



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: 48. 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.



Simply Reliable

SINCE
1975



48 Years of Reputation
& Trust

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.

DURABLE



Uncompromised
Durability

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.

TRUST &
PROMISE



Your Most Trustworthy
Partner

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.

- 1975 Good Will Instrument Co., Ltd. was established as a Power Supply manufacturer.
- 1983 The Kaohsiung branch was established.
- 1985 The Taichung branch was established.
- 1989 Good Will Southwest 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 Southwest 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 CNLA 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 installed.
- 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.
Marketing office was set up in India.
- 2010 CW Instek won Taiwan Excellence Award for CDS-1000/U Series, A/C-1000 Series, PFI-2000 Series and CDM-8261.
- 2012 CW Instek won Technology Innovation Award for CDS-1000 Series and CSP-930.
Acquired Japan TEXIO technology corporation.
- 2013 Instek Digital was merged to become a member of G.W. Instek business group.
CW Instek cooperated with Hitachi and IMAC to establish CW Alliance in Suzhou, China.
CW Instek won Technology Innovation Award for PFI-1102 and A/C-222E.
- 2014 CW Instek won Technology Innovation Award (Gold) for CDS-300 full touch screen oscilloscope.
European subsidiary was established in the Netherlands.
- 2015 CW Instek won Taiwan Excellence Award for CDS-180/200 Series and PFI-3000 Series.
- 2016 CW Instek won Taiwan Excellence Award for CDS-2000 Series and CSP-9310.
CW Instek won Taiwan Excellence Award for C-1100 and CPM-8211.
- 2018 CW Instek won Taiwan Excellence Award for C-1200 and CDM-966X Series.
- 2019 CW Instek INDIA LLP was established.
CW Instek won Taiwan Excellence Award for OPT-12000 Series and SPTS-5000.
- 2020 CW Instek won Taiwan Excellence Award for C-1200 and CPM-8115.
- 2021 CW Instek won Taiwan Excellence Award for CDS-1000A Series, PPX-Series, CPP-3000/6030 and CSM-2001H and CPM-8310.





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
- Handheld Digital Storage Oscilloscope
- Oscilloscope Education And Training Kit



SPECTRUM ANALYZERS & DEDICATED TESTER SERIES

- 5.25 GHz Spectrum Analyzer
- 3 GHz Spectrum Analyzer
- 1.8 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 Load
- DC Electronic Load
- High Power DC Electronic Load
- AC & DC Electronic Load



DIGITAL MULTIMETERS

- Digital Multimeter

LCR METERS

- Benchtop LCR Meter
- Battery Meter
- Handheld LCR Meter

SAFETY TESTERS

- AC/DC/PEEL Electrical Safety Analyzer
- AC/DC Withstanding Voltage Tester
- Resistance/Current Bond Tester
- AC Ground Bond Tester
- Multiple Scanner Box
- Leakage Current Tester

OTHER METERS

- DC MB-Div Meter
- Battery Meter
- Digital Power Meter
- Automatic Detection Meter
- AC Milliwatt Meter
- Precision Current Short Meter

A

650/350 MHz Digital Storage Oscilloscope



VPO
Visual Persistence Oscilloscope



NEW



GDS-3000A Series

- 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 wfms/s of Waveform Update Rate
- 10.2 inch 800 x 480 TFT LCD Display
- 490,000 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
- iC/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)

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D

Source Measure Unit



NEW



GSM-20H10

- 4.3-inch TFT LCD
- Maximum Output $\pm 210V/\pm 1.05A/22W$
- 0.012% Basic Measurement Accuracy with 6 1/2-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)

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D

Programmable High-precision D.C. Power Supply



NEW



PPX-Series

- CV, CC Priority Start Function
- Four Levels of Current Measurement Resolution (min. 0.1 μ A)/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

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D

Triple-channel Programmable DC Power Supply



NEW



GPP-3060/6030/3650

- 4.3" TFT LCD Display
- Setting Resolution: 1mV/0.1mA; Read Back Resolution: 0.1mV/0.1mA
- Low Ripple Noise: $\leq 1mVrms/\leq 2mArms$
- Transient Response Time: $\leq 100\mu s$
- 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

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D Programmable AC/DC Power Source

CE RS-485 GPIB USB LAN EMI



ASR-3000 Series

NEW

- Output Rating: AC 0 ~ 400 Vrms, DC 0 ~ + 570 V
- Output Frequency up to 999.9 Hz
- DC Output (100% of Rated Power)
- Measurement Items: Vrms, Vavg, Vpeak, Vrms, IpkH, Iavg, Ipeak, P, S, Q, PF, CF
- Voltage and Current Harmonic Analysis (THDn, THDn)
- Remote Sensing Capability
- OCV, OVP, OTH, AC Fail Detection and Fan Fail Alarm
- Support Arbitrary Waveform Function
- Output Capacity: 25VA / 25VA/4VA
- Customized Phase Angle for Output On/Off
- Sequence and Simulation Function (up to 10 sets)
- Interface(s): USB, LAN, RS-232, GPIB
- Built-in External Control (IO and External Signal Input)
- Built-in Output Relay Control & Memory Function (up to 10 sets)
- Built-in Web Server

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D Programmable D.C. Electronic Load

CE RS-485 GPIB USB LAN



PEL-2000B Series

NEW

- 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
- OCV/OCR/OTF/RVP/LVP Protection
- External Channel Control/Monitoring via Analog Control Connector
- Multi Interface : PEI 2000A Series: USB, RS-232, LAN, GPIB (Opt.)
- PEI 2000B Series: USB, RS-232, LAN and GPIB (Opt.)

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D High Power DC Electronic Load

CE RS-485 GPIB USB LAN



PEL-5000C Series

NEW

- Maximum Power up to 150kW
- Up to 8 units of Master/Slave Parallel Control
- 8-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 (90%~100% Modulo)
- Automatically Perform OCV, OVP 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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D DC Electronic Load

CE RS-485 USB



PEL-500 Series

NEW

- 8-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/Start Discharge Capacity(Ah, Wh) and Stop Discharge Time
- Bugs Test Can Simulate Peak Overhead Current and Trickle 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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AC & DC Electronic Load



AEL-5000 Series

- [illegible]

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P High Power DC Electronic Load



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
- Projection Analogue V, I, W, and C

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High Frequency LCR Meter



LCR-8200(A) Series

- Wide Test Frequency:
 - LCR 8200A: DC, 10Hz ~ 30(30/20/10/5) kHz
 - LCR 8200: DC, 10Hz ~ 30(30/20/10/5) 1 MHz
- 7" LCD color Display
- 600h Basic Accuracy
- Displaying Four Measurement Results Simultaneously from 1/7 Selectable Measurement Parameters Fully
- 11 Slope List Measurement
- Two Curves Setup Mode
- Equivalent Circuit Model Analysis (LCR4300-xx)
- Internal DC Bias Voltage ±17V
- USB Storage Available
- ALC Function Available
- Standard Interfaces:
 - RS-232C, USB Host/Device,
 - LAN, GPIB and Handler
- Universal Power Input

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E AC/DC/IR/GB Electrical Safety Analyzer



CPT-15000 Series

- 5000A AC Test Capacity (short circuit current > 200mA)
- 7" TFT LCD
- Comply with IEC 61010-2-014
- Device Requirement
- Manual Test Mode/Auto Test Mode
- RMS Current Measurement
- Zero Crossing Turn-on Operation
- Configurable Ramp-up & Ramp-down Time
- Statistics & Analysis Function
- Capacitive Load Testing Capability up to 45µF
- Sweep Function for DUT Characteristic Analysis
- Comprehensive Listed AUTO Mode Easy to Read Result and Judge
- Internal Storage and USB Storage Available
- Barcode Function Available
- Setting Data Export/Import
- Real Panel Output Available
- Standard Interface : RS232C
- USB Host/Device and Signal I/O
- Optional Interface : GPIB or LAN
- Universal Power Input

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E Multi-Channel Hipot Tester



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



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



NEW



GPM-8310

- 5" TFT LCD
- 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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GPT-9602	100VA AC/DC Withstanding Voltage Tester	E45
GPT-9603	100VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E45
GPT-9612	100VA AC Withstanding Voltage/Insulation Resistance Tester	E45
GPT-9801	200VA AC Withstanding Voltage Tester	E39
GPT-9802	200VA AC/DC Withstanding Voltage Tester	E39
GPT-9803	200VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E39
GPT-9804	200VA AC/DC Withstanding Voltage/Insulation Resistance/ Ground Bond Tester	E39
GPT-9901A	500VA AC Withstanding Voltage Tester	E39
GPT-9902A	500VA AC/DC Withstanding Voltage Tester	E39
GPT-9903A	500VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E39
GPT-9904	500VA AC/DC Withstanding Voltage/Insulation Resistance/ Ground Bond Tester	E39
GPT-99C1	Accessory - GPIB Card	E35
GPT-10KG1	Accessory - GPIB Card	E35
GPT-10KL1	Accessory - LAN Card	E35
GPT-12001	AC Electrical Safety Analyzer	E33
GPT-12002	AC/DC Electrical Safety Analyzer	E33
GPT-12003	AC/DC/IR Electrical Safety Analyzer	E33
GPT-12004	AC/DC/IR/CB Electrical Safety Analyzer	E33
GPT-15001	AC Electrical Safety Analyzer	E33
GPT-15002	AC/DC Electrical Safety Analyzer	E33
GPT-15003	AC/DC/IR Electrical Safety Analyzer	E33
GPT-15004	AC/DC/IR/CB Electrical Safety Analyzer	E33
GPW-001	Accessory - UL/CSA Power Cord, 3000mm	D123
GPW-002	Accessory - VDE Power Cord, 3000mm	D123
GPW-003	Accessory - PSE Power Cord, 3000mm	D123
GPW-005	Accessory - Power Cord, 3000mm	D123
GPW-006	Accessory - Power Cord, 3000mm	D123
GPW-007	Accessory - Power Cord, 3000mm	D123
GR		
GRA-401	Accessory - Rack Adapter Kit, 19", 4U Size	D123
GRA-403	Accessory - Rack Adapter Kit, 19", 4U Size	D123
GRA-407	Accessory - Rack Adapter Kit, 19", 4U Size	D123
GRA-408	Accessory - Rack Adapter Kit, 19", 4U Size	D123

GRA-408	Accessory – Rack Adapter Kit, 19", 4U Size	D123
GRA-410-E	Accessory – Rack Mount Kit (EIA), 19", 3U Size	D123
GRA-410-J	Accessory – Rack Mount Kit (JIS), 19", 3U Size	D123
GRA-411	Accessory – Rack Mount Kit, 19", 6U Size	A43
GRA-413-E	Accessory – Rack Mount Kit (EIA), 19", 3U Size for PEL-3211	D123
GRA-413-J	Accessory – Rack Mount Kit (JIS), 19", 3U Size for PEL-3211	D123
GRA-414-E	Accessory – Rack Mount Kit (EIA), 19", 3U Size for PEL-3021/3041/3111	D123
GRA-414-J	Accessory – Rack Mount Kit (JIS), 19", 3U Size for PEL-3021/3041/3111	D123
GRA-415	Accessory – Rack Mount Kit, 19", 6U Size	B25
GRA-417	Accessory – Rack Mount Kit, 19", 4U Size	E77
GRA-418-E	Accessory – Rack Mount Kit (EIA), 19", 2U Size	D123
GRA-418-J	Accessory – Rack Mount Kit (JIS), 19", 2U Size	D123
GRA-419-E	Accessory – Rack Mount Kit (EIA), 19", 2U Size	E77
GRA-419-J	Accessory – Rack Mount Kit (JIS), 19", 2U Size	E77
GRA-420	Accessory – Rack Mount Kit, 19", 6U Size	A45
GRA-422	Accessory – Rack Mount Kit, 19", 2U Size	E77
GRA-423	Accessory – Rack Mount Kit, 19", 2U Size	D123
GRA-424	Accessory – Rack Mount Kit, 19", 2U Size	D123
GRA-426	Accessory – Rack Mount Kit, 19", 2U Size	A45
GRA-428	Accessory – Rack Mount Kit (EIA), 19", 3U Size	D30
GRA-429	Accessory – Rack Mount Kit, 7U Size	D123
GRA-430	Accessory – Rack Mount Kit, 9U Size	D123
GRA-431-J	Accessory – Rack Mount Kit (JIS)	D123
GRA-431-E	Accessory – Rack Mount Kit (EIA)	D123
GRA-432	Accessory – Rack Adapter Kit	C34
GRA-433	Accessory – Rack Mount Kit, 19", 4U Size	E77
GRA-438	Accessory – Rack Mount Kit, 19", 4U Size	E77
GRA-439-J	Accessory – Rack Mount Kit (JIS), 19", 4U Size	D123
GRA-439-E	Accessory – Rack Mount Kit (EIA), 19", 4U Size	D123
GRA-440	Accessory – Rack Mount Kit, 19", 4U Size	E77
GRA-441-J	Accessory – Rack Mount Kit (JIS), 19", 4U Size	D123
GRA-441-E	Accessory – Rack Mount Kit (EIA), 19", 4U Size	D123
GRA-442-J	Accessory – Rack Mount Kit (JIS), 19", 4U Size	D123
GRA-442-E	Accessory – Rack Mount Kit (EIA), 19", 4U Size	D123
GRA-445	Accessory – Rack Mount Kit, 19", 4U Size	E77
GRA-449-J	Accessory – Rack Mount Kit (JIS), 19", 3U Size	D123
GRA-449-E	Accessory – Rack Mount Kit (EIA), 19", 3U Size	D123
GRF-1380	RF & Spectrum Analyzer Training System	B19
GRF-1380A	RF & Spectrum Analyzer Training System	B19
GRJ-1101	Accessory – Module Cable (0.5m)	D123
GRM-001	Accessory – Slide Bracket 2pcs/set	D123

GS

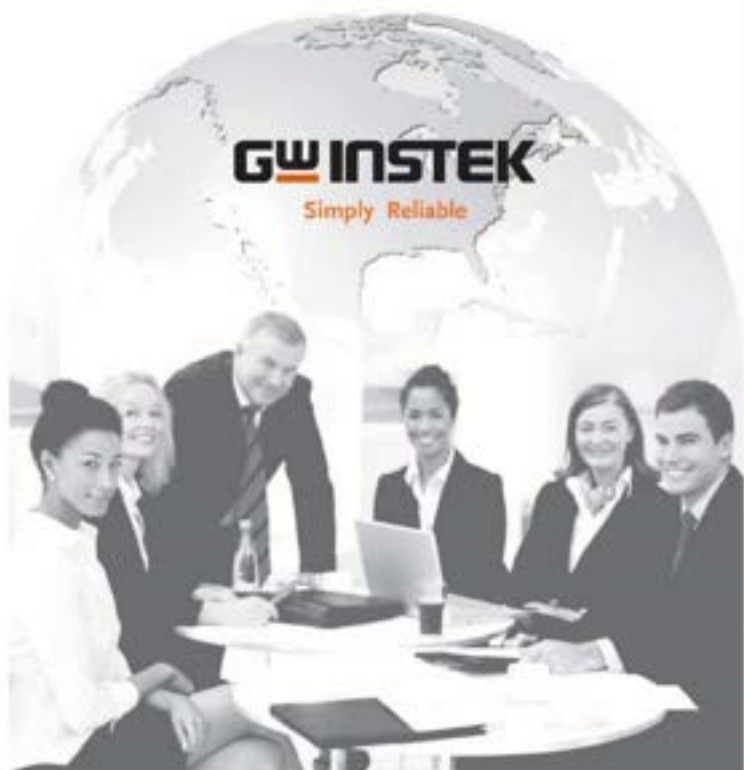
GSB-01	Multiplex Scanner Box, 8-Channel High Voltage	E40
GSB-02	Multiplex Scanner Box, 6-Channel High Voltage & 2-Channel Ground Bond	E40
GSC-008	Accessory – Soft Carrying Case	A42
GSC-009	Accessory – Soft Carrying Case	B25
GSC-010	Accessory – Soft Carrying Case	A42
GSC-011	Accessory – Soft Carrying Bag	A42
GSC-014	Accessory – Soft Carrying Case for DMM Accessory	E77
CSM-20H10	Source Measure Unit	D33
GSP-730	1GHz Spectrum Analyzer	B19
GSP-818	1.8GHz Spectrum Analyzer	B16
GSP-9300B	3GHz Spectrum Analyzer	B13
GSP-9330	3.25GHz Spectrum Analyzer	B5

GT

GTL-081A	Accessory – Logic Analyzer Probe, 8-Channel Logic Analyzer Probe for DS2-8LA	A42
GTL-16E	Accessory – 16-Channel Logic Analyzer Probe	A42
GTL-101	Accessory – Test Lead, BNC(P/M) to Alligator Test Lead, 1100mm	C34
GTL-103	Accessory – Test Lead, Banana to Alligator, Approx. 1200mm	E77
GTL-104A	Accessory – Test Lead, U-type to Alligator Test Lead, Max. Current 10A, 1000mm	D123
GTL-108A	Accessory – 4 Wire (Kelvin Clip) Test Lead, Approx. 1100mm	E77
GTL-110	Accessory – BNC Cable, BNC(P/M) BNC(P/M), 1000mm	A42
GTL-115	Accessory – G.B. Test Lead, U Type to Alligator, Approx. 1000mm	E77
GTL-116B	Accessory – G.B. Test Lead (Black Only), U Type to Alligator, Approx. 1500mm	E77
GTL-116R	Accessory – G.B. Test Lead (Red Only), U Type to Alligator, Approx. 1500mm	E77
GTL-117	Accessory – Test Lead, Banana to Probe, Approx. 1200mm	E77
GTL-120	Accessory – Test Lead, O-type to D-type Test Lead, Max. 40A, 1200mm	D123
GTL-121	Accessory – Sense Lead, O-type to Free Lead, 1200mm	D123
GTL-122	Accessory – Test Lead, U-type to Alligator Test Lead, Max. Current 40A, 1200mm	D123
GTL-123	Accessory – Test Lead, O-type to O-type Test Lead, 1200mm	D123

GTL-130	Accessory – Test Leads: 2 x red, 2 x Black, for 250V/800V Models, 1200mm	D123
GTL-131	Accessory – Test Clip, Suitable for GDP-040D	A42
GTL-132	Accessory – LINK Cable, Approx. 250mm	E77
GTL-134	Accessory – Test Leads for Rear Panel, 1200mm, 10A, 16 AWG	D123
GTL-137	Accessory – Output Power wire (load wire, 10AWG/50A, 600V/sense wire, 16AWG/20A, 600V)	D123
GTL-202	Accessory – Sense Lead, Banana to Banana Lead, European Terminal, 200mm	D123
GTL-203A	Accessory – Test Lead, Banana to Alligator, European Terminal, Max. Current 3A, 1000mm	D123
GTL-204A	Accessory – Test Lead, Banana to Alligator, European Terminal, Max. Current 10A, 1000mm	D123
GTL-205A	Accessory – Temperature Probe Adaptor with Thermocouple (K-type), Approx. 1000mm	A42
GTL-207A	Accessory – Test Lead, Banana to Probe Test Lead, 800mm	A42
GTL-209	Accessory – Test Lead, Banana to Bare-wire, Approx. 1000mm	E77
GTL-210	Accessory – Test Lead, Banana to Banana, Approx. 1000mm	E77
GTL-212	Accessory – Test Lead, O-Type to Bare-wire, Approx. 1000mm	E77
GTL-213	Accessory – Test Lead, O-Type to Banana, Approx. 1000mm	E77
GTL-214	Accessory – Da4 Cable, Approx. 1000mm	E77
GTL-215	Accessory – G.B. Test Lead, U Type to Alligator, Approx. 1000mm	E77
GTL-217	Accessory – Test Lead, Banana to Probe, Approx. 1400mm	E77
GTL-218	Accessory – Test Lead, O-type to O-type Test Lead, Max. 200A, 1500mm	D123
GTL-219	Accessory – Test Lead, O-type to O-type Test Lead, Max. 200A, 3000mm	D123
GTL-220	Accessory – Test Lead, O-type to O-type Test Lead, Max. 300A, 1500mm	D123
GTL-221	Accessory – Test Lead, O-type to O-type Test Lead, Max. 300A, 3000mm	D123
GTL-222	Accessory – Test Lead, O-type to O-type Test Lead, Max. 400A, 1500mm	D123
GTL-223	Accessory – Test Lead, O-type to O-type Test Lead, Max. 400A, 3000mm	D123
GTL-232	Accessory – RS-232C Cable, 9-pin, F-F Type, Null Modem, Approx. 2000mm	D123
GTL-234	Accessory – RS-232C Cable, 9-pin F-F type, Null Modem for computer, Approx. 2000mm	E77
GTL-235	Accessory – Communication Cable, Approx. 700mm	E77
GTL-236	Accessory – RS-232C Cable, 9-pin F-M type, Approx. 2000mm	E77
GTL-238	Accessory – RS-232 Cable, 9-pin, M-F type, 1000mm	D123
GTL-240	Accessory – USB Cable, USB 2.0, A-B type (I type), 1200mm	D123
GTL-246	Accessory – USB Cable, USB 2.0, A-B type, 1200mm	D123
GTL-247	Accessory – USB Cable, USB 1.1 A-A type, Approx. 1800mm	E77
GTL-248	Accessory – GPIB Cable, Double Shielded, 2000mm	D123
GTL-249	Accessory – Frame Link Cable, 100mm	D123
GTL-250	Accessory – GPIB Cable, Double Shielded, 600mm	A42
GTL-253	Accessory – USB Cable, USB 2.0, A-mini B Type, 1400mm	C34
GTL-255	Accessory – Frame Link Cable, 300mm	D123
GTL-258	Accessory – GPIB Cable, 25 pins Micro-D Connector	D123
GTL-259	Accessory – RS-232 Cable with DB9 connector to RJ45	D123
GTL-260	Accessory – RS-485 Cable with DB9 connector to RJ45	D123
GTL-261	Accessory – Serial Master Cable Terminator, 0.3M	D123
GTL-262	Accessory – RS-485 Slave cable	D123
GTL-264	Accessory – Signal I/O Converter Cable, 15-pin Male to 9-pin Female, Approx. 200mm	E75
GTL-301	Accessory – RF Cable, RG223 Assembly, 1000mm, N(P/M)	B25
GTL-302	Accessory – RF Cable, RG223 Assembly, 1000mm, N(P/M)	B25
GTL-303	Accessory – RF Cable, RG316 Assembly, 600mm, SMA(P/M)	B25
GTL-304	Accessory – RF Cable, RG223 Assembly, 280mm, N(P/M) - N(G/F)	B25
GTL-308	Accessory – 4 Wire (Kelvin clip) + Shield Test Lead, Approx. 1500mm	E77
GTL-309	Accessory – 4 Wire (Kelvin clip) + Shield Test Lead, Approx. 3000mm	E77
GTP-033A	Accessory – Oscilloscope Probe, 35MHz 1:1 Passive Probe	A45
GTP-070B-4	Accessory – Oscilloscope Probe, 70MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43
GTP-100B-4	Accessory – Oscilloscope Probe, 100MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43
GTP-150A-2	Accessory – Oscilloscope Probe, 150MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43
GTP-150B-2	Accessory – Oscilloscope Probe, 150MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43
GTP-151R	Accessory – Oscilloscope Probe, 150MHz 10:1 Passive Probe, BNC(P/M)	A44
GTP-200B-4	Accessory – Oscilloscope Probe, 200MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43
GTP-250A-2	Accessory – Oscilloscope Probe, 250MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43
GTP-250B-2	Accessory – Oscilloscope Probe, 250MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A44
GTP-251R	Accessory – Oscilloscope Probe, 250MHz 10:1 Passive Probe, BNC(P/M)	A44

95W-010	Accessory – Large Filter (Type A/F)	04
95W-011	Accessory – Output Terminal Cover for 200V/60Hz Models	04
95W-012	Accessory – High Voltage Output Terminal for 200V/60Hz Model	04
PT		
PT-100	Accessory – Temperature Probe, Approx. 1000mm	117
RL		
RL-001	Accessory – Return Loss Bridge, 50MHz – 1GHz, Source/Load AG/PL Coupling 50/50	303
SP		
SP-1000	2MHz DDS Function Generator	128
SP-1013	2MHz Dual Display DDS Function-Generator	128
SP		
SP-1000	10MHz 3-Channel Programmable Switching D.C. Power Supply	193
SP-1210	300W Switching D.C. Power Supply	193
SP-1510	300W Switching D.C. Power Supply	193
SP-2415	300W Switching D.C. Power Supply	193
SP-3619	300W Switching D.C. Power Supply	193
SP-480	300W Switching D.C. Power Supply	193
US		
USC-0101	20MHz – 440MHz, USB RF Signal Generator	132





OSCILLOSCOPES

The frequency bandwidth ranges from 50MHz to the high-class 650MHz. 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 CDS 3000A Series is the flagship product of CW Inseel's digital storage oscilloscope. Its highest frequency bandwidth has been elevated to 650MHz, 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 MDO 2000E Series is a mixed-signal oscilloscope, which offers dual analog channels/16 digital channels or 4 analog channels/16 digital channels. MDO 2000E has a built-in 16-channel logic analyzer and MDO 2000EA has a built-in 16-channel logic analyzer and a dual channel 25MHz arbitrary function generator. The MDO 2000A series is multi-functional 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. MDO 2000EA, MDO 2000AC 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, C&W Instek provides an entire series of oscilloscope solutions, consisting of three groups: Digital Storage Oscilloscopes, Analog Oscilloscopes and Real Time/Digital Storage Oscilloscopes.

Series	Type	100MHz	100MHz	100MHz	200MHz	200MHz	200MHz	100MHz	100MHz	100MHz	100MHz	Page
CDS-3000A Series	Digital	✓		✓								A5-10
CDS-3000 Series	Digital		✓									A11-12
CDS-2000A Series	Digital				✓		✓		✓	✓		A13-14
MSO-2000E Series	Digital					✓		✓	✓	✓		A15-20
MDO-2000A Series	Digital				✓		✓		✓			A21-26
MDO-2000E Series	Digital					✓		✓	✓	✓		A27-30
CDS-2000E Series	Digital					✓		✓	✓	✓		A31-32
CDS-100/200 Series	Digital					✓		✓	✓	✓		A33-34
CDS-1000E Series	Digital					✓		✓	✓	✓	✓	A35-40

Series	Configuration	Page
CDS-01	CDS-1000A/CDS-300E/CDS-2000A/CDS-2000E/MDO-2000E/CDS-1000E Series	A41

VPO TECHNOLOGY

When using a DSO to measure serial transmission 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, incidental 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 use a high-density IC for hardware acceleration to transfer all the acquired data into the displayed waveform image. Figure A shows the compression and quantization of waveform data. CDS-3000 has a waveform display region of 750 frames in width, while the record length is 254 dots 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 254 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.

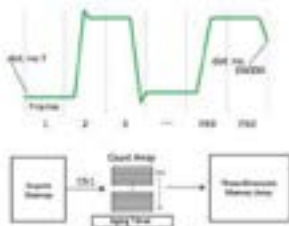


Figure A. The compression and quantization of waveform data

This process holds only for hundreds of micro seconds even if the calculation implemented by hardware architecture repeats for 750 times. The CDS-3000 Series uses such parallel processing structure to shorten the dead-time. Take 4 channel CDS-3000 as an example. It has 3034 counter arrays to simultaneously process input waveform data.

In general it takes approximately 18ms 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.

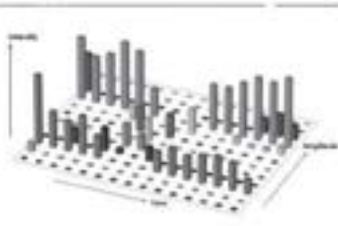


Figure B. Structure of 3D waveform data array

MEMORY DEPTH

Three major factors, including bandwidth, sample rate and memory depth, contribute 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.

$$\begin{aligned} \text{Total Waveform Points Sampled} &= \text{Record Duration} / \text{Sample Period} = \text{Record Duration} \times \text{Sampling Rate} \\ \text{If Total Waveform Points Sampled} &> \text{DSO Memory Depth, all excessive points sampled need to be abandoned and the effective sampling rate is forced to slow down} \\ \text{Memory Depth} &= \text{Record Duration} \times \text{Effective Sampling Rate} \\ \text{Effective Sampling Rate} &= \text{Memory Depth} / \text{Record Duration} \\ \text{When Record Duration is long, Longer DSO Memory Depth means Faster Effective Sampling Rate} \end{aligned}$$

*Sample period is 1/Sampling rate **Record duration is Time Base X 10 div.

650/350 MHz Digital Storage Oscilloscope



GDS-3000A Series
(650/350 MHz)



FEATURES

- 450/550MHz Bandwidth, 2 or 4 Input Channels
- 525Sa/s Real-time Sampling Rate(half channels)
- 2525Sa/s Real-time Sampling Rate(full channels)
- Per Channel 200Mpts Memory Depth
- 200,000 wh/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
- 33 sets of Automatic Measurement Offer Various Measurement Selections
- High resolution acquisition mode
- (C)/J1939/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 10 Sets of Power Analysis Measurements
- Optional 16 Digital Channels with a Logic Analyzer(PSO)
- Flexible Remote Control Connectivity (Standard: USB/RS485/RS-232; Option: GPIB)

OX-2000 digital storage oscilloscopes have 100MHz and 200MHz models with two-channel, two-channel and 14-channel logic analysis options. The series feature the memory depth of each channel up to 100Mpts, the sampling rate of 1GS/s, half channels and 1GS/s in all channels, 16-bit TWT ADC and it provides the color display mode.

Acoustic Signal Acquisition and Analysis

CC-3000S strengthens measurement and specifications related to on-surface measurement, including the memory depth of up to 128Mpts per channel. The advantage of long memory is that it allows users to maintain high sampling rates at low speed-time settings; the waveform update rate is up to 200,000/s/pts, and the expanded memory can capture and produce up to 400,000 segments. For measurement, **CC-3000S** incorporates the Fast scale function to allow users to fine-tune the vertical scale according to the segments as well as acquire full-scale measurement to improve the accuracy of the waveform. It also has a Fast zoom-in function and the acquisition method with the high resolution mode also records signals with better bandwidth measurement.

In addition, the series is equipped with 784 slots and 50 slots input impedance selection, which can be set according to different 50 Ω measurement requirements to achieve the effect of impedance matching. The search function can directly 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 delay data of each point measured by the cursor. Via the indicator function, the measured result is to be shown at the specific section of the waveform.

Small Domestic Violence

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 signals frequency domain fluctuations that are proportionally decomposed into signals superimposed means to be understood the signal strength distribution. The soft keys allow users to have more intuitive control, for example, they can increase the measurement efficiency.

11.3.6 Switching Mode Power Supply Measurements

2008-2009 provides a rich measurement basis for switch-mode power supply testing. The provided power supply test items include AC input analysis items: Power Quality, Harmonics, Input Current; DC output analysis required test items: Voltage, Transient Response Analysis, Turn-On/Off Efficiency, Control Loop Impedance/Bode and PSRR (Power Supply Rejection Ratio). Complete switching component analysis items: Mosfet/IGBT, Switching Loss, SDA (Soft-Switching Area) and

[illegible]

[illegible]

ORDERING INFORMATION

CDS 9853A	8108991	2-Channel	Digital Storage Oscilloscope
CDS 9854A	8108992	4-Channel	Digital Storage Oscilloscope
CDS 9952A	8108991	2-Channel	Digital Storage Oscilloscope
CDS 9954A	8108992	4-Channel	Digital Storage Oscilloscope

Appendix

[illegible]

CyClim	CPA-PWS	Power Analysis Software	ETAS-CPWS	CPWS Interface	ETAS-104.4	10-Element Logp. Analysis
Optional Accessories						
CPA-1000	30416 to 1.0 Picores probe					
CPA-1010	30416 to 10.0 Picores probe					
CPA-001	30416 to High voltage differential probe					
CPA-004	30416 to High voltage differential probe					
CPA-005	30416 to High voltage differential probe					
CPA-006	30416 to High voltage differential probe					
CPA-007	30416 to High voltage differential probe					
CPA-008	30416 to High voltage differential probe					
CPA-009	30416 to High voltage differential probe					
CPA-010	30416 to High voltage differential probe					
CPA-011	30416 to High voltage differential probe					
CPA-012	30416 to High voltage differential probe					
CPA-013	30416 to High voltage differential probe					
CPA-014	30416 to High voltage differential probe					
CPA-015	30416 to High voltage differential probe					
CPA-016	30416 to High voltage differential probe					
CPA-017	30416 to High voltage differential probe					
CPA-018	30416 to High voltage differential probe					
CPA-019	30416 to High voltage differential probe					
CPA-020	30416 to High voltage differential probe					
CPA-021	30416 to High voltage differential probe					
CPA-022	30416 to High voltage differential probe					
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CPA-027	30416 to High voltage differential probe					
CPA-028	30416 to High voltage differential probe					
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CPA-033	30416 to High voltage differential probe					
CPA-034	30416 to High voltage differential probe					
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CPA-037	30416 to High voltage differential probe					
CPA-038	30416 to High voltage differential probe					
CPA-039	30416 to High voltage differential probe					
CPA-040	30416 to High voltage differential probe					
CPA-041	30416 to High voltage differential probe					
CPA-042	30416 to High voltage differential probe					
CPA-043	30416 to High voltage differential probe					
CPA-044	30416 to High voltage differential probe					
CPA-045	30416 to High voltage differential probe					
CPA-046	30416 to High voltage differential probe					
CPA-047	30416 to High voltage differential probe					
CPA-048	30416 to High voltage differential probe					
CPA-049	30416 to High voltage differential probe					
CPA-050	30416 to High voltage differential probe					
CPA-051	30416 to High voltage differential probe					
CPA-052	30416 to High voltage differential probe					
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CPA-059	30416 to High voltage differential probe					
CPA-060	30416 to High voltage differential probe					
CPA-061	30416 to High voltage differential probe					
CPA-062	30416 to High voltage differential probe					
CPA-063	30416 to High voltage differential probe					
CPA-064	30416 to High voltage differential probe					
CPA-065	30416 to High voltage differential probe					
CPA-066	30416 to High voltage differential probe					

Free Download

PC software	Diagnostic software	Driver	Lubricant grade
PC software	Diagnostic software	Driver	Lubricant grade

Stage Panel



D53A-16LA 16 Channel Logic Analyzer



CRA-443-E Rack Adapter Panel

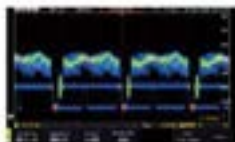
Rock Mounting [TF, 6.2]



CCT-100 Decking Fixture



A. 16.2 INCH, 8 BITS RGB COLOR GRADIENT DISPLAY



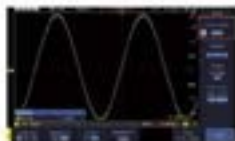
With respect to the waveform display technology, the GDS-3000A series oscilloscope is capable of displaying RGB color gradients with 8 bits each which can delineate the profound gradational fluctuations, as if it can recreate the analog oscilloscope display capability. When a composite signal is input, 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. 200M MEMORY DEPTH PER CHANNEL INDEPENDENTLY



The GDS-3000A series oscilloscope has a powerful and incomparable memory depth for the data retrieving. 200M memory depth per channel independently surpasses the specification of the industry's 3000 series DSO boundary. 200M memory depth allows users to easily seize the waveform detail while conducting fundamental measurement applications.

