserved MD external terminal block (EXT+/EXT-), and users can self-define the required simulated impedance networks (only applicable to parallel RC combination) to measure the leakage current to meet the requirements of new MD in future regulations. In addition, GLC-10000 provides a variety of standard interfaces, such as RS-232C, USB device, LAN and Remote I/O, and even GPIB (optional) to meet the needs of system control and data acquisition.

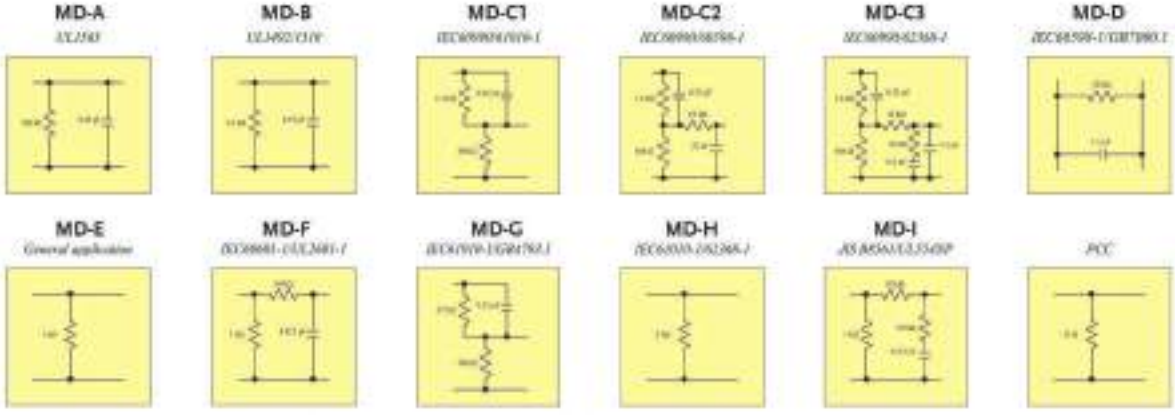
SPECIFICATIONS

Ranges	Range	Resolution	Accuracy		
DC					
50.00mA	4.00mA~50.00mA	10 µA	±(2%rdg+6dgt)		
5.000mA	0.400mA~5.000mA	1 µA	±(2%rdg+6dgt)		
500.0 µA	40.0 µA~500.0 µA	0.1 µA	±(2%rdg+6dgt)		
50.00 µA	4.00 µA~50.00 µA	0.01 µA	±2.0%fs		
AC / AC+DC					
			0.1Hz≤f≤15Hz	15Hz< f≤100kHz	100kHz< f≤1MHz
50.00mA	4.00mA~50.00mA	10 µA	±(4.0%rdg+10dgt)	±(2.0%rdg+6dgt)	±(2.0%rdg+10dgt)
5.000mA	0.400mA~5.000mA	1 µA	±(4.0%rdg+10dgt)	±(2.0%rdg+6dgt)	±(2.0%rdg+10dgt)
500.0 µA	40.0 µA~500.0 µA	0.1 µA	±(4.0%rdg+10dgt)	±(2.0%rdg+6dgt)	±(2.0%rdg+10dgt)
50.00 µA	4.00 µA~50.00 µA	0.01 µA	±4.0%fs	±2.0%fs	±2.0%fs
AC PEAK					
			15Hz≤f≤ 10kHz	10kHz<f≤100kHz	100kHz<f≤1MHz
75.0mA	5.0mA~75.0mA	100µ A	±(2.0%rdg+6dgt)	±5.0%fs	±15%fs
7.500mA	0.500mA~7.500mA	1µ A	±2.5%fs	±5.0%fs	±15%fs
750.0 µA	40.0 µA~750.0 µ A	0.1µ A	±4%fs	±5.0%fs	±20%fs
EUT Voltage/Current Monitor					
300V	85V~300V	0.1V	±(5%rdg+10dgt)		
20A	0.5A~20A	0.1A	±(2%rdg+5dgt)		
POWER SUPPLY					
For GLC-10000	AC 100V~240V±10%, 50/60Hz ; Power consumption : Max. 50VA				
For EUT IN	AC 100V~240V±10%, 50/60Hz, 20A				
EUT OUT (Front)	AC 100V~240V, 50/60Hz, 10A				
EUT OUT (Rear)	AC 100V~240V, 50/60Hz, 20A				
INTERFACE					
RS-232C, USB host & device, LAN, Signal I/O and GPIB (Optional)					
DIMENSIONS & WEIGHT					
342 (W) x 133.87 (H) x 348.51 (D) mm; Approx. 7.5kg					

Rear Panel

GLC-10000

MEASUREMENT NETWORK (MD)



Note : 1. The standard numbers that are listed are only example; the MD can be used with all applicable standards.
2. PCC is for Meter mode only.

A. SIMPLE AND INTUITIVE SYSTEM

The color TFT touch screen makes operation intuitive and simple, whilst making it easier to observe test result.

B. VARIOUS MEASUREMENT NETWORK

Nine Measurement Network are available for measuring the leakage current of electrical and medical equipment.

C. VARIOUS STANDARD INTERFACES

The various practical interfaces are equipped as standard making control convenient and flexible.

ORDERING INFORMATION

GLC-10000	Leakage Current Tester

ACCESSORIES :
Power cord x 1, Test lead(GTL-207A) x 2, CD x 1(Complete user manual), Alligator clips(GLC-01) x 1(Red x 2/Black x 2), Foil probe(GLC-02) x 1, Power Cord for EUT (GLC-03) x 1, Input & output terminal cover (GLC-04) x 1

OPTIONAL

GLC-10KG1	GPIB Card

OPTIONAL ACCESSORIES

GTL-232	RS-232C Cable
GTL-240	USB Cable, USB 2.0, A-B Type (L Type), 1200mm
GTL-246	USB Cable, USB 2.0 A-B TYPE CABLE, 4P
GTL-248	GPIB Cable (2.0m)

GLC-03 Power Cord for EUT

Approx. 1.8m

GLC-04 Input & Output Terminal Cover

GLC-9000

The GLC-9000 leakage current tester is used to perform leakage current (or called touch current) tests on general purpose electric (IEC 60950) equipment. This tester engages with nine measurement networks (or called Measuring Device) to provide the simulation of human body while the EUT (equipment under test) is taking a leakage current testing, in compliance with the specific standards or regulations such as IEC, UL, BS...etc.

In order to provide a simple operation environment, the GLC-9000 equips a large TFT LCD touch panel to configure system as well as to present the measurement settings information and result simultaneously. Besides, there are 50 preset testing conditions, which conform to IEC60950 and other standards, for general electric equipment can be recalled to reduce the setting time. In addition, 50 sets of empty memory are available for user defined.

A Meter mode is also available for the GLC-9000. It uses the measurement terminal (T1/T2) to measure voltage as the same way of ordinary voltmeter. During the voltage measurement, the SELV function (safety extra low voltage) is applicable to detect the voltage value between measuring points whether exceeding the SELV setting.

FEATURES

- Suitable for General Electrical of Leakage Current Measurement
- Touch Panel with Color LCD Display
- 9 Different Measurement Network to Simulate the Resistance of Human Body
- 50 Sets Preset Test Conditions Conform to the IEC 60950 ; 50 Sets Memories for Customer Defined
- 8 Different Types of Leakage Current
- Meter Function with SELV/CONV Function
- Upper & Lower Limitation for PASS/FAIL Judgment
- Various Leakage Current Measuring Mode : DC/AC/MC+DC/AC Peak
- Various Standard Interfaces : RS-232/ GPIB/USB Host & Device/EXT I/O

GTL-207A Test Lead

Approx. 0.8m

GLC-01 Alligator Clips

GLC-02 Foil Probe

SPECIFICATIONS

	Ranges	Range	Resolution	Accuracy	
DC					
	25.00mA	5.00mA ~ 25.00mA	10μA	±(0.2%rdg+16dgt)	
	5.000mA	0.500mA ~ 5.000mA	1μA	±(0.2%rdg+16dgt)	
	500.0μA	50.0μA ~ 500.0μA	0.1μA	±1.8%fs	
	50.00μA	4.00μA ~ 50.00μA	0.01μA	±1.8%fs	
AC or AC+DC					
				10Hz of 4180Hz	1000Hz of 3.1MHz
	25.00mA	5.00mA ~ 25.00mA	10μA	±(2.0%rdg+6dgt)	±(2.0%rdg+18dgt)
	5.000mA	0.500mA ~ 5.000mA	1μA	±(2.0%rdg+6dgt)	±(2.0%rdg+18dgt)
	500.0μA	50.0μA ~ 500.0μA	0.1μA	±(2.0%rdg+6dgt)	±(2.0%rdg+18dgt)
	50.00μA	4.00μA ~ 50.00μA	0.01μA	±1.8%fs	±1.8%fs
AC PEAK					
				20Hz of 1kHz	1kHz of 10kHz
	25.0mA	10.0mA ~ 25.0mA	100μA	±(2.0%rdg+6dgt)	±(5.0%rdg+18dgt)
	10.00mA	1.00mA ~ 10.00mA	10μA	±(2.0%rdg+6dgt)	±(5.0%rdg+18dgt)
	1.000mA	900μA ~ 1.000mA	1μA	±3.5%fs	±5.8%fs
	500.0μA	40.0μA ~ 500.0μA	0.1μA	±4.0%fs	±5.8%fs
EUT (EXTENDED)					
Voltage	300V	85V ~ 308V	0.1V	±(2%rdg+10dgt)	
Current	10A	0.5A ~ 10A	0.1A	±(2%rdg+5dgt)	
METER MODE					
	AC/DC	30.0 ~ 300.0V	0.1V	±(3%rdg+2V)	
	AC+DC	30.0 ~ 300.0V	0.1V	±(3%rdg+2V)	
	AC Peak	15.0 ~ 430.0V	0.1V	±(3%rdg+2V)	
INTERFACE					
RS-232C, GPIB, USB Host & Device, EXT I/O					
POWER SOURCE					
For GLC-9000: AC 108V/120V/230V(210V±10%, 50/60Hz; Power Consumption : Max. 50VA For EUT: AC 85V ~ 253V, 50/60Hz (264V Max.)					
DIMENSIONS & WEIGHT					
330 (W) x 130 (H) x 350 (D) mm; Approx. 5kg					

ORDERING INFORMATION

GLC-9000 Leakage Current Tester

ACCESSORIES :
User manual x 1, Power cord x 2, Test lead(GTL-207A) x 2, CD x1(Complete user manual), Alligator clips(GLC-01) x 4(Red x 2/Black x 2), Foil probe(GLC-02) x 1,

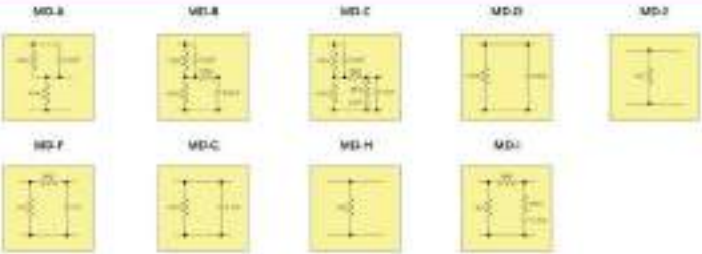
OPTIONAL ACCESSORIES

GTL-232	RS-232C Cable
GTL-245	USB Cable, USB 2.0, A-B Type (A Type), 1800mm
GTL-246	USB Cable, USB 2.0 A-B TYPE CABLE, 4P
GTL-248	GPIB Cable (2.0m)

GLC-9000

Rear Panel

MEASUREMENT NETWORK (MD)



A. SIMPLE AND INTUITIVE SYSTEM

The color TFT touch screen makes operation intuitive and simple, while making it easier to observe test result.

B. VARIOUS MEASUREMENT NETWORK

Nine Measurement Network are available for measuring the leakage current of electrical and medical equipment.

C. VARIOUS STANDARD INTERFACES

The various practical interfaces are equipped as standard making control convenient and flexible.

OTHER METERS

In order to provide customers with a complete "one stop shopping" solution, GW Instek also offers many other special test and measurement instruments for different applications. For power related measurement, the GPM-8310/8213 (A.C./D.C.) digital power meters are suitable for middle to high-end application such as stand-by power measurements, SPEC Power@ and other low-level power measurements. If you need to measure the resistance of material components, the GOM-800 Series D.C. milli-ohm meter is your ideal tool. As for audio signals related measurement, GW Instek provides GAD-201G automatic distortion meter and GVT-427B/417B A.C. millivolt meters. We also supply two models of the GBM-1000 Series battery meters with ranges of 180V and 80V. For current measurement, PCS-1000i is a high-precision D.C. and A.C. current shunt meter which carries built-in current shunts and high accuracy current measurement circuits.

PRODUCTS

- DC Milli-Ohm Meter
- Battery Meter
- Digital Power Meter
- Automatic Distortion Meter
- AC Millivolt Meter
- Precision Current Shunt Meter

COMPONENTS TESTING INSTRUMENT

MODEL	Description, Main Function	Page
GOM-805	DC Milli-Ohm Meter 1mΩ ~ 1MΩ	057-59
GOM-804	DC Milli-Ohm Meter 1mΩ ~ 1MΩ	

BATTERY METER

MODEL	Description, Main Function	Page
GBM-1000	300V Battery Meter (including RS232C USB device host and RS485/CAN interface)	060-62
GBM-1600	80V Battery Meter (including RS-232C/USB device host and RS485/CAN interface)	

POWER RELATED INSTRUMENT

MODEL	Description, Main Function	Page
GPM-8310	DC and 0.1Hz-100kHz, Max. Direct Input of up to 600V and 30A, 5" TFT LCD Total 10 Parameters Display, Waveform Display for V / I / P, Harmonic Measurement & Analysis	063-68
GPM-8213	DC and 45Hz-66Hz, Max. Direct Input of up to 600V and 20A, 4" TFT LCD Total 8 Parameters Display	069-70

AUDIO RELATED INSTRUMENT

MODEL	Description, Main Function	Page
GAD-201G	20Hz ~ 20kHz Automatic Distortion Meter	071
GVT-427B/427B	AC Millivolt Meter (DCH/DCH)	073

PRECISION CURRENT SHUNT METER

MODEL	Description, Main Function	Page
PCS-1000	Max. Voltage: AC 600V/DC 1800V, Max. Current: AC 300A/DC 1000A	074-76

GOM-804/805

FEATURES

- 50,000 Counts Display
- 3.5" (320 x 240) TFT LCD Display
- High Accuracy of 0.05% Precision
- 1Amp Test Current, 0.1μΩ Resolution
- Fast Measurement of 60 Readings Per Second
- Four-wire Resistance Measurement
- Temperature Compensation Measurement Function
- Delayed Measurement
- 10 sets of Panel Setting Memory
- Dry Circuit (GOM-881 Only)
- Drive Modes :
  GOM-805:DC+/DC-/Pulsed/PWM/Zero/Handler
  GOM-804:DC+, Stanley
- Interface : USB Device, RS-232C, Handler/Scan/EXT I/O, and GPIB(Option)

GOM-804/805 features 3.5-inch TFT display, maximum 50,000 counts measurement display, the rapid sampling rate of 60 readings per second, optimum 0.05% measurement precision, four-wire measurement method as well as the temperature measurement and temperature compensation measurement function to meet the requirement of low resistance measurement application. The GOM-805 also includes various drive modes and Dry circuit for contact resistance measurement applications. More features, including 10 sets of panel setting memory and many external control interface such as RS-232C, USB, Handler/Scan/EXT I/O or GPIB (option), greatly elevate GOM-804/805 milli-ohm meter's convenience in practical applications.

GOM-804/805 adopt 3.5-inch color LCD to enhance the clarity of measurement results and to provide display for related setting criteria that tremendously brings up the completeness of test information. Additionally, GOM-804/805, with the optimum 0.05% precision, augment the measurement speed to 60 sampling rate per second and maintain the display digits of five instead of four despite of different speed selections. Furthermore, the independent functional hyper-red direction keys together increase the operational convenience which allows users to complete their measurement tasks with intuitive convenience and speed.

GOM-805 provides Dry circuit and various drive modes (DC+, DC-, Pulsed, PWM) for measurement applications on different materials. The pulsed current output mode is suitable for measuring conductors of different materials and this output mode is to reduce the thermal EMF influence, which is caused by electric potential difference generated from different conductors acting on different temperatures while conducting low resistance measurements. The DC+ and DC- output modes are best for the measurement requirements of inductive components. The PWM output mode, ideal for changing temperature sensitive materials, can avoid resistance value variation which is due to over load happened on current measurement for a long period of time. During the DC+, DC- and Pulsed drive is supplied, the Dry circuit can work with their area. Dry circuit can limit the applied voltage under the open circuit voltage of 20mV to avoid over voltage occurred on the both ends of components. The over voltage will damage the oxide coating and the thin layer of contact surface, as a result, the validity of measurement will then be ruined. For instance, contact resistance of connector measurement is one of the applications.

With respect to connecting the external control, GOM-804/881 provide a D-sub 25-pin combined interface to execute according to the functional ties, Handler, Scan or EXT I/O for respectively connecting to a sorting machine connecting to an external on-off switch, and directly conducting external trigger control. For remote control and measurement result retrieval requirements, GOM-804/805 also provide various interface selections such as RS-232C, USB, and GPIB (GOM-804 option) /(GOM-805 standard) interface. Furthermore, the control commands are compatible to that of GOM-802 that saves time in adjusting programs while switching from the old model to the new model.

To sum up, GOM-804 evolves from GOM-802 platform with more advanced functionalities and specifications, including display digits, measurement speed and standard interface (RS-232C/USB). With all the capabilities of GOM-804, GOM-881 augments itself with new measurement attributes (Dry circuit and various drive modes) to meet the requirements of broader low resistance measurement applications.

SPECIFICATIONS

	GOM-804	GOM-805
DISPLAY		
	50,000 counts	
SAMPLING RATE		
Slow	10 readings / s	
Fast	60 readings / s	
RESISTANCE MEASUREMENT		

Range	Resolution	Test Current	Accuracy
5mΩ	0.1μΩ	1A	±(0.1% reading + 0.2% of range)
50mΩ	1μΩ	1A	±(0.1% reading + 0.03% of range)
500mΩ	10μΩ	100mA	±(0.05% reading + 0.02% of range)
5Ω	100μΩ	100mA	±(0.05% reading + 0.02% of range)
50Ω	1mΩ	10mA	±(0.05% reading + 0.02% of range)
500Ω	10mΩ	1mA	±(0.05% reading + 0.008% of range)
5kΩ	100mΩ	100μA	±(0.05% reading + 0.008% of range)
50kΩ	1Ω	100μA	±(0.05% reading + 0.008% of range)
500kΩ	10Ω	10μA	±(0.05% reading + 0.008% of range)
5MΩ (GOM-881)	100Ω	1μA	±(0.2% reading + 0.008% of range)
5MΩ (GOM-881)	100Ω	1μA	±(0.1% reading + 0.008% of range)

TEMPERATURE		
Range	50°C ~ 199.9°C	
Accuracy	10°C ~ 40°C : ± 3%±0.5°C ; Other : 0.1%±1.0°C	
Resolution	0.1°C	
DRY CIRCUIT		
	–	Open circuit less than 20mV For 10mΩ, 1Ω, 50Ω range only

COM-804/805

Rear Panel

SPECIFICATIONS		
	COM-804	COM-805
DRIVE MODE		
DC+ / DC-	DC + Only	Yes
Pulsed	—	Yes
PWM	—	Yes
Zero	—	Yes
Standby(*)	Yes	Yes
OTHER FUNCTIONS		
	Trigger : Internal, Manual, External ; Math : ABS, REL, %, TC Average : 2 ~ 100 times; Measurement Delay: TC for Transformer; Compare : Grade, Continuity beeper ; Binning (COM-805 only)	
INTERFACE		
USB	Standard	Standard
RS-232C	Standard	Standard
HANDLER/SCAN/EXT I/O	Standard	Standard
GPIB	Option (factory installed)	Standard
DISPLAY		
	4.3 "(320 x 240) TFT LCD	
MEMORY		
	20 sets for panel setting	
POWER SOURCE		
	AC 100 ~ 240 V, 50/60 Hz	
CONSUMPTION		
	35VA (max.)	
DIMENSIONS & WEIGHT		
	225 (W) x 102 (H) x 283 (D) mm ; Approx. 3 kg	

(*) The "Standby Function" must be selected with the rear PCB hardware. It is not applicable to customer's requirements.

ORDERING INFORMATION

COM-804	D.C. 6½ Digits Meter (Handler/RS-232C/USB Device/GPIB)
COM-804 without GPIB	D.C. 6½ Digits Meter(Handler/RS-232C/USB Device/Without GPIB)
COM-805	D.C. 6½ Digits Meter (Handler/RS-232C/USB Device)

ACCESSORIES

Quick Start Guide x 1, Power cord x 1, Test lead CTL-308 x 1, CD x 1 (complete user manual)

OPTION	
COM-801GT	GPIB Card (only for COM-804 and must be installed at factory before shipment)

OPTIONAL ACCESSORIES	
PT-100	Platinum Temperature Probe
CTL-232	RS-232C cable(9 pin, F-F type), approx. 3000mm
CTL-248	USB cable, A-B type, approx. 1200mm
CTL-348	GPIB cable approx. 2000mm
CTL-309	Test lead, approx. 3m

FREE DOWNLOAD	
Driver	LabView Driver

CTL-308 Test lead

approx. 1.2m

CTL-309 Test lead

approx. 1m

PT-100 Temperature Probe

Approx. 1.2m

D.C. Milli-Ohm Meter

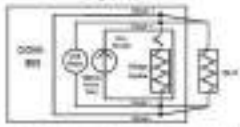
A. TOTALLY REPLACING THE EXISTING MODELS

In terms of the basic functionalities and specifications, GOM-804/805 can absolutely replace the existing model, GOM-802. All GOM-802 functionalities can be found from GOM-804/805, including various measurement range, 1A test current (maximum), four-wire measurement method, temperature probe (option, accessory model : PT-100) for temperature measurement and temperature compensation measurement, etc. The programming commands are also compatible to that of GOM-802. To simply put it, the brand new GOM-804/805 not only provide better display interface, fast measurement (60 readings per second), but also collocate with standard communications interface (RS-232C/USB device) to facilitate users in accomplishing measurement tasks rapidly. On top of that, model switching will not be a problem.