C. FINE SCALE



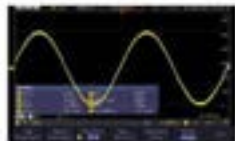
The Fine scale function is incorporated to allow users to fine-tune the vertical scale according to their needs to achieve full-scale measurement and improve the accuracy of the voltage or current measurements.

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

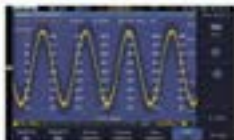
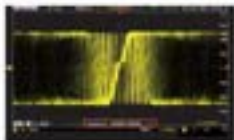


The GDS-3000A series soundly provides 38 measurement items. Based upon the parameters such as voltage, current, time, frequency, and delay measurement, users can decide which measurement items to choose. On the single display screen, the GDS-3000A series provides 8 measurement selections.

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.

B. 490,000 SEGMENTED MEMORY



In addition, CDS-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 CDS-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.

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, Rise, 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 CDS-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.

D. USER DEFINE KEY



CDS-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

II. 25MHZ DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR



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

GDS-3000A is standardly equipped with a 25MHz dual channel arbitrary waveform generator, and provides built-in Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Custom, 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 ARWG to store the signal measured by the analog channel of the oscilloscope to the arbitrary waveform of the signal source (ARW file), or it can directly output this signal from the signal generator, which is a new function that allows users to conveniently generate various measured signals to simulate diversified signal outputs.

III. PC REMOTE CONTROL (WEB SERVER FUNCTION)



GDS-3000A has a built-in Web Server function to allow users to connect GDS-3000A'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-3000A 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.



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, $\pm V$ Peak, $\pm I$ Peak, AC/DC voltage and current, voltage/current crest factor, impedance, resistance and reactance.



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 & $R_{th}(on)/R_{th}(off)$.

13 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.



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 item: transient response value (s).



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 suppresses 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



Published online 25 June 2009 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/anie.200901119



GDS-3000 Series
(500MHz)



FEATURES

- 50MHz Bandwidth, 2/4 Input Channels
- 40GS/s Real-time Sampling Rate and 100GS/s Equivalent Time Sampling Rate
- 256 Points Memory for Each Input Channel
- WFC (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: 50 Ω /1M Ω /1M Ω
- Optional Power Analysis Software for Power Source Measurement and Analysis
- Optional Serial-bus Analysis Software for Trigger & Decode of I²C, SPI and UART Interfaces

	CDS-3902	CDS-3804
VERTICAL		
Channels	2Ch+EXT (DC-NIM-In) 3dB	4Ch+EXT (DC-500MHz In) 3dB
Bandwidth	300Hz	700Hz
Calculated Rise Time		
Bandwidth Limit	100M/100M/100M/100Hz	100M/100M/100M/100Hz
Vertical Resolution	The bandwidth of the TIG input impedance is limited to 100MHz only	
Vertical Resolution [M] [C]	8 bits	
Vertical Resolution [M] [C]	2mV-5V/div	
Input Coupling	2mV-1V/div	
Input Impedance	AC, DC, CH0	
DC Gain Accuracy	1MΩ / 11pf	
Polarity	10k full scale	
Maximum Input Voltage (V M)	Super-, Invert	
Maximum Input Voltage (V M)	300Vrms, CAT I	
Offset Position Range	5 Vrms	
Waveform Signal Process	2mV/div - 100mV/div, 30.5V, 200mV/div - 5V/div, 33Hz	
	Aud., Autotest, Mathing, and Divide waveforms, Interpolation, Integration [App installation required], FFT, Spatial 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	All (Supports half mode for 30ns/div and slower), Manual, Single	
Trigger Type	Edge, Pulse Width, Video, Run key & rel. Slope, Glitch Trigger, Window Trigger, Super Trigger, Delay (45.120 steps, time delay) (50-70) PC2.0, DM7 [optional]	
Trigger Holdoff Range	10ns - 10s	
Coupling	AC, DC, LP HF re., Noise re.	
Sensitivity	DC-300kHz Approx. 3ds at 10mV, 100kHz-10MHz Approx. 1.5ds at 10mV, 100kHz-10MHz Approx. 3ds at 20mV, 20MHz-300kHz Approx. 2.5ds at 20mV	
EXT TRIGGER		
Range	±11V	
Sensitivity	DC - 10MHz Approx. 100mV, 10MHz - 20MHz Approx. 100mV, 20MHz - 100MHz Approx. 100mV, 100MHz - 500MHz Approx. 200mV	
Input Impedance	1MΩ ± 3%, -10pf	
HORIZONTAL		
Range	0.2-1.6 increments, 100ns, 100ms/div - 100s/div	
Post-trigger	50 div maximum	
Post-trigger Accuracy	1,000 div max (display on one lead)	
X-Y MODE	0.20 point/sec every 0.1 s time interval	
Auto Input/Auto kept Phase Shift	Channel 1, Channel 3/Channel 2, Channel 4 ±7 at 100kHz	
SIGNAL ACQUISITION		
Real Time Sample Rate	4GS/s	4GS/s
ET Sample Rate	100CS/s maximum for all models	
Memory Depth	274 points	
Acquisition Mode	Normal, Average, Peak detect, High resolution, Single Average: 2 ~ 256 waveforms • Peak Detect: 2ns	
CURSOR AND MEASUREMENT		
Cursor	Amplitude, Time, Gate, Amplitude	
Automatic	2d auto: Vpp, Vavg, Vmax, Vmin, 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 (PRR, FRF, LFR, FFF, LBR, LRF, LFF, LFI)	
Cursor Measurement	Subgate difference between cursors (ΔV) time difference between cursors (ΔT)	
Auto Cursor	Δ digit, range from 2MHz minimum to the rated bandwidth	
POWER MEASUREMENTS/OPTION		
Power Quality Measurements	V RMS, Δ RMS, True Power, Apparent Power, Reactive Power, Frequency, Power Factor, Power Angle, V Crest factor / Crest factor, [-] W Peak, [-] W Peak, [-] W Peak, DC Voltage, DC Current, Impedance, Resistance, Reactance Frequency(Hz), Magnitude(M), Mag. RMS(P), Phase(P), Load(R), Load(X), Peak / Rail, Max all, Windings(R), 200V Line, POHC Line, THD-I, THD-RMS, Genral, POHC, Input Power Power factor Fundamental Current, Harmonic 1, Harmonic 3 Ripple, Noise	
First peak, second peak		
CONTROL PANEL FUNCTION		
Autoset	Single button, automatically setup of all channels for vertical, horizontal and trigger systems, with undo action	
Ratio-range	Automatically adjusts the base and pan for the vertical scale of displayed waveform when the frequency and/or the amplitude of input signal changed.	
Save Setup	20 sets	
Save Waveform	25 sets	
DISPLAY SYSTEM		
TFT LCD Type	8" TFT LCD SVGA color display, ED Back-light	
Waveform Update Rate	1500 frames/sec	
Display Resolution	600 horizontal x 600 vertical pixels (SVGA)	
Interpolation	10x/2x/4x/8x equivalent time sampling	
Waveform Display	Dual, Vector, Variable persistence, Infinite persistence	
Display Contrast	≥ 16 contrast	
Display Brightness	Adjustable	



GDS-3000 Series

DESCRIPTIONS	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	
Silverroot Port	15-pin connector, 10/100Mbps	
SVGA Video Port	DB-15 female connector, monitor output for display on SVGA monitors	
GPIO	GPIO/USB Adapter (Optional)	
Co/NoCo BNC	10/Max/100k 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/NoCo audio alarm	
POWER SOURCE		
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection; Power Consumption: 80W	
OPERATING ENVIRONMENT		
Temperature	0°C ~ 50°C, Relative Humidity: 20% at 40°C or below, 5-45% at 41°C~50°C	
MISCELLANEOUS		
Multi-Languages Menu	Available	
On-Line Help	Available	
Time clock	Time and date, provide the date/time for saved data	
DIMENSIONS & WEIGHT		
	400 (W) x 200 (H) x 130 (D) mm, Approx. 4 kg	

The specifications apply when the oscilloscope is powered on for least 10 minutes under 25°C ± 0.5°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

CP9-5010: 500MHz 10:1 passive probe for GDS-3502/3504 (one per channel)

Options

OSA-PWR	Power analysis software; Power quality (harmonic), supply (inrush current) measurements
SEA-580	Serial Bus analysis software; I2C/SPI/UART (only 4 channel models support SPI function)

Optional Accessories

CSC-001	GPIO to USB adapter	GDP-005	25MHz high voltage differential probe
CTP-003A	33MHz 1:1 Passive probe	GDP-006	50MHz high voltage differential probe
GCP-005	50MHz/100A Current probe	GDP-100	100MHz high voltage differential probe
GCP-100	50MHz/100A Current probe	CSC-008	3/4 Carrying Case
CCP-1000	100MHz/10A Current probe	CTL-110	Test lead, BNC to BNC connector
CCP-1000	10MHz/10A Current probe	CTL-225	RS-232C cable, 9-pin female to 9-pin female, built-in modem for computer
CCP-200P	Power supply for current probe (2 input channel)	CTL-240	USB 2.0 cable, 4.9 type cable 40, 100cm
GCP-420P	Power supply for current probe (4 input channel)	GRA-411	Rack Mounting Kit
CP1-340	GPIO Cable, Double (Shielded), 2000mm	CDB-03	Oscilloscope Education and Training Kit
		CTK-100	Darkbox Return

File Download

PC Software	RealView software	Driver	USB driver / Latch driver
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Rear Panel



GUG-001 GPIO to USB Adapter

For: GDS-3000 Series, PSW Series



GRA-411 Rack Adapter Panel

Rack Mounting (1U, 6U)



CDB-03 Oscilloscope Education and Training Kit

For: GDS-1000/2000A/2000E/3000 Series
M10-2000 Series, M10-2000A/2000E/3000 Series



CSC-008 Soft Carrying Case



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



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



FEATURES

- 100/200/100/75MHz Bandwidth, 1 to 4 Input Channels
- J253a's Maximum Real-Time Sampling Rate and 1MB/s's Equivalent Time Sampling Rate Distorts Maximum Record Length
- WFO Technology to Display Less-Frequently Occurred Signals
- Fast Update Rate of 30,000 Waveform Per Second
- Suggested Memory Acquisition and Waveform Search Function
- Standard Model Provides PIC, UART, SPI, CAN and LIN Serial Bus Trigger and Analysis Functionality
- Optional 8 to 16 Additional Digital Channels with Logic Analyzer(MSO)
- Upgradeable DVM, H-Expansion, Data Log and Advanced Logic Functionality
- Optional 1MHz Function Commander
- Flexible Remote Control Connectivity (Standard : USB ; Optional : LAN/GPIB)

CDS-03 Oscilloscope Education and Training Kit

Part: C075-3000 (2000A/2000T/1000 Series)
 3000 Series / 3000 Series / 3000 Series / 3000 Series



GSC-008 Soft Carrying Case

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The specifications apply when the overcharge is presented as for at least 30 minutes within -20°C to $+20^{\circ}\text{C}$.
Note: These tests include, but are not limited to, the following:
• 100% duty cycle
• 100% load
• 100% efficiency
• 100% power factor



CDS-2000A Series

Journal of Management Inquiry

LDSC ANALYSIS SOFTWARE

Sample Rate	1000/S/s
Bandwidth	200Hz
Signal Length	200 mtr
Input Channels	16 Digital (D11 - D6) or 8 Digital (D7-D8)
Trigger Type	Edge, Pattern, Pulse Width, Serial Bus (I ² C, SPI, UART, CAN, LIN), Input
Thresholds	Quad 00 - 31, S4 - S7 Thresholds 00 (D11 - D12) D10 (D1 - D3), N/A ext)
Threshold Selections	771, CMOS, 5V1, 4V1, User Defined
Threshold Accuracy	±0.000V
User-defined Threshold Range	±1V
Maximum Input Voltage	±4V
Minimum Voltage Swing	±0.000V
Input Impedance	10 MΩ (probe loading 8 pF)
Input Resistance	1.5 MΩ

OPERATING ENVIRONMENT

Temperature: 40°C - 50°C Relative Humidity: 50% or above 50% or above 50%

doi:10.1017/S0022292410000505

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

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Mohr et al. • *gpr109* Is a GPCR for Lipid Signaling in *Drosophila* *J. Neurosci.*, August 6, 2008 • 28(32):7983–7991 • 7991

ORDERING INFORMATION

CDS-2304A	300MHz, 4-Channel, Digital Storage Oscilloscope
CDS-2302A	300MHz, 2-Channel, Digital Storage Oscilloscope
CDS-2204A	200MHz, 4-Channel, Digital Storage Oscilloscope
CDS-2202A	200MHz, 2-Channel, Digital Storage Oscilloscope
CDS-2104A	100MHz, 4-Channel, Digital Storage Oscilloscope
CDS-2102A	100MHz, 2-Channel, Digital Storage Oscilloscope
CDS-2004A	70MHz, 4-Channel, Digital Storage Oscilloscope
CDS-2002A	70MHz, 2-Channel, Digital Storage Oscilloscope

Augmented reality

OTF-0564 2019/01/17 Substância peróxido de hidrógeno (20% em água) per. inflam.
OTF-0562 2019/01/17 Substância peróxido de hidrógeno (20% em água) per. inflam.
OTF-0561 2019/01/17 Substância peróxido de hidrógeno (20% em água) per. inflam.
OTF-0563 2019/01/17 Substância peróxido de hidrógeno (20% em água) per. inflam.

OPTION

Model	Standard 8-Port Console	8-Port Console	8-Port Console	8-Port Console
8-Port Console	8-Port Console	8-Port Console	8-Port Console	8-Port Console
8-Port Console	8-Port Console	8-Port Console	8-Port Console	8-Port Console

ORIGINAL ACCEPTED

[illegible]

FREE DOWNLOAD

File Name	Size	Downloaded
File 1	100 KB	100%
File 2	200 KB	100%
File 3	300 KB	100%
File 4	400 KB	100%
File 5	500 KB	100%
File 6	600 KB	100%
File 7	700 KB	100%
File 8	800 KB	100%
File 9	900 KB	100%
File 10	1 MB	100%
File 11	1.1 MB	100%
File 12	1.2 MB	100%
File 13	1.3 MB	100%
File 14	1.4 MB	100%
File 15	1.5 MB	100%
File 16	1.6 MB	100%
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File 44	4.4 MB	100%
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File 46	4.6 MB	100%
File 47	4.7 MB	100%
File 48	4.8 MB	100%
File 49	4.9 MB	100%
File 50	5 MB	100%
File 51	5.1 MB	100%
File 52	5.2 MB	100%
File 53	5.3 MB	100%
File 54	5.4 MB	100%
File 55	5.5 MB	100%
File 56	5.6 MB	100%
File 57	5.7 MB	100%
File 58	5.8 MB	100%
File 59	5.9 MB	100%
File 60	6 MB	100%
File 61	6.1 MB	100%
File 62	6.2 MB	100%
File 63	6.3 MB	100%
File 64	6.4 MB	100%
File 65	6.5 MB	100%
File 66	6.6 MB	100%
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File 70	7 MB	100%
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File 72	7.2 MB	100%
File 73	7.3 MB	100%
File 74	7.4 MB	100%
File 75	7.5 MB	100%
File 76	7.6 MB	100%
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File 78	7.8 MB	100%
File 79	7.9 MB	100%
File 80	8 MB	100%
File 81	8.1 MB	100%
File 82	8.2 MB	100%
File 83	8.3 MB	100%
File 84	8.4 MB	100%
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File 89	8.9 MB	100%
File 90	9 MB	100%
File 91	9.1 MB	100%
File 92	9.2 MB	100%
File 93	9.3 MB	100%
File 94	9.4 MB	100%
File 95	9.5 MB	100%
File 96	9.6 MB	100%
File 97	9.7 MB	100%
File 98	9.8 MB	100%
File 99	9.9 MB	100%
File 100	10 MB	100%

Water Panel



DS2-16LA 16-Channel Logic Analyzer



DS2-08LA 8-Channel Logic Analyzer

DS2-LAN Ethernet & SVGA
Output

D52-CPIB CPIB Interface

D52-FGN DDS Function
Generator



MSO-2000E Series

SPECIFICATIONS

	MSO-2072(A)	MSO-2074(A)	MSO-21072(A)	MSO-21074(A)	MSO-21076(A)	MSO-21078(A)
BASIC SPECIFICATIONS (MSO-2000E only)						
Channels	2	4	2	4	6	8
Sample Rate	300 MS/s	14 MS/s	300 MS/s	14 MS/s	300 MS/s	14 MS/s
Vertical Resolution	14 bits	14 bits	14 bits	14 bits	14 bits	14 bits
Max. Frequency	20 MHz	20 MHz	20 MHz	20 MHz	20 MHz	20 MHz
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sin, Gaussian, Linear, Exponential Rise, Exponential Fall, Hysteresis, Config.					
Output Range	20 mVpp to 5 Vpp, High Z, 10 mVpp to 2.5 Vpp, 50 Ω					
Output Resolution	1mV					
Output Accuracy	2% (1 MHz)					
Offset Range	± 2.5 V ac-dc, High Z, ± 1.25 V ac-dc, 50 Ω					
Offset Resolution	1mV					
FREQUENCY RESPONSE ANALYSIS						
Dynamic Range	+30 dB (typical)					
Input and Output Sources	Channel 1 to 7 (1 to 4 for four channel model)					
Frequency Range	20 Hz to 25 MHz					
Number of Test Points	10 to 90 points per decade					
Test Amplitude	20 mVpp to 1 Vpp into high-Z. Fixed amplitude across entire sweep					
Test Source	Logarithmic, constant gain and phase plot					
Manual Measurements	Time pairs of leading and phase markers					
Plot Scaling	Auto-scaled during test					
POWER SOURCE REQUIREMENTS						
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection					
Multi-Language Menu	Available					
On-Line Help	Available					
Time-shift	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%, 40°C ~ 50°C					
DIMENSIONS & WEIGHT						
	184(W) x 308(H) x 127(D)mm, Approx. 2.2kg					

Note: These are maximums including probes & I/O 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

*High+Noise+Switch or Dual Channel Memory Arbitrary Waveform Generator

ACCESSORIES

User manual CD & 5, Power cord & 1

GCP-201: Probe Clip, 20PCS CTL-14E: 16-Channel Logic Analyzer Probe

GCP-200B-4: 100MHz/10V/1V/1Switchable passive probe for MSO-2102(A)/2104(A) (Active per channel)

GCP-100B-4: 100MHz/10V/1V/1Switchable passive probe for MSO-2102(A)/2104(A) (Active per channel)

GCP-200B-4: 200MHz/10V/1V/1Switchable passive probe for MSO-2202(A)/2204(A) (Active per channel)

OPTIONAL ACCESSORIES

CTL-14E	16-Channel Logic Analyzer Probe	GCP-100	100MHz/10A Current probe
CRA-42E	Back Mount Kit	GCP-100	100MHz/10A Current probe
CAR-001	100 Impedance Adapter	GCP-100	100MHz/10A Current probe
CAC-008	3A Carrying Case	GCP-100	100MHz/10A Current probe
CTL-14E	16-Channel Logic Analyzer Probe	GCP-200P	Power supply for current probe (2 input channel)
CTL-001	Oscilloscope Education & Training Kit	GCP-200P	Power supply for current probe (1 input channel)
GCP-655A	Oscilloscope Probe, 250MHz 1:1 Passive	GCP-201	Probe Clip, 20PCS
Probe, 50V/10M		GCP-655	250MHz High voltage differential probe
GCP-655	100MHz/10A Current probe	GCP-655	100MHz High voltage differential probe
		GCP-100	100MHz High voltage differential probe

FREE DOWNLOAD

PC Software	Operation software	Driver	USB driver, Lightbox driver
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Rear Panel



GDB-03 Oscilloscope Education and Training Kit

For: CTL-100E/2000A/2000S/1000SE Series
MSO-2000E Series/MSO-2000A/2000S Series



CTL-16E 16-Channel Logic Analyzer Probe

For: MSO-2000E Series



GCP-201 Probe Clip, 20PCS

For: MSO-2000E Series



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

MSO-2000E SERIES SELECTION GUIDE

MODEL	MSO-2000E	MSO-1000E	MSO-7000E	MSO-7000E	MSO-2014E	MSO-7020E
Bandwidth	200MHz	100MHz	100MHz	100MHz	200MHz	200MHz
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

MODEL	MSO-2000EA	MSO-1000EA	MSO-7000EA	MSO-7000EA	MSO-2014EA	MSO-7020EA
Bandwidth	200MHz	100MHz	100MHz	100MHz	200MHz	200MHz
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 modes provide 1GSa/s real-time sampling rate per channel; four analog channel modes provide 1GSa/s maximum real-time sampling rate. The 8-inch 800x480 TFT LCD and the minimum 1mV/div vertical range allow the MSO-2000E series to measure complex flexible 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 26,000 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 70Mpts 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 timing 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.

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.

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, Resonant 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.

The frequency range of FRA is from 20Hz 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.



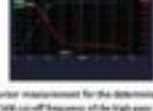
CAN Bus Trigger and Decode



Dual Channel Arbitrary Waveform Generator



FRA of RC high-pass filter



Cursor measurement for the determination of 100 cut-off frequency of the high-pass filter



The MSO-2000E series oscilloscope allows users to easily and completely observe inrush 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 130,000 wf/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.

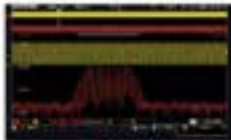
DUAL DISPLAY SCREEN ZOOM-IN AND PLAY/PAUSE FUNCTIONS



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.

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, Hanning, Hamming, and Black-harris. Users select window display for frequency domain analysis according to test requirements. The

MSO-2000E series not only provides the FFT function but also FFTs, 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.

D. 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.

E. 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 10M 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.

F. 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, Run, 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. The 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.

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 mask signals can be identified when reviewing 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.

K. 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 5 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.



MDO-2000A Series

Rear Panel



SPECIFICATIONS

	MDO-2102A/C	MDO-2202A/C	MDO-2302A/C
Size	Frequency Range: 100MHz-250MHz (typical relative to 10MHz) <100Hz-170MHz, <1.4M 100MHz-250MHz Maximum Amplitude: 100V (typical relative to 10MHz) <100V (typical relative to 10MHz) <100V (typical relative to 10MHz)		
Speed/Pulse	Frequency Range: 100MHz-250MHz, Rise/Fall time: <10ns, Bandwidth: <10ns, Duty Cycle: Square 50% & Pulse: 5:1, 10:1, 20:1, 50:1, Pulse Width: 10ns, >100ns		
Temp	Frequency Range: 100MHz-250MHz (typical) 100MHz-250MHz		
FREQUENCY RESPONSE ANALYSIS (MDO-2000A/C only)			
Dynamic Range	> 40dB (typical)		
Input and Output Source	Channel 1 or 2		
Frequency Range	10Hz to 25 MHz		
Number of Test Points	10 to 80 points per display		
Test Amplitude	20mVrms to 2Vrms into high-Z, Fixed test amplitude in custom amplitude for each display		
Test Results	Logarithmic overlaid gain and phase plot		
Manual Measurements	Two pairs of tracking gain and phase markers		
Wave Editing	Auto marker during test		
WARRANTY			
Line Voltage Range	AC 100V - 240V, 50Hz - 60Hz, auto selection		
Multi-Language Menu	Available		
On-Line Help	Available		
True Clock	Time and date, provides the date/time for saved data		
Operation Environment	Temperature: 0°C to 50°C, Relative Humidity: <80% @ 40°C or below, <45%, 60°C - 50°C		
Dimensions & Weight	340(W) x 100(H) x 127(D) mm, Approx. 3kg		

Note: *Dimension accuracy, excluding probes & LCD display panel.

ORDERING INFORMATION

MDO-2002AC	100MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer dual channel 250MHz 400
MDO-2202AC	200MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer dual channel 250MHz 400
MDO-2302AC	300MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer dual channel 250MHz 400
MDO-2000A	100MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer
MDO-2200A	200MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer
MDO-2300A	300MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer

Accessories:

Use manual CD & 3. Power cord & 3.

CTL-100 50V, 100V, cable & 3. (only in MDO-2000A/C)

CTP-1000-4 100MHz/10V (1/1) (Switchable passive probe for MDO-2000A/C/2500A/C (one per channel))

CTP-2000-4 200MHz/10V (1/1) (Switchable passive probe for MDO-2200A/C/2500A/C (one per channel))

CTP-3000-4 300MHz/10V (1/1) (Switchable passive probe for MDO-2300A/C/2500A/C (one per channel))

OPTIONAL ACCESSORIES

CBA-400	Back Adapter Panel	CCP-300	300MHz/200A Current probe
CAX-001	100V Impedance Adapter	CCP-100	100MHz/200A Current probe
CSC-000	Self-Coupling Case	CCP-500	500MHz/100A Current probe
CTF-240	100V Cable, 100V 1.0, A, B Type, 100mm	CCP-1000	1000MHz/100A Current probe
CTP-001A	Oscilloscope Probe, 25MHz 1:1	CCP-1000	1000MHz/100A Current probe
	Passive Probe	CCP-200P	Power supply for current probe (2 input channel)
CCP-025	Differential Probe, 25M High Voltage	CCP-400P	Current Probe - Power Supply, 4 Channel Power Supply for CCP-100/1000
CCP-050	Differential Probe, 50M High Voltage		
	Differential Probe		

FREE DOWNLOAD

PC Software	Operation software	Driver	User driver - Latimer driver
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SELECTION GUIDE

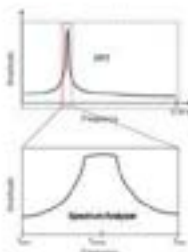
MODEL	MDO-2000AC	MDO-2000AG	MDO-2100AC	MDO-2100A	MDO-2100B	MDO-2100R
Bandwidth	300MHz	200MHz	100MHz	300MHz	200MHz	100MHz
Channels	2	2	2	2	2	2
Record Length	256M / ch	256M / ch	256M / ch	256M / ch	256M / ch	256M / ch
Real-Time Sampling Rate	Max. 1 GS/s	Max. 2 GS/s	Max. 1 GS/s	Max. 2 GS/s	Max. 2 GS/s	Max. 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. 2GS/s and the memory depth has also been upgraded to 256M/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 easy 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 analyzer, 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 (f_s). 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's 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 2yng 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: 100mVpp sine wave, fmax: 10.2MHz, fmin: 10.0MHz, bit rate: 10.0kHz. 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 Key sight DSOX2000A), 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 RSW 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. 120,000wfms/s WAVEFORM UPDATE RATE AND VPD WAVEFORM DISPLAY TECHNOLOGY



The MDO-2000A series oscilloscope allows users to easily and conveniently observe inrush signals and rare transient waveforms to increase waveform debugging efficiency by using features, including advanced VPD (Visual Persistence Oscilloscope) signal processing technology, waveform update rate as high as 120,000 wfms/s, and multi-layered offscreen display to enhance waveform display efficiency. Oscilloscope with VPD 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-2000A 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-2000A series

provides serial bus analysis function with 2048 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, 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-2000A series controls waveform zoom-out and glasspaste function to verify identify each desired event. The function allows users to conveniently compare 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 minute to 1000 hours, and record interval is 1 second, 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-2000A series or the remote computer via LAN.

E. SEGMENTED MEMORY FUNCTION



Users Can Select "Analysis 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 level signals can be identified when retrieving 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 20,000. 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.

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 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 isolate test conditions.

G. 20MHz DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR

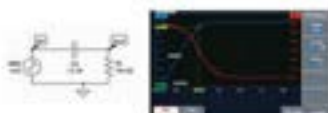


* MDO 3000AC only



With respect to signal source, MDO 3000AC features a built-in dual channel 20MHz 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/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 16M memory length. The arbitrary waveform can be edited through the PC software, and the edited arbitrary waveform (CSV file) can be recalled by the AVG 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=1.0kHz @ $T=1(21^{\circ}\text{C})$ and the measurement result is 1.1kHz which is quite close to the theoretical value. The frequency test range of FRA and the max. 90 points per decade of test point are higher than that of Keysight InfiniVision 3000T's option. More points per decade allow users to get higher accurate test results.



MDO-2000E Series



SPRING CLEANING

[illegible]

ORDERING INFORMATION

WDO-2384E/C	1000Hz 2-Channel Digital Storage Oscilloscope Spectrum analyzer dual channel 2384Hz @ 100MHz
WDO-2382E/C	1000Hz 2-Channel Digital Storage Oscilloscope Spectrum analyzer dual channel 2382Hz @ 100MHz
WDO-2194E/C	1000Hz 4-Channel Digital Storage Oscilloscope Spectrum analyzer dual channel 2194Hz @ 100MHz
WDO-2192E/C	1000Hz 4-Channel Digital Storage Oscilloscope Spectrum analyzer dual channel 2192Hz @ 100MHz
WDO-2674E/C	1000Hz 4-Channel Digital Storage Oscilloscope Spectrum analyzer dual channel 2674Hz @ 100MHz
WDO-2672E/C	1000Hz 4-Channel Digital Storage Oscilloscope Spectrum analyzer dual channel 2672Hz @ 100MHz

Appendix 1

- over manual CD + 1 Pro cable + 1, CFL110 (not) + 1 cable + 1, CFL105A. Alligator Clip test lead
(only on MCO 3000X, CFL100B. Same plug test lead (only on MCO 3000X).
- CFL105A-1: 100A/120V/1/1/1 Switchable passive probe for MCO 2070/1, 2070A/2 (see page 174)
- CFL105B-1: 100A/120V/1/1/1 Switchable passive probe for MCO 2070/1, 2070A/2 (see page 174)
- CFL105C-1: 100A/120V/1/1/1 Switchable passive probe for MCO 2070/1, 2070A/2 (see page 174)

OPTIONAL ACCESSORIES

[illegible]

FREE DOWNLOAD

PC Software	Copyright software	Date	Old Price	Current Price
MS Office 2003	Microsoft	2003	1000	500
MS Office 2007	Microsoft	2007	1200	600
MS Office 2010	Microsoft	2010	1500	750
MS Office 2013	Microsoft	2013	1800	900
MS Office 2016	Microsoft	2016	2000	1000
MS Office 2019	Microsoft	2019	2200	1100
MS Office 2021	Microsoft	2021	2400	1200
MS Office 2022	Microsoft	2022	2600	1300
MS Office 2023	Microsoft	2023	2800	1400
MS Office 2024	Microsoft	2024	3000	1500
MS Office 2025	Microsoft	2025	3200	1600
MS Office 2026	Microsoft	2026	3400	1700
MS Office 2027	Microsoft	2027	3600	1800
MS Office 2028	Microsoft	2028	3800	1900
MS Office 2029	Microsoft	2029	4000	2000
MS Office 2030	Microsoft	2030	4200	2100
MS Office 2031	Microsoft	2031	4400	2200
MS Office 2032	Microsoft	2032	4600	2300
MS Office 2033	Microsoft	2033	4800	2400
MS Office 2034	Microsoft	2034	5000	2500
MS Office 2035	Microsoft	2035	5200	2600
MS Office 2036	Microsoft	2036	5400	2700
MS Office 2037	Microsoft	2037	5600	2800
MS Office 2038	Microsoft	2038	5800	2900
MS Office 2039	Microsoft	2039	6000	3000
MS Office 2040	Microsoft	2040	6200	3100
MS Office 2041	Microsoft	2041	6400	3200
MS Office 2042	Microsoft	2042	6600	3300
MS Office 2043	Microsoft	2043	6800	3400
MS Office 2044	Microsoft	2044	7000	3500
MS Office 2045	Microsoft	2045	7200	3600
MS Office 2046	Microsoft	2046	7400	3700
MS Office 2047	Microsoft	2047	7600	3800
MS Office 2048	Microsoft	2048	7800	3900
MS Office 2049	Microsoft	2049	8000	4000
MS Office 2050	Microsoft	2050	8200	4100
MS Office 2051	Microsoft	2051	8400	4200
MS Office 2052	Microsoft	2052	8600	4300
MS Office 2053	Microsoft	2053	8800	4400
MS Office 2054	Microsoft	2054	9000	4500
MS Office 2055	Microsoft	2055	9200	4600
MS Office 2056	Microsoft	2056	9400	4700
MS Office 2057	Microsoft	2057	9600	4800
MS Office 2058	Microsoft	2058	9800	4900
MS Office 2059	Microsoft	2059	10000	5000
MS Office 2060	Microsoft	2060	10200	5100
MS Office 2061	Microsoft	2061	10400	5200
MS Office 2062	Microsoft	2062	10600	5300
MS Office 2063	Microsoft	2063	10800	5400
MS Office 2064	Microsoft	2064	11000	5500
MS Office 2065	Microsoft	2065	11200	5600
MS Office 2066	Microsoft	2066	11400	5700
MS Office 2067	Microsoft	2067	11600	5800
MS Office 2068	Microsoft	2068	11800	5900
MS Office 2069	Microsoft	2069	12000	6000
MS Office 2070	Microsoft	2070	12200	6100
MS Office 2071	Microsoft	2071	12400	6200
MS Office 2072	Microsoft	2072	12600	6300
MS Office 2073	Microsoft	2073	12800	6400
MS Office 2074	Microsoft	2074	13000	6500
MS Office 2075	Microsoft	2075	13200	6600
MS Office 2076	Microsoft	2076	13400	6700
MS Office 2077	Microsoft	2077	13600	6800
MS Office 2078	Microsoft	2078	13800	6900
MS Office 2079	Microsoft	2079	14000	7000
MS Office 2080	Microsoft	2080	14200	7100
MS Office 2081	Microsoft	2081	14400	7200
MS Office 2082	Microsoft	2082	14600	7300
MS Office 2083	Microsoft	2083	14800	7400
MS Office 2084	Microsoft	2084	15000	7500
MS Office 2085	Microsoft			

A. ULTRA-HIGH WAVEFORM UPDATE RATE AND VPO WAVEFORM DISPLAY TECHNOLOGY



The MDO-2000E series oscilloscope allows users to easily and completely observe much 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 wfms/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.

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 waveforms search by the trigger condition such as Edge, pulse width, 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-in 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 5 minutes to 1000 hours, and record interval is 5 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.

F. 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 switch 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 29,000. 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.

G. 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 200MSa/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 UAW file for data access.

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



MDO-2000EX has expanded its capabilities by incorporating a 1,000 count DMM and a 5V/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 1V/1A, 0.1V incremental adjustment which can supply power for the development

board and IoT (Internet of Things) module of the often used 8051/Arduino/ESP8266/MSP430 or Microprocessors and Micro controllers experiment courses. For education and digital circuit tests, it can satisfy the voltage input requirements of 5V or 3.3V. Each increment is 0.1V and over load protection is available.