B. FASTER MEASUREMENT WITHOUT SACRIFICING RESOLUTION

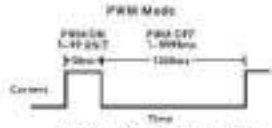
GOM-804/805 has two measurement speed selections, which are fast reading 60 readings per second, and Slow 10 readings per second. A major departure from the past, users, in the past, had to juggle between speed and display resolutions. GOM-804/805 will not affect resolution despite of any speed selections and will maintain the highest display digits. In other words, reading resolution will not be changed by changing speed and the display digits remain the same.

C. DRY CIRCUIT TEST FOR GOM-805 ONLY



Dry circuit is to limit test voltage and current to certain levels which will not cause contact points to produce physically or electrically changed circuit and its most frequently used application is contact resistance of connector measurement. Based upon MIL-STD-3144 method 3002.1 low signal level contact resistance, tests must be applied under the maximum open circuit voltage of 20mV (or lower), and short circuit current of 100mA (or lower) to avoid over voltage for the both ends of connectors. The over voltage will damage the oxide coating and the thin layer of contact surface, as a result, the validity of measurement will then be ruined. GOM-805 provides three levels (100m Ω /100mA/5 Ω /10mA/50Ω 1mA) as long open circuit voltage at 20mV to execute Dry circuit tests.

D. VARIOUS DRIVE MODES FOR GOM-805 ONLY



GOM-805 provides various current output drive modes to satisfy diversified and accurate low resistance measurement applications, for instance, for measuring conductors of different materials, the pulsed current output mode can be applied to reduce the thermal EMF influence, which is caused by different conductors acting on different temperatures. The PWM output mode, ideal for changing temperature sensitive materials, can avoid resistance value variation which is due to over load or large current measurement in a long period of time. The DC+ and DC- output modes are best for the measurement requirements of inductive components.

E. STANDARD INTERFACE FOR CONTROL AND COMMUNICATIONS

With respect to connecting the external control, GOM-804/805 provide a D-sub 25-pin composite interface to execute, according to the functionalities, Handler, Scan or EXT IO for connecting to a sorting machine connecting to an external on-off switch, and directly conducting external trigger control respectively. For remote control and measurement result retrieval requirements, GOM-804/805 also provide various interface selections such as RS-232C, USB, and GPIB (GOM-804 optional)/GOM-805 (standard) interface. The commands of GOM-804/805 are compatible to that of GOM-802 that allows users to switch equipment with simple settings. There is no cost in adjusting setting programs and production delay will not be happening while switching from the old model to the new model.

GBM-3300/3080

GW Instek launches a new series of desktop battery meter, the GBM-3300 Series, which uses AC 1kHz as the test signal and measures battery's voltage and internal resistance to 200V (GBM-3300) and 80V (GBM-3080). The series features 3.5" TFT LCD, 4-wire measurement method, high resolution (6-digit voltage/5-digit resistance) measurement display capability, and independent GO/NOGO determination of voltage and resistance, various communications interfaces, etc. to meet various types of battery measurements, ranging from single cell, battery cell, to the end product (battery), etc., so as to facilitate users in achieving accurate measurements at all stages of production.

The GBM-3300 Series provides excellent features for various types of batteries in measuring open circuit voltage and resistance. For voltage measurement, the accuracy is as high as ± (0.01% reading + 5 digits), and measurement resolution is up to 10μV (at 3V). For resistance measurement, the accuracy reaches ± (0.1% reading + 5 digits), and the resolution achieves 0.1μΩ (at 3mΩ) that is especially suitable for the sorting of single cell measurements, which is to achieve a better output balance for the follow-up series and parallel connections.

In the meantime, in order to facilitate users to quickly and clearly interpret the measurement results, the GBM-3300 Series features Hi/Lo determination respectively based on voltage and resistance, and can be switched to the sample (log numerical display) mode to meet the requirements of test accuracy, clear and easy-to-read, and elevated inspection efficiency and capabilities.

Other than the excellent measurement capabilities, the GBM-3080 Series also provides a number of functions to ensure effectiveness and convenience. For the effectiveness, the test lead (probe) contact status detection function is to effectively prompt users whether test lead (probe) and DUT are in good contact to ensure the validity of the measured value. In terms of convenience, the GBM-3080 Series provides two data storage methods (up to 10,000 lots of measurement values). "General storage" only stores the measured voltage and resistance values; "statistical storage" has the related parameters (Cp/Cpk/Mean/MAX/MIN...) for the statistical analysis. Users can store the data from the measurement process in the internal memory first and then transfer the data to the computer via flash drive for subsequent analysis without being limited to the connection with the computer.

In addition, for retrieving and storing measurement results via the transmission method, the GBM-3080 Series provides RS-232C/USB device (virtual COM) for setting programs and retrievals. The handler interface is provided for external trigger control via PLC. All interfaces use standard equipment that not only save the cost of instruments, but also meet the requirement of using different automated measurement systems.

FEATURES

- 3.5" TFT LCD (320x240)
- Measurement Items: DC Voltage and AC Resistance
  - Voltage Measurement Range(Max. Display): 200V
  - Resistance Measurement Range(Max. Display): 3.2kΩ
- Basic Accuracy For Voltage Measurement: 0.01%
- Basic Accuracy For Resistance Measurement: 0.1%
- Measurement Resolution: up to 0.1μΩ and 10μV, Suitable For Single-cell Measurement
- Independent Go/NoGo Determination Function For Voltage and Resistance Respectively
- The Judgment Mechanism of Test Lead/Probe Disconnect/Contact Failure is to Ensure The Measurement Reliability
- Standard Interfaces: USB Host/Device, RS-232C and Handler

SPECIFICATIONS

DISPLAY

Screen	3.5" (320 x240) TFT LCD
Resistance	5 digits
Voltage	6 digits

TEST SPEED

Slow	3 time/second
Medium	14 time/second
Fast	25 time/second
Fir. Fast	83 time/second

RESISTANCE MEASUREMENT

Test Frequency	1kHz ±0.1kHz (Fixed)
Input Impedance	1mΩ~3.8Ω: ≥ 95MΩ, 3.9Ω ~ 3kΩ: ≥ 2MΩ

Range

Range No.	Range	Max. scale	Resolution	Test Current	Open circuit Voltage (rms. max)
0	3mΩ	3.1000mΩ	0.1 μΩ	100mA	8V
1	30mΩ	31.000mΩ	1 μΩ	100mA	8V
2	300mΩ	310.00mΩ	10 μΩ	10mA	7V
3	3Ω	3.1000Ω	100 μΩ	1mA	3V
4	30Ω	31.000Ω	1mΩ	100 μA	3V
5	300Ω	310.00Ω	10mΩ	10 μA	1.3V
6	3kΩ	3200.0Ω	100mΩ	10 μA	1.3V

Accuracy

Range No.	Speed	Accuracy	Temperature Coefficient
0	Slow Medium Fast Fir. Fast	±0.3%rdg ± 10dgt ±0.3%rdg ± 15dgt ±0.3%rdg ± 30dgt ±0.3%rdg ± 40dgt	(±0.05%rdg ± 1dgt) / °C
1~6	Slow Medium Fast Fir. Fast	±0.3%rdg ± 3dgt ±0.3%rdg ± 7dgt ±0.3%rdg ± 7dgt ±1.0%rdg ± 8dgt	(±0.05%rdg ± 0.3dgt) / °C

Rear Panel

GBM-3300/3080

GBM-01 4 Wire(Kelvin clip) test lead, 1M(max.)

Approx. 1.1m

GBM-02 4 Wire(single pin) test probe, 1M(max.)

Approx. 1.1m

GBM-03 4 Wire(Kelvin pin) test probe, 300V(max.)

Approx. 1.1m

GBM-S1 Short Bar

SPECIFICATIONS

VOLTAGE MEASUREMENT

Range

Range No.	Range	Max. scale	Resolution
0	1V	±0.08000	10 μV
1	10V	±10.0000	100 μV
2	300V (For GBM-3300 only)	±300.000	1mV

Accuracy

Range No.	Speed	Accuracy	Temperature Coefficient
0~2	Slow	±(0.01%rdg + 3dgt	(±0.001%rdg + 0.3dgt)/°C
	Medium	±(0.03%rdg + 5dgt	
	Fast	±(0.05%rdg + 5dgt	
	DC Test	±(0.10%rdg + 6dgt	

OTHER FUNCTIONS

Range Selection	Auto range, Hold range, Non-range
Comparator	ABS, PER or SEQ
Contact Detection	OPEN & WIRE
Buzzer	OFF, Pass, Fail
Trigger	INT, EXT

INTERFACE

USB Host/USB Device/RS-232C/Handler

POWER SOURCE

AC 108~240V, 50/60Hz; Consumption: 15W

DIMENSIONS & WEIGHT

304(W) x 107(H) x 309(D) mm, Approx. 2.8kg

ORDERING INFORMATION

GBM-3300 300V Battery Meter (including RS-232C/USB device/host and HANDLER interface)
GBM-3080 80V Battery Meter (including RS-232C/USB device/host and HANDLER interface)

ACCESSORIES :

Safety sheet x1 ; Power cord x 1 ; GBM-01 x 1 ; 4 Wire(Kelvin clip) test lead, 1M(max.), approx. 1.100mm ;
CD x 1(including complete user manual) and USB driver)

OPTIONAL ACCESSORIES

GBM-02	4 Wire (single pin) test probe, 80V (max.), approx. 1.100mm
GBM-03	4 Wire (Kelvin pin) test probe, 300V (max.), approx. 1.400mm
GBM-S1	Short Bar (for GBM-02/GBM-03)
GTL-232	RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000mm
GTL-248	USB cable, A-B type, approx 1200mm
GRA-402	Rack Mount Kit
GRA-414	Rack Mount Kit, 19" 2U size for two sets

A TWO DISPLAY MODES

Standard Mode
(Setting conditions and R+V measurement parameters)

The GBM-3000 series offers two display modes to fulfill little users in maximizing the benefits of their measurements – Standard mode: The main measurement parameters (three combinations: R+V/R/V) and parameter settings for the related measurements can be displayed.

Simple Mode
(R+V measurement parameters)

simultaneously. This mode is applicable to R&D design and engineering verification. Simple mode: Big numerical display only shows the results of main measurement parameters to increase the visibility of observations. This mode is suitable for production measurements.

B INDEPENDENT GO/NOGO DETERMINATION

Independent Hi/LO Setting

The GBM-3000 series provides independent Hi/LO determination settings for both voltage and resistance and can be set according to the required mode, such as 1kΩ, 1V or ANY. In addition to displaying

Separate & Totally Judgment

the results of the final determination, the results of individual measurement parameters are also provided for subsequent actions.