GDS-2000E Series

ORDERING INFORMATION

GDS-2084E	200MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2082E	200MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2184E	100MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2182E	100MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2874E	700MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2872E	700MHz, 2-Channel, Digital Storage Oscilloscope

Accessories:

User manual CD x 1, Power cord x 1

CPH-010 x 1 100Hz/5V(1:1) Switchable passive probe for GDS-2072E/2074E (one per channel)

CPH-008 x 1 100Hz/5V(1:1) Switchable passive probe for GDS-2182E/2184E (one per channel)

CPH-200 x 1 200MHz/5V(1:1) Switchable passive probe for GDS-2802E/2804E (one per channel)

OPTIONAL ACCESSORIES

CSA-026	Back Adapter Panel
CSA-801	100 Impedance Adapter
CSC-808	Soft Carrying Case
CTL-346	USB Cable, USB 2.0, A/B Type, 120cm
CCP-500	500Hz/20A Current probe
CCP-1000	100Hz/10A Current probe
CCP-100	100Hz/100A Current probe
CCP-1000	100MHz/10A Current probe
CCP-2000P	Power supply for current probe (2 input channel)
CCP-4000P	Power supply for current probe (4 input channel)
CDP-6116	Oscilloscope Probe, 500Hz 1:1 Passive Probe, 30C(F/4)
CDP-625	250MHz High-voltage differential probe
CDP-650	500MHz High-voltage differential probe
CDP-100	100MHz High-voltage differential probe

FREE DOWNLOAD

PC Software	Operation software
Driver	USB driver, LAN driver

Rear Panel



CDB-03 Oscilloscope Education and Training Kit

For GDS-1000/2000A/2000E/3000E Series
M50-2000E Series/M50-2000A/2000E Series



200/100/70 MHz Digital Storage Oscilloscope

Model No.
GDS-200
200/100/70 MHz
32,000 Counts



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



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



FEATURES

- 200/100/70MHz Bandwidth Selections, Two Input Channels
- 1GS/s Maximum Sample Rate
- Maximum 5M/1M Memory Depth Per Channel
- 7" 800 x 480 Full Touch Panel Capacitive LCD Multi-Point Control, Landscape and Portrait Display
- Built in 32,000/5,000 Counts DMM
- True 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



The portable 7" full touch panel capacitive LCD, featuring multi-point touch panel method which allows engineers to move waveform position, adjust waveform size, and set trigger conditions easily, substitute 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 unimagined measurement results.

Built in, second to none, the largest 5M 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 reviewing detailed transient signals. Any delicate changes of arising waveforms can be clearly presented in front of engineers when they adjust time scale from long to short that leaves no measurement problems unsolved.

Built in 50,000 counts (GDS-300) or 5,000 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 diagrams 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 reviewing 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 unidentified.

Engineers need to isolate power and solve corresponding grounding issue while conducting circuit debugging. One of the criteria engineers must account is to maintain system grounding and isolation safety in the 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 problems that elevates the efficiency and safety of test and measurement.

Engineers often need some calculation tool software to conduct circuit design and debugging analysis during the RSD 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.

SPECIFICATIONS						
	GDS-307	GDS-310	GDS-320	GDS-207	GDS-210	GDS-220
VERTICAL						
Channels	2 (BNC-Input)					
Input Impedance	1M (12%, 1k Hz approx.)					
Maximum Input	CAT I 300Vrms					
Input Coupling	AC, DC, GND					
Bandwidth	30~100MHz (1.5dB)	30~100MHz (1.5dB)	30~100MHz (1.5dB)	30~100MHz (1.5dB)	30~100MHz (1.5dB)	30~100MHz (1.5dB)
Calculated Rise Time	3ns	3.5ns	1.7ns	3ns	3.5ns	1.7ns
Sensitivity	2mV/div-10V/div (2.5dB increment)					
Accuracy	±2% at Rated + 0.5 dB + 10ms					
Bandwidth Limit	200MHz (3dB)					
Offset	Normal, Invert					
Offset Position Range	100mV/div-100V/div (100mV/div-100V/div approx.)					
Waveform Signal Process	Auto, Hold, Off, 100ns					
SIGNAL ACQUISITION						
Realtime Sample Rate	1GS/s					
Memory Depth	3Mpoints per ch					
Acquisition Mode	Average - 3-254 waveforms, Peak detect - 10ms, 500ns or 100ns					
Display Width	30,000 widths					
TRIGGER						
Source	CH1 or CH2					
Trigger mode	Auto, Normal, Single, Force					
Trigger type	Edge, Pulse Width, Video, Alternate					
Trigger mode	10ns - 10s					
Coupling	AC, DC, LVL, H/L, NR					
Sensitivity	50~250mV approx. 0.5 bits or 10ns 250mV-10/100/2000mV approx. 1.5 bits or 10ns					
HORIZONTAL						
Range	5ns-100V/div (2.5dB increment)					
Roll	100ms/div - 100ns/div					
Pre-trigger	10:10 max.					
Post-trigger	1:200 div max (dependent on time base)					
Accuracy	±20ppm over any 1 time time interval					
XY MODE						
Phase Shift	±5° or 100ns					
CURSOR AND MEASUREMENT						
Cursor	Voltage of Reference between cursors (V), Time of Reference between cursors (T), Frequency measure (1/T)					
Auto-measurement	24 sets					
Auto-cursor AutoSet	8 digits, Range 2Hz to rated bandwidth					
TEMPERATURE MEASUREMENT						
	Available					

[illegible]

ORDERING INFORMATION

CDS-128	200MHz, 2 Channels, Digital Storage Oscilloscope		
CDS-118	100MHz, 2 Channels, Digital Storage Oscilloscope		
CDS-307	70MHz, 2 Channels, Digital Storage Oscilloscope		
CDS-228	200MHz, 2 Channels, Digital Storage Oscilloscope		
CDS-119	100MHz, 2 Channels, Digital Storage Oscilloscope		
CDS-307	70MHz, 2 Channels, Digital Storage Oscilloscope		
ACCESSORIES			
CSM-000-01	CSM-000-01 Cable	CSC-438	Soft Carrying Case
CPS-008-01	100MHz Probe, Suitable for CDS-307/200, CDS-100/118	CSC-411	Soft Carrying Bag
CPS-008-02	200MHz Probe, Suitable for CDS-128/228	SAR-001	AC/DC Adapter
CH-303A	Multi-meter Test Lead 1	CWS-001	Wrist Strap
Optional Accessories			
CDF-000	Active Dual Channel Differential Probe	CLC-001	Vertical Calibration Cable
CLC-001	Vertical Calibration Cable	CSP	Probe Carrying Case for 7" & 8" Screen
CLC-002	Horizontal Calibration Cable	CST-110	USB Cable, USB 2.0 to FireWire 800
CLC-003	Temperature probe adapter with Thermocouple (K type)		Approx. 1400mm
File Download			
Download PDF Software			

SELECTION CLINCH

	MODEL 1	CODE M7	CODE I19	CODE I20	CODE M87	CODE I218	CODE I209
Bandwidth	20000 us	1000000 us	200000 us	70000 us	100000 us	100000 us	100000 us
Sample Rate	10.73/s	10.73/s	10.73/s	10.73/s	10.73/s	10.73/s	10.73/s
Memory Length	384 jps	384 jps	384 jps	1 M jps	384 jps	384 jps	1 M jps
DMA Count	50,000	50,000	50,000	1,000	5,000	5,000	5,000
Temperature Measurement	✓	✓	✓	✓	✓	✓	✓

CDS-300 Series Rear Panel



CDS-200 Series Rear Panel



CSC-010 Soft Carrying Case



CSC-011 Soft Carrying Bag



CPE-700 Protective Films



CAP-001 AC-DC Adapter





GDS-1000B Series

Specifications

Model: GDS-1064B, GDS-1072B, GDS-1014B, GDS-1016B, GDS-1104B, GDS-1102B	
DISPLAY	
TFT LCD Type	7" TFT HVGA color display
Display Resolution	800 horizontal x 480 vertical pixels (WSGA)
Interpolation	5x/4x/3x
Waveform Display	Clear, vector, variable persistence (1 frame-4k), infinite persistence
Waveform Update Rate	10,000 waveforms per second, maximum
Display Controls	8 x 11 buttons
Display Mode	Y1, Y2
INTERFACE	
USB Port (Channel Penetration)	USB 2.0 high-speed host port (A), USB high-speed 2.0 device port (B)
Co-Axis BNC	10:41 connector, 10:100Mbps with 10P Auto-MDIX port for 4 channel modeling
Navigation Style Lock	1x 10-key split-processor output
Power Source	Real-time security and protection in standard Kensington-style lock
POWER SOURCE	
	AC 100V ~ 240V, 50Hz ~ 60Hz, Auto selection, Power consumption: 30 Watts
MISCELLANEOUS	
Multi-Language Menu	Available
Operation	Temperature: 0°C ~ 50°C, Relative Humidity: <80% at 40°C or below
Environment	< 45% at 40°C ~ 50°C
Online Help	Available
DIMENSIONS & WEIGHT	
	340(W) x 208 (H) x 127 (D)mm, Approx. 2.8kg

Note: The specifications apply when the GDS-1000B is powered on for at least 30 minutes under 40°C ± 5°C.

ORDERING INFORMATION

GDS-1102B	200MHz, 2 channels, Digital Storage Oscilloscope
GDS-1104B	100MHz, 4 channels, Digital Storage Oscilloscope
GDS-1102B	100MHz, 2 channels, Digital Storage Oscilloscope
GDS-1014B	70MHz, 4 channels, Digital Storage Oscilloscope
GDS-1012B	70MHz, 2 channels, Digital Storage Oscilloscope
GDS-1014B	50MHz, 4 channels, Digital Storage Oscilloscope

ACCESSORIES

Use manual CD x 1, Power cord x 1	
CP1-009-A, 50MHz (0.1:1) Switchable passive probe for GDS-1014B, GDS-1012B, GDS-1014B (one per channel)	
CP1-009-B, 100MHz (0.1:1) Switchable passive probe for GDS-1014B, GDS-1104B (one per channel)	
CP1-009-C, 200MHz (0.1:1) Switchable passive probe for GDS-1104B (one per channel)	

OPTIONAL ACCESSORIES

CSA-004	Back Adapter Panel
CAR-001	100 Impedance Adapter
CSC-008	Soft Carrying Case
CTL-346	USB Cable, USB 2.0, A-B Type, 1.000mm
CCP-006	200Hz/200A Current probe
CCP-008	100Hz/10A Current probe
CCP-009	100Hz/100A Current probe
CCP-1000	100MHz/10A Current probe
CCP-1001	100Hz/10A Current probe
CCP-200P	Power supply for current probe (2 input channels)
CCP-400P	Power supply for current probe (4 input channels)
CFP-001A	Oscilloscope Probe, 50MHz 1:1 Passive Probe, BNC (BNC)
CCP-002	200Hz high voltage differential probe
CCP-003	100Hz high voltage differential probe
CCP-100	1000Hz high voltage differential probe

FREE DOWNLOAD

Software	Operation Software
Driver	USB Driver, Laptop Driver

Rear Panel



GDS-01 Oscilloscope Education and Training Kit

for GDS-1000B/1000A/1000C/1000D Series
MSO-1000B Series



A. WAVEFORM UPDATE RATE UP TO 50,000wfms/s AND VFO DISPLAY TECHNOLOGY



The GDS-1000B 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 VFO 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-1000B 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-1000B Series is indeed an excellent debugging weapon for the test and measurement industry.

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



With respect to the waveform display technology, the GDS-1000B 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-1000B 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-1000B Series intends to bring to the general purpose oscilloscope arena.



The GDS-1000B 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-1000B Series while enlarging the waveform to 20ns/div reveals a very clear sine waveform detail which is precisely the true value of the GDS-1000B Series oscilloscope.

C. 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-1000B 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 CDS-10008 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 CDS-10008 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 wave/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 CDS-10008 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 CDS-10008 series provides engineers with partial waveform zooms 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 related vicinity of the waveform needed to be zoomed in; the lower window shows the enlarged partial waveform. The function not only allows engineers to

make a comparison but also grasp waveform details in the different time frame. Additionally, the CDS-10008 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 DUT's waveforms as well as to verify identify waveform's problems.

F. DIVERSIFIED TRIGGER FUNCTIONS



The CDS-10008 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 designs to save development time and to accomplish tasks.

G. X-Y MODE DISPLAY



The CDS-10008 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 Lissajous 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.

H GO/NOGO FUNCTION



For the industries, the yield rate determination is very important to mass production. The GOS-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 template. 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.

I DIGITAL VOLTAGE METER FUNCTION



For electric circuit measurement and debugging, R&D engineers require oscilloscopes as well as basic voltage meters. The GOS-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 CDW inside website

J DATA LOG FUNCTION



The GOS-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, GOS-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 CDW inside website

E DIGITAL FILTER FUNCTION



In electric circuit tests, engineers are often troubled by noise interference while measuring signals. The GOS-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 36 MEASUREMENT PARAMETER SELECTIONS



The GOS-1000B series oscilloscope is equipped with 36 different automatic measurement parameter functions. Users, after obtaining measured waveforms, can select different measurement parameters from Measure key according to different measurement requirements. The GOS-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 36 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 GOS-1000B Series oscilloscope, via the OpenWave connection software developed by GW Instek, can connect with the PC. Users, after installing USB driver under Windows interface, can connect GOS-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



CDB-03

The CDB-03 training kit allows you to learn both the basic and the advanced functions of the CDS 2000 Series, CDS 2000A Series/CDS 2000E Series/MSO-2000 Series and CDS 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 hi-tech 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 CDB-03 training kit and the included manuals, you are able to acquire adequate knowledge in using a DSO with advanced features.

SPECIFICATIONS	
SIGNAL OUTPUT	
The CDB-03 provides 10 basic and 10 advanced oscilloscope training signals	
BASIC OSCILLOSCOPE TRAINING	
Lab 1: Connect and view a waveform Lab 2: Compensate the probe (50% 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 (CDB-03 including: noise function, auto measure, cursor gating measure) Lab 6: VPO (VPO signal, color, gray mode) Lab 7: Autoset function (P1 screen, AC priority) Lab 8: Automatic range Lab 9: Save data using hardcopy function	
ADVANCE OSCILLOSCOPE TRAINING	
Lab 1: Automatic measurement (gating measurement) Lab 2: Using peak detect mode Lab 3: Low speed signal measurement Lab 4: Rising signal measurement Lab 5: Using zoom correlate function Lab 6: Transient signal measurement Lab 7: Compare waveform & phase measurement Lab 8: Run 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: ITC signal Lab 17: SPI signal Lab 18: CAN signal Lab 19: GDI signal	
POWER SUPPLY	
1x DC, USB or auxiliary power input	
ORDERING INFORMATION	
CDB-03 Oscilloscope Education And Training Kit	
ACCESSORIES: CDB-01 Signal demo board with instructions CTL-34A USB 2.0 A & B Type cable	



GTP-0708-4

For: GDS-1002A/1012B/1014A,
GDS-2010A/2014A,
GDS-2012A/2014A



The GTP-0708-4 is a 4:1 ratio attenuator modular probe designed for use with DC to 70MHz oscilloscopes with input impedances of 1MΩ. The probe consists of following separate parts:

- 1. BNC main connector and compensation box
- 2. Probe body probe tip and 4:1 attenuator
- 3. Accessory 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Item	10:1	1:1
Bandwidth	DC ~ 70MHz (±1dB)	DC ~ 40MHz (±1dB)
Input B	~ 10pF	~ 10pF (20pF max)
Input C	10.8 ~ 17.5 pF	10 ~ 17.5 pF
Att. Ratio	10:1	1:1
Max. Input Voltage	1000V AC, 100V peak	1000V AC, 100V peak
Accessories	1. BNC main connector 2. Ground lead 3. Cable marker 4. Insulating tape 5. 4:1 tip 6. Adjusting tool 7. Earth tip	

GTP-1008-4

For: GDS-2100A/2104A,
GDS-2102B/2104B



The GTP-1008-4 is a passive high impedance oscilloscope probe designed and calibrated for use as an instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input impedance of 10~30pF. The probe incorporates a two-position slide switch on the head which selects attenuation of 1:1 or 10:1 position.

Item	10:1	1:1
Bandwidth	DC ~ 100MHz (±1dB)	DC ~ 100MHz (±1dB)
Input B	~ 10pF	~ 10pF (20pF max)
Input C	10.8 ~ 17.5 pF	10 ~ 17.5 pF
Att. Ratio	10:1	1:1
Max. Input Voltage	1000V AC, 100V peak	1000V AC, 100V peak
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tape 5. 4:1 tip 6. Adjusting tool 7. Earth tip	

GTP-1508-2

For: GDS-2100A/2104A



The GTP-1508-2 is a passive high impedance oscilloscope probe designed and calibrated for use as an instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input impedance of 10~30pF. The probe incorporates a two-position slide switch on the head which selects attenuation of 1:1 or 10:1 position.

Item	10:1	1:1
Bandwidth	DC ~ 150MHz (±1dB)	DC ~ 40MHz (±1dB)
Input B	~ 10pF	~ 10pF (20pF max)
Input C	11 pF	10 pF
Att. Ratio	10:1	1:1
Max. Input Voltage	1000V AC, 100V peak	1000V AC, 100V peak
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tape 5. 4:1 tip 6. Adjusting tool 7. Earth tip	

GTP-1508-2

For: GDS-2000/200 Series



The GTP-1508-2 is a passive high impedance oscilloscope probe designed and calibrated for use as an instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input impedance of 10~30pF. The probe incorporates a two-position slide switch on the head which selects attenuation of 1:1 or 10:1 position.

Item	10:1	1:1
Bandwidth	DC ~ 150MHz (±1dB)	DC ~ 40MHz (±1dB)
Input B	~ 10pF	~ 10pF (20pF max)
Input C	11 pF	10 pF
Att. Ratio	10:1	1:1
Max. Input Voltage	1000V AC, 100V peak	1000V AC, 100V peak
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tape 5. 4:1 tip 6. Adjusting tool 7. Earth tip	
Compensation Range	—	10 ~ 30pF

GTP-2008-4

For: GDS-Series



The GTP-2008-4 is a passive high impedance oscilloscope probe designed and calibrated for use as an instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input impedance of 10~30pF. The probe incorporates a two-position slide switch on the head which selects attenuation of 1:1 or 10:1 position.

Item	10:1	1:1
Bandwidth	DC ~ 200MHz (±1dB)	DC ~ 100MHz (±1dB)
Input B	~ 10pF	~ 10pF (20pF max)
Input C	10.8 ~ 17.5 pF	10 ~ 17.5 pF
Att. Ratio	10:1	1:1
Max. Input Voltage	1000V AC, 100V peak	1000V AC, 100V peak
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tape 5. 4:1 tip 6. Adjusting tool 7. Earth tip	
Compensation Range	10 ~ 30pF	—

GTP-2508-2

For: GDS-2000A/2004A



The GTP-2508-2 is a passive high impedance oscilloscope probe designed and calibrated for use as an instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input impedance of 10~30pF. Ground this probe to the end of the previous version.

Item	10:1	1:1
Bandwidth	DC ~ 200MHz (±1dB)	DC ~ 40MHz (±1dB)
Input B	~ 10pF	~ 10pF (20pF max)
Input C	~ 17pF	~ 17pF
Att. Ratio	10:1	1:1
Max. Input Voltage	1000V AC, 100V peak	1000V AC, 100V peak
Accessories	1. Channel identifier clip 2. Hook 3. Ground lead 4. Insulating tape 5. 4:1 tip 6. Adjusting tool 7. Earth tip	

Ordering Guide

If an accessory is ordered separately from the main product, please indicate the nomenclature of the accessory when placing order.
Example: GDS-1002A 50k Carrying Case for GDS-10000 Series

If an accessory is ordered along with the main product, please indicate the option number of the accessory when placing order.
Example: GDS-2102B 50kCarrying Case, 5:1Bandwidth, Visual Performance DSO, GDS-200 Series 50k Carrying Case

GTP-151R

For: CDS-3000 Series



The GTP-151R is compatible with active function oscilloscopes that automatically detect and display the attenuation factor of the probe.

Item	10:1
Bandwidth	DC - 100MHz (40dB)
Input Z	>10MΩ
Input C	<1pF
Att. Ratio	1:10
Max. Input Voltage	>100Vpk
Accessories	1 Channel shielder clip, 3 Spring hook, 3 Ground lead, 4 Insulating tip, 5 kΩ tip, 5 Adjusting tool, 1 Measuring tip, 8 Spring with tip

GTP-251R

For: CDS-3000 Series



The GTP-251R is compatible with active function oscilloscopes that automatically detect and display the attenuation factor of the probe.

Item	10:1
Bandwidth	DC - 200MHz (40dB)
Input Z	>10MΩ
Input C	<1pF
Att. Ratio	1:10
Max. Input Voltage	DC 100V CAT I, 300V CAT II
Accessories	1 Channel shielder clip, 3 Spring hook, 3 Ground lead, 4 Insulating tip, 5 kΩ tip, 5 Adjusting tool, 1 Measuring tip, 8 Spring with tip

GTP-250B-2

For: CDS-3000 Series



The GTP-250B-2 is a passive high-impedance oscilloscope probe designed and calibrated for use on instruments having an input impedance of 1 MΩ (shunted by 20pF). However, it may be compensated for use with instruments having an input impedance of 10-pF (shunted by 20pF) at the end of the previous sentence.

Item	10:1	1:1
Bandwidth	DC - 200MHz (40dB)	DC - 100MHz (40dB)
Input Z	>10MΩ	1MΩ (20pF shunted)
Input C	<1pF	<1pF
Att. Ratio	1:10	1:1
Max. Input Voltage	100V CAT I, 300V CAT II	300V CAT I, 100V CAT II
Accessories	1 Channel shielder clip, 2 Hook, 3 Ground lead, 4 Insulating tip, 5 kΩ tip, 5 Adjusting tool, 1 Measuring tip, 8 Spring with tip	

GTP-300B-4

For: MDO-3000 Series



The GTP-300B-4 is a passive high-impedance oscilloscope probe designed and calibrated for use on instruments having an input impedance of 1 MΩ (shunted by 20pF). However, it may be compensated for use with instruments having an input impedance of 10-pF. The probe design is a two-position probe which is the best which reflects attenuation of 1:1, 10:1.

Item	10:1	1:1
Bandwidth	DC - 200MHz (40dB)	DC - 100MHz (40dB)
Input Z	>10MΩ	1MΩ (20pF shunted)
Input C	<1pF	<1pF
Att. Ratio	1:10	1:1
Max. Input Voltage	100V CAT I, 300V CAT II	300V CAT I, 100V CAT II
Accessories	1 Channel shielder clip, 2 Hook, 3 Ground lead, 4 Insulating tip, 5 kΩ tip, 5 Adjusting tool, 1 Measuring tip, 8 Spring with tip	

GTP-351R/352R

For: CDS-3000 Series



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

	GTP-351R	GTP-352R
Item	10:1	10:1
Bandwidth	DC - 200MHz	DC - 200MHz
Input Z	>10MΩ	>10MΩ
Input C	<1pF	<1pF
Att. Ratio	1:10	1:10
Max. Input Voltage	100V CAT I, 300V CAT II	100V CAT I
Accessories	1 Channel shielder clip, 3 Spring hook, 3 Ground lead, 4 Insulating tip, 5 kΩ tip, 5 Adjusting tool, 1 Measuring tip, 8 Spring with tip	

GTP-350A-2

For: CDS-2000A/2000A



The GTP-350A-2 is a passive high-impedance oscilloscope probe designed and calibrated for use on instruments having an input impedance of 1 MΩ (shunted by 1pF). However, it may be compensated for use with instruments having an input impedance of 10-pF. Consistent accuracy to the end of the previous sentence.

Item	10:1	1:1
Bandwidth	DC - 200MHz	DC - 200MHz
Input Z	>10MΩ	>10MΩ
Input C	<1pF	<1pF
Att. Ratio	1:10	1:1
Max. Input Voltage	100V CAT I, 300V CAT II	100V CAT I, 100V CAT II
Accessories	1 Channel shielder clip, 3 Spring hook, 3 Ground lead, 4 Insulating tip, 5 kΩ tip, 5 Adjusting tool, 1 Measuring tip, 8 Spring with tip	

GKT-100 Deskew Fixture

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

- 1 CDS-3000 or 1 or CDS-3000A x1
- 2 GKT-100 x1
- 1 200 type A-B cable (1' used for deskew fixture)
- 4 Standard passive probe (1)
- 5 Current probe (1) (GTP-150 or GTP-100)



GTP-501R

For: CDS-3000 Series
CDS-3000 Series



The GTP-501R is a passive high impedance oscilloscope probe designed and calibrated for use on equipment having an input impedance of 1MΩ or greater by 10pF. Maximum 2 times the compensated for use with instruments having an input impedance of 10Ω-50Ω. Connect this probe to the end of the previous network.

Item:	001
Manufacturer:	DC Instruments
Input B:	~10pF
Input C:	~10pF
Max. Input Voltage:	100V
Accessories:	1 Channel oscilloscope 2 Spring load 3 Ground lead 4 Insulating tip 5 4.0 tip 6 Adjusting tool 7 Measuring tip 8 Spring loading tip

GTP-093A

For: CDS-3000 Series



GTP-093A is a 1:1 attenuator oscilloscope probe. Designed for use with DC to 20MHz oscilloscopes with input impedance of 1MΩ. The probe extends the following separate units: 1. BNC input connector and compensation kit 2. Spring 1.20 cable

Item:	1
Manufacturer:	DC Instruments
Input B:	~10pF (20MHz)
Input C:	~10pF
Max. Input Voltage:	100V
Accessories:	1 Channel oscilloscope 2 Spring load 3 Ground lead 4 Insulating tip 5 4.0 tip 6 Adjusting tool 7 Measuring tip 8 Spring loading tip

GTL-500



GTL-710



GTL-300A



GTL-212



GTL-240



GTL-240



GTL-250



GTL-253



GTL-300A



CRA-411 Rack Mount Kit

For: CDS-3000 Series



CRA-420 Rack Mount Kit

For: CDS-3000 Series



CRA-426 Rack Mount Kit

For: AGO-2000 Series, AGO-2000 Series, AGO-2000 Series, AGO-2000 Series



CRA-430 Rack Mount Kit

For: CDS-3000 Series



ACCESSORIES

Current Probe and Differential Probe Solutions



GCP-100/1000



GCP-100/1000, GCP-100P/425P



GCP-825



GCP-100/100



GCP-6000 (for GDS1000 series)

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: 250kHz, 500kHz and 1000kHz. The current probes come in a broad variety of bandwidth and current ranges (ranging from 100mA/20A, 1000mA/10A, 1000mA/200A, 1000mA/1000A, 1.6mA/70A), to cover any number of power supply testing applications.

* The GCP-100P/1000 must be used in conjunction with the GCP-100P/425P current probe power supply.

* The GCP-100P is capable of passing 1 unit of GCP-100 or GCP-1000 and the GCP-425P is capable of passing 4 units.

CURRENT PROBE

	GCP-100	GCP-1000	GCP-100	GCP-1000	GCP-1000
Probe Bandwidth	DC-200kHz	DC-200kHz	DC-200kHz	DC-100kHz	DC-100kHz
Rise Time	1.1ns (Typ.)	0.7ns (Typ.)	Not on test	0.71ns (Typ.)	2.5ns on test
Maximum Continuous Input Range	200A/100mA (A)	100A/200mA (A)	10A/100mA	10A/200mA (A)	10A/100mA
Maximum Peak Current Value	DC: 200A AC: 1400mA	DC: 100A AC: 1000mA	10A	DC: 10A AC: 1000mA	10A
Output Voltage Range	100mV(A)/200mV(A)	200mV(A)/200mV(A)	0.11V(A)	200mV(A)/200mV(A)	0.11V(A)
DC Amplitude Accuracy	+0% add. max. at 100 mV(A) -20% add. max. at 10 mV(A) +0% add. max. at 10 mV(A) -10% add. max. at 10 mV(A) +10% add. max. at 10 mV(A) -10% add. max. at 10 mV(A)	+0% add. max. at 200 mV(A) -10% add. max. at 10 mV(A) +0% add. max. at 10 mV(A) -10% add. max. at 10 mV(A) +10% add. max. at 10 mV(A) -10% add. max. at 10 mV(A)	+1.0% (typ.) at 10V -0.5% (typ.) at 10V +0.5% (typ.) at 10V -0.5% (typ.) at 10V +0.5% (typ.) at 10V -0.5% (typ.) at 10V	+0% add. max. at 100 mV(A) -20% add. max. at 10 mV(A) +0% add. max. at 10 mV(A) -10% add. max. at 10 mV(A) +10% add. max. at 10 mV(A) -10% add. max. at 10 mV(A)	+1.0% (typ.) at 10V -0.5% (typ.) at 10V +0.5% (typ.) at 10V -0.5% (typ.) at 10V +0.5% (typ.) at 10V -0.5% (typ.) at 10V
Noise	—	—	2.5mVrms at 10V	—	2.5mVrms at 10V
Base Supply Voltage	—	—	+12Vdc 0.5V	—	+12Vdc 0.5V
Maximum Rated Power	—	—	1.0W	—	1.0W
Maximum Test Voltage	CAT II 300V/CAT III 600V	CAT II 600V	100V CAT I	CAT II 400V	100V CAT I

CURRENT PROBE POWER SUPPLY

	GCP-100P	GCP-425P
Compatible Current Probe	GCP-100/GCP-1000	GCP-100/GCP-1000
Number of Power Supply Connections	2	4
Output Voltage	+12Vdc 0.5V	+12Vdc 0.5V
Rated Output Current	+0.5A	+0.5A
Rated Supply Voltage (Vdc/ACVrms)	150V/120V, 220V/140V ACVrms	100V - 340V ACVrms
Maximum Rated Power	10W	10W
Dimensions & Weight	100px170px110px (3.94x6.69x4.33)in, Approx. 1.7kg	100px170px110px (3.94x6.69x4.33)in, Approx. 1.1kg
Accessories	Power cord, fuse	Power cord, fuse

WICH VOLTAGE DIFFERENTIAL PROBE

	GCP-825	GCP-650	GCP-100
Probe Bandwidth	DC - 250kHz (differential mode, 400V) DC - 100kHz (differential mode, 200V)	DC - 400kHz (differential mode, 400V, 400V, 400V) DC - 200kHz (differential mode, 200V)	DC - 300kHz (differential mode, 400V, 400V, 400V) DC - 150kHz (differential mode, 200V)
Attenuation	x10, x100, x1000	x10, x100, x1000, x10000	x10, x100, x1000, x10000
Accuracy	<1%	<1%	<1%
Voltage Input Range (DC-AC peak to peak)	1.00Vdc to 1V (A) 1.00Vdc to 1V (A) 1.00Vdc to 1V (A)	1.00Vdc to 1V (A) 1.00Vdc to 1V (A) 1.00Vdc to 1V (A)	1.00Vdc to 1V (A) 1.00Vdc to 1V (A) 1.00Vdc to 1V (A)
Permitted Max Input Voltage	Maximum differential voltage Max voltage between input terminal and ground (offsets) differential mode (1.1V) Between non-earth and ground (1V) (1.1V)	Maximum differential voltage Max voltage between input terminal and ground (offsets) differential mode (1.1V) Between terminals and ground (1V) (1.1V)	Maximum differential voltage Max voltage between input terminal and ground (offsets) differential mode (1.1V) Between terminals and ground (1V) (1.1V)
Input Impedance	10M (10M)	10M (10M)	10M (10M)
Output	0.1V	0.1V	0.1V
Output Impedance	50	50	50
Rise Time	1.1ns (typ.) (200mV/div) (1.1ns add. attenuation)	1.1ns (typ.) (200mV/div) (1.1ns add. attenuation)	1.1ns (typ.) (200mV/div) (1.1ns add. attenuation)
Rejection Rate on Common Mode	200V/200V - 1000V/1000V (1000V/1000V)	200V/200V - 1000V/1000V (1000V/1000V)	200V/200V - 1000V/1000V (1000V/1000V)
Power Supply	External DC adapter Maximum Peak (0.4A)	External DC adapter Maximum Peak (0.4A)	External DC adapter Maximum Peak (0.4A)

DUAL CHANNEL DIFFERENTIAL PROBE

	GCP-6000
Channel	2
Bandwidth (A/B)	DC - 400kHz (200V)
Attenuation	100X
Voltage Input Range	400Vdc Max. CAT II
Output	0.1V
Maximum Input Voltage to Earth	400Vdc to 200V
Typical CMRR	80dB (typ.) 80dB (typ.) 80dB (typ.)
Input Impedance	10M (typ.) 10M (typ.) 10M (typ.)
Output Impedance	50
Rise Time	1.1ns for 200V
Power Supply	10V DC from GDS-1000/100 Series
Accuracy	<1%
Rejection Rate	10V/10V - 100V/100V (100V/100V)



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, SFM, ACPR/OCBR/CHPA/10₁, harmonic, CNR/CTB/CSO, frequency counter, and communications interfaces such as USB, RS-232, LAN, MicroSD, GPIB, etc.

GSP-9130 and GSP-9008 are applied spectrum analyzers. GSP-9130's built-in EMF-dedicated feature is one of a kind and it caters to 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-9130 and GSP-9008 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-1100/GRF-1100A/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.

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).

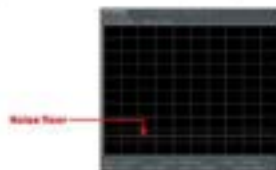


Figure 2, Noise Floor

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.

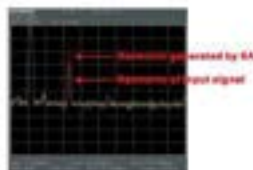


Figure 4, Harmonics

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 3, Frequency Range

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 5, Spurious Noise

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

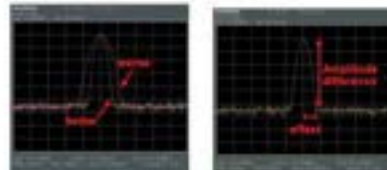


Figure 5 : Phase Noise

Figure 5b shows the definition of phase noise. It is usually defined as dBc with a frequency offset. For example, -30dBc at 200kHz offset with 30Hz 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 f_1 and f_2 , the harmonics are as follows.

Input	Output
f_1, f_2	Fundamentals f_1, f_2
	2nd order harmonics $2f_1, 2f_2, f_1+f_2, f_1-f_2$
	3rd order harmonics $3f_1, 3f_2, 2f_1+f_2, 2f_1-f_2$
etc.	etc.

The third order harmonics are the primary concern in a system. If the frequencies of f_1 and f_2 are very close, then $2f_1-f_2$ and f_1-2f_2 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 $2f_1-f_2$ and $2f_2-f_1$

An example is expressed in Table 3.

Input	Harmonics	1	2	3
100, 110	100, 110	—	300, 130, 110, 120, 90, 120	
100, 101	100, 101	—	300, 103, 101, 102, 99, 102	
100, 100.1	100, 100.1	—	300, 100.3, 100.1, 100.2, 99.9, 100.2	

Table 3: 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). Given that 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-toned signal measurements.