C EXCELLENT SUPPLEMENTARY MEASUREMENT CAPABILITY

Disconnect/Contact Display

In addition to providing accurate measurements, the ability of the GBM-3000 Series to supplement the measurement of production lines is also a major feature of the series. For example, the ability to detect disconnect/contact. The display screen can clearly show bad contact of the test lead (probe). The series can store up to 10,000 sets of measurement data and has the statistical calculation function to allow

Statistical Function

the status of the production process to be clearly observed and analyzed in real time without any manual calculation or connection to the computer. After the measurement is completed, the result can be transferred to the computer through flash drive for long term storage and subsequent analysis.

D COMPREHENSIVE STANDARD INTERFACES

Finally, the GBM-3000 series provides a variety of practical and standard-equipped interfaces including RS-232C, USB device/Handler, which are for measurement result collection in the remote program control or collocating with system integrators for external trigger measurement through PLC.

Digital Power Meter

GPM-8310

NEW

CE | USB Host | USB Device | LAN | RS232 | GPIB | DAI

FEATURES

- 5" TFT LCD
- DC, 0.1Hz ~ 100KHz Voltage/Current Test Bandwidth
- Two Numerical Display Modes
  - General Mode: Displays 3 Main Test Items + 6 Secondary Test Items
  - Simple Mode: Displays the Test Values of 6 Main Test Items
- Waveform Display: V (voltage), I (current), P (power)
- The Current/Voltage can be Measured in a Deformed Wave with CF of 3, and the Half-range CF can Reach 6 or 4A
- Meeting the IEC 61000-4-7 Harmonics Measurement Requirements (50/60Hz)
- 50th Order of Harmonic Measurement and Analysis (value and bar graph)
- Integration Function Supports Automatic Level-changing
- External Current Sensor Input Terminals (EXT1/EXT2)
- Standard Interfaces: RS-232C, USB Device/Host, LAN, GPIB
- Optional Interface: Digital I/O (DA4) (must be installed before leaving the factory)
- Optional Accessory: GPM-001

GW Instek GPM-8310 is a digital power meter for single phase (1P2W) AC power measurement. Features include DC, 0.1Hz~100KHz test bandwidth, 16bit A/D, and 100KHz sampling rate. It adopts 5" TFT LCD screen with a five-digit measurement display and provides 15 power measurement related parameters, and has a high precision measurement capability. It also features the ability to display waveform (voltage/current/power), the integration measurement function, harmonic measurement and analysis of each order (meeting the IEC 61000-3-2 harmonic measurement requirements up to 50/60Hz), external sensor input terminals, and various communication interfaces, etc., to help users achieve clear, convenient and accurate power measurements. This power meter is a most cost-effective power meter with more complete functionalities among the products of the same category.

The rated direct input voltage of GPM-8310 is 600V and the input current is 20A. The minimum current level is 5mA (resolution up to 0.1μA) and the power measurement resolution is 1μW. The user-factor can reach 1 (half measurement range can reach 6 or 4A), and the voltage/current/power measurement capability can reach ±(0.05% reading ±0.1% level). Different measurement modes can be selected according to (~AC+DC) AC/DC/V-HB/MN), providing up to 28 relevant parameters for power measurements, including voltage (Vmn/Vac/Vdc/Vrmn/Vcyk/Vpk), current (Imn/Iac/Idc/Irmn/Icyk/Ipk), frequency (FHz/FRs), power (P/Pc/Q/S/PF), crest factor (CFV/CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion-total (THDV/THDA), maximum current ratio (MCR), and the MMTA calculation function. Hence, for the measurement of low current/low power such as standby power consumption or the measurement of power consumption of general products, this power meter provides the best range and accuracy support.

GPM-8310 also makes good use of the advantages of the TFT LCD to display the results of parameter measurement by using numerical and graphical methods. In terms of numerical values, the general mode and the simple mode are provided. The general mode can display 10 measurement parameters (3 main measurements + 6 secondary measurements), and the simple mode can display four measurement parameters. These displayed parameters can be arbitrarily selected from 15 power parameters according to the needs of users. In terms of graphic display, a simple oscilloscope mode is provided to display waveforms of three parameters including voltage, current and power. In addition, the measurement and analysis of each harmonic order of the measurement signal can be completely displayed by numerical values or bar graphs. This power meter not only meets the needs of accuracy and legibility in process testing, but also meets the needs of diverse measurement applications in R&D design and quality verification.

In addition, the performance of GPM-8310 in auxiliary measurement mechanisms/functions is also comprehensive. For the application of measuring large voltage, the VT ratio setting can be used with an external voltage Potential Transformer. For the measurement of large current, the type of current transformer – voltage output type or current output type will determine the applied method. If it is a current output type, it can be directly added to the rear panel of the instruments and collocated with the CT ratio setting to conduct measurement. If it is a voltage output type, measurement can be conducted through the external current sensor input terminals (EXT1/EXT2) provided by GPM-8310. Automatic level-changing can self-define the required level to save level-changing time. 10,000 sets of internal measurement data can be used to store measurement data according to the update rate set by GPM-8310 or a user-defined time interval for subsequent analysis.

In terms of data retrieval and storage, GPM-8310 provides a variety of communication interfaces including RS-232C/USB device (virtual COM)/LAN/GPIB. Users can write programs to read the measurement results according to their habits or with existing system interfaces and there is no need to procure interfaces. USB host supports GPM-8310 screen capture, internal record data access, and firmware update. For the needs of external signal control or the use of data recorder to record data, GPM-8310 also provides an optional Digital I/O (DA4) interface (must be installed before leaving the factory), which can be connected to an external controller such as PLC or a data recorder to meet the application of automatic measurement or long recording.

SPECIFICATIONS

INPUT

Item	Specification		
Input Type	Voltage	Floating input through resistive voltage divider	
	Current	Floating input through shunt	
Measure Range	Voltage	15V, 30V, 60V, 150V, 300V, 600V	
	Current		
	Direct input	5mA, 10mA, 20mA, 50mA, 100mA, 200mA, 0.5A, 1A, 2A, 5A, 10A, 20A	
	Sensor input	EXT 1: 2.5 V, 5 V, 10 V	
		EXT 2: 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V	
Input Impedance	Voltage		Input resistance approach 2 MΩ
	Current		
	Direct input range 5mA ~ 200mA		Input resistance approach 300 mΩ
	Direct input range 0.5A ~ 20A		Input resistance approach 1 mΩ
	Sensor input		
	Input range 2.5A ~ 20A (EXT1)		Input resistance approach 100kΩ
	Input range 50mA ~ 2V (EXT2)		Input resistance approach 20kΩ
Continuous Maximum Allowable Input	Voltage		peak value of 1.5kV or RMS value of 1kV, whichever is less
	Current		
	Direct input range 5mA ~ 20mA		peak value of 30 A or RMS value of 20A, whichever is less
	Direct input range 0.5A ~ 30A		peak value of 120A or RMS value of 80A, whichever is less
	Sensor input		peak value less than or equal to 5 times of the rated range
Input Bandwidth	DC, 0.1Hz ~ 120kHz		
Continuous Maximum Common-mode Voltage	600 Vrms, CAT II		
Line Filter	select OFF or ON (cut off frequency of 500 Hz)		
Frequency Filter	select OFF or ON (cut off frequency of 500 Hz)		
A/D Converter	Simultaneous conversion voltage and current inputs Resolution: 16bit Maximum conversion rate: Approx. 300kHz		

GPM-8310

Rear Panel

SPECIFICATIONS

VOLTAGE AND CURRENT ACCURACY

Item	Specifications
Requirements	Temperature: 23 ± 3°C Humidity: 30–70% RH Input waveform: Sine wave crest factor = 1.4 common-mode voltage: 0 V Number of displayed digits: 5 digits Frequency filter: Turn on to measure voltage or current of 200 Hz or less After 30 minutes after warm-up time has passed After measurement range is changed (zero-level compensation) Update interval: ≥ 200 ms
Accuracy	DC: ± (0.1% of reading + 0.3% of range) 0.1 Hz ≤ f < 10 Hz: ± (0.1 % of reading + 0.2 % of range) 45 Hz ≤ f ≤ 66 Hz: ± (0.1 % of reading + 0.05 %of range) 66 Hz < f ≤ 1 kHz: ± (0.1 % of reading + 0.2 % of range) 1 kHz < f ≤ 10 kHz: ± (0.02 × f) % of reading + 0.1% of range) 10 kHz < f ≤ 100 kHz: ± (0.1 % of reading + 0.3 % of range) + (0.04 × f) % of reading)
Temperature Coefficient	Add: ±(0.05% of reading/°C within the range 5 to 18°C or 28 to 40°C
When the Line Filter is Turned ON	45 – 66 Hz: Add 0.2 % of reading < 45 Hz: Add 0.5 % of reading
Accuracy When the Crest Factor is 3 or 6 or 9	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy
Influence of Temperature Changes After Zero-level Compensation or Range Change	Add 0.05% of range/°C to the DC voltage accuracy. Add the following value to the DC current accuracies. 1 mA/10 mA/100 mA/1.00 mA/10.00 mA/100 mA ranges: 3 µA/°C 0.3 A/1 A/3 A/10 A/20 A ranges: 300 µA/°C External current sensor input (EXT 1): 1 mV/°C External current sensor input (EXT2): 40 µV/°C
Accuracy When the Crest Factor is Set to 6 or 9A	accuracy obtained by doubling the measurements range error for the accuracy when the crest factor is set to 3
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy

ACTIVE POWER ACCURACY

Item	Specifications
Requirements	same as the conditions for voltage and current Power factor: 1
Accuracy	DC: ± (0.1 % of reading + 0.2 % of range) 0.1 Hz ≤ f < 45 Hz: ± (0.2 % of reading + 0.2 % of range) 45 Hz ≤ f ≤ 66 Hz: ± (0.1 % of reading + 0.05 % of range) 66 Hz < f ≤ 1 kHz: ± (0.2 % of reading + 0.2 % of range) 1 kHz < f ≤ 10 kHz: ± (0.1 % of reading + 0.2 % of range) + ((0.04 × f) ÷ f) % of reading) 10 kHz < f ≤ 100 kHz: ± (0.3 % of reading + 0.3 % of range) + ((0.04 × f) ÷ f) % of reading)
Influence of Power Factor	when power factor (Z) = 0 (L: capacitive power) ± 0.1 % of S for 45 Hz ≤ f ≤ 66 Hz ± (0.1 × f / 5 % of S) for up to 100 kHz as reference data f: Frequency of input signal in kHz when 0 < λ < 1 (θ: phase angle of line Voltage and current) (power reading) × (power reading error %) + (power range %) × (power range) / indicated apparent power value) + (tanθ × (influence when λ = 0)[%])
When The Line Filter is Turned ON	45 – 66 Hz: Add 0.3 % of reading < 45 Hz: Add 1 % of reading
Temperature Coefficient	same as the temperature coefficient for voltage and current
Accuracy When The Crest Factor is Set to 6 or 9A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy of Apparent Power (S)	voltage accuracy + current accuracy
Accuracy of Reactive Power (Q)	accuracy of apparent power × √(1.0004 − (λ)) / √(1 − (λ)) ± 100 %
Accuracy of Power Factor (λ)	± ((0.1/λ) + (1.0002/λ) − 1) × influence from the power factor when λ = 0% / 100)) ± 1 digit when voltage and current are at the measurement range rated input
Accuracy of Phase Difference (θ)	± (	arccos ((0.1/λ) + (1.0002/λ) − 1) − arccos λ	) influence from the power factor when λ = 0 % / 100) ± 1 digit when voltage and current are at the measurement range rated input
Accuracy When The Crest Factor is Set to 6 or 9A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy

GPM-001 Test Fixture/Test Fixture(DL)

GTL-209 Test Lead

GTL-210 Test Lead

GTL-212 Test Lead

GTL-213 Test Lead

SPECIFICATIONS

VOLTAGE, CURRENT AND ACTIVE POWER MEASUREMENTS

Item	Specifications
Measurement Method	Digital sampling method
Crest Factor	3 or 6 (6A)
Wiring System	Single-phase, two-wire (1 P2 W)
Range Select Auto Range	Select manual or auto ranging Auto range increase The range is upped when any of the following conditions is met: Crest factor 3: Urms or Irms exceeds 130% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6: Urms or Irms exceeds 130% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Crest factor 6A: Urms or Irms exceeds 260% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Auto range decline The range is lowered when all of the following conditions are met. Crest factor 3: Urms or Irms is less than or equal to 30% of the measurement range. Urms or Irms is less than or equal to 130% of the next lower measurement range. Upk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 or 6A: Urms or Irms is less than or equal to 30% of the measurement range. Urms or Irms is less than or equal to 125% of the next lower measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range.
Display Mode Switching	Vrms (the true RMS value of voltage and current) VOLTAGE MEAN (the rectified mean value calibrated to the RMS value of the voltage and the true RMS value of the current) AC DC
Measurement Synchronization Source	Select voltage, current, or off In the case of Auto (Active Ref), select the voltage or current from the equipped element.
Line Filter	Select OFF or ON (cutoff frequency at 500 Hz).
Peak Measurement	Measures the peak (max, min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.
Zero-level Compensation	Removes the internal offset of the measure unit (After measurement range is changed)
Measurement Parameters	Voltage: Vrms , Vmn , Vdc , Vac Current: Irms , Idc , Iac Active Power: P Apparent Power: VA Reactive power: VAR Power Factor: PF Crest Factor: CFV, CFI Phase Angle: DEG Frequency: Hz and VHz Voltage Peak: V+pk and V-pk Current Peak: I+pk and I-pk Active Power Peak: P+pk and P-pk Total Harmonic Distortion: THDI and THDV Maximum Current Ratio: MCR

FREQUENCY MEASUREMENT

Item	Specifications
Measurement Item	Voltage and current
Measurement Frequency Range	Data update interval: Measurement frequency Range 0.1 s: 25 Hz ≤ f ≤ 100 kHz 0.25 s: 10 Hz ≤ f ≤ 100 kHz 0.5 s: 5 Hz ≤ f ≤ 100 kHz 1 s: 2.0 Hz ≤ f ≤ 100 kHz 2 s: 1.0 Hz ≤ f ≤ 100 kHz 5 s: 0.5 Hz ≤ f ≤ 100 kHz 10 s: 0.2 Hz ≤ f ≤ 100 kHz 20 s: 0.1 Hz ≤ f ≤ 100 kHz Auto (*1): 0.1 Hz ≤ f ≤ 100 kHz (*1) Limit of the measurement lower limit frequency by the Timeout setting Timeout: lower limit frequency 1 s: 2.0 Hz 5 s: 0.5 Hz 10 s: 0.2 Hz 30 s: 0.1 Hz
Measurement Range	Auto switching among six types: 100mHz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, and 100 kHz.
Frequency Filter	Select: OFF or ON (cut-off frequency of 500 Hz)
Accuracy	Requirements: When the input signal level is 30% or more of the measurement range (if the crest factor is set to 3, (60% or more if the crest factor is set to 6 or 6A) • Frequency filter is ON when measuring voltage or current of 500 Hz or less. ± (0.05% of reading)

SPECIFICATIONS

INTEGRATION

Item	Specifications
Mode	Select manual integration mode, standard integration mode, or repetitive integration mode.
Timer	Automatically stop integration by setting a timer. Selectable range: 0 hours 00 minutes 00 seconds to 9999 hours 59 minutes 59 seconds
Accuracy	±(Power accuracy (or current accuracy) + 0.1% of reading) (fixed range)
Range Setting	Auto range or fixed range is available for integration
Timer Accuracy	±0.005%
Remote Control	Start, stop and reset operations are available using an external remote signal. (option)

HARMONIC MEASUREMENT

Item	Specifications
Measured Item	Voltage, Current, Power
Measured Method	Zero-cross simultaneous calculation method
Frequency Range	10 Hz to 1.2 kHz
FFT Data Length	1024 4096 (Data switch when both 50Hz/60Hz and update rate = 0.1s conditions are met)

Sample Rate, Window Width, and Upper Limit of Analysis Orders*	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders
	10 Hz to 44 Hz	Fs 1024	1	50
	45 Hz to 55 Hz	Fs 512	10	50
	56 Hz to 88 Hz	Fs 512	12	50
	89 Hz to 150 Hz	Fs 512	8	32
	150 Hz to 300 Hz	Fs 256	4	16
	300 Hz to 600 Hz	Fs 128	8	8
	600 Hz to 1000 Hz	Fs 64	16	4

Accuracy	Frequency	Voltage	Current	Power
	10 Hz ≤ f < 45 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.35% of reading + 0.55% of range
	45 Hz ≤ f < 440 Hz	0.15% of reading + 0.15% of range	0.15% of reading + 0.35% of range	0.25% of reading + 0.35% of range
	440 Hz ≤ f < 1.2kHz	0.25% of reading + 0.25% of range	0.25% of reading + 0.25% of range	0.40% of reading + 0.50% of range

* 50Hz/60Hz Compliant IEC61000-4-7

D/A OUTPUT (OPTIONS)

Item	Specifications
Output Voltage	±5 V FS (approx. ±7.5 V maximum) against each rated value.
Number Of Output Channels	4
Output Items	Set for each channel: U, I, P, VA, VAR, PF, DEG, HZ, I+Z, Upk, Ipk, WP, WPL, q, qL, OFF
Accuracy	±(accuracy of each measurement item + 0.2% of FS) (FS = 5 V)
D/A Conversion Resolution	16 bits
Minimum Load	1MΩ
Update Interval	Same as the data update interval. In the case of Auto Update Rate, update interval is equal to signal interval. More than 100ms.
Temperature Coefficient	±0.05%/°C of FS

REMOTE CONTROL INPUT/OUTPUT SIGNAL (OPTIONS)

Item	Specifications
Remote Control Input Signal	EXT HOLD, EXT TRIG, EXT START, EXT STOP, EXT RESET
Remote Control Output Signal	BUSY, BUSY
I/O Level	TTL
I/O Logic Period	Negative logic, falling edge

D-SUB I/O SIGNAL (OPTIONS)

Item	Specifications
I/O Control Output Signal	OUT1, OUT2, OUT3, OUT4
I/O Level	TTL
I/O Sink Current	Max 100mA (per bit)

* 1) 2) 3) 4) 5) 6) 7) 8) 9) 10) 11) 12) 13) are separated from the measured values including voltage, current and active power, which are through computation or input or output or ... electrical signal based on voltage, current or pulse, and are simply referred to as input, output, etc. in this manual unless otherwise specified in the text.
* "Error" will be shown for 0 or Q, over* ... when displayed for 1 and 0, overvoltage, current or voltage is less than 0.5% of the rated range (less than or equivalent to ... The above-mentioned failure is set to ...

GENERAL

Note	The below are the basic conditions required to operate the DPM-837 within specifications. • 1-year Calibration Yearly • Operating Environment: 18~28 °C (64.4~82.4 °F) • Humidity: ≤80%RH, • Accuracy: ± (% of reading + % of range) • The specifications apply when it warmed up for at least 30 minutes and operates in the slow rate. • The power supply cable must be grounded to ensure accuracy. • Input voltage and current must be standard sine wave. • The power factor must be 1. • The crest factor must be 3. • The common-mode voltage must be zero.
Specification Condition	Temperature: 23 °C±5 °C Humidity: ≤80%RH (non-condensing)
Operation Condition	Temperature: 0°C ~ 40°C, • 30 ~ 40°C, Relative Humidity < 70%RH (non-condensing) • >40°C, Relative Humidity < 50%RH (non-condensing) Indoor use only Altitude: < 2000 meters Pollution degree 2
Storage Condition	Temperature: -40°C ~ 80°C Humidity: < 90%RH (non-condensing)
Power Source	AC 100-240V, 50~60Hz ; Consumption Max. 50VA
Dimensions	368(W) x 130(H) x 370(D) mm (w/o bumpers)
Weight	Approx. 4.0kg

ORDERING INFORMATION

GPM-8310	Digital Power Meter with RS-232C/USB device & host/LAN/GPIB
GPM-8310 with DAI	Digital Power Meter with RS-232C/USB device & host/LAN/GPIB and opt. DAI

ACCESSORIES

Safety Instruction Sheet x 1, Power cord x 1, Test lead GTL-209 x 1, Test lead GTL-210 x 1, CD x 1 (including complete user manual and USB driver), DAI cable GTL-214 (available for GPM-8310 with DAI only)

OPTIONAL

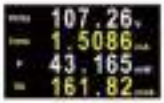
GPM-DAI	DAI interface (excluding cable, GTL-214) Note: Optional DAI interface must be installed in factory.

OPTIONAL ACCESSORIES

GPM-001	Test fixtures (including GTL-208 x 1, GTL-213 x 1)	GTL-246	C.F.M Cable, Approx. 3000mm
GPM-001-BAG	Test fixtures (including GTL-208 x 1, GTL-213 x 1)	GRA-403	Rack Mount Kit, 19" (3U size)
GTL-209	Test Lead, Banana to Banana, Approx. 1000mm		
GTL-210	Test Lead, Banana to Banana, Approx. 1000mm		
GTL-212	Test Lead, D-Type to Banana, Approx. 1000mm		
GTL-213	Test Lead, D-Type to Banana, Approx. 1000mm		
GTL-214	DAI Cable, Approx. 1000mm		
GTL-232	RS-232C cable, 9 pin Female to 9 pin, null modem for computer, Approx. 2000mm		
GTL-248	USB Cable, A-B type, Approx. 1800mm		

A. VARIOUS DISPLAY MODES

Numerical (General) Mode



Numerical (Simple) Mode

Waveform Mode

Harmonic (Bar Graph) Measurement

Harmonic (Table Column) Measurement

GPM-8310 provides the numerical value display mode and the waveform display mode, which help users to maximize the benefit of their measurement. Under the numerical mode, there are the general mode and the simple mode. The general mode has related measurement settings and can simultaneously display 30 measurement parameters (2 main measurements and 8 secondary measurements). The simple mode displays only 4 measurement parameter values. The parameters in each mode can be arranged and combined as required. Under the graphic mode, a simple oscilloscope function is provided to display the waveforms of three parameters including voltage, current and power. The horizontal scale can be adjusted (from 25μs/div ~ 1s/div according to the set data update rate), and 3 magnification rates for waveform observation are also provided for users to select. In the harmonic measurement, the measurement results of each order of harmonics can be displayed by bar graphs, and a specific observation order can be specified. The relevant values of each order of harmonics (voltage/current/power/voltage distortion ratio/current distortion ratio/power distortion ratio/voltage phase angle/current phase angle) can be completely recorded and displayed.