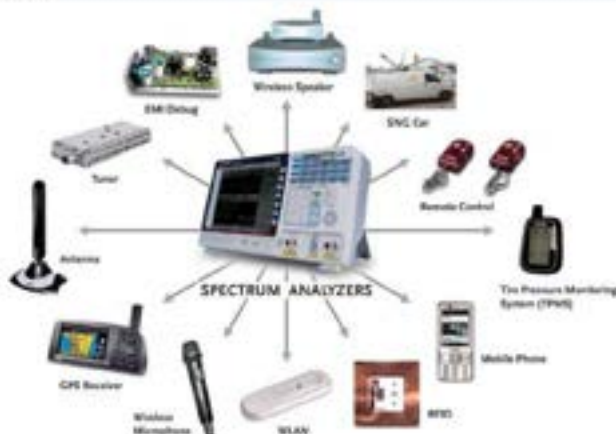
DYNAMIC RANGE

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 spurious 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	CSP-8138	CSP-8168	CSP-818	CSP-730
Frequency Range	9kHz ~ 1.2GHz	9kHz ~ 3GHz	9kHz ~ 1.8GHz	330kHz ~ 3GHz
Frequency Stability	+1ppm max. (per year)	+1ppm max. (per year)	+1ppm max. (per year)	-
Over Temperature Frequency Stability	+0.02% ppm (0 ~ 50°C)	+0.02% ppm (0 ~ 50°C)	+0.5ppm (15°C to 55°C)	-
RFW Range	1Hz~10kHz in 1-10 sequence 200Hz, 9kHz, 120kHz, 10kHz for CW Filter	1Hz~1MHz in 1-10 sequence 200Hz, 9kHz, 120kHz, 10kHz for CW Filter	10Hz to 200kHz (1-10 steps by sequence), 10kHz, 10kHz EM Filter(50Hz), 200Hz, 9kHz, 120kHz, 10kHz (Optional)	30kHz, 100kHz, 300kHz, 10kHz (20kHz Range is not adjustable)
VHF Range	1MHz~1MHz in 1-10 sequence	1MHz~1MHz in 1-10 sequence	10kHz~1MHz in 1-10 sequence	-
Phase Noise	40dB/Hz @ 1GHz, 10kHz offset	40dB/Hz @ 1GHz, 10kHz offset	40dB/Hz @ 1GHz, 10kHz offset	40dB/Hz @ 1GHz, 10kHz offset
Noise Floor	-150dBm @ 1GHz, 10Hz BW, per amp on	-150dBm @ 1GHz, 10Hz BW, per amp on	-140dBm @ 1GHz, 10Hz BW, per amp on	-100dBm @ 1GHz, 10kHz BW
Overload Protection	+50dBm, +20VDC	+50dBm, +20VDC	+50dBm, +20VDC	+50dBm, +20VDC
Reference Level Range	-150dBm ~ +20dBm	-150dBm ~ +20dBm	-80 dBm to +20 dBm	-40dBm ~ +20dBm
Input Attenuator	0 ~ 20dB, in 1 dB steps	0 ~ 20dB, in 1 dB steps	0 ~ 40dB, in 1 dB steps	-
Preamplifier	Built-in 10dB external	Built-in 10dB external	Built-in 20dB internal	-
Measurement Functions	SEM, ACM, OCRW, Ch-PW, N-JB BW, Phase Jitter, Harmonic, TOL, CNR, CFO, CTR, PWR, TSP	SEM, ACM, OCRW, Ch-PW, N-JB BW, Phase Jitter, Harmonic, TOL, CNR, CFO, CTR, PWR, TSP	ACR, OCRW, Ch-PW, N-JB BW	ACR, OCRW, Ch-PW
Demodulator	Yes, with AM/FM/SSB/FSK analysis	Yes, with AM/FM analysis	Yes, with AM/FM analysis	-
Calib. Sweep	Yes	Yes	-	-
Frequency Counter	Support, Min. resolution 1Hz	Support, Min. resolution 1Hz	Support, Min. resolution 1Hz	-
Sequence	Yes	Yes	-	-
Link Loss	Yes	Yes	Yes	Yes
Correction Table	Yes	Yes	-	-
Trace Number	4 Traces	4 Traces	3 Traces	2 Traces
Trace Select Mode	Positive peak, negative peak, sample, normal, Max/Min Value, Quick-Peak, Average	Positive peak, negative peak, sample, normal, Max/Min Value, Quick-Peak, Average	Positive peak, negative peak, sample, normal, Max/Min Value, (Optional) Quick-Peak/Average	-
Marker Number	8	8	8	8
Internal Memory	16MB	16MB	21MB	8 memories
Display Mode	Spectrogram, Topographic, Spectrum	Spectrogram, Topographic, Spectrum	Time Span, Bandwidth Zoom, Spectrum	Spectrum
Split Window	Yes	Yes	-	Yes
Tracking Generator	100kHz ~ 1.2GHz (optional)	100kHz ~ 3GHz (optional)	100kHz ~ 1.8GHz (optional)	-
IF Output	V, 80MHz, -20dBm	V, 80MHz, -20dBm	-	-
Interface	USB Host/Device, RS-232, LAN(RJ-45) standard, MicroSD, GPIB(Optional)	USB Host/Device, RS-232, LAN(RJ-45) standard, MicroSD, GPIB(Optional)	USB Host/Device, LAN	USB Host/Device, RS-232
Screen Size	8.4 inch Color TFT LCD with SVGA (800 x 600)	8.4 inch Color TFT LCD with SVGA (800 x 600)	16.4 inch Color TFT LCD with SVGA (800 x 600)	8.8 inch Color TFT LCD with VGA (640 x 480)
Host Adapter Panel	V, CAN-413	V, CAN-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-1100A	GRF-1100
Collocation Instrument	CSP-730	CSP-730
Necessary Option	USC-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	B28	B10

3.25GHz Spectrum Analyzer



GSP-9330



FEATURES

- Frequency Range: 9kHz - 3.25GHz
- 500ppm Frequency Stability and Typing Aging Rate
- RBW: 1Hz - 180Hz (NBW), 6dB EMI Filter: 200Hz, 9kHz, 120kHz, 1MHz
- Fastest Sweep Time: 20μs
- Sensitivity: -140dBm/Hz (@PreAmp-on)
- Built-in Preamp/Att, 50dB Attenuator, and Sequence Function
- Built-in EMC Pretest Function
- Built-in 2FSK Analysis, AM/FM/ASK/PSK Demodulation & Analysis
- Built-in F108 Point, Harmonic, Channel Power, NdB Bandwidth, OCW, ACW, SEM, TOL, CNR, CTB, CSO, Noise Marker, Frequency Counter, Time Domain Power, Cated 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, GPIB Interface

CSP-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, CSP-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, CSP-9330 has incorporated the EMC pretest solution to facilitate EMC tests. The simple and easy EMC pretest procedures from CSP-9330 can tremendously shorten users' product launch timelines.

SPECIFICATIONS

FREQUENCY		
Range	9 kHz - 3.25 GHz	
Resolution	1 Hz	
FREQUENCY REFERENCE		
Accuracy	± period since last adjustment ± aging rate ± stability over temperature ± supply voltage stability ± 1 ppm/Max. ± 0.001 ppm	
Aging Rate	1 year after last adjustment 0 - 50 °C	
Frequency Stability Over Temperature	± 0.001 ppm	
Supply Voltage Stability	± 0.02 ppm	
FREQUENCY MESSOUT ACCURACY		
Start, Stop, Center, Marker	± (marker frequency indication ± frequency reference accuracy ± 10% ± RBW ± frequency resolution)	
Trace Points	Min: 801 points, Max: 8 points	
NUMBER FREQUENCY COUNTER		
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	
Accuracy	± (marker frequency indication ± frequency reference accuracy ± channel resolution)	RBW/Span > 100 : 1, Min level is 20Hz, 10 dB
FREQUENCY SPAN		
Range	0.1Hz (span span), 100 Hz - 3.25 GHz	
Resolution	1 Hz	
Accuracy	± frequency resolution	RBW > Auto
PHASE NOISE		
Offset from Center		At 1 GHz, RBW = 10 Hz, VBW = 10 Hz, Average 3 dB
10 kHz	± 36 dBc/Hz	± 36 dBc/Hz
100 kHz	± 45 dBc/Hz	Typical
1 MHz	± 113 dBc/Hz	Typical
RESOLUTION BANDWIDTH (RBW) FILTER		
Filter Bandwidth	1 Hz - 1.8 kHz for 1.5:10 sequence 200 Hz, 9 kHz, 120 kHz, 1 MHz	5dB bandwidth 4dB bandwidth
Noise	± 8dB, RBW = 10 kHz ± 1%, RBW = 1 MHz ± 0.5 %	Normal
Shape factor	± 0.5 %	Normal Bandwidth ratio: 40dB:3dB
VIDEO BANDWIDTH (VBW) FILTER		
Filter Bandwidth	1 Hz - 1.8 kHz for 1.5:10 sequence	Full bandwidth
(1) Frequency Resolution is Span/Channel Span (2) (2) Typical noise floor is in the 100 kHz range. For the performance see specification 40dB offset noise with a 40dB noise floor over the entire bandwidth. (3) RBW 10 to 100 Hz, they are determined by frequency accuracy. (4) Noise level is relative to the noise floor. The noise level is relative to the noise floor.		
AMPLITUDE		
AMPLITUDE RANGE		
Measurement Range	100 μV - 1 mV 1 μV - 10 mV 10 mV - 3.25 GHz	DAVL = 10 dBm DANL = 21 dBm DANL = 30 dBm
ATTENUATION		
Input Attenuation Range	0 - 10 dB, 10 - 61 dB steps	Auto or manual setup
MAXIMUM SAFE INPUT LEVEL		
Average Total Power	5 - 31 dBm	Input attenuation 0 to 60 dB
DC Voltage	± 10 V	
1-dB GAIN COMPRESSION		
Total Power at 1st Offset	± 0 dBm	Typical: ± 2.10 dBm, preamp. off
Total Power at 1st Offset	± 22 dBm	Typical: ± 2.10 dBm, preamp. on Min: power level (dBm) ± input power (dBm) ± attenuation (dB)

CSC-009 Soft Carrying Case

For CSP-9330/9330B





CSP-9330

Rear Panel



GRA-415 Rack Adapter Panel

For CSP-9330, Rack Mounting (2U, 6U)



GKT-001 General Kit Set

Includes:
ADP-002
ATN-100
CTL-001
GSC-002
For CSP-Series



GKT-002 CATV Kit Set

Includes:
ADP-002
ADP-101
CTL-004
GSC-003
For CSP-Series



GKT-003 RLF Kit Set

Includes:
CAT-001
CAT-002
CTL-002
GSC-004
For CSP-Series



GKT-008 EMI Probe Kit Set

Includes:
ADP-002
CTL-003
PB-01
PB-02
APV-04
APV-05
For CSP-Series



SPECIFICATIONS		
DISPLAYED AVERAGE NOISE LEVEL (dBMV)		
Preamp off	0 dB attenuation, 50 Ω input is terminated with a 50 Ω load, RBW 10 Hz, VBW 10 Hz, span 100 kHz, reference level = -40 dBm, trace average 240	
3 kHz ~ 140 MHz	= 93 dBm	Nominal
100 kHz ~ 1 MHz	= 90 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz ~ 10 MHz	= 121 dBm	Nominal
2.7 ~ 3.2 GHz	= 116 dBm	Nominal
Preamp on	0 dB attenuation, 50 Ω input is terminated with a 50 Ω load, RBW 10 Hz, VBW 10 Hz, span 100 kHz, reference level = -40 dBm, trace average 240	
100 kHz ~ 1 MHz	= 108 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz ~ 10 MHz	= 142 dBm	Nominal
10 MHz ~ 3.2 GHz	= 142 dBm - 3 x (f/1 GHz) dB	Nominal
* dBmV, span and gain reference conditions		
LEVEL DISPLAY RANGE		
Scale	Log, Linear, dBm, dBmV, dBmV/10, W	
Units	0.01 dB	
Marker Level Resolution	0.01 dB of reference level	
Level Display Modes	Trace, Transposition, Spectrogram	
Number of Traces	4	
Trace Functions	Positive peak, negative peak, sample, normal, RMS (not listed), Quad Peak, Average	
	Clear & Write, Max/Min Hold, View, Store, Average	
	Can be setup for each trace separately	
ABSOLUTE AMPLITUDE ACCURACY		
Absolute Error	Carrier: 100 MHz ~ 100 MHz, RBW 10 kHz, VBW 1 MHz, span 100 kHz, log scale, 1 dB/div, peak-to-peak, 20°C $\pm$ 1°C, Signal at Reference Level	
Preamp Off	= 0.0 dB	
Preamp On	= 0.4 dB	
	dB level 0 dBm, 10 dB, 20 dB attenuation	
	dB level -40 dBm, 0 dB, 20 dB attenuation	
FREQUENCY RESPONSE		
Preamp Off	Attenuation: 10 dB, Reference: 100 MHz, 20 ~ 30°C	
100 kHz ~ 3.2 GHz	= 0.1 dB	
30 kHz ~ 2.2 GHz	= 0.7 dB	
Preamp On	Attenuation: 0 dB, Reference: 100 MHz, 20 ~ 30°C	
1 MHz ~ 2 GHz	= 0.6 dB	
3 MHz ~ 3.2 GHz	= 0.8 dB	
ATTENUATION SWITCHING UNCERTAINTY		
Attenuator Setting	0 ~ 50 dB in 1 dB step	
Uncertainty	= 0.25 dB	
	Reference: 100 MHz, 10 dB attenuation	
BAND FILTER SWITCHING UNCERTAINTY		
1 MHz ~ 1 MHz	= 0.25 dB	
	Reference: 10 MHz, 0 dB	
LEVEL MEASUREMENT UNCERTAINTY		
Overall Amplitude Accuracy	= 1.0 dB	
	20 ~ 30°C, frequency $\pm$ 1 MHz, Signal input 0 ~ -40 dBm, Reference level 0 ~ -40 dBm, input attenuation 10 dB, RBW 10 Hz, VBW 1 kHz, after cal, Preamp Off	
	Typical	
	= 0.2 dB	
SPURIOUS RESPONSE		
Second Harmonic Intercept	= 21 dBm	
	Preamp off, signal input: 0 dBm, 0 dB attenuation	
	Typical: 10 MHz $\pm$ 1 MHz, 1 kHz	
	Typical: 775 MHz $\pm$ 1 MHz, 1 kHz	
	Preamp off, signal input: -40 dBm, 0 dB attenuation	
	100 MHz ~ 3.2 GHz	
Third-order Intercept	= 14 dBm	
	Preamp off, signal input: -40 dBm, 0 dB attenuation	
	Typical: 10 MHz $\pm$ 1 MHz, 1 kHz	
	Typical: 775 MHz $\pm$ 1 MHz, 1 kHz	
	Preamp off, signal input: -40 dBm, 0 dB attenuation	
	100 MHz ~ 3.2 GHz	
Third-order Intercept	= 14 dBm	
	Preamp off, signal input: -40 dBm, 0 dB attenuation	
	Typical: 10 MHz $\pm$ 1 MHz, 1 kHz	
	Typical: 775 MHz $\pm$ 1 MHz, 1 kHz	
	Preamp off, signal input: -40 dBm, 0 dB attenuation	
	100 MHz ~ 3.2 GHz	

3.25GHz Spectrum Analyzer

SPECIFICATIONS

SWEEP

SWEEP TIME

Range

100ms – 1000s

50 µs – 1000 s

Continuum, Single

Auto run; Manual

Positive or negative edge

Typical = 0.44s

Typical = 0.142s

Auto resolution = 10µs

RF PREAMPLIFIER

Frequency Range

1 MHz – 3.25 GHz

10 dB

Standard (included as standard)

FRONT PANEL INPUT/OUTPUT

RF INPUT

Connector Type

50 ohm female

Impedance

50Ω

VSWR

<1.4:1

Standard

100 MHz – 1.25 GHz, input attenuator 0-10 dB

POWER FOR OPTION

Connector Type

50 ohm male

Voltage/Current

0V – 17V/500 mA max

With short circuit protection

USB HOST

Connector Type

A plug

Protocol

USB 2.0

Supports full/high speed

WIRELESS SOCKET

Protocol

SD 1.1

Support Cards

Micro SD, Micro SDHC

Up to 32GB capacity

REAR PANEL INPUT/OUTPUT

REFERENCE OUTPUT

Connector Type

BNC female

Output Frequency

10 MHz

Output Amplitude

1.2V RMS

Output Impedance

50Ω

Standard

REFERENCE INPUT

Connector Type

BNC female

Input Reference Frequency

10 MHz

Input Amplitude

1 dBm – +10 dBm

Frequency Scan Range

Within ± 5 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

1.2V RMS

Protocol

Auto select priority function

LAN NETWORK INTERFACE

Connector Type

RJ 45

Rate

10/100/1000 Base-Tx Auto MDIX

USB DEVICE

Connector Type

B plug

Protocol

USB 2.0

For remote control only, supports USB TMC

Supports full/high speed

RF OUTPUT

Connector Type

50 ohm female

Impedance

50Ω

RF Frequency

100 kHz – 3.25 GHz

Output level

10 dBm

Standard

10 dB attenuation, RF input – 0 dBm @ 1 GHz

EXHIBITION OUTPUT

Connector Type

3 lines, open collector, accept for mouse operation

VIDEO OUTPUT

Connector Type

DVI-D (Integrated analog and digital), Single Link, Compatible with VGA or HDCP standard through adapter

RS-232C INTERFACE

Connector Type

2 x 8 pin female

RS-485, RS-422, CTS

GPS (RECEIVER) OPTION

Connector Type

4-pin 485 bus connector

AC POWER INPUT

Power Source

AC 100 V – 240 V, 50/60 Hz

Auto range selection

GENERAL

Internal Data Storage

16 MB (non-volatile)

Power Consumption

± 0.5 W

Warm-up Time

± 0.5 minutes

Temperature Range

–5 °C – +45 °C

10 °C – +70 °C

100 kHz – 110 GHz, 100 dBm, Approx. 4 dB

110 GHz – 1.25 GHz, 100 dBm, Approx. 0 dB

Standard

10, 40 options (Base + FG + G/FB + Battery)

Calibration Cycle

The recommended calibration cycle is used prior to calibration exercises and available through the internal calibration software

TECHNICAL SPECIFICATIONS (OPTIONAL)

Frequency Range

100 kHz – 3.25 GHz

Output Power

10 dBm – 100 dBm

Absolute Accuracy

± 0.1 dB

Output Tolerance

Reference – 100 MHz, 10 dBm

100 kHz – 1 GHz

0.1 dB – 0.1 GHz

0.1 dB – 0.1 GHz

± 0.1 dB

± 0.1 dB

± 0.1 dB

± 0.1 dB

± 0.1 dB

± 0.1 dB

± 0.1 dB

± 0.1 dB

± 0.1 dB

Reference – 10 dBm

Typical, output level = 10 dBm

Standard

100 kHz – 3.25 GHz, source attenuation +12 dB

Note: The maximum RF power is 100 W when the 100 dBm is used.

These specifications apply when the 3.25 GHz is powered on for at least 40 minutes to warm up to a temperature of 20 °C to 30 °C, unless specified otherwise.

ORDERING INFORMATION

CSP-9100 3.25 GHz Spectrum Analyzer

EMC Protect Solution: Q7-100 150V Near-Field Probe Set
 QLN-5000A Line Impedance Stabilization Network
 QT-1000 Isolation Transformer
 CPL-5010 Transient Limiter

ACCESSORIES:

Power Cord, Interface of Calibration, CD-ROM (with Quick Start Guide, User Manual, Programming Manual, SpectrumShot Software, SpectrumShot Guide & VCI Driver)

OPTION:

CSP-901 Tracking Generator (factory-installed option)
 Option B2 Battery Pack
 QSM-9001 USB Interface (factory-installed option)

OPTIONAL ACCESSORIES:

CAC-900 Anti-Carrying Case
 QSM-910 Rack Adapter Panel

FREE DOWNLOAD:

SpectrumShot PC Software for Windows (available on USB install software)
 32 Drive Supports (WIN7, 32-bit Windows/64-bit Programming (available on USB install software))

QLN-5000A Two Line Y-Network For CSP-9100



CPL-5010 Transient Limiter For CSP-9100



QT-1000 Isolation Transformer For CSP-9100



FAST SIGNAL SWEEP

FM Signal Monitoring



Taiwan Telecom Signals



For spectrum analyzer, speed is the most important specification. CSP-9100 provides sweep speed up to 20K μ s. 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, turned on/off or other interfering signals under GSM Band.

MODULATED SIGNAL ANALYSIS

2FSK Signal Analysis



2FSK

ASK/FSK Signal Demodulation & Analysis



FSK



ASK

AM/FM Signal Demodulation & Analysis



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, audio coding 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 CSP-9100 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

C EMC PRETEST SOLUTION



CSP-9030 has the built-in EMI dedicated 200/10/100/1MHz filter, 20dB low noise amplifier and Quasi-Peak/Average detection mode to conduct radiation and conduction tests after collocating with the probe set.

CAT-008, the radiation test probe set, provides a complete near field test probe set to simplify the complex measurement procedures and to simulate 100m for field tests from the lab. Using CAT-008 can greatly save engineers' debugging time and the money for going back and forth to the

labs. CAT-008 can collocate with the Tracking Generator function of CSP-8130 to conduct EMI tests.

For conduction tests, CSP-9030 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 CW Instek Are as Follows:

CSP-9030	Spectrum Analyzer	Built-in complete EMC pretest solution
CAT-008	EMI Near Field Probe Set	Provide probe set for near field signals, including: ANT-04/ANT-05: field sensor PB-01: AC high voltage probe PB-02: Source contact probe
CLN-100GA	LISN	LISN required by EMI conduction tests and it meets CISPR14-1:2006 regulations
CAT-100A	Isolation Transformer	Different mains have different current loadings that will cause systems to have short circuit. Isolation transformer prevents short circuit by isolating current loop.
CPL-1010	Transient Limiter	Transient Limiter will make test equipment safer. EUT has large voltage variation or complexity

For more detailed information about EMC Pretest Solutions, please see "DETAILED EMC PRETEST SOLUTION" documents.

D GRAPHIC PROCESSING OF SIGNAL MONITORING

Observe FM Signals by Spectrogram



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 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

Observe WPM Signals by Topographic



process of signal variation according to time changes that is beneficial to observe intermittent fault signals or electromagnetic interference signals. Users can 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 source.

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

Spectrum Emission Mask



SEM

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

CSP-9130 has the built-in SEM settings of 3 CPM, 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/CBO/CTS

The built-in CNR/CBO/CTS functions of CSP-9130 are ideal for measuring performance of CATV amplifier and system.

Note: General CATV is 75Ω. For CSP-9130, a 10 - 75 ohm adapter is needed.

TDS (Third Order Intercept)



Users can measure the linearity of non-linear systems and components such as receiver, low-noise amplifier and mixer by TDS 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 source's and oscillator's carrier deviation. This function can directly convert signal jitter to phase (ps) and time (ps).

Marker Noise

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

Gated Sweep

Radial 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 signals 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 allows 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 accurate routine test procedures.

Shorter 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 5001 ppm frequency stability.

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.

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, OCSE, ACPR, SLM, Phase jitter, N-BB Bandwidth & Flattop items so as to save time on reading user manual.

COMMUNICATIONS INTERFACE

Various Interface



Provide USB Host, RS-232, LAN (RJ-45), and GPIB (option) instrument control interface. Supported programs comply with IEEE488.2.

File Storage and Video Output



DVI Interface



USB Device/MicroID

Provide USB Device, MicroID interface for file storage. Quick Save function is also available for users to quickly retrieve displays. Support DVI with 800 x 600 resolutions.

PC Software - SpectrumShot



EMI Pretest Mode

Users can use the external software SpectrumShot for EMI pretest 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.

NI Driver & LabVIEW Support

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



Get Trace Mode

Under Get 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 a 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.



Remote Control Mode

VARIOUS AUGMENTING OPTIONS

Tracking Generator



TG option provides 6 to 58 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 N dB Bandwidth function measures dB bandwidth of Bandpass Filter. DUT bridge should be connected with tracking generator to measure the return loss of antenna or filter.

Scalar Network Analysis



3dB Frequency Bandwidth



Reflection Loss

P1dB Point Measurement



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(CSC-009) provides convenience and protection to the instrument. CLEP-8110 is equipped with 8.4 inches 800 x 600 pixels LCD display which yields clearer display results for outdoor operations.

3GHz Spectrum Analyzer

Figure 10. 2D-MS/MS spectra of the protein.



CSP-9300B (9kHz-3GHz)



FEATURES

- Frequency Range : 9kHz – 3 GHz
- 0.001ppm Frequency Stability and Type-A Aging Rate
- Built-in Preset/offset, SSB Attenuation, and Sequence Function
- RBW : 1Hz – 1kHz
- Sensitivity : -140dBm/Hz (at Presamp-on)
- Built-in AM/FM Demodulation & Analysis
- Built-in FSWB port, Harmonic, Channel Power, N-48 Bandwidth, OCPSK, ACPR, SSB, TCH, CHIR, CTR, CSO, Noise Marker, Frequency Counter, Time Domain Modes, Catd Sweep
- Built in Spectrogram, Topographic and Dual-View Display Modes
- Remote Control Software : SpectrumSoft
- Remote Control Interface : LAN, USB, RS-232
- Options : Tracking Generator, CPDR Interface

CSC-009 Soft Carrying Case

See CDA-91.001-0000



GS9-9500B is a 3GHz spectrum analyzer, which meets general RF measurement requirements. It provides a frequency stability of 0.003ppm 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/ChPwr, CATV parameters etc.

For signal monitoring and processing, CSP93000 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, 1394, MicroSD, GPIB interface, and DVI out.

In summary, CSP-80008 is a viable, 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 Resolution	1 Hz to 1 GHz 1 Hz	
FREQUENCY REFERENCE		
Accuracy	± specified error/ten adjustment ± aging term ± stability over temperature ± supply voltage stability	
Aging Rate	± 1 ppm/year	1 year after last adjustment
Frequency Stability Over Temperature	± 0.001 ppm	0 ~ 50 °C
Supply Voltage Stability	± 0.01 ppm	
FREQUENCY READOUT ACCURACY		
Start, Stop, Center Marker	± (marker frequency indication ± frequency reference accuracy ± 100 ± 1000 ± frequency resolution)	
Trace Points	Min. 500 points, 999, 5 points	
MARKER FREQUENCY COUNTER		
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	
Accuracy	± (marker frequency indication ± frequency reference accuracy ± counter resolution)	1000/1 year, ± 0.01% after level to 1 GHz ± 20 dB
FREQUENCY SPAN		
Range Resolution Accuracy	0 Hz (zero span), 100 Hz ~ 1 GHz 1 Hz ± frequency resolution	1000 / Auto
PHASE NOISE		
Offset from Carrier		From 10 Hz to 10 MHz, 100 kHz to 10 MHz
10 kHz	± 80 dBc/Hz	Average 20
100 kHz	± 95 dBc/Hz	Typical
1 MHz	± 110 dBc/Hz	Typical
RESOLUTION BANDWIDTH (RBW) FILTER		
Filter Bandwidth	1 Hz to 1 MHz to 1.0-10 megahertz 100 Hz, 0.1 kHz, 100 kHz, 1 MHz ± 0.1%, ± 0.1% ± 1 MHz ± 0.1%, ± 0.1% ± 1 MHz ± 0.1%	± 0.1% bandwidth ± 0.1% bandwidth Nominal
Accuracy		
Shape Factor		Nominal Bandwidth ratio: 40dB:3dB
VIDEO BANDWIDTH (VBW) FILTER		
Filter Bandwidth	1 Hz to 1 MHz to 1.0-10 megahertz	± 0.1% bandwidth
Accuracy		
Shape Factor		
AMPLITUDE		
AMPLITUDE RANGE		
Measurement Range	100 fV to 1 V (RMS)	CH1/2 10 dBm CH3/4 to 17 dBm CH5/6 to 30 dBm
ATTENUATOR		
Input Attenuation Range	0 ~ 60 dB to 1 dB steps	Auto or manual setup
MAXIMUM SAFE INPUT LEVELS		
Average Total Power	0 ~ 17 dBm	Input attenuation 0 to 60 dB
DC Voltage	± 90 V	
1 dB GAIN COMPRESSION		
Total Power at 1st Mixer	± 0 dBm	Typical / 10-30 MHz, peak-to-peak, off
Total Power at 2nd Mixer	± 2 dBm	Typical / 10-30 MHz, peak-to-peak, on
		Maximum power level (dBm) ± input power



GSP-9300B

SPECIFICATIONS

DISPLAYED AVERAGE NOISE LEVEL (dBr)

Preamp off 0 dB attenuation, RF input is terminated with a 50 Ω load, BW 10 MHz, VBW 10 MHz, span 100 kHz, reference level = -60 dBm, trace average (40)

9 kHz - 100 kHz	< -90 dBm	Normal
100 kHz - 1 MHz	< -80 dBm - 1 + (2/100 kHz) dB	Normal
1 MHz - 10 MHz	< -100 dBm	Normal
10 MHz - 3 GHz	< -115 dBm	Normal

Preamp on 0 dB attenuation, RF input is terminated with a 50 Ω load, BW 10 MHz, VBW 10 MHz, span 100 kHz, reference level = -60 dBm, trace average (40)

9 kHz - 1 MHz	< -105 dBm - 3 + (2/100 kHz) dB	Normal
1 MHz - 10 MHz	< -140 dBm	Normal
10 MHz - 3 GHz	< -140 dBm - 3 + (2/1 GHz) dB	Normal

10 dBm, 100 kHz video response

LEVEL DISPLAY RANGE

Scale	Log, Linear	
Units	dBr, dBm, dBμV, V, W	
Marker Level Resolution	0.01 dB	Log scale Linear scale
Level Display Modes	Trace, Topography, Spectrogram	Single/Tuple Windows
Number of Traces	4	
Detector	Average peak, negative peak, average, normal, ENR (peak video), Quick-Peak, Average	
Trace Functions	Clear & Setup, Mark/Min Hold, Free, Blank, Average	Can be setup for each trace separately

ABSOLUTE AMPLITUDE ACCURACY

Absolute Point Center 100 MHz, BW 10 MHz, VBW 1 MHz, span 100 MHz, log scale, 1 dB/div, peak detector, 20°C, 10 dB signal at Reference Level

Preamp Off	< 0.3 dB	Ref level 0 dBm, 10 dB RF attenuation
Preamp On	< 0.4 dB	Ref level 0 dBm, 10 dB RF attenuation

FREQUENCY RESPONSE

Preamp Off	100 kHz - 20 GHz	Attenuation (dB) Reference 100 MHz, 20-20°C
	100 kHz - 1 GHz	< 0.3 dB
	1 MHz - 1 GHz	< 0.3 dB
Preamp On	100 kHz - 20 GHz	Attenuation (dB) Reference 100 MHz, 20-20°C
	100 kHz - 1 GHz	< 0.4 dB
	1 MHz - 1 GHz	< 0.4 dB

ATTENUATION SWITCHING UNCERTAINTY

Attenuation Setting	0 dB, 10 dB, 20 dB step	Reference: 100 MHz, 100 dB attenuation
Uncertainty	< 0.21 dB	

NOISE FILTER SWITCHING UNCERTAINTY

1 Hz - 1 MHz	< 0.21 dB	Reference: 10 kHz, 10 dB
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LEVEL MEASUREMENT UNCERTAINTY

Overall Amplitude Accuracy	< 1.3 dB	20-20°C, Frequency = 10 MHz, Signal Input 0-100 dBm, Reference level 0-20 dBm, Input attenuation 100 dB, NEW 1 kHz, 10 dB, after cal; Preamp Off
	< 0.3 dB	Normal

SPURIOUS RESPONSE

Second Harmonic Intercept	Preamp off, signal input: 10 dBm, 50 dB attenuation	
	< -13 dBm	Signal: 100 kHz to 10 MHz
	< -40 dBm	Signal: 10 MHz to 1 GHz
Third-order Intercept	Preamp off, signal input: 10 dBm, 50 dB attenuation	
	< -140 dBm	Signal: 100 kHz to 10 MHz
	< -140 dBm	Signal: 10 MHz to 1 GHz
Input Related Spurious	< -140 dBm	100 MHz - 3 GHz
Normal Response (Preamp off)	< -90 dBm	Input signal level: 20 dBm, Att. 10 dB, Att = 100, 20 - 20°C, Input terminated 50 Ω, Preamp off

SWEEP

Range	200 ps - 1000 s	Span = 0 Hz
	100 ps - 1000 s	Span = 0 Hz, 500 ns resolution = 100 s
Sweep Mode	Continuous, Single	
Trigger Source	Free run, Video, External	
Trigger Mode	Positive or negative edge	

RF PREAMPLIFIER

SWEEP 10 MHz		
Frequency Range	1 MHz - 3 GHz	
Gain	10 dB	Normal (included as standard)

Rear Panel



GRA-415 Rack Adapter Panel

For GSP-9300B, Rack Mounting (P/P, S)



GKT-001 Control Kit Set

Includes:	
ACP-001	
ATN-100	
CTL-100	
CTC-000	
For GSP-Series	

GKT-002 CATV Kit Set

Includes:	
ACP-001	
ACP-100	
CTL-304	
CSC-001	
For GSP-Series	

GKT-003 RLE Kit Set

Includes:	
CAL-001	
CAL-002	
CTL-001	
CSC-004	
For GSP-Series	

GKT-006 EMI Probe Kit Set

Includes:	
ACP-002	
CTL-303	
PA-01	
PA-02	
AVT-0K	
AVT-0N	
For GSP-Series	



3GHz Spectrum Analyzer

SPECIFICATIONS

FRONT PANEL INPUT/OUTPUT

RF INPUT

Connector Type	50-ohm female	Normal
Impedance	50 Ω	
VSWR	<1.5:1	Maximum: 3:1 (100 MHz), input attenuator 2:1 @ 30 MHz

POWER FOR OPTION

Connector Type	50-ohm male	
Voltage/Current	0.5V / 100 mA max	With short circuit protection

USB HOST

Connector Type	A plug	
Protocol	USB2.0	Support multi-high-speed

VIDEO SOCKET

Protocol	SD 1.1	
Support Cards	Micro SD, Micro SDHC	Up to 32GB capacity

REAR PANEL INPUT/OUTPUT

REFERENCE OUTPUT

Connector Type	BNC, female	
Output Frequency	10 MHz	Normal
Output Amplitude	5.0V (0dB)	
Output Impedance	50 Ω	

REFERENCE INPUT

Connector Type	BNC, female	
Input Reference Frequency	10 MHz	
Input Amplitude	0 dBm ~ -10 dBm	
Frequency Lock Range	Within ± 0.1 ppm of the input reference frequency	

ANALOG OUTPUT

Connector Type	BNC, female	Open collector
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TRIGGER INPUT/CHARGE PUMP INPUT

Connector Type	BNC, female	
Input Amplitude	5.0V (0dB)	
Switch	Auto selection by function	

LAN TCP/IP INTERFACE

Connector Type	RJ45	
Bus	100 base T / 100base TX, Auto MDI/MDI-X	

USB DEVICE

Connector Type	B plug	
Protocol	USB2.0	For external control only, supports USB HSC, supports full/high/low speed

IF OUTPUT

Connector Type	Coax, female	
Impedance	50 Ω	Normal
IF Frequency	800 MHz	Normal
Output Level	0 dBm	10-40 dBm, 100 MHz input - 0 dBm @ 1 GHz

EMERGENCY OUTPUT

Connector Type	5-pin video jack, used for mouse operation	
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VIDEO OUTPUT

Connector Type	CVBS (integrated audio and video), single color, compatible with VGA or DVI standard through adapter	
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REMOTE INTERFACE

Connector Type	5-pin D-sub, female	RS-485, RS-422
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DATA INTERFACE (OPTIONAL)

Connector Type	10-pin D-sub, female	
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AC POWER INPUT

Power Source	AC 100 V ~ 240 V, 50/60 Hz	Auto range selection
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GENERAL

Internal Data Storage	16 GB optional	
Power Consumption	< 60 W	
Warm-up Time	< 30 minutes	
Temperature Range	-10 °C ~ +50 °C	Operating
Humidity Range	10% ~ 90% (non-condensing)	Storage
Dimensions & Weight	440 mm (H) x 340 mm (W) x 160 mm (D), Approx. 4.5 kg (9.9 lbs)	Max. 90 °C (198 °F) (basic) / 70 °C (158 °F) (battery)

Calibration Cycle

	The recommended calibration cycle is one year. Calibration services are available through our metrology services.	
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TRACKING GENERATOR (OPTIONAL)

Frequency Range	100 MHz ~ 3 GHz	
Output Power	30 dBm ~ 0 dBm in 0.5 dB steps	@ 100 MHz, 10 dBm, source attenuation 10 dB, 20 ~ 30°C
Attitude Accuracy	± 0.5 dB	
Output Power	Reference: 100 MHz, 10 dBm	
Output Level Switching (optional)	100 MHz ~ 3 GHz	
Power Source	2 GHz ~ 3 GHz	± 1.5 dB
Connector Type	50 Ω	± 2 dB
Impedance	50 Ω	Referenced to 10 dBm
Output VSWR	< 1.5:1	Typical, output level = 10 dBm

For the tracking generator, the output level is 10 dBm.