B. RICH MEASUREMENT PARAMETERS

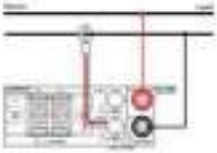
Measurement Items	Symbols
Voltage	Vrms, Vmn, Vpk, Vac, Vdc, Vcf, Vmx
Current	Arms, Amn, Apk, Aac, Adc, Acf, Amx
Power	P, S, Q, Ppk, Ppk, VA, VAR
Power Factor	PF
Crest Factor	CFA, CFV
Phase Angle	ΦAV
Frequency	Hz, Fm
Total Harmonic Distortion	THDF, THDR
Maximum Current Ratio	MCR
Integration	WP, WPc, WP+, q, q+, q-, Hour, Sec

Note: "*" Only applicable to specific measurement modes for selection

GPM-8310 provides a variety of measurement items and functions, including voltage, current, frequency, effective power, apparent power, reactive power, power factor, crest factor, total harmonic distortion, and can also measure the maximum current ratio. GPM-8310 is also equipped with the measurement function of power or current time integration for the DUT. Users set a period of time to perform instantaneous power integration at the set time period, and then divide by the time to obtain the average power of the DUT. In addition, when performing integration measurement, GPM-8310 supports automatic level changing function for the power change of the DUT at different times in order to obtain the most complete integration result within the set time.

C SUPERB MEASUREMENT ASSISTANCE

Ratio Configuration



External Current Sensor Input

With respect to the support of measurement assistance, the performance of CPM-8310 is outstanding. First of all, for the measurement of high voltage/high power, the setting of voltage ratio/power ratio is provided to restore the attenuated ratio to a true value. For the measurement of large current, other than the setting of current ratio, external current sensor terminals (EXTI, EXTI) can be utilized to connect with a voltage output type current transformer, making large current measurement more convenient. In addition, CPM-8310 provides 4 sets of panel settings for storage/recall and memory for storing 10,000 lots of measurement values. The measurement storage can tag the measurement results based upon the update rate or a self-defined time interval to facilitate the subsequent analysis. The USB host on the front panel supports screen capture, measurement value storage, and CPM-8310 firmware update.

D FLEXIBLE LEVEL-CHANGING MECHANISM

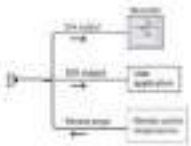
Automatic level-changing under the integration function

Self-defined automatic level-changing mechanism

CPM-8310 provides the measurement of the integration function under the automatic level-changing mode to allow users to fully co-locate the total value of the power consumption of the DUT from the beginning to the end of the integration function. In addition, CPM-8310 also supports self-defined setting mechanism for level-changing. Users can select the required level to be changed to save time on level-changing and expedite the test.

E CONVENIENT AND PRACTICAL INTERFACE

Practical Interface



DAI Interface Mechanism

CPM-8310 provides comprehensive and diverse communications interfaces including RS-232 / USB / LAN / GPIB, which are suitable for customers to write computer software for remote control and the collection of measurement results through commands. The optional Digital I/O (DAI) interface provides 3 different modes: the external control mode, the DAI output mode and the self-defined output mode based on user settings. When the setting is in the external control mode, it allows users to activate, stop, trigger or reset the integration measurement function through external signals. When the setting is in the DAI output mode, users can define 4 measurement parameter values from the 25 measurement parameters provided (even with the result of integration measurement) to produce outputs by a fixed level (full scale: 5V) or a manual level (full scale: ±5V) and receive results by co-locating with a data recorder. When the setting is in the self-defined output mode, a communications interface is required to control the action of each defined pin through commands.

Digital Power Meter

CPM-8213

GPM-8213 power meter is designed specifically for single-phase (1P2W) AC power supply's power measurements. Powerful features, including 4" TFT LCD, five-digit measurement display, 19 power measurement parameters, integral measurement function, high-accuracy voltage/current/power measurement capabilities, front/rear panel input terminals, and various communications ports, are to facilitate users with clear, convenient, and accurate power measurements.

GPM-8213 provides as many as 19 power measurement parameters, including voltage(Vrms/V+pk/V-pk), current (Arms/A+pk/A-pk), frequency (Hz/kHz), power (W/P+pk/P-pk), crest factor (CF/CF), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion (THDV/THDI), high accuracy voltage/current/power measurement capabilities (reading: ±0.1% level ±0.1%). The advantages of TFT LCD have been efficiently deployed to simple mode and standard mode. Simple mode displays conventional power meter's four measurement parameters to meet the requirement of accuracy and clarity for the test on manufacturing process. Standard mode extends the display to the maximum of 8 measurement parameters (1 major measurements + 6 monitor measurements) to satisfy the various measurement application requirements of R&D, design, and quality verification.

For DUT requiring IEC 62301/EN 50564 standby power consumption test, GPM-8213 provides the optimal measurement supports, including test frequency bandwidth of DC~6kHz, the minimum current level of 1mA (resolution: 0.1mA), power measurement resolutions (1mW for minimum current and voltage level; 1mW for maximum current and voltage levels), crest factor reading 1 (full range reading), and measurement of total harmonic distortion (at least 10th order power harmonics). For large voltage/large current measurement applications of general power measurement, GPM-8213 provides PT/CT rate function to collocate with external potential transformer or current transformer to meet the measurement requirements.

With respect to data retrieval and storage, the standard RS-232C/USB interfaces (virtual COM) /LAN can be utilized to edit and retrieve programs or the optional GPIB interface (installed by manufacturer) can be selected to meet users' automatic test system requirements.

FEATURES

- 4" TFT LCD
- Basic Accuracy : ±(0.1% of reading + 0.1% of range)
- Two Data Display Modes
  - Standard Display : Displaying Ten Major Measurement Items + Six Minor Measurement Items
  - Simple Display : Displaying Two Sets of Two Different Measurement Items
- Met the Requirement of IEC 62301 Power Measurement
  - Voltage/Current Test Frequency Bandwidth : DC ~ 6kHz
  - Watt Resolution : 1mW
  - Current Resolution : 0.1mA
  - Current/Voltage Measurements: Reach CF=3 for Distorted Wave and CF=1.4 for Half Range
  - Wh Power vs. Time/Ah Current vs. Time Integration Function
  - Total Harmonic Distortion Measurement
- Front Panel Test Terminal
- Standard Interfaces : RS-232C, USB Device, LAN
- Optional Test Fixture : CPM-001

SPECIFICATIONS

INPUT		
ITEM		Range
RATING VOLTAGE		90E Vrms
RATING CURRENT		30 Arms
IMPEDANCE (50/60Hz)	Voltage	2.4 MΩ
	Current	1mA~300 mA: 500 mΩ
	Current	0.3A~30A : 5 mΩ
MAXIMUM VOLTAGE		700 Vrms
MAXIMUM CURRENT		35 Arms
MAXIMUM COMMON MODE VOLTAGE		80E V
LOW PASS FILTER	Cutoff frequency	90E Hz
PARAMETERS		
ITEM		Symbol
MEASUREMENT	Voltage	Vdc, Vrms, V+pk, V-pk
	Current	Idc, Arms, I+pk, I-pk
	Power	P, P+pk, P-pk, VA, Var
	Crest Factor	CFV, CFI
	Power Factor	PF
	Frequency	Hz, kHz
	Angle	Deg
	Total Harmonic Distortion	THDV, THDI
	Integration	Time, WP, WP-, WP-, q, q-, q+
DISPLAY DIGITS		5 digits
FREQUENCY BANDWIDTH		DC, 45Hz~66Hz
AVERAGE		1, 2, 4, 8, 16, 32, 64
PT RATE		1 ~ 9999.999
CT RATE		1 ~ 9999.999
DISPLAY MODE	Standard	8 measurement items
	Simple	4 measurement items
VOLTAGE		
ITEM		Range
RANGE	CF=3	15V, 30V, 60V, 150V, 300V, 600V
	CF=4	7.5V, 15V, 30V, 75V, 150V, 300V
CREST FACTOR		3 or 6 (selectable)
ACCURACY	Effective Range	10% ~ 100% of range
	DC	±(0.3% of reading+0.3% of range)
	45Hz ≤ f < 66Hz	±(0.1% of reading+0.1% of range)
	66Hz < f ≤ 1kHz	±(0.1% of reading+0.2% of range)
	1kHz < f ≤ 6kHz	±5% of reading
	Filter(ON)	Add 0.1% of reading@45Hz ~ 66Hz
TEMPERATURE EFFECT	0~18°C / 28~40°C	Add ±0.01% of reading/°C
RESIDUAL NOISE		0.1% of range

GPM-8213

Rear Panel

GPM-001 Test Fixture/Test Fixture(DJ)

GTL-209 Test Lead

GTL-210 Test Lead

GTL-212 Test Lead

GTL-213 Test Lead

SPECIFICATIONS		
CURRENT		
ITEM		Range
MEASUREMENT	CF=3	5mA,10mA,20mA,50mA,100mA,200mA,0.5A,1A,2A,5A,10A,20A
	CF=6	2.5mA,5 mA,10mA,25mA,50mA,100mA,250mA,0.5A,1A,2.5A,5A,10A
CREST FACTOR		3 or 6 (selectable)
ACCURACY	Effective Range	1% ~ 100% of range
	DC	±(0.2% of reading+0.2% of range)
	45Hz ≤ f ≤ 66Hz	±(0.1% of reading+0.1% of range)
	66Hz < f ≤ 1kHz	±(0.1% of reading+0.2% of range)
	1kHz < f ≤ 5kHz	±1% of reading
	Filter(ON)	Add 0.1% of reading@45Hz ~ 66Hz
TEMPERATURE EFFECT	5~18°C/28~40°C	Add ±0.03% of reading/°C
RESIDUAL NOISE		0.5% of range
POWER		
ITEM		Range
ACCURACY	Effective Range	1% ~ 110% of range
	DC	±(0.2% of reading+0.2% of range)
	45Hz ≤ f ≤ 66Hz	±(0.1% of reading+0.1% of range)
	66Hz < f ≤ 1kHz	±(0.1% of reading+0.3% of range)
	1kHz < f ≤ 5kHz	±5% of reading
	Filter(ON)	Add 1% of reading@45Hz~66Hz
TEMPERATURE EFFECT	5~18°C/28~40°C	Add ±0.03% of reading/°C
FREQUENCY		
ITEM		Range
MEASUREMENT	Filter(ON)	30.000 Hz~499.99 Hz
	Filter(OFF)	30.000 Hz~5.0000 kHz
PARAMETER		Voltage, Current
EFFECTIVE RANGE		10%~100% of voltage input
ACCURACY		±0.06% of reading
INTEGRATION		
ITEM		Range
INTERGRATION	Accuracy	±(voltage or current accuracy+0.1% of reading)
TIME	Range	0 hour 00 min ~ 9999 hour 59 min
	Accuracy	±0.01%/1second
DISPLAY		
4" TFT LCD		
POWER CONSUMPTION		
Max. 20VA		
INTERFACE		
RS-232C, USB device, LAN		
POWER SOURCE		
AC 100~240 V, 50-60Hz		
DIMENSIONS & WEIGHT		
370(W) x 170(H) x 350(D) mm, Approx. 2.9kg		

ORDERING INFORMATION

GPM-8213 with GPIB	Digital Power Meter (PC-DSP, USB device/AMI/Input/GPIB)
GPM-8213	Digital Power Meter (PC-DSP, USB device/AMI)
ACCESSORIES	
Power Cord x 1, Test Lead GTL-209 x 2, CD x 1 (User Manual), USB driver)	
OPTIONAL	
GPM-8201 GPIB card (factory installed)	
OPTIONAL ACCESSORIES	
GPM-001 Test Fixture (including GTL-210 x 2, GTL-213 x 1)	GTL-206 USB Cable, A-B type, Approx. 1800mm
GPM-001-DJ Test Fixture (including GTL-210 x 2, GTL-213 x 1)	GTL-207 GPIB Cable, Approx. 1800mm
GTL-209 Test Lead, Banana to Banana, Approx. 1800 mm	GPM-009 Rack Mount Kit, 19" 2U size
GTL-210 Test Lead, Banana to Banana, Approx. 1000mm	GPM-010 Rack Mount Kit, 19" 2U size for two sets
GTL-212 Test Lead, D type to Banana, Approx. 1800mm	
GTL-213 Test Lead, D type to Banana, Approx. 1000mm	
GTL-232 RS-232C cable, 9 pin female to 9 pin, null modem for computer, Approx. 2000mm	

Automatic Distortion Meter

The GAD-201G distortion meter is aimed at total harmonic distortion (THD) and AC voltage measurement at audio frequency range, from 20 – 30kHz. Frequency and voltage are displayed simultaneously on dual meters, with measurement range automatically switching over full scale. The frequency keys cover 400Hz, 1kHz, and 10kHz for commonly used measurement frequencies. The output terminals can feed basic waveforms (V) and harmonic distortion (T) to an external monitoring device. Residual distortion, including hum and noise, is kept to a minimum level of 0.03%, making GAD-201G ideal for high-end audio applications.

GAD-201G

FEATURES

- **Automatic Level & Distortion Measurements**
- **Auto or Hold Function Can be Selectable**
- **0.1% – 100% in 7 Distortion Measuring Ranges**
- **20Hz – 30kHz in 3 Continuous Ranges**
- **400Hz, 1kHz, 10kHz 3 Spot Frequency**
- **1mVrms – 300Vrms in 12 ACV Measuring Ranges**

GTL-103 Test Lead

Banana-Alligator Heads
Approx. 1.2m

SPECIFICATIONS

DISTORTION MEASUREMENT	
Range	0.1% – 100% full scale in 7 ranges by auto ranging
Fundamental Frequency Range	20Hz – 30kHz in 3 continuous ranges with fine adjustment tuning and 3 spots for 400Hz, 1kHz and 10kHz freq.
Input Level	100mVrms – 300Vrms
Automatic Level Control Range	12dB
Fundamental Rejection	80dB or above
Second Harmonic Accuracy	Within 1.1dB at a basic frequency of 20Hz – 30kHz
Residual Distortion	(Including hum and noise) Less than 0.03%
AC VOLTAGE MEASUREMENT	
Range	1mVrms to 300Vrms full scale in 12 ranges by auto ranging
Frequency Response	20Hz – 300kHz ±1dB
Input Impedance	100kΩ±2% 30pF or less (shielded)
Accuracy	Within ±3% of full scale (at 1kHz)
Residual Noise	Less than 10μV (input short circuited)
Output Level	1 – 1Vrms, 1 – 100mVrms at meter full scale
Output Impedance	Approx. 600Ω
POWER SOURCE	
AC 100V/110V/220V/240V ±10%, 50/60Hz, Power Consumption : Max. 35VA	
DIMENSIONS & WEIGHT	
310(W) x 155(H) x 360(D)mm, Approx. 4.6 kg	

ORDERING INFORMATION

GAD-201G Automatic Distortion Meter

ACCESSORIES
User Manual x1, Power cord x1
Test lead GTL-103 x1

A.C. Millivolt Meter

The GVT-427B/417B Series is a compact analog AC millivoltmeter ideal for low level voltage measurements with a sensitivity 300 μV Full scale sensitivity. GVT-427B has dual independent channels that can be used simultaneously or separately for measurement. Voltage scale is separated into 12 ranges, easily accessible by the large rotary selector. The wide measurement range, frequency (10Hz ~ 1MHz) and voltage (-70dB ~ +40dB), provides ample headroom for most applications.

GVT-427B (2CH)
GVT-417B (1CH)

CE

FEATURES

- 300 μV Full Scale Sensitivity
- Measures Frequency From 10Hz ~ 1MHz
- Measures From -70dB ~ +40dB in 12 Ranges
- Dual Channel (GVT-427B)

CTL-101 Test Lead

BNC-Alligator Heads
Approx. 1.2m

SPECIFICATIONS

INPUT	
Voltage Range Decibel Range	300μV ~ 100V of Full Scale in 12 ranges -70dB ~ +40dB in 12 ranges
Accuracy	±3% of full scale
Operating Mode	GVT-427B : CH1 and CH2 separately or simultaneously at CH1 GVT-417B : use CH1 only
Frequency Response	10Hz ~ 300kHz (-3%), 10Hz ~ 1MHz (-10%) (reference 1 kHz)
Impedance	1 MΩ, approx. 40pF
OUTPUT	
Level Distortion	Approx. 0.775mV at full scale Less than 2%
POWER SOURCE	
AC 115V/230V ± 10%, 50/60Hz, Power Consumption : Max. 18VA	
DIMENSIONS & WEIGHT	
130(W) x 210(H) x 280(D)mm, Approx. 2.8 kg	

ORDERING INFORMATION

GVT-427B	2 Channels AC Millivolt Meter
GVT-417B	1 Channel AC Millivolt Meter

ACCESSORIES:
User manual (1), Power cord ( )
Test Lead CTL-101 x 2 for GVT-427B
Test Lead CTL-101 x 1 for GVT-417B

Note : GVT-427B Without CE Approved

Isolated Output High Precision Current Shunt Meter

PCS-1000I

FEATURES

- 6 1/2 Digit Voltage and Current Measurement Resolution
- Simultaneous Current and Voltage Measurement
- Five Current Measurement Levels(AC & DC) : 30mA/300mA/3A/30A/300A
- AC Voltage Measurement Levels : 200mV/2V/20V/200V/600V
- DC Voltage Measurement Levels : 200mV/2V/20V/200V/1000V
- Standard : USB Device & GPIB
- CE Verification

CHY Index rolls out the new PCS-1000I isolated output high precision current shunt meter, which inherits the simultaneous voltage and current measurement function of PCS-1000. PCS-1000I adopts five sets of independent shunt resistors to provide five current measurement levels, including 300A, 30A, 3A, 300mA, and 30mA to meet the requirements of different current level measurements. Internally, PCS-1000I utilizes two sets of 24bits ADCs and low temperature coefficient electronic components to mainly focus on the current measurement of power supply devices. High precision PCS-1000I can be used in adjusting and calibrating instruments. Additionally, temperature variation will not cause PCS-1000I to yield any measurement errors. PCS-1000I can automatically select optimal measurement level with the maximum resolution so as to replace manual selection to save operational time.

PCS-1000I provides a BNC output, which can connect with an oscilloscope to directly observe current waveform variation without using a current probe. General oscilloscopes do not have isolated channels and their input and output are structured as a common point, therefore, the output load will likely result in measurement errors. PCS-1000I is isolated current output design can prevent measurement errors from an oscilloscope with non-isolated outputs. PCS-1000I, a high precision AC/DC current shunt meter, not only provides USB and GPIB communications interfaces for users to remotely control the instrument but also conducts simultaneous voltage and current measurements. The SCPI communications commands of PCS-1000I allow users to remotely control PCS-1000I via a PC to operate measurement data read backs.

SPECIFICATIONS

DC CHARACTERISTICS

DC Voltage

Range	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
200.0000 mV	0.0010 + 0.0015	0.0005 + 0.0005
2.000000 V	0.0010 + 0.0010	0.0005 + 0.0001
20.00000 V	0.0010 + 0.0010	0.0005 + 0.0001
200.0000 V	0.0010 + 0.0010	0.0005 + 0.0001
1000.000 V	0.0010 + 0.0020	0.0005 + 0.0001

Accuracy specification : ± (% of reading + % of range) voltage input resistance: 10MΩ for all DC voltage ranges

DC Current

Range	Burden Voltage	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
30.00000 mA	< 0.4 V	0.01 + 0.005	0.001 + 0.002
300.0000 mA	< 0.3 V	0.01 + 0.005	0.001 + 0.002
3.000000 A	< 0.3 V	0.01 + 0.005	0.001 + 0.002
30.00000 A*1	< 0.3 V	0.01 + 0.005	0.001 + 0.002
300.0000 A*1	< 0.3 V	0.02 + 0.005	0.001 + 0.002

Accuracy specification : ± (% of reading + % of range)

Isolated DC Current Monitor Accuracy

Range	Half Year 23 °C ± 5 °C DC Accuracy	Temperature Coefficient/°C
30.00000 mA	0.1 + 0.05	0.001
300.0000 mA	0.1 + 0.05	0.001
3.000000 A	0.1 + 0.05	0.001
30.00000 A*1	0.1 + 0.05	0.001
300.0000 A*1	0.2 + 0.05	0.001

Accuracy specification : ±(% of output + % of full scale)(nominal output voltage for the full scale current : 3 V

AC CHARACTERISTICS

True RMS AC Voltage

Range	Frequency	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
200.0000 mV	45 Hz~1kHz 1kHz~10kHz 10kHz~100kHz	0.1 + 0.03 1.0 + 0.03 3.0 + 0.10	0.005 + 0.005
2.000000 V			0.005 + 0.005
20.00000 V			0.005 + 0.005
200.0000 V			0.005 + 0.005
600.000 V			0.005 + 0.005

Accuracy specification : ±(% of reading + % of range)

True RMS AC Current

Range	Frequency	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
30.00000 mA	45 Hz~2kHz 2kHz~20kHz	0.1 + 0.03 1.0 + 0.03	0.03 + 0.006
300.0000 mA			0.03 + 0.006
3.000000 A			0.03 + 0.006
30.00000 A*1	45 Hz~4kHz	0.1 + 0.03	0.03 + 0.006
300.0000 A*1			0.03 + 0.006

Accuracy specification : ±(% of reading + % of range)

PCS-1000I

Rear Panel

PCS-001 Basic Accessory Kit

SPECIFICATIONS

Isolated AC Current Monitor Accuracy

Range	Frequency	Half Year 23°C±5°C AC Accuracy	Temperature Coefficient/°C
30.0000 mA	45Hz~1kHz	0.2 + 0.05	0.001
300.0000 mA	1kHz~10kHz	0.5 + 0.05	0.001
3.000000 A			0.001
30.0000 A*1	45Hz~400Hz	0.5 + 0.05	0.001
300.0000 A*1			0.001

Accuracy specification : ±(% of output + % of Full scale), monitor output voltage for the full scale current = 1V. The specifications are only applicable when the input is 10% or greater of the full scale range.