Note: The specifications apply when the CSP-9300B is powered on for at least 30 minutes for warming up for a temperature of 20 °C (68 °F), unless specified otherwise.

ORDERING INFORMATION

CSP-9300B 3GHz Spectrum Analyzer

ACCESSORIES

Power Cord, Certificate of Calibration, CD-ROM, Quick Start Guide, User Manual, Programming Manual, SpectranView Software, SpectranView Guide & Ivi Driver	
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OPTION

Opt. B1: Tracking Generator	Opt. B2: GPIB interface
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OPTIONAL ACCESSORIES

OSC-600: 10k Carrying Case	GA-415: Rack Adapter Panel
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FREE DOWNLOAD

SpectrumShot PC Software for Windows System (see table on USB setup website), Ivi Driver Support (at the end of Windows/IVI Programming) (available on USB website)	
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1.8GHz Spectrum Analyzer

Rear Panel



CSP-818

SPECIFICATIONS

[illegible]

ORDERING INFORMATION

CSP-818 1.8 GHz Spectrum Analyzer

Oct. 20 Trucking Capacity (Metric) Installed

Opt. 00 Ink Filter and EMI Detector (Factory Installed)

ACKNOWLEDGMENTS

Power with Confidence Certificate. CD including quick start guide, user manual, programming manual, PC software

OPTIONAL ACCESSORIES

CDP-BITE Tracking Capabilities into Software-Based

CSP-8373: EMI Filter and EMI Detector (no software required)

STATE DOWNLOADED

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-418 provides a minimum 10Hz RBW resolution and provides a 1-10 steps setting below the 500kHz RBW to allow a flexible signal detection.

C. AM / FM DEMODULATION

GSP-418 provides AM and FM demodulation and supports demodulated audio output.

D. ACPR, OCBW, CHPW

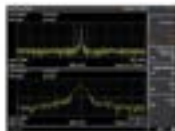
The ACPR function can set up to three sets of adjacent channel tests.



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-418 offers two Limit Line measurements: Window Measure and Limit Line Measure.

3GHz Spectrum Analyzer & RF and Communications Trainer



GSP-730

3GHz Spectrum Analyzer



CW Instek GSP-730 is a 3GHz Spectrum Analyzer developed mainly to fulfil 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 Equipment courses.



GRF-1300/1300A

RF and Communication Trainer



GSP-730 FEATURES

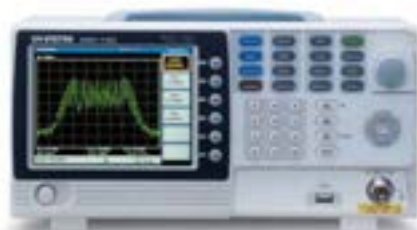
- Frequency Range : 150kHz ~ 3GHz
- Autotest Function
- Noise level : $-5 \sim 100\text{dBm}$
- RBW Range : 30kHz, 100kHz, 300kHz, 1MHz
- ACPR/CHP/OCBW Measurement
- 3 Traces in Different Colors
- Split Window Function
- Limit Line Function
- Remote Control Software
- Presentation Material for Training 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 ~ 3MHz
Triangle Wave : 0.1 ~ 3MHz
- RF Frequency : 370 ~ 930MHz
- AM Modulation & FM Modulation
- 5 On/Off Switches and 5 Test Points to Simulate & 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	150kHz ~ 3GHz	
Center Frequency		
Setting Resolution	8.15mHz	
Accuracy	$\pm 50\text{mHz}$	Frequency span : 0.5GHz ~ 2.5GHz, 20 $\pm 1^\circ\text{C}$
Frequency Span		
Range	8 Hz (Zero Span), 1MHz ~ 3GHz	Frequency span : 0.5GHz ~ 2.5GHz, 20 $\pm 1^\circ\text{C}$
Accuracy	$\pm 2\%$	
Resolution Bandwidth (RBW)		
Offset Span Carrier	10kHz, 100kHz, 300kHz, 1MHz	Normal, -40dB bandwidth
SSB Phase Noise		
Offset Span Carrier	$\pm 41\text{dBc/Hz}$ @ 100kHz offset	Typical, RBW : 20kHz, Span:1MHz @ 1GHz
Spectrum Response & Harmonics		
	less than -55dBc	Reference at 40dBm input
AMPLITUDE		
Reference Level		
Input Range	$-120 \sim -40\text{dBm}$	
Accuracy	Within $\pm 0.8\text{dB}$	Reference at 1GHz, 30MHz 50Hz
Unit	dBm, dBc, dBμV	
Average Noise level		
	-100dBm	Typical, center frequency 1GHz RBW 30kHz
FREQUENCY CHARACTERISTICS		
	@ 500MHz ~ 2.5GHz	$\pm 1.0\text{dB}$
	@ 80 ~ 300MHz, 2.5 ~ 4GHz	$\pm 0.5\text{dB}$
SWEEP		
Sweep Time		
Range	100ms ~ 8.4s, auto	Not adjustable
Accuracy	$\pm 2\%$	Frequency span : 5.6 spans
RF INPUT		
Impedance	50 ohm	Normal
VSWR	less than 2.0dB input at $\pm 10\text{dB}$	
Max Damage Level	$\pm 50\text{dBm}$ (CW average power), 15VDC	
Connector	4-type female	
INTERFACE		
RS 232C	Sub-D female 9-pin	
USB Connector	USB Host/Device full speed supported	
VGA Output	Sub-D female 15-pin	
Display	480 x 480 RGB color LCD	
GENERAL		
Temperature Range	Operating : $5 \sim 45^\circ\text{C}$	Guaranteed at $25 \pm 2^\circ\text{C}$, without self-heating case less than 40°C / 30min
Operating Humidity	Storage : $20 \sim 60^\circ\text{C}$ less than 40°C / 90%RH	
Dimensions & Weight	210 (W) x 152 (H) x 100 (D) mm Approx. 2.2kg	
Power Source	AC 100 ~ 240V, 50/60Hz	



CSP-730

Rear Panel



GRF-1300 Front Panel



GRF-1300A Front Panel



CSP-1300/1300A SPECIFICATIONS		
	GRF-1300A	GRF-1300
BAND BAND		
Waveforms	Sine, Square, Triangle, 0.1-30MHz, Step: 10kHz	Sine, Square, Triangle, 0.1-30MHz, Step: 10kHz
Frequency Range	21.5Vpp	21.5Vpp
Amplitude	20.7Vpp into 50 Ohm	20.7Vpp
Harmonic Distortion	2-100dB	2-100dB
RF/IF ANALYSIS		
Frequency Accuracy	$\pm 0.15\text{MHz}$	$\pm 0.15\text{MHz}$
Adjustable Range	240kHz (30MHz - 300MHz), Step: 1MHz	240kHz (30MHz - 300MHz), Step: 1MHz
Power Range	2-15dBm	2-15dBm
PM		
Max Frequency Deviation	$\pm 1\text{MHz}$	$\pm 1\text{MHz}$
AM		
Peak Difference	2-18dBm	2-18dBm
MIXER		
LO + IF	2-15dBm	—
LO - IF	2-15dBm	—
MIXER + MODULATION		
	2-40dBm	—
BANDPASS FILTER		
Frequency Centre: 2.4GHz	Bandwidth: $\pm 20\text{MHz}$	—
INTERFACE		
USB Device	USB Type B	USB Type B
DIMENSIONS & WEIGHT		
166(W) x 113(H) x 90(D)mm, 0.5(W) x 0.1(H) x 0.1(D)in, Approx. 1.2kg/2.6lb		

ORDERING INFORMATION

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

ACCESSORIES

CSP-730: Quick start manual x 1, User manual CD x 1, Power cord x 1
GRF-1300/1300A: Experiment test book of student version, Power point file and remote control software CD, GRF-1300: RF cable x 3, Antenna x 1, GRF-1300A: RF cable x 5, Antenna x 1, N to SMA adapter connector x 1, Power cord x 1

OPTION

GRF-400 GRF-1300 Experiment test book of teacher version
GRF-400 GRF-1300A Experiment test book of teacher version

OPTIONAL ACCESSORIES

ADP-001 5V to 9V Type Adapter **CT5-001** RF Cable, SC216 Assembly, 600mm, 50ohm, 1.5m
ADP-002 500A to 9V Type Adapter **CT5-004** USB Cable, USB 2.0, A-B Type, 1.000mm

ATA-001 Antenna, General PM Antenna, 900MHz

FREE DOWNLOAD

PC Software: Training system remote control software

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.

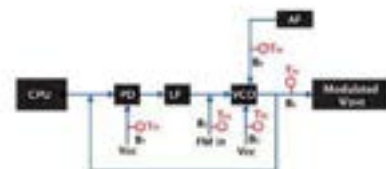
GRF-1300/1300A RF communications trainer, as the counterpart of GSP-730 for the basic RF communications experiment system, is capable of generating a baseband signal and a RF carrier signal for the built in AM and FM communications operations. The baseband signal output contains the selections of Sine, 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 circuitry. 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
- Base Band and RF signal measurements
- AM and FM signal measurements
- Communication system and product measurements

• Learning Outcome Tests

• Auxiliary Tools

- RFI files including all experiments contents
- Remote control software to control GRF-1300, GSP-730 simultaneously
- Experiment test books including the student version and the teacher (optional)

CURRICULUM CONTENTS

GSP-730+GRF-1300 Solution

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

Fully-electronic RF Training System

In class, teachers can connect GSP-730 and GRF-1300 with a PC via 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.

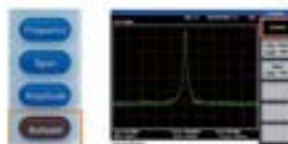
Properly connect Spectrum Analyzer, GRF-1300A RF and Communications Trainer, USC-LF44 RF Signal Generator and a PC to perform ongoing experiments while the lecture is being given. Using a PC, teacher can present teaching material with Power Point slides and simultaneously control GSP-730, GRF-1300A and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

B. PC SOFTWARE FOR GSP-730 AND GRT-1300 REMOTE CONTROL



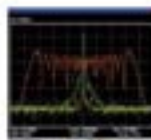
The dedicated PC software, Primary RT, is provided to support the remote control of GSP-730 and GRT-1300 simultaneously. The control includes base band signal waveform, frequency and RF signal frequency for GRT-1300 and Frequency, Span, Amplitude, RBW and spectrum transferring of GSP-730.

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



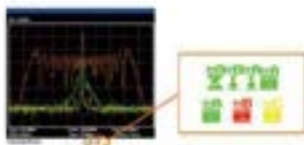
GSP-730 can illustrate a signal with three colors simultaneously under various display modes, including Clear/Write, Max/Peak Hold, Min/Peak Hold, View, Blank and Average. Other useful trace functions such as trace math operations are also accomplishable.

E. MARKER FUNCTION



Five Markers can be used to obtain the measurement readings of specified points. Each marker has a counterpart Δ Marker, the amplitude difference can be measured and indicated by setting the frequency of marker and the interval frequency of Δ Marker 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 corner 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 LIVE 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.

10. 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.

11. 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 recent communication systems, such as CDMA systems. GSP-730

will illustrate channels by various colors so that the operation may become more precise and may minimize errors.

12. 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.

MODEL	DESCRIPTION	CATEGORY	APPLICABLE DEVICE
ASP-001	Adaptor, 50Ω, BNC(f) - N(f/M)	Adaptor	CSP Series
ASP-002	Adaptor, 50Ω, SMA(f) - N(f/M)	Adaptor	CSP Series
ASP-001	Adaptor, 75Ω BNC(f) - 50Ω BNC(f/M)	Adaptor	CSP Series
ATN-100	Adaptor, 50Ω Attenuation, 50Ω, N(f) - N(f/M)	Adaptor	CSP Series
CAR-001	Adaptor, 50Ω Termination, N(f/M)	Adaptor	CSP Series
CAR-002	Adaptor, Cap with Chain, N(f/M)	Adaptor	CSP Series
CAC-000	Soft Carrying Case	Bag	CSP-9030, CSP-9000
CTL-040	USB Cable, USB 2.0, A-B Type, 100mm	Communication Cable	CSP Series
CTL-040	CPB Cable, Double Shielded, 2000mm	Communication Cable	CSP-9030, CSP-9000
CTL-050	CPB Cable, Double Shielded, 600mm	Communication Cable	CSP-9030, CSP-9000
CTL-110	BNC Cable, BNC(f/M)-BNC(f/M), 1000mm	General Lead	CSP Series
CTL-301	RF Cable, RG213 Assembly, 1000mm, N(f/M)	General Lead	CSP Series
CTL-302	RF Cable, RG213 Assembly, 500mm, N(f/M)	General Lead	CSP Series
CTL-303	RF Cable, RG213 Assembly, 900mm, SMA(f/M)	General Lead	CSP Series, CAP-1000/1000A
CTL-304	RF Cable, RG213 Assembly, 300mm, N(f/M) - N(f)	General Lead	CSP Series
CRA-410	Rack Mount Kit, 1P, 6U Size	Rack	CSP-9030, CSP-9000
ADB-003	Adaptor, DC Block, BNC(f/M)-BNC(f/N), 50W, 10MHz-1.2GHz	EMI Application	CSP Series
ADB-004	Adaptor, DC Block, N(f/M)-N(f/N), 50W, 10MHz-4GHz	EMI Application	CSP Series
ADB-005	Adaptor, DC Block SMA(f/M)-SMA(f/N), 50W, 0.1MHz-8GHz	EMI Application	CSP Series
CST-000	EMI Probe Set, Including ANT-01, ANT-02, PB-01, PB-02, BOP-002, CTL-303	EMI Application	CSP Series
CLN-0040A	Line Impedance Stabilization Network (LISN), AC Single Phase, 50Hz-500kHz	EMI Application	CSP Series
CIT-0000	Isolated Transformer, 900VA Capacity	EMI Application	CSP Series
CPL-9010	Transient Limiter, Input: BNC(f), Output: M(f/N), 50mA-200mA	EMI Application	CSP Series
ATA-001	Antenna, General FM Antenna, BNC(f/M)	Special Application	CSP Series
CAR-001	CAR-100 Experiment Test Book of Teacher Version	Special Application	CAR-100
CAR-002	CAR-100A Experiment Test Book of Teacher Version	Special Application	CAR-100A
CST-000	General Kit Set, Including ASP-002, ATA-100, CTL-303, CSC-000	Special Application	CSP Series
CST-000	CHTV Kit Set, Including ASP-001, ASP-101, CTL-304, CSC-000	Special Application	CSP Series
CST-000	RLS Kit Set, Including CAR-001, CAR-002, CTL-302, CSC-000	Special Application	CSP Series
RLS-001	Return Loss Bridge, 10MHz-1GHz, Source/Load: N(f), Coupling: N(f/M)	Special Application	CSP Series

CTL-110 BNC Cable, BNC(f/M)-BNC(f/M), 1000mm



CTL-340 USB Cable, USB 2.0, A-B Type, 1000mm



CRA-410 Rack Adapter Kit



CTL-340 CPB Cable, Double Shielded, 2000mm



CTL-250 CPB Cable, Double Shielded, 600mm



CPL-9010 Transient Limiter, Input: BNC(f), Output: M(f/N), 50mA-200mA



CLN-0040A Line Impedance Stabilization Network (LISN), AC Single Phase, 50Hz-500kHz



CIT-0000 Isolated Transformer, 900VA Capacity



RLB-001

Return Loss Bridge
10MHz – 1GHz



Frequency Range	10MHz – 1GHz
Directivity	Greater than 20dB, <40dB, <60dB, <80dB, <100dB
Insertion Loss	Greater than 10dB, <15dB, <20dB, <25dB
Return Loss	Greater than 10dB, <15dB, <20dB, <25dB
Characteristics Impedance	50 Ohms
Connector	N-Type, SMA and SMA, SMA, SMA, SMA
Dimensions & Weight	30 x 14 x 11 (mm), 100 g

ATA-001

RF Antenna
For: CSP Series
(An additional ADP-000 is needed for using CSP spectrum analyzer)



CKT-008 EMF Probe Kit Set

ADP-002 – Adapter SMA(2/F) – N (P/N) x 1
CTL-000 – RF Cable SMA(2/F) – SMA(2/F) x 1
PK-01 – AC Voltage Probe x 1
PK-02 – Touch Penetration RF Probe x 1
ANT-04 – In-Rail Probe x 1
ANT-05 – In-Rail Probe x 1



CKT-001 General Kit Set

ADP-002
ATA-100
CTL-000
CSC-000



CKT-002 CATV Kit Set

ADP-001
ADP-100
CTL-004
CSC-000



CKT-003 RLB Kit Set

CAK-001
CAK-002
CTL-000
CSC-000



ADP-001

Adapter
SMA(2/F) – N(P/N)



ADP-002

Adapter
SMA(2/F) – N(P/N)



CAE-001

Termination SWR
N (P/N)



CAK-002

Cable with Chain
N (P/N)



CTL-001

RF Cable (C) (2/F)
N(P/N)
100mm



CTL-000

RF Cable Assembly
(SMA(2/F) – N(P/N))
200mm



CTL-003

RF Cable Assembly
(SMA(2/F) – SMA(2/F))
200mm



(An additional ADP-000 is needed for using CSP spectrum analyzer)

CTL-004

RF Cable Assembly
(SMA(2/F) – N(P/N))
200mm



ADB-002

DC Block SMA 50Ω 10MHz–2.2GHz



ADB-004

DC Block N-Type SMA 10MHz–4GHz



ADB-005

DC Block SMA 50Ω 0.1MHz–4GHz



CAK-001

SWR Impedance Adapter



ADP-100

SMA(2/F) 2/F –
SMA(2/F) N-C



(An additional ADP-000 is needed for using CSP spectrum analyzer)

ATA-100

Small Antenna
N(P/N) – N(P/N)





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 mainstay 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 1uHz 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-2000 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, PSK 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. $\text{frequency} = \text{sampling rate} / \text{number of points in waveform}$. 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

ARBITRARY FUNCTION GENERATOR SELECTION GUIDE OF MFG-2000 Series

OPTION		Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100
Technology		Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100	Address / 100
CHANNEL	Analog Channel	2	2	2	2	2	2	2	2	2	2	2	2
ISOLATED DESIGN	Isolated	-	Y	-	Y	-	Y	-	Y	-	Y	-	Y
RF	RF Generation Frequency	-	100MHz	100MHz	-	100MHz	100MHz	-	100MHz	100MHz	-	100MHz	100MHz
FREQUENCY	Frequency Range	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz	20Hz~100kHz
	Frequency Resolution	1Hz	1Hz	1Hz	1Hz	1Hz	1Hz	1Hz	1Hz	1Hz	1Hz	1Hz	1Hz
	Frequency Rate	200kHz	200kHz	200kHz	200kHz	200kHz	200kHz	200kHz	200kHz	200kHz	200kHz	200kHz	200kHz
MB	Resolution Rate	120kHz	120kHz	120kHz	120kHz	120kHz	120kHz	120kHz	120kHz	120kHz	120kHz	120kHz	120kHz
	Memory Length	100 Points	100 Points	100 Points	100 Points	100 Points	100 Points	100 Points	100 Points	100 Points	100 Points	100 Points	100 Points
	Vertical Resolution	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
OUTPUT	Amplitude Range (dBm)	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm	0dBm~10dBm
	THD (dBm)	<10dB	<10dB	<10dB	<10dB	<10dB	<10dB	<10dB	<10dB	<10dB	<10dB	<10dB	<10dB
	Amplitude (dB)	100mV~100V	100mV~100V	100mV~100V	100mV~100V	100mV~100V	100mV~100V	100mV~100V	100mV~100V	100mV~100V	100mV~100V	100mV~100V	100mV~100V
TAN OUT	Impedance Match	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2	50Ω ± 1% 2
	TH Impedance Output	0	0	0	0	0	0	0	0	0	0	0	0
	Square Wave Pul Time	<10ns	<10ns	<10ns	<10ns	<10ns	<10ns	<10ns	<10ns	<10ns	<10ns	<10ns	<10ns
CHARACTERISTIC	Square Duty Cycle	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%
	Wave Width	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns	20ns~99.9ns
	Only Cycle	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%	0.1%~99.9%
MISC. WAVEFORM	Loading and Trailing Edge Time	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns	10ns~100ns
	Sine	0	0	0	0	0	0	0	0	0	0	0	0
	Square	0	0	0	0	0	0	0	0	0	0	0	0
FUNCTION	Triangle/Ramp	0	0	0	0	0	0	0	0	0	0	0	0
	Arise	0	0	0	0	0	0	0	0	0	0	0	0
	Arise	0	0	0	0	0	0	0	0	0	0	0	0
POWER AMPLIFIER	Power Amplifier Output	0	0	0	0	0	0	0	0	0	0	0	0
	Power Amplifier Output	0	0	0	0	0	0	0	0	0	0	0	0
	Power Amplifier Output	0	0	0	0	0	0	0	0	0	0	0	0
REFERENCE	Reference	0	0	0	0	0	0	0	0	0	0	0	0
	Reference	0	0	0	0	0	0	0	0	0	0	0	0
	Reference	0	0	0	0	0	0	0	0	0	0	0	0
DISPLAY	Display	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD	6.3" TFT-LCD
	Display Display	0	0	0	0	0	0	0	0	0	0	0	0
	Display Display	0	0	0	0	0	0	0	0	0	0	0	0
STORAGE MEMORY	Storage Memory	100 Bytes	100 Bytes	100 Bytes	100 Bytes	100 Bytes	100 Bytes	100 Bytes	100 Bytes	100 Bytes	100 Bytes	100 Bytes	100 Bytes
	Storage Memory	0	0	0	0	0	0	0	0	0	0	0	0
	Storage Memory	0	0	0	0	0	0	0	0	0	0	0	0
POWER	Power Source	AC100-240V	AC100-240V	AC100-240V	AC100-240V	AC100-240V	AC100-240V	AC100-240V	AC100-240V	AC100-240V	AC100-240V	AC100-240V	AC100-240V
	Power Consumption	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W
	Power Consumption	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W	100W~200W
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ARBITRARY FUNCTION GENERATOR

ARBITRARY FUNCTION GENERATOR SELECTION GUIDE OF AFG-2000 Series

MODEL	AFG-2010	AFG-2101	AFG-2112	AFG-2105	AFG-2005	AFG-2011	AFG-2003
Technology	Analog / DDS	Analog / DDS	Analog / DDS	Analog / DDS	Analog / DDS	Analog / DDS	Analog / DDS
CHANNEL	Analog Channel	2	1	1	1	1	1
BF	BF Generator Frequency	—	—	—	—	—	—
FREQUENCY	Frequency Range	0 Hz ~ 20MHz	0 Hz ~ 20MHz	0 Hz ~ 20MHz	0 Hz ~ 20MHz	0 Hz ~ 20MHz	0 Hz ~ 20MHz
	Frequency Resolution	1Hz	0.1Hz	0.1Hz	0.1Hz	0.1Hz	0.1Hz
ARB	Sample Rate	100MSa/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s
	Acquisition Rate	80MSa/s	160MSa/s	160MSa/s	160MSa/s	160MSa/s	160MSa/s
	Memory Length	4k Points	4k Points	4k Points	4k Points	4k Points	4k Points
	Waveform Resolution	10bit	10bit	10bit	10bit	10bit	10bit
OUTPUT	Amplitude Range (dBm)	1mVpp ~ 10Vpp (10dBm) 1mVpp ~ 10V (0dBm)	1mVpp ~ 10Vpp (10dBm) 1mVpp ~ 10V (0dBm)	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp (10dBm) 1mVpp ~ 10V (0dBm)	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp
	DC Offset (dBm)	±10Vpp (PC-DC) (0dBm) ±10Vpp (AC-DC) (0dBm)	±10Vpp (PC-DC) (0dBm) ±10Vpp (AC-DC) (0dBm)	±10Vpp (PC-DC)	±10Vpp (PC-DC) (0dBm) ±10Vpp (AC-DC) (0dBm)	±10Vpp (AC-DC)	±10Vpp (AC-DC)
	Amplitude Unit	Vpp, Vrms, dBrn	Vpp, Vrms, dBrn	Vpp, Vrms, dBrn	Vpp, Vrms, dBrn	Vpp, Vrms, dBrn	Vpp, Vrms, dBrn
Impedance Match	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAIR (OUT)	FAIR Output/Time Output	—	—	—	—	—	—
SQUARE	Square Rise/Fall Time	<10ns	<10ns	<10ns	<10ns	<10ns	<10ns
CHARACTERISTIC	Square Duty Cycle	1% ~ 99%	1% ~ 99%	1% ~ 99%	1% ~ 99%	1% ~ 99%	1% ~ 99%
PULSE	Pulse Width	50ns ~ 999.9ns	—	—	—	—	—
CHARACTERISTIC	Duty Cycle	—	—	—	—	—	—
	Leading and Trailing Edge Time	—	—	—	—	—	—
Basic Waveform	Sine	Y	Y	Y	Y	Y	Y
	Square	Y	Y	Y	Y	Y	Y
	Triangle/Ramp	Y	Y	Y	Y	Y	Y
	Pulse	Y	Y	Y	Y	Y	Y
	Random	Y	Y	Y	Y	Y	Y
	Sum	Y	—	—	—	—	—
PRESET FUNCTION	Recall	Y	Y	Y	Y	—	—
MODULATION	Amplitude Modulation	Y	Y	Y	Y	—	—
	FM	Y	Y	Y	Y	—	—
	PM	Y	—	—	—	—	—
	FSK	Y	Y	Y	Y	—	—
	ASK	—	—	—	—	—	—
	PSK	—	—	—	—	—	—
COUNTER FUNCTION	Sum	Y	—	—	—	—	—
	Counter	Y	Y	Y	Y	—	—
OTHERS	Ext. Trigger Input	Y	Y	Y	Y	—	—
	Ext. Modulation Input	Y	Y	Y	Y	—	—
	Trigger Output	Y	—	—	—	—	—
	Modulation Output	—	Y	Y	Y	—	—
	Marker Output	—	—	—	—	—	—
	GPIO(Including option)	—	—	—	—	—	—
INTERFACE	USB Host	Y	Y	Y	Y	Y	Y
	USB Device	Y	Y	Y	Y	Y	Y
	LAN	—	—	—	—	—	—
	RS232C	—	—	—	—	—	—
DISPLAY	Display	5.1" TFT-CD	5.1" 3-Gate LCD	5.1" 3-Gate LCD	5.1" 3-Gate LCD	5.1" 3-Gate LCD	5.1" 3-Gate LCD
	Waveform Display	Y	Y	Y	Y	Y	Y
SDO LINE	SDO Line	Y	Y	Y	Y	Y	Y
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LABELVIEW	LabelView Drive	Y	Y	Y	Y	Y	Y
POWER	Power Source	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V
	Power Consumption	20W	20W	20W	20W	20W	20W
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30MHz/20MHz Arbitrary Function Generator



AFC-303X/302X



FEATURES

- 1 port - 20 or 40MHz, 20Vpp, 1 or 2 Channel (s)
- Arbitrary Waveform 256Mpts/s, 16-bit Resolution, 8M Memory Depth
- Isolation Channel Circuit Design
- Synchronized Phase Operates up-to 6 Units and 12 Channels
- Harmonic Signal Generator
- Dual Channel Models Support SLM Modulation, Coupling, Tracking, and Phase Functions
- Pulse Waveform Parameters Can Be Set Independently
- Built-in AM/FM/PM/FSK/PSK/QPSK/SSM Modulation, Delay and Burst Functions
- Built-in Medical and Automotive (Electronic) Waveforms
- Built-in IQ Isolated Waveform on AFG-3021/3021
- Provides USB/LAN/GPIB (Optional) Instrument Control Interface

CV Intra-ACI: Intra-ACI functional logic generators use 2000ns/2000ns single output channel and 2000ns MW data loaded channel models. Designed to meet industry academic research, and education applications, this single output channel is used in ground isolation, dual channel models are also independently used ground isolation, which is suitable for floating circuits, up to 420V. Without losing grounding reference line consideration, each channel of dual channel models can be operated independently and each AWG unit can output simultaneously. Applications are: for instance, the system control or transmission device of automotive electronics. The same features sample rate of 250MS/s, 16-bit resolution, and AWG peak memory depth allowing waveform characteristics. The AWG unit is also suitable for high speed digital logic testing, through using a CV Intra AWG digital storage oscilloscope with the built-in 2000ns/2000ns of the ACI-100A/002A.

The series supports amplified phase for multi-channel operation and the maximum phase-amplification operation is up to 4 units and ± 7 channels. With greater duty frequency standard can be input its internal signal source to obtain precision for frequency output. The series covers frequency range and amplitude swing that can integrate functions, including logic/arithmetic, one-way (one-bit)/two-way (analog) waveform, continuous single/digitized trigger to various application requirements by applying different wave-form methods. Frequency measurement is supported by the built-in frequency counter. The series also provides a wide range of I/O signals for the frequency response of electronic components such as the gain and frequency amplifiers. Amplitude noise simulates vibration tests (requires a vibration shaker), and it also conducts aging tests of various materials and forecasts wear of new frequency amplifier.

The main features of the AFM3000 include output at arbitrary from 10 mHz to 10 MHz (powered with a 2.5 A full load), frequency range from 10 mHz to 20 MHz or 10 MHz, Frequency resolution, and built-in sine, square, pulse, triangle, ramp, DC voltage, harmonics and noise. The waveforms width, rise time and fall time of pulse waveforms can be adjusted flexibly. Pulse waveform, with duty ratio from 0.01 Hz to 99.99%, can be applied as trigger signal. Users can simulate arbitrary coding into full built-in function waveforms. The series supports M0/M2/M3/J23, PPM modulation, frequency noise, amplitude noise and burst to satisfy industrial application requirements. Two channel models provide DTM modulation, coding, testing, and phase to meet the test requirements of differential signal phase control and amplitude distortion. Built-in full-harmonic signal generator simulates harmonic signal of switching power supplies and also acts as an on-line filter characteristics. The A-C 1000/1001 provides free software (NANIS) for users to generate and build waveforms from the built-in diagrams or to do accurate measurements.

REFERENCES

CHANNELS		AFC 2011	AFC 2012	AFC 2021	AFC 2022
		1	2	1	2
FEATURES					
SD Signal Ground for the Instrument Channel		Commutator shell for channel outputs, Top output, 100% RST input, Shell input and Shell output are isolated from the instrument channel. Maximum permissible voltage on isolated connector shells is ± 42 Vpk (DC - AC Peak)			
Each of the Signal Ground of CH 1/CH2		no	isolated	no	isolated
Standard Waveforms		Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic, DC			
ARBITRARY WAVEFORMS					
Sample Rate		250 MSa/s			
Resolution Rate		12/16 bit			
Waveform Length		8M points			
Amplitude Resolution		16 bits			
Non Volatile Memory		on-EM capabilities (?)			
User defined Output Section		Any section from 1 - 8M points			
Trigger		software/manual/external			
Inputs in Arbitrary Waveforms		Sine, Square, Ramp, Saw, Exp Rise, Exp Fall, DC Pulse, Station, Hyperbolic, Sinecos, Arctan, Hyperbolic, Saw, down, Rectangular, 18, 36, 54, 72, 90, 108, 126, 144, 162, 180, 198, 216, 234, 252, 270, 288, 306, 324, 342, 360, 378, 396, 414, 432, 450, 468, 486, 504, 522, 540, 558, 576, 594, 612, 630, 648, 666, 684, 702, 720, 738, 756, 774, 792, 810, 828, 846, 864, 882, 900, 918, 936, 954, 972, 990, 1008, 1026, 1044, 1062, 1080, 1098, 1116, 1134, 1152, 1170, 1188, 1206, 1224, 1242, 1260, 1278, 1296, 1314, 1332, 1350, 1368, 1386, 1404, 1422, 1440, 1458, 1476, 1494, 1512, 1530, 1548, 1566, 1584, 1602, 1620, 1638, 1656, 1674, 1692, 1710, 1728, 1746, 1764, 1782, 1800, 1818, 1836, 1854, 1872, 1890, 1908, 1926, 1944, 1962, 1980, 1998, 2016, 2034, 2052, 2070, 2088, 2106, 2124, 2142, 2160, 2178, 2196, 2214, 2232, 2250, 2268, 2286, 2304, 2322, 2340, 2358, 2376, 2394, 2412, 2430, 2448, 2466, 2484, 2502, 2520, 2538, 2556, 2574, 2592, 2610, 2628, 2646, 2664, 2682, 2700, 2718, 2736, 2754, 2772, 2790, 2808, 2826, 2844, 2862, 2880, 2898, 2916, 2934, 2952, 2970, 2988, 3006, 3024, 3042, 3060, 3078, 3096, 3114, 3132, 3150, 3168, 3186, 3204, 3222, 3240, 3258, 3276, 3294, 3312, 3330, 3348, 3366, 3384, 3402, 3420, 3438, 3456, 3474, 3492, 3510, 3528, 3546, 3564, 3582, 3600, 3618, 3636, 3654, 3672, 3690, 3708, 3726, 3744, 3762, 3780, 3798, 3816, 3834, 3852, 3870, 3888, 3906, 3924, 3942, 3960, 3978, 3996, 4014, 4032, 4050, 4068, 4086, 4104, 4122, 4140, 4158, 4176, 4194, 4212, 4230, 4248, 4266, 4284, 4302, 4320, 4338, 4356, 4374, 4392, 4410, 4428, 4446, 4464, 4482, 4500, 4518, 4536, 4554, 4572, 4590, 4608, 4626, 4644, 4662, 4680, 4698, 4716, 4734, 4752, 4770, 4788, 4806, 4824, 4842, 4860, 4878, 4896, 4914, 4932, 4950, 4968, 4986, 5004, 5022, 5040, 5058, 5076, 5094, 5112, 5130, 5148, 5166, 5184, 5202, 5220, 5238, 5256, 5274, 5292, 5310, 5328, 5346, 5364, 5382, 5400, 5418, 5436, 5454, 5472, 5490, 5508, 5526, 5544, 5562, 5580, 5598, 5616, 5634, 5652, 5670, 5688, 5706, 5724, 5742, 5760, 5778, 5796, 5814, 5832, 5850, 5868, 5886, 5904, 5922, 5940, 5958, 5976, 5994, 6012, 6030, 6048, 6066, 6084, 6102, 6120, 6138, 6156, 6174, 6192, 6210, 6228, 6246, 6264, 6282, 6300, 6318, 6336, 6354, 6372, 6390, 6408, 6426, 6444, 6462, 6480, 6498, 6516, 6534, 6552, 6570, 6588, 6606, 6624, 6642, 6660, 6678, 6696, 6714, 6732, 6750, 6768, 6786, 6804, 6822, 6840, 6858, 6876, 6894, 6912, 6930, 6948, 6966, 6984, 7002, 7020, 7038, 7056, 7074, 7092, 7110, 7128, 7146, 7164, 7182, 7200, 7218, 7236, 7254, 7272, 7290, 7308, 7326, 7344, 7362, 7380, 7398, 7416, 7434, 7452, 7470, 7488, 7506, 7524, 7542, 7560, 7578, 7596, 7614, 7632, 7650, 7668, 7686, 7704, 7722, 7740, 7758, 7776, 7794, 7812, 7830, 7848, 7866, 7884, 7902, 7920, 7938, 7956, 7974, 7992, 8010, 8028, 8046, 8064, 8082, 8100, 8118, 8136, 8154, 8172, 8190, 8208, 8226, 8244, 8262, 8280, 8298, 8316, 8334, 8352, 8370, 8388, 8406, 8424, 8442, 8460, 8478, 8496, 8514, 8532, 8550, 8568, 8586, 8604, 8622, 8640, 8658, 8676, 8694, 8712, 8730, 8748, 8766, 8784, 8802, 8820, 8838, 8856, 8874, 8892, 8910, 8928, 8946, 8964, 8982, 9000, 9018, 9036, 9054, 9072, 9090, 9108, 9126, 9144, 9162, 9180, 9198, 9216, 9234, 9252, 9270, 9288, 9306, 9324, 9342, 9360, 9378, 9396, 9414, 9432, 9450, 9468, 9486, 9504, 9522, 9540, 9558, 9576, 9594, 9612, 9630, 9648, 9666, 9684, 9702, 9720, 9738, 9756, 9774, 9792, 9810, 9828, 9846, 9864, 9882, 9900, 9918, 9936, 9954, 9972, 9990, 10008, 10026, 10044, 10062, 10080, 10098, 10116, 10134, 10152, 10170, 10188, 10206, 10224, 10242, 10260, 10278, 10296, 10314, 10332, 10350, 10368, 10386, 10404, 104			

30MHz/20MHz Arbitrary Function Generator



AFG-3032/3022

SPECIFICATIONS				
	AFG-3031	AFG-3032	AFG-3021	AFG-3022
OUTPUT CHARACTERISTICS (3)				
Amplitude	1 mVpp ~ 10 Vpp (into 50Ω); 2 mVpp ~ 20 Vpp (into open circuit) ±1% of setting ±1 mVrms for 1 Vrms; ±1 mVrms without DC offset			
Resolution	0.1 mV on 4 digits			
Frequency	0.1 Hz ~ 10 MHz; 0.2 Hz ~ 10 MHz ~ 40 MHz (precision relation: 1 kHz/100 Hz)			
Wave	Vpp, Vrms, dBm			
Offset	±1 Vpp at ~40 V (into 50Ω); ±1 Vpp at ~40 V (into open circuit) ±1% of setting; ±2 mV ~ 0.1% of amplitude			
Waveform Output	100 typical (3 mV), > 10 MHz (output disabled)			
EMC Output	Short circuit protected; Overload relay automatically disables main output 42 dBm max			
Ground	TTL compatible (max 150 mA)			
Isolation	500 nominal			
Level	TTL compatible (max 150 mA)			
Impedance	500 nominal			
SINE WAVE CHARACTERISTICS				
Harmonic Distortion(2)	40 dBc DC ~ 1 MHz; Ampl: 0 Vpp ~ 20 dBc; DC ~ 1 MHz; Ampl: 0 Vpp ~ 40 dBc 1 MHz ~ 10 MHz; 1 Vpp; Ampl: 0 Vpp ~ 40 dBc; 10 MHz ~ 30 dBc; Ampl: 0 Vpp ~ 40 dBc			
Total Harmonic Distortion Spectral Density(2)	-40 dBc ~ -100 dBc; DC ~ 20 dBc			
Phase Noise	40 dBc DC ~ 1 MHz; 10 dBc; 1 MHz ~ 20 MHz -40 dBc ~ -100 dBc (typical) (1 MHz) ~ 100 dBc (typical) (10 MHz) = 100 dBc (typical) (10 MHz offset); 10 ~ 100 MHz			
SQUARE WAVE CHARACTERISTICS				
Rise/Fall Time	≤ 8 ns (3)			
Overshoot	≤ 5%			
Asymmetry(2)(50% duty)	1% of period; 7 ns			
Variable Duty Cycle	20.0% ~ 80.0%; < 20 MHz 40.0% ~ 60.0%; 20 ~ 30 MHz		20.0% ~ 80.0%; < 20 MHz	
Jitter	0.2% ~ 0.22 ppm/1 MHz; 0.1% ~ 0.12 ppm/1 MHz			
RAMP CHARACTERISTICS				
Linearity	≤ 0.1% of peak output			
Variable Symmetry	0% ~ 100% (0.1% resolution)			
PULSE CHARACTERISTICS				
Pulse Width	20ns ~ 999.999ns (extended mode 0.00ns ~ 1.9999ns); Width: 0.02% ~ 99.9999% (all Time 0.00ns) ~ 99.9999% (all Time 0.00ns) ~ 99.9999% (all Time 0.00ns) ~ 99.9999% (all Time 0.00ns)			
Duty Setting Range	0.001% ~ 99.9999% (extended mode 0.00001% ~ 100.0000%)			
Period	40ns ~ 1,000,000ns			
Rise Time and Fall Time(4)	≤ 20ns ~ 700,000ns			
Resolution	0.0001%			
Overload	≤ 5%			
Jitter	100 ppm ~ 30 ps			
Noise				
Noise Type	Gaussian			
Noise Bandwidth	100 MHz equivalent bandwidth			
HARMONIC				
Harmonic Order	≤ 8			
Harmonic Type	User, OME, RL, User; Amplitude and Phase can be set for all harmonics			
AM and AM/PM(50%)				
Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Noise, Jitter			
Modulating Waveform	Sine, Square, Triangle, Jitter, Sin Ramp			
Modulating Frequency	2 mHz ~ 20 kHz			
Depth	0% ~ 100.0%			
Source	Internal / External			



AFG-3031/3021

SPECIFICATIONS

	AFG-3031	AFG-3032	AFG-3021	AFG-3022
FMT				
Center Waveform	Sine, Square, Triangle, Ramp			
Modulating Waveform	Sine, Square, Triangle, Up/Down Ramp			
Modulating Frequency	2 mHz – 20 kHz			
Phase Deviation	0° – 360° (2-bit resolution)		0° – 360° (2-bit resolution)	
Source	Internal / External			
PM				
Center Waveform	Sine, Triangle, Ramp			
Modulating Waveform	Sine, Square, Triangle, Up/Down Ramp			
Phase Deviation	0° – 360° (2-bit resolution)			
Modulating Frequency	2 mHz – 20 kHz			
Source	Internal			
PWM				
Center Waveform	Square			
Modulating Waveform	Sine, Square, Triangle, Up/Down Ramp			
Modulating Frequency	2 mHz – 20 kHz			
Duty Cycle	0% – 100% of pulse width, 0.1% resolution			
Source	Internal / External			
PSK				
Center Waveform	Sine, Square, Triangle, Ramp			
Modulating Waveform	10% duty cycle square			
Internal Rate	2 mHz to 1 MHz			
Frequency Range	DC – 99 MHz		DC – 20 MHz	
Source	Internal / External			
ADDITIONAL MODULATION (SUM)				
Center Waveform	Sine, Triangle, Ramp, Pulse, Noise			
Modulating Waveform	Sine, Square, Triangle, Up/Down Ramp			
Ratio	0% – 100% of carrier amplitude, 0.1% resolution			
Modulating Frequency	2 mHz – 20 kHz			
Source	Internal / External			
FSK				
Center Waveform	Sine, Square, Triangle, Ramp			
Modulating Waveform	10% duty cycle square			
Internal Rate	2 mHz – 1 MHz			
Frequency Range	DC – 99 MHz		DC – 20 MHz	
Source	Internal / External			
SWEEP				
Waveform	Frequency Sweep: Sine, Square, Triangle, Ramp; Amplitude Sweep: Sine, Square, Triangle, Ramp, Pulse, Noise, AFD			
Type	Frequency, Amplitude			
Function	Linear or Logarithmic			
Direction	Up or Down			
Slew/Stop Frequency	Any frequency within the waveform's range			
Sweep Time	1 ms – 200 s (7 ms resolution)			
Trigger Mode	Single, External, Internal			
Trigger Source	Internal / External			
BURST				
Waveform	Sine, Square, Triangle, Ramp, Pulse, Noise			
Frequency	1 mHz – 50 MHz (0.1 mHz – 50 MHz (0.1 mHz – 50 MHz (0.1 mHz – 50 MHz)			
Burst Count	1 – 1,000,000 cycles or infinite			
Start / Stop Phase	360° – -360° (0.1° resolution)			
Internal Period	1 ps – 100 ns			
Gate Source	External trigger (pulse waveforms can only be used to gate mode)			
Trigger Source	Single, External or Internal Mode			
Trigger Delay	N (cycle, infinite, 0 ps – 100 ns (7 ps resolution)			

- Note: 1. A total of ten waveforms can be stored (any waveform can consist of 80 points maximum).
2. Add 1/10 th of output amplitude and offset specification per-C for operation outside of 0-C-10-C range (year specification).
3. Edge time decreased at higher frequency.
4. Sine and square waveforms above 20 MHz are allowed only with an "infinite" count.
5. Harmonic distortion and spurious noise at low amplitudes is limited by a -35 dBm floor.
6. Low mag noise if the pulse width is beyond the setting range of the normal mode. The pulse may vanish at zero.
7. Rise time and fall time should be 90-95% 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, AM(100-50%), FM, PM, SSB, SSB			
Voltage Range	± 10 V full scale			
Input Impedance	10kΩ			
Frequency	DC ~ 20 kHz			
Modulation Output				
Type	AM, AM(100-50%), FM, PM, SSB, SSB, SSB			
Amplitude Range	0 ~ 10Vp			
Impedance	10kΩ typical			
EXTERNAL TRIGGER INPUT				
Type	For FSK, Burst, Sweep, N Cycle RST			
Input Level	1V, Compatibility			
Stops	Rising or Falling (Selectable)			
Pulse Width	≥ 500 ns			
Input Rate	DC ~ 1 MHz			
Input Impedance	10kΩ, DC coupled			
LATENCY				
Sweep	≤ 1 μs (typical), Burst ≤ 0.1 ms (typical), AM ≤ 27 (sample rate) / 2 kHz			
JITTER				
Sweep	2.7 μs (burst), 1 ns, except pulse 500 ps			
Timing REFERENCE OUTPUT				
Output Voltage	1.5Vp ± 10 D square wave			
Output Impedance	50Ω, AC coupled			
Output Frequency	10 kHz			
Timing REFERENCE INPUT				
Input Voltage	0.5Vp ~ 10Vp			
Input Impedance	1kΩ, unbalanced, AC coupled			
Input Frequency	10 kHz ~ 10 MHz			
Waveform	Sine or Square (50/50 duty)			
Ground Isolation	40Vdc max			
EXTERNAL SYNC				
Phase Delay (max)	Series Connection : (20 + (N-2) × 20) ns, Parallel connection : (N-1) × 8 ns (N is the number of connected units)			
Maximum Number of Connected Units	Series Connection : 4, Parallel Connection : 8			
Applicable Functions	Sine, Square, Triangle, Pulse, Ramp, Harmonic, BFO, Sweep, Burst			
Storage/Retrieval	10 Groups of Setting Information			
Interface	USB (Optional), LAN, GPO			
Display	4.3 inch TFT LCD, 480 × 270 (300 × 270)			
GENERAL SPECIFICATIONS				
Power Source	AC100 ~ 240V, 50 ~ 60Hz			
Power Consumption	200W	200W	200W	200W
Operating Environment	Temperature to satisfy the specification : 10 ~ 35°C (Operating temperature : 0 ~ 40°C, Relative Humidity : 10 ~ 80%, 0 ~ 40°C) : 20% ~ 80% (Installation category : CAT 1)			
Operating Altitude	2000 meters			
Pollution Degree	IEC 60710 Degree 2, Volatile Use			
Storage Temperature	-10 ~ 30°C, Humidity : 10% ~ 80%			
Dimensions & Weight	250 (W) × 120 (H) × 375 (D)mm, Approx. 8kg			

Note : The specifications apply when the function generator is generated for at least 30 minutes under +25°C ± 5°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	× 1, CD-ROM with AFG software and user manual	× 1
CTL-Y10 BNC Cable	BNC(P/M)-BNC(P/M), 1000mm	× 1 (only AFG-3031/3021)
CTL-Y10 BNC Cable	BNC(P/M)-BNC(P/M), 1000mm	× 2 (only AFG-3032/3022)

OPTIONAL

AFG-3031	GPIB Interface	CRA-432	Rack Adapter Kit
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OPTIONAL ACCESSORIES

CTL-246	USB Type A to Type B cable
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FREE DOWNLOAD

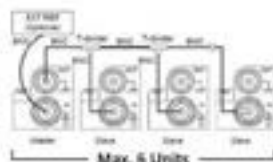
PC Software	Arbitrary Waveform Editing Software
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A CIRCUIT DESIGN FOR GROUND ISOLATION AMONG OUTPUT/INPUT TERMINAL, INSTRUMENT CHASSIS, AND DUAL CHANNELS



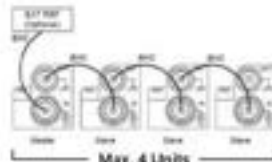
Channel 1, channel 2, reference 10 MHz input, synchronization and modulation input/output connector grounding are isolated from instrument chassis. The output channels of dual channel models are independently isolated. These connectors can sustain maximum isolation voltage up to $\pm 42\text{Vpk}$ (DC + 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 $\pm 5\text{V}$ 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 $\pm 42\text{Vpk}$ (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-18A/U) and T type BNC connector to connect up to 6 units to conduct synchronized phase operation.

Users can implement multi channel synchronized phase operation up to 6 units and 12 channels (AFG 3032/3022). There are two methods to execute synchronized phase applications. Under different frequency, master unit can synchronize each channel and modulate individual phase.



Method two uses reference frequency output (REF OUT) and reference frequency input (REF IN), 50 ohm BNC cable (RG-18A/U) to connect up to 4 units to conduct synchronized phase operation.

At 10 MHz reference frequency input (REF IN) connector, users can input 10 MHz atomic clock frequency standard via 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 tests on EMI power filter. Users can set order number and phase for harmonic signals to obtain desired signals. The above diagrams show 8th harmonic signal.

D PULSE GENERATOR



Pulse Generator



Pulse Signal

The output frequency for pulse reaches 25 MHz and its duty cycle is from 0.01% to 99.99%. 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.

E VERSATILE OUTPUT WAVEFORM SELECTIONS



Sine



Square



Triangle



Ramp



Pulse



Noise



DC Voltage



Arbitrary Waveform

MEDICAL APPLICATION WAVEFORMS (MFG-2020HMI excluded)



ECG



ECG1



ECG2



ECG3

AUTOMOTIVE ELECTRONIC WAVEFORMS (MFG-3320HM excluded)



Ignition



ISO1631-2 TP5A



ISO1631-2 TP5B



ISO1631-2 TP58

There are standard waveforms for the series such as sine, square, triangle, ramp, pulse, noise, DC voltage. In addition, 102 built-in waveforms, including medical application waveforms and

commonly used automotive electronic waveforms allow users to easily select desired waveforms.

F IQ BASEBAND WAVEFORM OUTPUT FUNCTION FOR AFG-3032/3032Z



FSK



MSK



PSK



QAM

The CH1 and CH2 of AFG-3032/32 provide the IQ baseband waveform outputs, which include ASK, MSK, FSK (2FSK, 4FSK, 8FSK), PSK (BPSK, QPSK, 8QPSK, 16QPSK), and QAM (BPSK, 4QPSK, 8QPSK, 16QPSK).

BPSK, APSK (16APSK, 32APSK), QAM (16QAM, 32QAM, 64QAM), etc. New IQ waveform commands are also available in the user manual.

G. MODULATION FUNCTION



Amplitude Modulation



Frequency Modulation



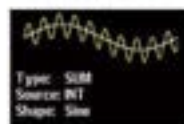
Phase Modulation



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.

H. SWEEP FUNCTION



Amplitude Sweep Setting



Amplitude Sweep Signal



Frequency Sweep Setting



Frequency Sweep Signal

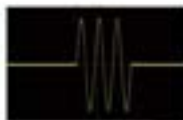
The series supports frequency sweep and amplitude sweep that can also integrate functions, including linear/logarithm, one-way (raw tooth)/two-way (triangle) waveforms, continuous/single trigger/gated trigger to meet various application requirements by different sweep methods. Frequency sweep carries 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.

I. BURST FUNCTION



Burst Setting



Burst Signal

The series supports N period or gated trigger. Phase angle, duration time, frequency, waveform infirior 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 45 built-in waveforms.

* Direct Waveform Reconstruction (DWR)



Direct Waveform Reconstruction from the DSO

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

* CSV file Upload

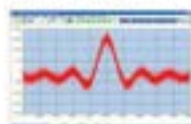
Start	End
0	1000000
Length	1000000
Sample Rate	1000000
0	1000000
1000000	1000000
2000000	1000000
3000000	1000000
4000000	1000000
5000000	1000000

Supports CSV file

File Name	Waveform1.csv
File Path	C:\Program Files\Agilent\AWRTE\
File Size	1000000
File Type	CSV
File Format	CSV
File Encoding	UTF-8
File Description	
File Author	
File Created	
File Modified	
File Deleted	
File Uploaded	

Support CSV file upload produced by MATLAB and Excel

* Arbitrary Waveform Editing PC Software



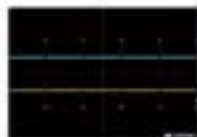
A Sine Waveform with Gaussian Noise



Digital Signal

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

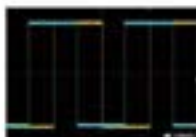
CORRELATED FUNCTIONS OF DUAL CHANNEL OUTPUTS



Differential Signal



Sine and Cosine Signal



Square Signal Phase Adjustment

AFG-3022/2022 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 effect for all parameters of dual channel. The example is amplifier using third order interpolation point (P3) 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



FEATURES

- Wide Frequency Range from 1μHz to 50/80MHz
- 1μHz Frequency Resolution Throughout Full Range
- Standard Waveform: Sine, Square, Triangle, Ramp, Pulse, Noise
- Built-In AM, FM, PWM, FSK, Sweep, Burst Functions
- 1kbit, 200MSa/s, 1M-Point Deep Arbitrary Waveform
- DSR (Direct Waveform Reconstruction) Capability
- Arbitrary Waveform Editing PC Software
- 4.3" High Resolution LCD Display
- GPIB, RS-232C, USB Host/Device Standard Interfaces

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 200MSa/s sample rate, 100MHz repetition rate by true point-to-point edit, 1k-bit vertical resolution and 1M-point waveform length is a very useful and flexible signal source to meet diversified application 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 waveform clip pricing through front-panel operation, the CSV file waveform data download, the direct waveform reconstruction through DSR 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 ∞-Ω to ensure right impedance compatibility between AFG and DUT.

SPECIFICATIONS		AFG-3081	AFG-3051
Waveform	Standard Waveform	Sine, Square, Ramp, Pulse, Noise, DC, Sawtooth, Superimposed Sine, Superimposed Pul, Negative Ramp	
Arbitrary Waveform	AWG Resolution	Built-in or 200 MSa/s	
	Sampling Rate	100MHz	
	Waveform Length	1M points	
	Amplitude Resolution	10 bits	
	Non-Volatile Memory	Two 1M waveforms *8	
Frequency Characteristics	Range	10Hz to 80MHz	
	Resolution	1μHz	
Accuracy	Frequency	±1 ppm (0 ~ 80%)	
	Amplitude	±1 ppm per 1 point	
Output Characteristics	Amplitude	10-volts to 10 Vpp (max 20V), 20-volts to 20 Vpp (open-circuit)	
	Accuracy	±1% of setting (1-volts to 10V), ±0.1% (10V to 20V)	
	Distortion	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Offset	±1 mV to ±10 V (max 20V), ±10V to ±10V (open-circuit)	
	Waveform Output	10-volts to 10 Vpp (max 20V), 20-volts to 20 Vpp (open-circuit)	
Sync Output	Accuracy	±1% of setting (1-volts to 10V), ±0.1% (10V to 20V)	
	Impedance	50Ω (typical), ∞Ω (load not connected)	
Waveform Characteristics		THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
Total Harmonic Distortion	THD	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Spurious (non-harmonic)	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Phase Noise	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Frequency	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Amplitude	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
Square Wave Characteristics	Rise/Fall Time	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Settling Time	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Overload	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Accuracy	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Waveform Duty Cycle	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
RAMP Characteristics	Linearity	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Frequency Accuracy	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Amplitude Accuracy	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Settling Time	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Overload	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
PULSE Characteristics	Amplitude	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Frequency	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Settling Time	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Overload	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Accuracy	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
AM Modulation	Carrier Waveform	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Modulating Waveform	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Modulating Frequency	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Depth	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Source	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
FM Modulation	Carrier Waveform	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Modulating Waveform	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Modulating Frequency	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Depth	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Source	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
PULSE	Carrier Waveform	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Modulating Waveform	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Modulating Frequency	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Depth	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	
	Source	THD: < 0.01% (10V to 20V), < 0.01% (10V to 20V), < 0.01% (10V to 20V)	

80MHz/50MHz Arbitrary Function Generator



AFC-3081/3051

Rear Panel



- *1. A total of ten waveforms can be stored (every waveform can composed of 100 points maximum)
- *2. Add 1/100 of output amplitude and offset specification per °C for operation outside of 0°C-25°C (range 7 year specification)
- *3. Slope time decreased at higher frequency
- *4. Sine and square waveforms above 20MHz are allowed only with an "Infinite" mode
- *5. Harmonic distortion and spurious noise at low amplitudes is limited by a 1% offset floor
- *6. Auto Download Times

	Binary Code		ASCII Code	
Spine	ON/OFF (ON/1) (OFF/0)	ON (Binary)	ON (ASCII)	
100 points	100 bits	20 bits	20 bits	
1000 points	1000 bits	200 bits	200 bits	
10000 points	10000 bits	2000 bits	2000 bits	
100000 points	100000 bits	20000 bits	20000 bits	
1000000 points	1000000 bits	200000 bits	200000 bits	
10000000 points	10000000 bits	2000000 bits	2000000 bits	
100000000 points	100000000 bits	20000000 bits	20000000 bits	
1000000000 points	1000000000 bits	200000000 bits	200000000 bits	
10000000000 points	10000000000 bits	2000000000 bits	2000000000 bits	

FUNCTIONS		AFC-3081	AFC-3051
FORM			
Carrier Waveform		Sine, Square, Triangle, Ramp, Pulse	
Waveform		Sine, Square, Triangle, Ramp, Pulse	
Internal Rate		1 kHz - 100 kHz	
Frequency Range		DC - 80 MHz	DC - 50 MHz
Source		Internal/External	
SWEEP			
Waveform		Sine, Square, Triangle	
Type		Linear or Logarithmic	
Source		Internal/External	
Sweeping Range		10 Hz - 80 MHz	10 Hz - 50 MHz
Sweep Time		1 ms - 100 s	
Trigger		Single, External, Internal	
Source		Falling edge of Start signal (Programmable frequency)	
Source		Internal/External	
BURST			
Waveform		Sine, Square, Triangle, Ramp	
Frequency		1 kHz - 80 MHz	1 kHz - 50 MHz
Burst Count		1 - 100000 cycles or infinite	
Start/Stop Phase		0.000 - 1.000	
Internal Period		1 ms - 100 s	
Gate Source		External, Trigger	
Trigger Source		Single, External or Internal Rate	
Trigger Delay		10 ns - 100 ms	10 ns - 10 ms
EXTERNAL MODULATION INPUT			
Type		For AM, FM, Sweep, PM	
Voltage Range		± 2V full scale	
Input Impedance		50 Ω	
Frequency		DC - 20 MHz	
EXTERNAL TRIGGER INPUT			
Type		For Pulse, Ramp, Sweep	
Input Level		75V, Compatible	
Shape		Rising or falling (programmable)	
Pulse Width		> 100 ns	
Input Impedance		50 Ω, 50 Ω input	
Latency		Source: 10 ns (typical), Ramp: 100 ns (typical)	
Filter		Square: 1 kHz (typical), Ramp: 100 Hz (typical)	
MODULATION OUTPUT			
Type		For AM, FM, Sweep, PM	
Amplitude		Range: 20 mV - 100 mV (typical)	
TRIGGER OUTPUT			
Type		For Burst, Sweep	
Level		75V, Compatible into 50 Ω	
Pulse Width		> 100 ns	
Maximum Rate		1 kHz	
Period		100 ns - 100 s	
Impedance		50 Ω	
MARKER OUTPUT			
Type		For AM, Sweep	
Level		75V, Compatible into 50 Ω	
Period		100 ns - 100 s	
Impedance		50 Ω	
Storage/Recall		10 Groups of Setting Memory	
Interface			
Interface		USB, RS-232C, USB Host/Device	
Display			
Display		4.3 inch TFT LCD (480 x 320) x 170	
SYSTEM CHARACTERISTICS			
Configuration Files		Function Change, Standard/Option, Pulse Width, Shift to Auto-Off	
Frequency Change		Frequency Change, Delay, Amplitude Change, Shift to Offset Change, Shift to Source	
Auto Download Times		Auto Download Times, Shift to 100 points, Modulation Change, Shift to Source	
Storage		Storage, Shift to 100 points, Shift to 100 points, Shift to 100 points	
GENERAL SPECIFICATIONS			
Power Consumption		10W	
Operating Environment		Temperature to satisfy the specification: 10 - 40 °C, Operating temperature: 0 - 40 °C, Relative humidity: 10% - 90%, 10 - 40 °C, 10% - 90%, 10 - 40 °C, 10% - 90%	
Operating Altitude		2000 meters	
Protection System		DC 42V (Input), 100V (Input), 100V (Input)	
Storage Temperature		0 - 40 °C, Humidity: 10%	
POWER SOURCE			
Power Source		AC/DC - 100V - 50 - 60Hz	
POWER CONSUMPTION			
Power Consumption		10W	
ENVIRONMENT & WEIGHT			
Size (mm)		144 (W) x 144 (H) x 104 (Depth), Approx. 4kg	

ORDERING INFORMATION

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

ACCESSORIES

- CD-ROM Manual - Software v. 1.1, Quick Start Guide v. 1.1, Power Cord v. 1.1, 100V 100W Load v. 1.1

OPTIONAL ACCESSORIES

- CTL-212 85-210V Cable
CTL-214 USB Cable, USB 2.0 A-B Type Cable, 4P
CTL-216 USB Cable, USB 2.0 A-B Type Cable, 4P
CTL-218 USB Cable, USB 2.0 A-B Type Cable, 4P
CTL-219 USB Cable, USB 2.0 A-B Type Cable, 4P
CTL-220 USB Cable, USB 2.0 A-B Type Cable, 4P
CTL-221 USB Cable, USB 2.0 A-B Type Cable, 4P

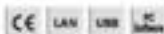
FREE DOWNLOAD

- PC Software: Arbitrary Waveform Editing Software

Multi-Channel Function Generator



MFC-2000 Series



FEATURES

- Maximum Five Output Channels
- Equivalent Performance Arbitrary Channels
Frequency: 1/4 to 100/100/100MHz
- RF Channel Frequency (AC/100/100): 10/100MHz
- Pulse Generator Frequency: 100Hz
- Power Amplifier: Low Frequency, 100-1000Hz, 20W
(20W limited by current setting)
- True Point by Point Output Arbitrary Waveform
Function: MFC-2220HM Sample Rate: 200MS/s,
Repetition Rate: 125MHz, Other models Sample
Rate: 200MS/s, Repetition Rate: 100MHz, 14-bit
Resolution, 1M Points Memory Depth
- Earth Ground Isolation Design Among I/O
Terminals and Instrument Chassis
(MFC-2220HM Excluded)
- Frequency Counter: 100MHz, 8-bit Frequency
Resolution
- AM/FM/PM/SSB/FSK/PSK/LSM/PWM
Modulation
- Built-in Medical and Automotive Electronic
Waveforms
- USB Host/USB Device/LAN/MFC-2220 only
- 4.3 Inch TFT Color Display

MFC-2220HM Rear Panel



MFC-2250MRA Rear Panel



The MFC-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 100MHz 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 F1 models, which extend from the basic single-channel AFG with pulse generator models to five-channel models as in totally various educational and industrial applications.

The AFG channel of the MFC-2000 series outputs sine, square, and triangle, etc. The series features true point by point output arbitrary waveform characteristics of 200 MS/s sample rate, 100MHz waveform repetition rate, 14-bit resolution, and 1M points memory depth. The MFC-2220HM offers up to 150MS/s sample rate and 125MHz repetition rate. Some models provide various modulation methods such as AM/FM/PM/SSB/FSK/PSK/LSM. Sweep, Burst, Trigger, 150MHz Frequency Counter and 25MHz pulse generator 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), features various modulations, Sweep, and digital modulations such as ASK and PSK and its sine wave frequency is up to 330MHz. 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, 100W, 140-1000Hz bandwidth, and distortion less than 0.1% can be applied to the audio application.

The overall design of the MFC-2000 series (MFC-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 $\pm 42V_{pk}$ (DC + AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit outputs can be executed without bothering 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 $\pm 42V_{pk}$ to meet the requirements of higher DC bias voltage such as automotive and educational applications.

The AFG of the MFC-2000 series collocating with AWES (Arbitrary Waveform Editing Software) allows users to easily and quickly edit arbitrary waveforms. DWR (Direct Waveform Reconstruction) allows users to collocate with CDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction. 162 built-in waveforms allow users to edit arbitrary waveforms and to output the whole segment or divided segments.

With the multi-functionality channels, the MFC-2000 series provides different industrial sectors with special dual-channel waveforms, IQ modulation signals, low-frequency vibration simulation, automotive sensors, medical applications (MFC-2220HM excluded), AM/FM broadcast signals, PWM motor or fan control signals, pulse synchronized signals, pulse noise, 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.

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

Channel 1	100MHz Max 100MHz 200MHz sine	40/10/10/10/10/10 Pulse Source, Sweep, Trigger Frequency Counter	20W PPA
Channel 2	100MHz Max 100MHz 200MHz sine		
RF Channel	100MHz Max 100MHz 200MHz sine		
Pulse Generator	25MHz Full Function pulse generator (Frequency Modulation, Cycle, Rise and Fall Edge adjustable)		
Power Amplifier	20W Power Amplifier (20W/10W/40W/100W/1000W/1000W/1000W/1000W/1000W)		

* PPA, PPA are standard equipped in MFC-2220HM.