GENERAL

Power Supply	100 V/120 V/230 V/240 V ±10%
Power Line Frequency	50/60 Hz
Operating Environment	Full accuracy for 0 °C ~ 35 °C, Full accuracy to 80% R.H. at 40 °C
Storage Environment	-40 °C ~ 70 °C
Power Consumption	Max 30VA
Dimensions Weight	210(W) x 80(H) x 390(D)mm ; Approx. 5 kg

(The specifications apply when the PCS-1000I is powered on for at least 30 minutes at warm up in a temperature of 18 °C ~ 28 °C unless specified otherwise.)
Note *1: The accuracy for 30A, 300A must be measured by a power factor of 1 (pure load).

ORDERING INFORMATION

PCS-1000I Isolated Output High Precision Current Shunt Meter

ACCESSORIES

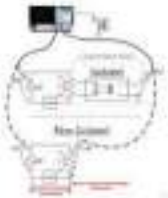
Quick Operation Guide, User Manual (CD) x 1, AC Power Cord x 1 (Region Dependent)

CTL-106A	Alligator Clip Test Lead (1A Max)
CTL-209A	Banana Plug Test Lead
CTL-240	USB Cable
PCS-001	Basic Accessory Kit

OPTIONAL ACCESSORIES

GRA-419-J	Rack Mount Kit (EA)
GRA-419-S	Rack Mount Kit (JIS)

PCS-1000I
VS. Current Probe for Measurement



The Measurement Issue for Non-Isolated Shunt Meter

Isolated Output High Precision Current Shunt Meter

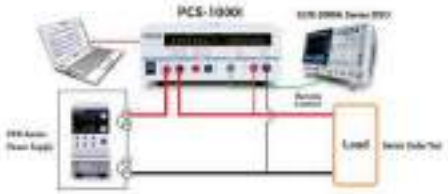
A SIMULTANEOUS VOLTAGE AND CURRENT MEASUREMENT

PCS-1000I high precision AC and DC shunt meter can simultaneously measure current and voltage with the maximum 6 1/2 measurement resolution. The above diagram shows the connection method of simultaneous measurement. Compared with the test of conventional meters from other brands, PCS-1000I is simple in connection and there is no requirement of any additional instrument.

B FIVE SETS OF SHUNT RESISTORS TO SWITCH MEASUREMENT

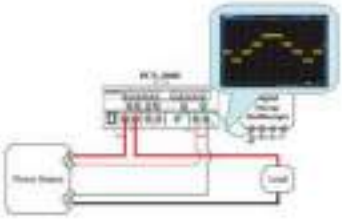
The switching measurement of five independent shunt resistors provides excellent resolution than that of a single shunt resistor. Under 30mA range, the resolution is 0.01uA, which is ideal for very small current measurement.

C REMOTE CONTROL APPLICATION



PCS-1000I is not only a high precision AC/DC shunt meter but also provides users with USB and GPIB communications interface so as to remotely control operational sequence. The SCPI commands of PCS-1000I allow users to read back measurement value via a computer remotely controlling PCS-1000I. As shown on the above diagram, the series connection between PCS-1000I and DUT and the parallel connection between voltage input and DUT are arranged to conduct simultaneous voltage and current measurement on DUT. Via the connection between communications and a notebook computer, PCS-1000I can be remotely controlled by operating the notebook computer and edited sequence.

3 ISOLATED OUTPUT CURRENT OUTPUT DESIGN



PCS-1000I adopts isolated current output design. Its BNC output can directly connect with an oscilloscope to avoid measurement errors resulted from the common ground of oscilloscope's analog input measurement.

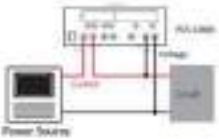
4 AUTOMATIC RANGE-SWITCHING MEASUREMENT FUNCTION

Press and hold Auto key, PCS-1000I will automatically select the maximum measurement resolution for users to save time in manual selection.

5 CONNECTION COMPARISON

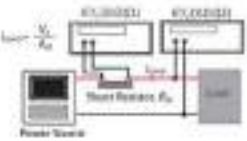
PCS-1000I can simultaneously measure current and voltage with 6 1/2 measurement resolution. The left diagram shows the connection method of simultaneous measurement. Compared with the test of conventional meters from other brands, PCS-1000I is simple in connection and there is no requirement of any additional instruments.

PCS-1000I Conducts Simultaneous Voltage and Current Measurement



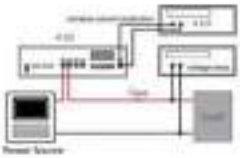
1. Only one PCS-1000I is needed to measure voltage and current.
2. Easy connection.
3. USB and CAN communications on the rear panel can be used for data communication while connecting with a PC.

Shunt Resistor Conducts Current and Voltage Measurement



1. One voltage meter is needed to measure voltage on shunt and the voltage will be converted to current. For simultaneous voltage and current measurement, one extra voltage meter is required.
2. Complex connection.
3. For data communication with a PC, the PC must be connected to two voltage meters.

Conventional Shunt Meter Conducts Current and Voltage Measurement



1. This method requires one shunt meter, one current meter to increase current measurement resolution, and one voltage meter to measure voltage.
2. Complex connection.
3. For data communication with a PC, the PC must be connected to two meters.

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

ACCESSORIES

GBM-01 	GBM-02 	GBM-03
GBM-S1 	GDM-01 	GDM-BC1A
GDM-TL01 	GHT-108 	GHT-109
GHT-112 	GHT-114 	GHT-115
GHT-116B 	GHT-116S 	GHT-117 / GHT-117 (EU)
GHT-118 	GHT-118 (EU) 	GHT-119
GHT-300 	GLC-01 	GLC-02

ACCESSORIES

CPM-801	CPM-801 (II)	GBC-01
GTL-101	GTL-103	GTL-104A
GTL-106A	GTL-111	GTL-116B
GTL-116B	GTL-117	GTL-132
GTL-305A	GTL-307A	GTL-309
GTL-210	GTL-212	GTL-215
GTL-216	GTL-215	GTL-217

ACCESSORIES

GTL-388 	GTL-389 	GTL-232
GTL-234 	GTL-235 	GTL-236
GTL-240 	GTL-246 	GTL-247
GTL-248 	GTL-250 	GTL-251
LCS-001 	PT-100 	GDM-8DCI
GDM-8DCI 	GDM-9DCI 	GPT-9DCI
GPT-18DCI 	GPT-18DLI 	GTL-264

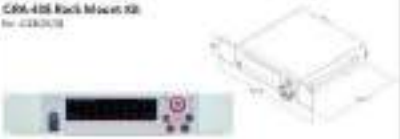
ACCESSORIES

FIXTURE MODEL	DESCRIPTION	CONNECTION	DUT PACKAGE	APPLICATION
LCR-05	Test Fixture for measuring axial and radial lead components Frequency: DC to 1MHz Max. Voltage: +/- 35V	4 Wire	Axial & radial lead components	Suitable for axial & radial lead type L, C, R
LCR-05A	Test Fixture for axial & radial leaded components Frequency: DC to 300kHz Max. Voltage: +/- 45V (including SHORT bar and STD LOAD)	4 Wire	Axial & radial lead components	Suitable for axial & radial lead type L, C, R
LCR-06B	Kelvin clip test lead Frequency: DC to 1MHz Max. Voltage: +/- 60V	4 Wire (Kelvin clip)	DIP/chipped components	Suitable for low R or high C
LCR-07	Test leads for conventional component measurement Frequency: DC to 1MHz Max. Voltage: +/- 35V	2 Wire (Alligator clip)	Conventional component for terminal, board mounted components	Suitable for low C or high R
LCR-08	SMD chip tweezers Frequency: DC to 1MHz Max. Voltage: +/- 35V	4 Wire (SMD chip tweezers)	SMD components	Suitable for SMD type L, C, R
LCR-18A	Test Fixture for tantalum electrolytic components Frequency: DC to 30MHz Max. Voltage: +/- 45V	4 Wire (SMD chip tweezers)	SMD chip components	Range 0402 to 7511 (including SHORT bar and STD LOAD)
LCR-12	Kelvin clip test lead Frequency: DC to 10MHz Max. Voltage: +/- 35V Approx. 0.8m	Kelvin clip test lead		
LCR-11	SMD chip test fixture Frequency: DC to 10MHz Max. Voltage: +/- 45V	4 Wire (SMD chip test fixture)	SMD chip components	Suitable for SMD Range0081 to 3811
LCR-15A	Test Fixture for SMD chip components Frequency: DC ~ 30MHz Max. Voltage: +/- 45V	4 Wire (SMD chip test fixture)	SMD chip components	Range 0201 to 1811 (including STD LOAD)
LCR-16	External DC Bias voltage box Frequency: 40Hz to 1MHz Max. Voltage: +/- 40V			
LCR-17	External DC Bias Current box Frequency: 40Hz to 1MHz Max. Current: +/- 2.5A			

ACCESSORIES

CRA-417 Rack Mount Kit

CRA-408 Rack Mount Kit



CRA-422 Rack Mount Kit

CRA-431 Rack Mount Kit

CRA-419 CIA Rack Mount Kit

CRA-419 JIS Rack Mount Kit

CRA-436 Rack Mount Kit

CRA-440 Rack Mount Kit

CRA-443 Rack Mount Kit

NOTE

WINS TAIWAN EXCELLENCE AWARD

台灣精品
TAIWAN EXCELLENCE

GDS-1000-U Series
Digital Storage Oscilloscope

AFG-3000 Series
Arbitrary Function Generator

PEL-2000 Series
Programmable D.C. Electronic Load

GDS-300/200 Series
Digital Storage Oscilloscope

PEL-3000 Series
Programmable D.C. Electronic Load

GDS-3000 Series
Digital Storage Oscilloscope

GSP-9330
9.25GHz Spectrum Analyzer

C-1100
ASK/FSK Tester

CPM-8213
Digital Power Meter

C-1200
LoRa Tester

GDM-906X Series
6 1/2 Digit Dual Measurement Multimeter

SKTS-5000
Smart Keys Test Solution

GPT-12000 Series
AC/DC/IR/GB Electrical Safety Analyzer

C-3200
LoRaWAN Tester

GPM-8310
Digital Power Meter

GDS-3000A Series
60/150 MHz Digital Storage Oscilloscope

PPX-Series
Programmable High-precision D.C. Power Supply

GSM-20H10
Source Measure Unit

GPP-3060/6030
Triple-channel Programmable DC Power Supply

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