SIGNAL SOURCES

SIGNAL SOURCES

SPECIFICATIONS

FREQUENCY CHARACTERISTICS	Range	Sine, 1 kHz - 100 MHz (DUT, 1 kHz - 100 MHz) for MFC-2000H4 ; 1 kHz - 100 MHz (DUT) / 1 kHz - 100 MHz (DUT) for MFC-2000H4
	Resolution	Square: 250 Hz (min); Triangle: Ramp: 1 MHz
OUTPUT CHARACTERISTICS	Amplitude (into 50 Ω)	100 mV to 1 Vpp (MFC-2000H4) / 100 mV to 1 Vpp (MFC-2000H4)
	Accuracy	±1% of setting ±1 mV (into 50 Ω) without DC offset
OFFSET CHARACTERISTICS	Accuracy	±1 mV (into 50 Ω)
	Offset	±100 mV (into 50 Ω) / ±100 mV (into 50 Ω) / ±100 mV (into 50 Ω) / ±100 mV (into 50 Ω) / ±100 mV (into 50 Ω)
SINE WAVE CHARACTERISTICS	Impedance	50 Ω (typical) / 100 Ω (typical) / 100 Ω (typical)
	Harmonic Distortion	±1% (typical) / ±1% (typical) / ±1% (typical)
SQUARE WAVE CHARACTERISTICS	Total Harmonic Distortion	±1% (typical) / ±1% (typical) / ±1% (typical)
	Rise/Fall Time	±10 ns (typical) / ±10 ns (typical) / ±10 ns (typical)
BAND CHARACTERISTICS	Overload	±100 mV (into 50 Ω) / ±100 mV (into 50 Ω) / ±100 mV (into 50 Ω)
	Variable Duty Cycle	±10% (typical) / ±10% (typical) / ±10% (typical)
MODULATION CHARACTERISTICS	Linearity	±1% (typical) / ±1% (typical) / ±1% (typical)
	Modulation Type	AM, FM, PM, FM/PM (The detail same as DUT modulation specification)
PSK (MFC-2000H4 also provided)	Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
ASK (MFC-2000H4 also provided)	Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb

POWER AMPLIFIER

POWER AMPLIFIER	Input Impedance	50 Ω
	Input Voltage	1.230 Vpp
	Working Mode	Constant Voltage
	Gain	20 dB
	Output Power (R=50 Ω)	10 W (Square)
	Output Voltage	2.230 Vpp
	Output Current	1.414 A
	Rise/Fall Time	±10 ns
	Full Power Bandwidth	100 Hz - 100 MHz
	Overload	±100 mV (into 50 Ω) / ±100 mV (into 50 Ω) / ±100 mV (into 50 Ω)
	Total Harmonic Distortion	±1% (typical) / ±1% (typical) / ±1% (typical)
	Ground Isolation	±100 mV (into 50 Ω) / ±100 mV (into 50 Ω) / ±100 mV (into 50 Ω)

ADVANCED FUNCTIONS

AM MODULATION	Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
FM MODULATION	Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
PM	Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
SUM	Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
PSM	Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
FSK	Carrier Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Modulating Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
SWEEP	Waveform	Sine, Square, Triangle, Ramp, Pulse, Arb
	Type	Linear or Logarithmic
	Sweep Direction	Up or Down
	Sweep Time	100 ns to 100 ms

Multi-Channel Function Generator

SPECIFICATIONS

	Source	Internal / External
	Trigger	Single, Internal, Internal
	Marker	Marker signal on rising edge programming
	Event	Internal / External
BURST	Waveforms	Sine, Square, Triangle, Ramp
	Frequency	Max Frequency 250kHz (sine, square), 1MHz (triangle, ramp)
	Pulse Count	1 - 1000000 Cycles or infinite
	Bursting Phase	0.001° - 360°
	Internal Frequency	1 Hz - 500 Hz
CLOCK SOURCE	Gate Source	Internal, Trigger
	Trigger Source	Single, Internal, Internal
TIMING DELAY	MCycle, nSec	80 - 100 s
EXTERNAL TIMING INPUT	Type	For TTL, RS-485, RS-422
	Input Level	TTL Compatible
	Pulse Width	Rising or falling (infinite)
	Input Impedance	1MΩ, DC coupled
EXTERNAL MODULATION INPUT	Type	For FM, PM, AM, DTMF
	Voltage Range	±1V to 10V
	Input Impedance	1MΩ
	Ground Isolation	DC - 20MHz (MFC-2200HM, DC - 100kHz) AC 100kHz (MFC-2200HM isolated)
TIMING OUTPUT	Type	For RS-485, RS-422, RS-423
	Level	TTL Compatible into 50Ω
	Pulse Width	Rising or falling (infinite)
	Maximum Rate	100kHz
	Impedance	50Ω Typical
REFERENCE INPUT (MFC-2200HM only)	Input Voltage	0.1Vpp to 10Vpp
	Output Impedance	10Ω, unbalanced, AC coupled
	Output Frequency	30.343MHz ± 100Hz
REFERENCE OUTPUT (MFC-2200HM only)	Waveform	Sine or Square (30.343kHz)
	Output Voltage	1.7Vpp square wave
	Output Impedance	50Ω, AC coupled
FREQUENCY COUNTER	Range	0.1Hz - 100MHz
	Accuracy	Time Base accuracy (internal)
	Time Base	±0.001% (20 Hz to 100 kHz)
	Resolution	1Hz (maximum resolution is 100Hz for 100 Hz to 100MHz)
	Input Impedance	1MΩ (typical)
	Sensitivity	20mVrms - 30Vrms (20Hz - 100MHz)
	Ground Isolation	AC 100kHz (MFC-2200HM isolated)
Dual Channel Function (Only 2200)	Phase	180° - 180° Synchronous phase
	Lock	200kHz
	Coupling	Frequency (Ratio or Difference, Amplitude & DC Offset)
	Display	1
OTHER	Bandwidth	10 Groups of 100MHz
	Interface	LAN (RJ-45), SATA (Serial ATA), USB
	Display	3.5 inch TFT LCD, 800 x 480 x 320
GENERAL SPECIFICATIONS	Power Source	AC 100-240V, 50-60Hz
	Power Amplifier Source	10W (typical), AC 100-1000V (20-240V), 50-60Hz (MFC-2200HM, MFC-2200MA, MFC-2200HM only)
	Power Consumption	40W at 100V (typical power amplifier)
	Operating Environment	Temperature to satisfy the specification: 10° - 35°C, Operating temperature: 0° - 40°C, Relative humidity: 10% - 90% (5° - 40°C), 10% - 90% (5° - 40°C), Humidity (category 1) 10% - 90%
	Operating Altitude	3000m
ACCESSORIES	Relay Output	100V (typical), 100mA (typical)
	Storage Temperature	-40° - 70°C, nonoperating: -55° - 100°C
	Dimensions & Weight	200mm x 100mm x 100mm (typical) Approx. 2.0kg

The specification applies when the function generator is powered on for at least 30 minutes under 20°C ± 5°C.
 Note: (1) A total of two functions can be stored. (Only waveform can be processed at a maximum of 100 points)
 (2) AM: 100V of output amplitude and other specifications are for operation under 100V of AC input
 (3) Power specification
 (4) DC offset is zero
 (5) See specification for RF Generator (MFC-2200)
 (6) See specification for RF Generator (MFC-2200)

ORDERING INFORMATION

MFC-2110	100kHz Single Channel Arbitrary Function Generator with Pulse Generator
MFC-2120	200kHz Single Channel Arbitrary Function Generator with Pulse Generator
MFC-2120MA	200kHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, Power Amplifier
MFC-2130M	300kHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFC-2160MF	600kHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 100MHz RF Signal Generator
MFC-2160MA	600kHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 100MHz RF Signal Generator, Power Amplifier
MFC-2130M	300kHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFC-2160M	600kHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFC-2160MA	600kHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 100MHz RF Signal Generator, Power Amplifier
MFC-2160MA	600kHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 100MHz RF Signal Generator, Power Amplifier
MFC-2200HM	200MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation

ACCESSORIES

Quick Start Guides	1. CD-ROM with MFC Software and User Manuals
CTA-101	80V Adapter Test Lead 1 (MFC-2110/2120/2130/2160/2160MA/2200HM)
CTA-101	80V Adapter Test Lead 2 (MFC-2200MA/2200HM/2200MA/2200HM)
CTA-101	80V Adapter Test Lead 3 (MFC-2200HM)

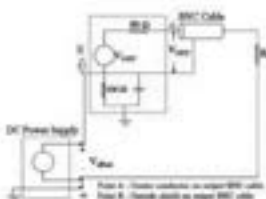
OPTIONAL ACCESSORIES

CTA-101	100V Type B to Type B cable
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FREE DOWNLOAD

PC Software	Arbitrary Waveform Editing Software
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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 $\pm 42V_{pk}$ (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 $\pm 42V_{pk}$ (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit setups can be executed without fearing 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 $\pm 5V$ under 50 μm load. An external power supply can be used to bring up the DC bias voltage to $\pm 42V_{pk}$ (DC+ AC peak value) for higher DC bias applications.

($\neq$ MFG-2220-4M 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.

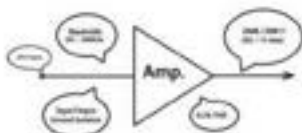
The pulse width can be fine-tuned to the minimum of 20ns and the leading/trailing edge times can be set independently to the minimum of 10ns.

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 arbitrary waveform function supports 200 MHz sample rate, 100MHz waveform repetition rate, 14 bit resolution, 16k point memory depth, frequency sweep and various modulation methods such as AM/FM/PM/PSK/QAM/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 oscillators.

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.

Multi-Channel Function Generator

I VERSATILE OUTPUT WAVEFORM SELECTIONS



Sine



Square



Triangle



Ramp



Pulse



Noise



DC Voltage

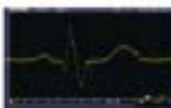


Arbitrary Waveform

MEDICAL APPLICATION WAVEFORMS (MFC-1220HM Excluded)



Cardiac



ECG1



ECG2



ECG3

AUTOMOTIVE ELECTRONIC WAVEFORMS (MFC-1220HM Excluded)



Ignition



ISO1612-2 TP1A



ISO1612-2 TP1B



ISO1612-2 TP2B

There are standard waveforms for the series such as sine, square, triangle, ramp, pulse, noise, DC voltage. In addition, 102 built-in waveforms, including medical application waveforms and

commonly used automotive electronic waveforms allow users to easily select desired waveforms.

II VARIOUS MODULATION FUNCTION



Amplitude Modulation



Frequency Modulation



Phase Modulation



Pulse Width Modulation



Frequency Shift Keying Modulation



Amplitude Shift Keying Modulation



Phase Shift Keying Modulation



Sum Modulation

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.

G. SWEEP FUNCTION



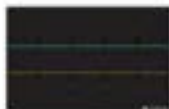
The series supports frequency sweep that can also integrate other functions, including linear/logarithmic and INTR/EXT/manual trigger to meet various application requirements. Frequency sweep carries out tests on the frequency response of electronic components such as filter and low frequency amplifier.

H. BURST FUNCTION



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

I. 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/2220M/2240M/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 measurement of two different frequency oscillator 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 speaker distortion tests.

J. 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 100 built-in waveforms.



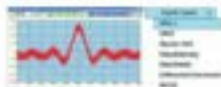
Direct Waveform Reconstruction

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)



CSV File Upload

Support CSV file upload produced by MATLAB and Excel.



Arbitrary Waveform Editing PC Software

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

K. 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



FEATURES

- Wide Frequency Ranges From 1 μ Hz – 25MHz (sine wave)
- 1 μ Hz Resolution in Full Range
- Built-in Standard 12MSa/s, 10M, 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 Interface for Remote Control and Waveform Editing

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 10Vpp-output amplitude, 25MHz frequency bandwidth with 1 μ Hz 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 waveform, user can edit the 4k built-in waveforms or create a whole new one. Moreover, AFG-2225 carries features of AM/FM/PM/FSK/SUM Modulation, Sweep, Burst and Frequency Counter, which can be applied to various communication fields.

In addition to the intuitive and user-friendly 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.

SPECIFICATIONS		CH1	CH2
WAVEFORMS		Sine, Square, Ramp, Pulse, Noise, ARB	
ARBITRARY FUNCTION		Sample Rate: 120MSa/s Repetition Rate: 400Hz Waveform Length: 4k points Amplitude Resolution: 10 bits Non-volatile Memory: 4k points	
FREQUENCY CHARACTERISTICS		Range: Sine/Square: 1 μ Hz – 25MHz Ramp: 10Hz Resolution: 1 μ Hz Accuracy: $\pm 0.05\%$ Stability: ± 1 point, per 1 year Aging: ± 1 point Tolerance: ± 1 point	
OUTPUT CHARACTERISTICS		Amplitude Range: 1mVpp–10Vpp (into 50 Ω); 1mVpp–20Vpp (open circuit) 1mVpp–5Vpp (into 50 Ω for 20MHz–25MHz) 2mVpp–10 Vpp (open circuit for 20MHz–25MHz) a1% of setting $\pm 0.05\%$ (1MHz into 50 Ω without DC offset) 1mV ± 3 digits a1% (0.1Hz) $\pm 0.05\%$; $\pm 1\%$ (0.1 μ Hz) $\pm 0.05\%$; $\pm 0.5\%$ (0.1 μ Hz) $\pm 0.05\%$; a10% (0.01Hz) $\pm 0.05\%$ (sine wave relative to 1mV/10mV 50 Ω) 70pp, 10mV, 0.0mV Offset Range: ± 10 Vpp ± 0.1 points 50 Ω ; ± 10 Vpp ± 0.1 points (open circuit) a2.5Vpp ± 0.1 (into 50 Ω) for 20MHz–25MHz a1Vpp ± 0.1 points (open circuit) for 20MHz–25MHz 2% of setting–30mV $\pm 0.1\%$ of amplitude 50 Ω typical (load); $> 10M\Omega$ (output disabled) Short circuit protected; Overload relay automatically disables main output	
SINE WAVE CHARACTERISTICS		Harmonic Distortion: ≤ 5 dBc, DC–200kHz, Ampl = 0.1Vpp; 30 dBc, 200kHz–1MHz, Ampl = 0.1Vpp ≤ 5 dBc, 1MHz–5MHz, Ampl = 0.1Vpp; 30 dBc, 1MHz–25MHz, Ampl = 0.1Vpp	
SQUARE WAVE CHARACTERISTICS		Rise/Fall Time: ≤ 25 ns at maximum output (into 50 Ω load) Overshoot: $\leq 5\%$ Asymmetry: $\leq 1\%$ of period ± 5 ns Variable Duty Cycle: 1.0%–99.9% $\pm 0.0004\%$; 10.0%–90.0% $\pm 0.004\%$; 50.0% $\pm 0.004\%$	
RAMP CHARACTERISTICS		Linearity: $\leq 0.1\%$ of peak output Variable Symmetry: 0%–100% (0.1% Resolution)	
PULSE CHARACTERISTICS		Period: 40ns – 200 μ s Pulse Width: 20ns – 199.9 μ s Overshoot: $< 1\%$ Jitter: 20ps ± 1 ns	
AM MODULATION		Carrier Waveform: Sine, Square, Ramp, Pulse, ARB Modulating Waveform: Sine, Square, Triangle, Triangle, Ramp, Noise Modulating Frequency: 0.01Hz – 20kHz (10%) Depth: DC – 200% (0.01) 0% – 100% Source: Internal / External	Carrier Waveform: Sine, Square, Ramp, Pulse, ARB Modulating Waveform: Sine, Square, Triangle, Triangle, Ramp, Noise Modulating Frequency: 0.01Hz – 20kHz (10%) Depth: DC – 200% (0.01) 0% – 100% Source: Internal / External



AFG-2225

SPECIFICATIONS		
	CH1	CH2
FM MODULATION		
Carrier Waveform	Sine, Square, Ramp	Sine, Square, Ramp
Modulating Waveform	Sine, Square, Triangle, Up/Down, Decaying	Sine, Square, Triangle, Up/Down, Decaying
Modulating Frequency	20Hz ~ 250kHz (INT); DC ~ 250kHz (EXT)	20Hz ~ 250kHz (INT); DC ~ 250kHz (EXT)
Peak Deviation	DC ~ Max Frequency	DC ~ Max Frequency
Source	Internal / External	Internal / External
FM		
Carrier Waveform	Sine, Square, Ramp	Sine, Square, Ramp
Modulating Waveform	Sine, Square, Triangle, Up/Down, Decaying	Sine, Square, Triangle, Up/Down, Decaying
Modulating Frequency	20Hz ~ 250kHz (INT); DC ~ 250kHz (EXT)	20Hz ~ 250kHz (INT); DC ~ 250kHz (EXT)
Phase Deviation	0° ~ 360°	0° ~ 360°
Source	Internal / External	Internal / External
FSK		
Carrier Waveform	Sine, Square, Ramp, Pulse	Sine, Square, Ramp, Pulse
Modulating Waveform	50% duty cycle square	50% duty cycle square
Modulating Frequency	20Hz ~ 100kHz (INT); DC ~ 100kHz (EXT)	20Hz ~ 100kHz (INT); DC ~ 100kHz (EXT)
Phase Deviation	1μHz ~ Max Frequency	1μHz ~ Max Frequency
Source	Internal / External	Internal / External
SRG		
Carrier Waveform	Sine, Square, Ramp, Pulse, Noise	Sine, Square, Ramp, Pulse, Noise
Modulating Waveform	Sine, Square, Triangle, Up/Down, Decaying	Sine, Square, Triangle, Up/Down, Decaying
Modulating Frequency	20Hz ~ 250kHz (INT); DC ~ 250kHz (EXT)	20Hz ~ 250kHz (INT); DC ~ 250kHz (EXT)
Phase Deviation	0° ~ 360°	0° ~ 360°
Source	Internal / External	Internal / External
SWEEP		
Waveform	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 ~ 300s	1ms ~ 300s
Source	Internal / External/Manual	Internal / External/Manual
SRG		
Waveform	Sine, Square, Ramp	Sine, Square, Ramp
Frequency	1μHz ~ 100kHz (sine, square)	1μHz ~ 100kHz (sine, square)
Burst Count	1 ~ 1000 cycles or infinite	1 ~ 1000 cycles or infinite
Start/Stop Phase	180° ~ 360°	180° ~ 360°
Internal Period	1ms ~ 300s	1ms ~ 300s
Clock Source	External Trigger	External Trigger
Trigger Source	Single, External or Internal Rate	Single, External or Internal Rate
In Cycle, Infinite	2s ~ 40000ms	2s ~ 40000ms
FREQUENCY COUNTER		
Range	10Hz ~ 100MHz	
Accuracy	Time Base accuracy: ±10ppm	
Time Base	±25ppm (25°C ±1°C) after 24 minutes warm up	
Resolution	The minimum resolution is: 500Hz for 10Hz, 5.19Hz for 100MHz	
Input Impedance	1MΩ/1pF	
Sensitivity	20mVrms ~ 900mV (50Ω ~ 100MΩ)	
DUAL CHANNEL FUNCTION		
Phase	-180° ~ 180°; Synchronous phase	-180° ~ 180°; Synchronous phase
Tracking	CH1-CH2	CH1-CH2
Coaxing	Frequency/Rate or Difference/Amplitude & DC Offset	Frequency/Rate or Difference/Amplitude & DC Offset
ESClv	✓	✓

Rear Panel



SPECIFICATIONS		
	CH1	CH2
EXTERNAL TRIGGER INPUT		
Type	For Pk, Burst, Sweep	
Input Level	TTL, Compatibility	
Pulse Width	Rising or Falling(Selectable)	
Input Impedance	≥100ns 10kΩ, DC coupled	
EXTERNAL MODULATION INPUT		
Type	For AM, FM, PM, SSB	
Voltage Range	±2V full scale	
Input Impedance	10kΩ	
Frequency	DC ~ 20kHz	
TRIGGER OUTPUT		
Type	For Burst, Sweep, Arb	
Level	TTL, Compatible into 50Ω	
Pulse Width	≥100ns	
Maximum Rate	100Hz	
Pin-out	At TTL Level	
Impedance	200Ω typical	
SAVE/RECALL		
10 Groups of Testing Memories		
INTERFACE		
USB (Host & Device)		
DISPLAY		
3.5" TFT LCD		
POWER SOURCE		
AC100-240V, 50-60Hz		
POWER CONSUMPTION		
21W (Max.)		
OPERATING ENVIRONMENT		
Temperature to satisfy the specification: 15~25°C, Operating temperature: 0~40°C, Relative Humidity: 40%~90%, 0~100%, 15~40°C Installation category: CAT II		
OPERATING ALTITUDE		
3000 meters		
STORAGE TEMPERATURE		
-10~70°C, Humidity: 5~95%		
DIMENSIONS & WEIGHT		
266(W)×100(H)×215(D) mm ; Approx. 2.1 kg		

* The specifications apply when the function generator is powered on for at least 30 minutes under +15°C ~ 25°C.

ORDERING INFORMATION

AFG-1225 25MHz True Dual Channel Arbitrary Function Generator

ACCESSORIES

User Manual CD x 1, Quick Start Manual x 1, CAT-101 Test Lead x 3, Power Cord x 1

OPTIONAL ACCESSORIES

GT1-110 BNC Cable, BNC (P/M) BNC/FIM, 1000cm

GT1-204 USB Cable, USB 2.0 Type A ~ Type B, 4ft

FREE DOWNLOAD

PC Software Arbitrary Waveform Editing Software

25MHz/12MHz/5MHz Arbitrary Function Generator



AFG-2105/2112/2125



AFG-2005/2012/2025



FEATURES

- 0.1Hz ~ 5/12/25 MHz with 0.1Hz Resolution
- Sine, Square, Ramp, Noise and Arbitrary Waveform
- 20MS/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 Other Key Setting Information Shown on the 3.5" LCD Screen Simultaneously
- AM/FM/FSK Modulation, Sweep, and Frequency Counter Functions (AFG-2100 only)
- USB Device Interface for Remote Control and Waveform Editing
- PC Arbitrary Waveform Editing Software

The AFG-2100/2000 Series Arbitrary Function Generator is a DDS (Direct Digital Synthesis) 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 20MS/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) waveform 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/FSK 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 logical 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 signal output.

SPECIFICATIONS

	AFG-2105	AFG-2112	AFG-2125	AFG-2005	AFG-2012	AFG-2025
Waveform(s)	Sine, Square, Ramp, Noise, Arbitrary Waveform					
ARBITRARY FUNCTION						
Sample Rate	20MS/s					
Repetition Rate	10MS/s					
Waveform Length	4k points					
Amplitude Resolution	10 bit					
FREQUENCY CHARACTERISTICS						
Range	Sine/Square	0.1Hz~5MHz, 0.1Hz~12MHz, 0.1Hz~25MHz				
	Ramp	0.1Hz ~ 10kHz				
Resolution	0.1Hz					
Accuracy	±0.2ppm					
Stability	±1 ppm per 1 year					
Aliasing	±1 ppm per 1 year					
Spurious	-130dBc					
INPUT CHARACTERISTICS						
Amplitude	Range	±20mV ~ 1Vpp-10Vpp-50V, 2Vpp-20Vpp-50V (50Ω), 5Vpp-50Vpp-50V (100Ω), 20Vpp-10Vpp-50V (50Ω)				
	Accuracy	±2% of setting ±10Vpp (50Ω, 100Ω) 50Vpp without DC offset				
	Resolution	1mVrms 10Vrms				
Offset	Range	±10V ac-±10V (50Ω), ±10V ac-±50V (50Ω), ±10V ac-±10V (100Ω), ±10V ac-±50V (100Ω) for 20MHz~25MHz, ±10V ac-±50V (50Ω) for 20MHz~25MHz				
	Accuracy	±2% of setting ±10V (50Ω), ±10V ac-±50V (50Ω)				
	Impedance	50Ω nominal				
SYNC Output	Level	TTL compatible (max 1V)				
	Impedance	50Ω nominal				
	Rise or Fall Time	5.7ns				
SINE WAVE CHARACTERISTICS						
Harmonic Distortion	10 dBm	DC ~ 200kHz, Amplitude > 0.1Vpp, 20 dBm, 200kHz ~ 1MHz, Amplitude > 0.1Vpp				
	31 dBm	1MHz, Amplitude > 0.1Vpp, 31 dBm, 30kHz ~ 25MHz, Amplitude > 0.1Vpp				
SQUAREWAVE CHARACTERISTICS						
Rise/Fall Time	0.2ns at maximum output (into 50Ωload)					
Duty Cycle	~ 5%					
Asymmetry	1% of period / ns					
Variable Duty Cycle	1%~99.9% (100kHz), 20.0%~80.0% (1MHz), 40.0%~60.0% (10MHz), 50% (25MHz)					
RAMP CHARACTERISTICS						
Linearity	±0.1% of peak output					
Variable Symmetry	20% (100kHz) 1% Resolution					
FM MODULATION						
Carrier Waveform	Sine, Square, Triangle					
Modulating Waveform	Sine, Square, Triangle					
Modulating Frequency	2 kHz to 20 kHz (Sine), DC-20kHz (Sine)			—		
Depth	0%~100%					
Source	Internal/External					
FM MODULATION						
Carrier Waveform	Sine, Square, Triangle					
Modulating Waveform	Sine, Square, Triangle					
Modulating Frequency	2 kHz to 20 kHz (Sine), DC-20kHz (Sine)			—		
Deviation	0% to Max Frequency					
Source	Internal/External					

25MHz/12MHz/5MHz Arbitrary Function Generator

AFG-2000 Series Rear Panel



AFG-2100 Series Rear Panel



SPECIFICATIONS						
Model	AFG-2105	AFG-2112	AFG-2125	AFG-2005	AFG-2012	AFG-2025
SWEEP						
Waveform	Sine, Square, Triangle Linear or Logarithmic					
Start/Stop Frequency	0.1Hz to 25MHz					
Sweep Time	10ms-100ms					
Source	Internal/External					
FSK						
Carrier Waveform	Sine, Square, Triangle					
Modulating Waveform	0.1Hz to 25MHz					
Modulation Rate (Frequency Range)	0.1Hz-100Hz (0.1Hz-100Hz (Hz))					
Source	Internal/External					
FREQUENCY COUNTER						
Range	1Hz-100MHz					
Accuracy	True RMS accuracy ± 0.01%					
Time Base	100ns to 100ms					
Resolution	100ns to 100ms					
Input Impedance	1MΩ typ					
Sensitivity	10mVrms-200mVrms (1Hz-100MHz)					
STORAGE/WEIGHT						
10 Groups of Setting Memory						
INTERFACE						
USB (Type A)						
Display						
LCD						
POWER SOURCE						
AC100-240V 50-60Hz						
POWER CONSUMPTION						
20W						
OPERATING ENVIRONMENT						
Temperature to satisfy the specification: 10-30°C, Operating temperature 0-40°C, Relative humidity: 10-90%, 0-40°C, 45-90%, 10-40°C, Humidity category: CAT 3						
OPERATING ALTITUDE						
≤2000 meters						
STORAGE TEMPERATURE						
-10-50°C, Humidity: 0-90%						
DIMENSIONS & WEIGHT						
260(W)×101(H)×110(D) mm, Approx. 2.2 kg						
ORDERING INFORMATION						
AFG-2005 5MHz Arbitrary Function Generator						
AFG-2105 5MHz 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) x 1, Quick Start Guide x 1, Power cord x 1						
AFG-2100 Series: CTL-100 Test Lead x 1, Instruction Manual x 1, Power cord x 1						
AFG-2000 Series: CTL-100 Test Lead x 1, Instruction Manual x 1, Power cord x 1						
OPTIONAL ACCESSORIES						
CTL-100 USB Cable, USB 2.0 Type A - Type B, 4P						
CTL-110 BNC Cable, BNC (P/M)-BNC (P/M), 1000mm						
FREE DOWNLOAD						
PL Software Arbitrary Waveform Editing Software						
Driver USB Driver						

SELECTION GUIDE

MODEL	AFG-2005	AFG-2105	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/PM MODULATION	✓	✓	✓	✓	✓	✓
FREQ COUNTER	✓	✓	✓	✓	✓	✓

DIRECT DIGITAL SYNTHESIZED (DDS) FUNCTION GENERATOR OVERVIEW

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

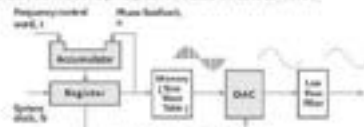


Figure 1 Block Diagram of DDS

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 time 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 memory, an address n in the memory selects the K_n data. Meanwhile the address n is fed back as part of the phase feedback to be added with K . Repeat the above steps, the $2K_n$, $3K_n$, and eventually a wave data is sent to construct a complete sine wave. The time base is the system clock f_0 . Compared with the conventional function generator (produced in the linear 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_0 . 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	SFC-100	SFC-101
Technology	CMOS	CMOS
Driving Channel	1	1
Frequency Range	0.1Hz ~ 20MHz	0.1Hz ~ 20MHz
Frequency Resolution	0.1Hz	0.1Hz
Sample Rate	-	-
Regulation Rate	-	-
Vertical Resolution	-	-
Memory Length	-	-
Amplitude Range (@50V)	100mV	100mV
DC Offset (@50V)	±0.5V (AI/CO)	±0.5V (AI/CO)
Attenuator	att0dB	att0dB
Amplitude Unit	-	Vpp
Impedance Switch	50Ω	50Ω
Square Rise/Fall Time	25ns	25ns
Square Duty Cycle	25% ~ 75%	25% ~ 75%
Size	V	V
Square	V	V
Triangle/Ramp	V	V
Pulse	-	-
Sine	-	-
Acute	-	-
CWDS Output	-	-
TTL Output/Time Output	-	-
Storage	-	-
AW/Arbitrization	-	-
FM	-	-
FM	-	-
FSK	-	-
PSK	-	-
QAM	-	-
LC/F Function	-	-
LC/F Function	-	-
Carrier Function	-	-
Ext. Trigger Input	-	-
Ext. Modulation Input	-	-
Trigger Output	-	-
Modulation Output	-	-
Marker Output	-	-
CPU	-	-
USB Host	-	-
USB Device	-	-
RS-232C	-	-
Display	8-digits LED	8-digits LED
Voltage Display	V	V
ESD Link	-	-
Internal Storage Memory	-	-
Self-Test (Error)	-	-
Power Source	AC 110V/220V/240V/10%	AC 110V/220V/240V/10%
Power Consumption	-	-
Page	C28	C28

3 MHz DDS Function Generator



SFC-1003/1013 (3MHz)



FEATURES

- DDS Technology and FPGA Design
- Frequency Range (0.1Hz ~ 3MHz)
- High Frequency Accuracy: 20ppm
- High Frequency Stability: 20ppm
- Max. Frequency Resolution: 100 mHz
- Low Distortion Sine Wave (-55dBc, 0.1Hz-200 kHz)
- Voltage Display (Only SFC-1013)

SELECTION GUIDE

Function	SFC-1003	SFC-1013
Frequency	0.1 MHz ~ 3 MHz	0.1 MHz ~ 3 MHz
Offset	✓	✓
TTL Output	✓	✓
-40dB Attenuation	✓	✓
Voltage display	—	✓

SPECIFICATIONS

MAIN	
Output Function	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	20ppm
Frequency Accuracy	20ppm
Aging	15ppm/year
Amplitude Range	2mVp-p ~ 10Vp-p (into 50Ω load)
Amplitude Accuracy	±0.5% at maximum position (only SFC-1013)
Impedance	50Ω (±10%)
Attenuator	40dB (fixed)
DC Offset	< 1V ~ > 1V (into 50Ω load)
Duty Control Range	10% ~ 90% below 1MHz (for square wave only)
Display	5-Digits LED display
Output Control	ON/OFF selector
SINE WAVE	
Harmonics Distortion	Maximum Amplitude attenuation to 1/10 of any panel settings, TTL OFF
	2: -45dB, 0.1Hz ~ 200kHz 3: -40dB, 0.2MHz ~ 200kHz 4: -35dB, 200kHz ~ 3MHz 5: -30dB, 0.1Hz ~ 100kHz 6: -25dB, 100kHz ~ 200kHz 7: -20dB, 200kHz ~ 300kHz
Flatness (at maximum amplitude relative to 1Vrms)	
TRIANGLE WAVE	
Linear	0.1Hz ~ 0.1Hz ~ 100kHz ; 0.1Hz, 100kHz ~ 100kHz
SQUARE WAVE	
Symmetry	1% of period-Avg, 0.1Hz ~ 100kHz
Rise or Fall Time	< 100ns at maximum output (into 50Ω load)
TTL OUTPUT	
Level	2.7Vp-p
For Out	20 TTL load
Rise or Fall Time	< 20ns
GENERAL	
Operation Environment	Indoor use, altitude < 2000m Ambient Temperature: 0°C ~ 40°C Relative Humidity: < 80% at 0°C ~ 40°C up to 90% at 30°C ~ 40°C Pollution category II Pollution Degree 2
POWER SOURCE	
	AC 100V/120V/220V/240V 50Hz/60Hz
STORAGE CONDITION	
Temperature	-10°C ~ 70°C
Humidity	70% (Maximum)
DIMENSION & WEIGHT	
	207(W) x 117(H) x 221(D) mm, Approx. 2.1kg

ORDERING INFORMATION

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

ACCESSORIES

User manual, Power cord x 1, Test lead CTL-101 x 1

OPTIONAL ACCESSORIES

CTL-110 BNC Cable, SFC/FM, SFC/FM, 1000mm

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: 0.00% or less distortion factor for 500Hz–20kHz. The external synchronization signal input helps collaborate with other measurement devices.

The GWINSTEK USC-Series RF signal generator is a pocket-sized and USB interface compatible RF signal generator. It covers the frequency range from 33MHz – 4400MHz. The USC-Series provides continuous wave (CW) signal outputs without any signal modulation function.

The built-in electronic attenuator of the USC-Series allows an adjustable power range between -30dBm to 0dBm. The USC-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	0Vrms
Impedance	600Ω
Power Source	AC100/120/220/230V±10%
Page	C31

RF SIGNAL GENERATOR

MODEL	USC-LF44
Application	RF signal generator
Analog Channel	1
Frequency Range	34.5MHz – 4400MHz
Output Range	-30dBm – 0dBm
Impedance	50Ω
Modulation	Sine Wave
Display	-
Interface	USB
Power Source	DC 5V
Power Consumption	-
Page	C32-33



GAG-810 (1MHz)



FEATURES

- Frequency from 10Hz – 1MHz
- 0.02% Low Sine wave Distortion
- 8 Steps Output Attenuator
- EXT SYNC Function

GAG-810 provides a convenient solution for low frequency (< 1MHz) signal generation, specifically for a 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.

SPECIFICATIONS	
SINE WAVE CHARACTERISTIC	
Frequency Range	10Hz – 1MHz, 5 Ranges
Frequency Indicator	Dial Scale
Frequency Accuracy	± 5% ± 1Hz (at 10, 100, 1000)
Output Voltage	5 Vrms (500Ω load)
Frequency Response	10Hz – 10kHz ± 0.5dB (at 500Ω load)
Distortion Factor	Reference Frequency (1kHz)
	100Hz – 20kHz < 0.02%
	100Hz – 100kHz < 0.03%
	> 10 range for 100kHz, < 10 range for 100kHz
	50kHz – 200kHz < 0.1%
	20kHz – 500kHz < 0.1%
	10kHz – 1MHz < 1.1%
SQUARE WAVE	
Output Voltage	2 Vpp (no load)
Duty Cycle	≤ 2% (at 10Hz max output)
Rise & Fall Time	< 100ns
Duty Ratio	50% ± 5%
EXT. SYNCHRONIZATION	
Synchronizing Range	± 10 Vrms
Max. Allowable Input	10V (DC + AC peak)
Input Impedance	10kΩ ±
OUTPUT	
Output Impedance	500Ω
Output Attenuator	8, 10, 20, 30, 40, 50dB 8 ranges (accuracy ± 1dB at 500Ω load)
POWER SOURCE	
AC 110V/220V/230V ± 10%, 50/60Hz	
DIMENSIONS & WEIGHT	
130MM x 210MM x 70MM (approx.)	

ORDERING INFORMATION

GAG-810 1MHz Audio Generator with 0.02% Low Sine Wave Distortion
 ACCESSORIES:
 User Manual x 1, Power cord x 1, Test lead x 2, 100 x 1



USG-LF44



FEATURES

- Frequency Range : 34.3MHz ~ 440MHz
- Output Power Range : 10dBm ~ -60dBm
- Continuous Wave Signal Without any Modulation
- Support Fixed Frequency, Frequency Sweep, Frequency Hopping & Power Sweep Mode
- -107dBc/Hz Phase Noise@100kHz Offset
- Frequency Resolution : 100Hz
- PC USB Interface Powered and Controlled
- External PC Software Support Different Operating System

The USG-LF44 RF signal generator is a pocket-sized and USB interface compatible RF signal generator. It covers the frequency range from 34MHz ~ 440MHz. 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 -60dBm to 0dBm. The USG-LF44 has several operational modes including fixed frequency, frequency sweep, frequency hopping, and power sweep.

A USC CD-ROM provides dedicated PC application programs, which were developed under x86 software structure. This USC 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 USC APP to smart phone or tablet with Android 4.0 or above. To operate USC, use USB/OTG connecting cable to connect L4401 for smart phone and LTC. The Android APP application software for the USC signal generator is available on Google Play Store.

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

SPECIFICATIONS

FREQUENCY RANGE
34.3 MHz ~ 4.4 GHz
OUTPUT POWER
-60 dBm ~ 0 dBm, in 1 dB steps
INTERNAL REFERENCE FREQUENCY
23 MHz, aging of 1 ppm at 1 sec rate
FREQUENCY ACCURACY (0 dBm Output Level)
± 100 Hz at 100MHz
FREQUENCY RESOLUTION
100 Hz
OUTPUT ISOLATION
≥ 75 dB, Output Control On/Off
MODE CONTROL
Fixed Frequency / Single Sweep / CW Sweep / Frequency / Power Sweep
SWEEP DUTY
10 1000 ms in 1 ms steps
FREQUENCY OFFSET
-300kHz ~ 300 kHz in 100kHz steps
OUTPUT FLATNESS (0 dBm Output Level)
-1 dBm ~ 0 dBm, typical
PHASE NOISE
Carrier Frequency
34.3 MHz Offset Frequency
-67 dBc/Hz, typical, 330 dBuVrms
34.3 MHz Offset Frequency
-107 dBc/Hz, typical, 110 dBuVrms
2ND HARMONICS (0 dB Attenuation)
-15 dBm, typical
34.3 MHz ~ 3.0 GHz
-15 dBm, typical
3.0 GHz ~ 3.0 GHz
-15 dBm, typical
3.0 GHz ~ 4.4 GHz
-15 dBm, typical
3rd HARMONICS (0 dB Attenuation)
-15 dBm, typical
34.3 MHz ~ 3.0 GHz
-15 dBm, typical
3.0 GHz ~ 3.0 GHz
-15 dBm, typical
3.0 GHz ~ 4.4 GHz
-15 dBm, typical
SPECIFICATIONS RELATED TO RESOLUTION SETTINGS
10 -30 dBm, typical, Resolution 0.1 dB
10 -40 dBm, typical, Resolution 0.2 dB
SPECIFICATIONS RELATED TO THE FUNDAMENTAL OUTPUT
10 -40 dBm, typical

ORDERING INFORMATION

USG-LF44 RF Signal Generator

ADP-003

SO-1 N type (female) to SMA (female) Adapter
For USC Series



GTL-303

SO-1 SMA RF cable (300mm)
For USC 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

50 Ω nominal

OUTPUT VSWR

< 1.5 : 1 , Output level @ -30dBm

MAXIMUM PERMISSIBLE DC VOLTAGE

< 20V

MAXIMUM REVERSE POWER

< 10dBm (7W)

ELECTROMAGNETIC COMPATIBILITY

EN 55011 class A, EN 55012B1 (industrial environment), EN 61010-2-1, EN 61010-4-2, EN 61010-4-2, EN 61010-4-2

DIMENSIONS & WEIGHT

300W x 100 (H) x 30 (D)mm, Approx. 100g

USG-1F4H 15MHz ~ 4400MHz RF Signal Generator

ACCESSORIES

USB cable, CD-ROM with USC software, CSP-730 PrimaryRF software and User manual

GTL-203 USB Cable, USB 2.0, A-mini B Type, 1400mm

OPTIONAL ACCESSORIES

ADP-003 SO-1 N type (female) to SMA (female) Adapter

GTL-303 SO-1 SMA RF cable (300mm)



Test Result of Simultaneous Power Sweep and Frequency Sweep



Easy to Use Graphical Interface with Numeric Setting

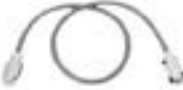


USC Android APP



Test Result of Low Pass Filter with PrimaryRF Software

MODEL	DESCRIPTION	APPLICABLE DEVICE
ADP-803	Adaptor, 300, N(F) - SMA(F)	USC-Series
CRA-432	Rack Adaptor Kit	AFG-3000 Series
CTL-101	Test Lead, BNC (F/M) to Alligator Test Lead, 1100mm	AFG-Series, SFG-Series, GFC-Series
CTL-110	BNC Cable, BNC(F/M) to BNC(F/M), 1000mm	AFG-Series, SFG-Series, GFC-Series
CTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000mm	AFG-3001/3015, CPG-3015
CTL-246	USB Cable, USB 2.0, A-B Type, 1200mm	MFC-3000 Series, AFG-Series
CTL-348	CP18 Cable, Double Shielded, 2000mm	AFG-3000 Series
CTL-258	CP18 Cable, Double Shielded, 600mm	AFG-3000 Series
CTL-253	USB Cable, USB 2.0, A-mini B Type, 1400mm	USC-Series
GTL-303	RF Cable, RG316 Assembly, 600mm, SMA(F/M)	USC-Series

ADP-803 	GTL-303 	CTL-232 
CTL-101 	GTL-110 	GTL-348 
CTL-246 	GTL-250 	CTL-253 
CRA-432 Rack Mount Kit For: AFG-3000 Series  		



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.

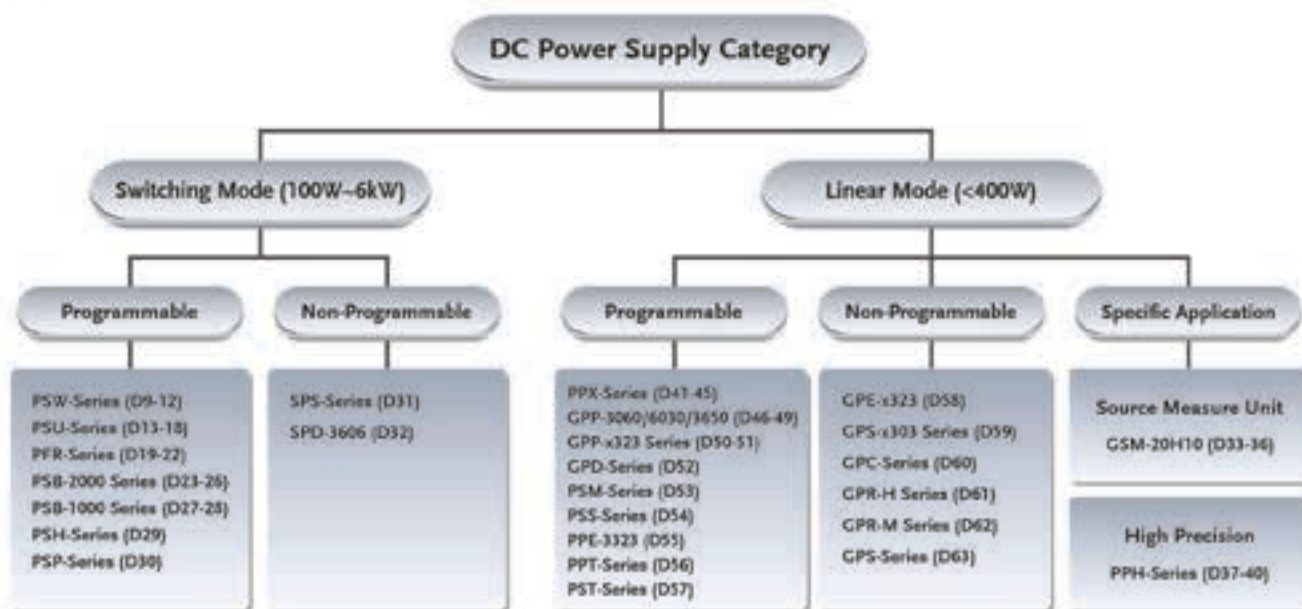
Precision source meter is the latest product offering a four-quadrant power supply, which can accurately utilize voltage or current and measure voltage and/or current at the same time.

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

GENERAL SELECTION GUIDE OF DC POWER SUPPLY BY TECHNIC

Technic	Channel	Programmability	Display	Model Series	Page
Switching	1	Programmable	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-Programmable	LED	SPS-Series	D31
	2	Programmable	LED	PSB-2400L2	D23-26
	3	Non-Programmable	LED	SPD-3606	D32
Linear	1	Programmable	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-Programmable	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	Programmable	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	Non-Programmable	LED	PST-3201	D57
	3		LED	PST-3202	
	2		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	Programmable	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-Programmable	Switching	LED	SPS-Series	D31
		Linear	LED	CPE-1326	D58
			LED	GPR-H Series	D61
			LED	GPR-M Series	D62
			LED	GPS-1830D/GPS-1850D/GPS-3030D/GPS-3030DD	D63
Multiple Channel	Programmable	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
		Switching	LED	SPD-3606	D32
	Non-Programmable	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

Voltage(V)	Current(A)	Total Power(W)	Model Name	Display	Technic	Interface	Page
160	7.2	360	PSW 160-7.2	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
160	10	400	PSB-1400M	LCD	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D27-28
160	14.4	720	PSW 160-14.4	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
160	20	800	PSB-1800M	LCD	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D27-28
160	21.6	1080	PSW 160-21.6	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
200	0.1	20	GSM-20H10	LCD	Linear	RS-232, USB TMC, LAN, GPIB	D35-36
250	4.5	360	PSW 250-4.5	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
250	9	720	PSW 250-9	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
250	13.5	1080	PSW 250-13.5	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
300	5	1500	PSU 300-5	LED	Switching	RS-232, RS-485, USB CDC, LAN, Analog Control, (Opt) GPIB	D13-18
400	3.8	1520	PSU 400-3.8	LED	Switching	RS-232, RS-485, USB CDC, LAN, Analog Control, (Opt) GPIB	D13-18
600	2.6	1560	PSU 600-2.6	LED	Switching	RS-232, RS-485, USB CDC, LAN, Analog Control, (Opt) GPIB	D13-18
800	1.44	360	PSW 800-1.44	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
800	2.88	720	PSW 800-2.88	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
800	3	400	PSB-2400H	LED	Switching	RS-232, USB CDC, Analog Control, (Opt) GPIB	D23-26
800	4.32	1080	PSW 800-4.32	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D9-12
800	6	800	PSB-2800H	LED	Switching	RS-232, USB CDC, 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	USB/TMC, LAN, GPIB	D37-40
	9	5	45							
CH2	12	1.5	18	81	PPH-1506D	2	LCD	Linear	USB/TMC, LAN, GPIB	D37-40
CH1	15	3	45							
	9	5	45	81	PPH-1510D	2	LCD	Linear	USB/TMC, LAN, GPIB	D37-40
CH2	12	3	36							
	15	3	45							
	9	5	45	138	PPT-1830	3	LED	Linear	GPIB	D56
CH1	18	3	54							
CH2	18	3	54							
CH3	6	5	30	385	GPP-3060	3	LCD	Linear	USB/CDC, RS-232, (Opt)LAN, GPIB	D46-49
CH1	30	6	180							
CH2	30	6	180							
CH3	1.8/2.5/3.3/5.0	5	25	180	GPD-23035	2	LED	Linear	USB/CDC	D52
CH1	30	3	90							
CH2	30	3	90	195	GPD-33035	3	LED	Linear	USB/CDC	D52
CH1	30	3	90							
CH2	30	3	90							
CH3	2.5/3.3/5.0	3	15	195	GPD-43035	4	LED	Linear	USB/CDC	D52
CH1	30	3	90							
CH2	30	3	90							
CH3	5	3	15							
CH4	5	1	5	195	GPD-3303D	3	LED	Linear	USB/CDC	D52
CH1	30	3	90							
CH2	30	3	90							
CH3	2.5/3.3/5.0	3	15	192	GPP-2323	2	LCD	Linear	USB/CDC, RS-232, (Opt)LAN, GPIB	D50-51
CH1	32	3	96							
CH2	32	3	96							
CH1	32	3	96	217	GPP-3323	3	LCD	Linear	USB/CDC, 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	USB/CDC, 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	USB/CDC, 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

Model No.	Capacity	Power (W)	Model Name	Output	Technology	Output	Part No.
8	30	348	CPB-0830H4D	LED	Linear	Rear-Panel Output	061
12	30	360	SPS-1230	LED	Switching	Rear-Panel Output	057
18	3	54	CPS-18100	LED	Linear	Rear-Panel Output	063
18	3	90	CPS-18100	LED	Linear		063
18	10	180	CPB-1810H4D	LED	Linear	Rear-Panel Output	062
18	20	360	SPS-1820	LED	Switching	Rear-Panel Output	057
18	20	360	CPB-1820H4D	LED	Linear	Rear-Panel Output	061
24	15	360	SPS-2415	LED	Switching		057
30	3	90	CPS-30100	LED	Linear	Rear-Panel Output	063
30	3	90	CPS-30100D	LED	Linear		063
30	6	180	CPB-3060D	LED	Linear	Rear-Panel Output	062
32	6	192	CPS-3236	LED	Linear	Rear-Panel Output	058
32	10	320	CPB-3210H4D	LED	Linear	Rear-Panel Output	061
36	10	360	SPS-3610	LED	Switching	Rear-Panel Output	057
60	3	180	CPB-6030D	LED	Linear	Rear-Panel Output	062
60	6	360	SPS-606	LED	Switching	Rear-Panel Output	057
60	6	360	CPB-6060D	LED	Linear	Rear-Panel Output	061
75	3	375	CPB-7530D	LED	Linear	Rear-Panel Output	061
110	3	330	CPB-11030D	LED	Linear	Rear-Panel Output	061
300	1	300	CPB-30010D	LED	Linear	Rear-Panel Output	061

NON-PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

Model No.	Capacity	Power per CH	Total Power(W)	Model Name	Channel	Output	Topology	Part No.	
CH1	30	6	180	375	SPD-3486	3	LED	Switching	052
CH2	30	6	180						
CH3	5	3	75						
CH1	32	3	96	180	CPS-3233	2	LED	Linear	058
CH2	32	3	96						
CH3	32	3	96						
CH1	32	3	96	217	CPS-3233	3	LED	Linear	058
CH2	32	3	96						
CH3	1.2/2.5/3.3/5	3	25						
CH1	32	3	96	212	CPS-4323	4	LED	Linear	058
CH2	32	3	96						
CH3	5	1	5						
CH4	75	1	75	180	CPS-1263	2	LED	Linear	059
CH1	30	3	90						
CH2	30	3	90						
CH1	30	3	90	195	CPS-1263	3	LED	Linear	059
CH2	30	3	90						
CH3	5	3	15						
CH1	30	3	90	200	CPS-4363	4	LED	Linear	059
CH2	30	3	90						
CH3	3.2 ~ 5.2	1	5.2						
CH4	8 ~ 15	1	15	375	CPS-3060D	3	LED	Linear	060
CH1	30	6	180						
CH2	30	6	180						
CH3	5	3	75	375	CPS-4830D	3	LED	Linear	060
CH1	60	3	180						
CH2	60	3	180						
CH3	5	3	15						

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



PSW-Series



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 adaptor 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										
	PSE 30-36	PSE 30-72	PSE 30-108	PSE 40-27	PSE 40-54	PSE 40-81	PSE 80-11.3	PSE 80-27	PSE 80-40.5	
OUTPUT RATING										
Voltage	0 ~ 40V	0 ~ 30V	0 ~ 30V	0 ~ 40V	0 ~ 40V	0 ~ 40V	0 ~ 30V	0 ~ 30V	0 ~ 30V	
Current	0 ~ 10A	0 ~ 12A	0 ~ 10.8A	0 ~ 27A	0 ~ 27A	0 ~ 27A	0 ~ 11.3A	0 ~ 27A	0 ~ 40.5A	
Power	120W	120W	108W	36W	36W	36W	36W	36W	108W	
REGULATION(OC)										
Load	20mV	20mV	20mV	20mV	20mV	20mV	40mV	40mV	40mV	
Line	10mV	10mV	10mV	20mV	20mV	20mV	40mV	40mV	40mV	
REGULATION(CC)										
Load	40mV	20mV	11.3mV	20mV	20mV	20mV	18.3mV	20mV	41.3mV	
Line	40mV	20mV	11.3mV	20mV	20mV	20mV	18.3mV	20mV	41.3mV	
RIPPLE & NOISE (Noise Bandwidth: 20Hz~100kHz; Ripple Bandwidth: 10Hz~100kHz)										
CV p-p	20mV	20mV	10mV	40mV	40mV	40mV	40mV	40mV	100mV	
CV rms	3mV	3mV	3mV	2mV	11mV	11mV	7mV	7mV	15mV	
CC rms	72mV	36mV	210mV	54mV	108mV	108mV	27mV	54mV	81mV	
PROGRAMMING ACCURACY										
Voltage	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	
Current	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	
MEASUREMENT ACCURACY										
Voltage	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	0.1% ± 10mV	
Current	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	0.1% ± 10mA	
RESPONSE TIME										
Rise Time	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms	
Fall Time(Full Load)	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms	
Fall Time(No Load)	500ms	500ms	500ms	500ms	500ms	500ms	500ms	500ms	500ms	
Load Transient Recover Time	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	1mA	1mA	1mA	1mA	1mA	2mA	2mA	2mA	
MEASUREMENT RESOLUTION (By PC Remote Control Mode)										
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	2mV	2mV	2mV	
Current	1mA	1mA	1mA	1mA	1mA	1mA	2mA	2mA	2mA	
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	3-30V	3-30V	3-30V	4-40V	4-40V	4-40V	5-30V	5-30V	5-30V	
OC	1.6 ~ 30.6A	5 ~ 79.2A	5 ~ 118.8A	2.7 ~ 29.7A	5 ~ 10.4A	5 ~ 10.4A	5 ~ 10.4A	2.7 ~ 29.7A	4.05 ~ 44.55A	
OPP	Activated by reduced internal temperature									
FRONT PANEL DISPLAY ACCURACY ± 1 digit										
Voltage	0.1% ± 20mV	0.1% ± 20mV	0.1% ± 20mV	0.1% ± 20mV	0.1% ± 20mV	0.1% ± 20mV	0.1% ± 20mV	0.1% ± 20mV	0.1% ± 20mV	
Current	0.1% ± 0.05mA	0.1% ± 0.05mA	0.1% ± 0.05mA	0.1% ± 0.05mA	0.1% ± 0.05mA	0.1% ± 0.05mA	0.1% ± 0.05mA	0.1% ± 0.05mA	0.1% ± 0.05mA	
ENVIRONMENT CONDITION										
Operation Temp.	0°C ~ 50°C									
Storage Temp.	-25°C ~ 70°C									
Operating Humidity	20% ~ 85% RH, No condensation									
Storage Humidity	90% RH or Less, No condensation									
LOAD REGULATION COEFFICIENT										
Voltage	50µV/V, of rated output voltage, after a 30-minute warm-up									
Current	50µV/V, of rated output current, after a 30-minute warm-up									
OTHER										
Assembling Control	No									
Interface	USB/LAN/CAN/RS-485/RS-232/RS-422/RS-485/RS-422/RS-485									
Fan	With thermal sensing control									
POWER SOURCE	AC100V~240VAC, 47~63Hz, single phase									
DIMENSIONS & WEIGHT										
	71(90)×124(90) 47(50) mm, Approx. 3kg	142(90)×124(90) 47(50) mm, Approx. 3.3kg	214(90)×124(90) 47(50) mm, Approx. 3.3kg	71(90)×124(90) 47(50) mm, Approx. 3kg	142(90)×124(90) 47(50) mm, Approx. 3.3kg	214(90)×124(90) 47(50) mm, Approx. 3.3kg	71(90)×124(90) 47(50) mm, Approx. 3kg	142(90)×124(90) 47(50) mm, Approx. 3.3kg	214(90)×124(90) 47(50) mm, Approx. 3.3kg	

PSE-001

PSE-002

PSE-003

PSE-004

PSE-005

PSE-006

PSE-007



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

SPECIFICATIONS										
	PSW 160-7.3	PSW 160-1.4	PSW 160-21.6	PSW 250-4.5	PSW 250-8	PSW 250-15.3	PSW 800-1.44	PSW 800-3.33	PSW 800-4.33	
OUTPUT RATING										
Voltage	0 ~ 160V	0 ~ 300V	0 ~ 160V	0 ~ 250V	0 ~ 250V	0 ~ 250V	0 ~ 800V	0 ~ 800V	0 ~ 800V	
Current	0 ~ 7.3A	0 ~ 14.4A	0 ~ 21.6A	0 ~ 4.5A	0 ~ 8A	0 ~ 15.3A	0 ~ 1.44A	0 ~ 3.33A	0 ~ 4.33A	
Power	120W	720W	1080W	56W	72W	108W	144W	220W	1080W	
REGULATION (%)										
Load	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	
Line	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	
REGULATION (%)										
Load	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	
Line	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	
SUPPLY & NOISE (Power Bandwidth: 20Hz to 20kHz, Noise Bandwidth: 10kHz)										
CP p-p	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	
CP rms	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	
CC rms	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	
PROGRAMMING ACCURACY										
Voltage	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	
Current	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	
MEASUREMENT ACCURACY										
Voltage	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	
Current	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	
RESPONSE TIME										
Raise Time	100ms	100ms	100ms	100ms	100ms	100ms	100ms	100ms	100ms	
Fall Time(Full Load)	100ms	100ms	100ms	100ms	100ms	100ms	100ms	100ms	100ms	
Fall Time(No Load)	100ms	100ms	100ms	100ms	100ms	100ms	100ms	100ms	100ms	
Load Transient Recovery Time (Load Change from 10% to 90%)	2ms	2ms	2ms	2ms	2ms	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 4 units including the master unit	Up to 4 units including the master unit	Up to 4 units including the master unit	Up to 4 units including the master unit	Up to 4 units including the master unit	Up to 4 units including the master unit	Up to 4 units including the master unit	Up to 4 units including the master unit	Up to 4 units including the master unit	
Series Operation	Up to 2 units including the master unit	Up to 2 units including the master unit	Up to 2 units including the master unit	Up to 2 units including the master unit	Up to 2 units including the master unit	Up to 2 units including the master unit	Up to 2 units including the master unit	Up to 2 units including the master unit	Up to 2 units including the master unit	
PROTECTION FUNCTION										
OVP	16 ~ 170V	16 ~ 170V	16 ~ 170V	16 ~ 170V	16 ~ 170V	16 ~ 170V	16 ~ 170V	16 ~ 170V	16 ~ 170V	
OCF	0.75 ~ 7.3A	1.44 ~ 14.4A	1.44 ~ 14.4A	0.45 ~ 4.5A	0.45 ~ 4.5A	0.45 ~ 4.5A	0.45 ~ 4.5A	0.45 ~ 4.5A	0.45 ~ 4.5A	
OPP	Activated by elevated internal temperature	Activated by elevated internal temperature	Activated by elevated internal temperature	Activated by elevated internal temperature	Activated by elevated internal temperature	Activated by elevated internal temperature	Activated by elevated internal temperature	Activated by elevated internal temperature	Activated by elevated 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% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	0.1% ± 100mV	
Current	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	0.1% ± 1mA	
ENVIRONMENT CONDITION										
Operation Temp.	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	
Storage Temp.	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	
Operating Humidity	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	
Storage Humidity	90% RH or Less, No condensation	90% RH or Less, No condensation	90% RH or Less, No condensation	90% RH or Less, No condensation	90% RH or Less, No condensation	90% RH or Less, No condensation	90% RH or Less, No condensation	90% RH or Less, No condensation	90% RH or Less, No condensation	
LOAD-REGULATION COEFFICIENT										
Voltage	100ppm/V of rated output voltage after a 10 minute warm-up	100ppm/V of rated output voltage after a 10 minute warm-up	100ppm/V of rated output voltage after a 10 minute warm-up	100ppm/V of rated output voltage after a 10 minute warm-up	100ppm/V of rated output voltage after a 10 minute warm-up	100ppm/V of rated output voltage after a 10 minute warm-up	100ppm/V of rated output voltage after a 10 minute warm-up	100ppm/V of rated output voltage after a 10 minute warm-up	100ppm/V of rated output voltage after a 10 minute warm-up	
Current	200ppm/V of rated output current after a 10 minute warm-up	200ppm/V of rated output current after a 10 minute warm-up	200ppm/V of rated output current after a 10 minute warm-up	200ppm/V of rated output current after a 10 minute warm-up	200ppm/V of rated output current after a 10 minute warm-up	200ppm/V of rated output current after a 10 minute warm-up	200ppm/V of rated output current after a 10 minute warm-up	200ppm/V of rated output current after a 10 minute warm-up	200ppm/V of rated output current after a 10 minute warm-up	
OTHER										
Assembling Control Interface	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
USB/UART/CPB/USB/Power/RS232C/USB/Optional	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
With thermal sensing control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
POWER SOURCE	AC/DC-240VAC, 47-63Hz, single phase	AC/DC-240VAC, 47-63Hz, single phase	AC/DC-240VAC, 47-63Hz, single phase	AC/DC-240VAC, 47-63Hz, single phase	AC/DC-240VAC, 47-63Hz, single phase	AC/DC-240VAC, 47-63Hz, single phase	AC/DC-240VAC, 47-63Hz, single phase	AC/DC-240VAC, 47-63Hz, single phase	AC/DC-240VAC, 47-63Hz, single phase	
DIMENSIONS & WEIGHT										
73(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	107(W) x 124(D) x 100(H) mm	
Approx. 30g	Approx. 33g	Approx. 33g	Approx. 33g	Approx. 33g	Approx. 33g	Approx. 33g	Approx. 33g	Approx. 33g	Approx. 33g	

PSW-008



PSW-009



PSW-010



PSW-011



PSW-012





PSW-Series

ORDERING INFORMATION

PSW 30-10	(0-10V/0-10A/100W) Multi-Range DC Power Supply
PSW 30-12	(0-10V/0-12A/120W) Multi-Range DC Power Supply
PSW 30-15	(0-10V/0-15A/150W) Multi-Range DC Power Supply
PSW 40-27	(0-40V/0-27A/1080W) Multi-Range DC Power Supply
PSW 40-34	(0-40V/0-34A/1360W) Multi-Range DC Power Supply
PSW 40-81	(0-40V/0-81A/3240W) Multi-Range DC Power Supply
PSW 50-13.5	(0-50V/0-13.5A/675W) Multi-Range DC Power Supply
PSW 50-17	(0-50V/0-17A/850W) Multi-Range DC Power Supply
PSW 50-40.5	(0-50V/0-40.5A/2025W) Multi-Range DC Power Supply
PSW 100-7.2	(0-100V/0-7.2A/720W) Multi-Range DC Power Supply
PSW 100-14.4	(0-100V/0-14.4A/1440W) Multi-Range DC Power Supply
PSW 100-21.6	(0-100V/0-21.6A/2160W) Multi-Range DC Power Supply
PSW 250-4.5	(0-250V/0-4.5A/1125W) Multi-Range DC Power Supply
PSW 250-9	(0-250V/0-9A/2250W) Multi-Range DC Power Supply
PSW 250-13.5	(0-250V/0-13.5A/3375W) Multi-Range DC Power Supply
PSW 300-1.44	(0-300V/0-1.44A/432W) Multi-Range DC Power Supply
PSW 300-1.80	(0-300V/0-1.8A/540W) Multi-Range DC Power Supply
PSW 300-4.32	(0-300V/0-4.32A/1296W) Multi-Range DC Power Supply

ACCESSORIES

CD-ROM x 1 (Programming Manual, User Manual, CTI T5 Test Leads) for PSW 100V/80V/140V;
Power Card x 1 (Region-dependent), CTI-240 USB Cable * 1, Type x 1, PSW-004 Basic Accessories Kit x 1
(for PSW 30V/40V/50V/100V), includes: 4x Terminal screws and washers x 2, 4x Filter x 1, Analog control
protection battery x 1, Analog control test lead x 1, 8x Terminal bulbs, nuts and washers x 2

PSW-000	Basic Accessories Kit for PSW 30V/40V/50V models
PSW-001	Output Terminal Cover for 30V/40V/50V/100V models
PSW-011	Output Terminal Cover for 250V/300V models
PSW-012	High Voltage Output Terminal for 250V/300V model

OPTIONAL ACCESSORIES

PSW-001	Accessory Kit	PSW-010	Large Filter (Type F170)
PSW-002	Sample DC Test	CTI-240	CPH Cable, Double Shielded, 3000mm
PSW-003	Contact Removal Tool	CTI-250	CPH Cable, Double Shielded, 6000mm
PSW-005	Cable for 2 Units of PSW-Series in Series	GUW-001A	USB to RS-232 Cable, 3000mm(m)
PSW-006	Module Conversion (for PSW 100V/40V/50V/100V)	GUW-001B	RS-232 to USB Adapter with 4x 40V/10V Rear Port
PSW-008	Cable for 2 Units of PSW-Series in Parallel Mode Connection	GUW-001	CPH to USB Adapter
PSW-007	Cable for 3 Units of PSW-Series in Parallel Mode Connection	GRA-410g	Back Mount Kit (30V)
GET-001	Extended Terminal with max. 50A (for PSW 10V/40V/80V/140V)	GRA-410E	Back Mount Kit (31A)
GET-002	Extended Terminal with max. 10A (for PSW 250V/300V)		
GET-003	Extended European Terminal with max. 20A (for PSW 10V/40V/80V/140V)		
CTL-130	Test lead: 2 x red, 2 x black (for PSW 210V/300V)		

PSW-Series (LV) Rear Panel



PSW-Series (HV) Rear Panel



GRA-410 [E] Back Mount Kit (30V/31A)

For: PSW-Series



CTL-130 Test lead, 3000mm, 55AWG, UK 3209 (for PSW 210V/300V)



GUW-001A USB to RS-232 Cable (for PSW-Series, 3000mm)



GUW-001 CPH to USB Adapter (for 100V/200V-Series, PSW-Series)



GET-001 Extended Terminal (for PSW 10V/40V/80V/140V)



GET-002 Extended Terminal (for PSW 200V/300V)



GET-003 Extended European Terminal (for PSW 10V/40V/80V/140V)



Programmable Switching D.C. Power Supply



PSU-Series



FEATURES

- Voltage Output: 6V/5V/2.5V/10V/20V/30V/40V/50V/60V/80V/100V/150V/180V/400V/600V
- Power Output: 1200W ~ 1050W
- CV/CC Priority Mode
- Adjustable Voltage/Current Rise and Fall Time
- Series/Parallel Connection: Max. 2 units
[Models Under 300W are 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, GPF, UVL, AC Fail, Fan Fail
- Standard: USB, LAN, RS-232, RS-485, Analog Control
- Option: GPIB, Isolated Analog Interface [Voltage Control/Current Control]

Our Inven PSU-Series, a DC power supply with high power density design, is 1U in height and compatible with 19" Rack Mount Size. The series is suitable for test system integration 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/200A to 600V/2.4A. The Series is suitable for different test conditions and DUTs, including electronic components testing, micro resistors, relays, smart resistors, 12V/34V/48V battery simulation, and automotive electronic device testing.

The PSU-Series is ideal for the primary input of DC/DC converter and semiconductor production application. PSU is often integrated into component test systems such as aging test equipment for capacitors; 800V DC bias applications; aging test equipment for diode semiconductor production equipment; automotive electronics; and ECU for V8 engine or V10 engine, etc.

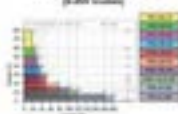
Utilizing some model units of the PSU-Series to conduct series and parallel connections can increase total output power, total current or total voltage. The wide voltage and current output ranges of the PSU-Series can fully satisfy various voltage and current measurement requirements. The PSU-Series is a single power output DC programmable power supply which outputs 1200W to 1500W. The PSU-Series provides maximum 2 units in series connection (models under 300W) to achieve maximum 600V or 4 units in parallel connection to obtain maximum 800A 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 slow rate for output voltage or current based upon test requirements. There are two kinds of slow rate settings: high speed priority and slow rate priority. High speed priority sets slow rate at the maximum speed to reach CC or CV mode. Slow rate priority allows users to set slow rate for CC or CV mode in order to control rise or fall slow rate. Slow 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.

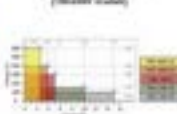
Comparing with other 1U power supplies available in the market, PSU supports a most complete array of interfaces, including USB, LAN, RS-232, RS-485, analog control interface, GPIB (option), isolated analog interface (voltage control), and isolated analog interface (current control). Via the multi-drop mode, PSU will not need any switch/hub and GPIB cable for remote control and slave unit synchronization when using LAN, USB or GPIB. This feature can help users save costs on augmentation equipment for connecting slave while 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 ~ 40ms. 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-Series Operating Area (0.400V models)



PSU-Series Operating Area (0.600V models)



Model	Output Voltage (V)	Output Current (A)	Output Power (W)
PSU-0.400	0.400	200	80
PSU-0.600	0.600	200	120
PSU-1.000	1.000	200	200
PSU-2.500	2.500	100	250
PSU-5.000	5.000	50	250
PSU-10.000	10.000	25	250
PSU-20.000	20.000	12.5	250
PSU-30.000	30.000	8.3	250
PSU-40.000	40.000	6.25	250
PSU-50.000	50.000	5.0	250
PSU-60.000	60.000	4.17	250
PSU-80.000	80.000	3.12	250
PSU-100.000	100.000	2.5	250
PSU-150.000	150.000	1.67	250
PSU-200.000	200.000	1.25	250
PSU-300.000	300.000	0.83	250
PSU-400.000	400.000	0.62	250
PSU-600.000	600.000	0.42	250

1U Handle & Bracket



- Notes:
- (1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
 - (2) Maximum current is guaranteed to maximum 0.4% of the rated output current.
 - (3) At 50-100W or 150-200W, constant load.
 - (4) From No-load to Full-load, constant input voltage. Measured at the setting point in Remote Sense.
 - (5) Measure with 2070W 80-100W (2.5% probe).
 - (6) Measurement frequency bandwidth is 10Hz to 20kHz.
 - (7) Measurement frequency bandwidth is 1Hz to 10kHz.
 - (8) From 10% to 90% of rated output voltage, with rated relative load.
 - (9) From 90% to 10% of rated output voltage, with rated relative load.
 - (10) Time for output voltage to recover within 0.1% of the rated output for a load change from 10 to 90% of its rated output current. Voltage rise time from 10% to 100% of rated output.
 - (11) Fastest voltage change, equal to the unit voltage rising, constant input voltage.
 - (12) For 50-100W models the ripple is measured at 1V, rated output voltage and full output current. For other models, the ripple is measured at 10-100mV output voltage and full output current.
 - (13) At rated output power.
 - (14) At rated the load panel (the top) the temperature is guaranteed to 40°C.

Salted in a New Way

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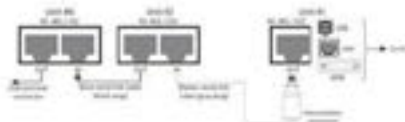
Programmable Switching D.C. Power Supply

A. SERIES-PARALLEL OPERATION AND HIGH POWER DENSITY

Power Density	1 unit	2 units	Power Density	1 unit	2 units	3 units	4 units
Height of case	8.25"	8.25"	Height of case	8.25"	8.25"	8.25"	8.25"
PSU 6-300	60W	120W	PSU 6-300	60W	60W	60W	60W
PSU 6-100	100W	200W	PSU 6-100	100W	100W	100W	100W
PSU 12-150	150W	300W	PSU 12-150	150W	150W	150W	150W
PSU 15-100	100W	200W	PSU 15-100	100W	100W	100W	100W
PSU 20-75	75W	150W	PSU 20-75	75W	75W	75W	75W
PSU 20-50	50W	100W	PSU 20-50	50W	50W	50W	50W
PSU 20-30	30W	60W	PSU 20-30	30W	30W	30W	30W
PSU 20-25	25W	50W	PSU 20-25	25W	25W	25W	25W
PSU 20-15	15W	30W	PSU 20-15	15W	15W	15W	15W
PSU 20-10	10W	20W	PSU 20-10	10W	10W	10W	10W
PSU 20-5	5W	10W	PSU 20-5	5W	5W	5W	5W
PSU 20-3	3W	6W	PSU 20-3	3W	3W	3W	3W
PSU 20-1.5	1.5W	3W	PSU 20-1.5	1.5W	1.5W	1.5W	1.5W
PSU 20-0.5	0.5W	1W	PSU 20-0.5	0.5W	0.5W	0.5W	0.5W
PSU 200-1.5	1.5W	3W	PSU 200-1.5	1.5W	1.5W	1.5W	1.5W
PSU 200-0.5	0.5W	1W	PSU 200-0.5	0.5W	0.5W	0.5W	0.5W
PSU 200-0.1	0.1W	0.2W	PSU 200-0.1	0.1W	0.1W	0.1W	0.1W
PSU 200-0.05	0.05W	0.1W	PSU 200-0.05	0.05W	0.05W	0.05W	0.05W

To augment output power, the PSU-series can realize two-fold rated power/models under 300W via 2 same model units in series connection; and four-fold rated power via 4 same model units in parallel connection so as to satisfy customers with large voltage and large current requirements. 1U height units in series connection can achieve maximum 400V output. 4U height units in parallel connection can output maximum 800A and 4240W.

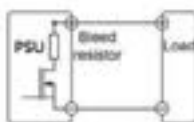
B. REMOTE PROGRAM CONTROL (UP TO 11 UNITS CONNECTION)



Provide RS-232, RS-485, USB, GNB and LAN for PC to remote control Master PSU-Series. RJ-45 connector on the rear panel can connect up to 11 units.
LAN or USB remote control and augmenting slave units by using PSU-Series multi-drop mode will no longer need any switch/hub that can help customers save equipment costs.

For the detailed information please refer to user manual.

C. BLEEDER CONTROL



PSU Series Built-in Bleed Resistor

The PSU-Series employs a bleed resistor in parallel with the output terminal. Bleed resistor is designed to dissipate the power from the power supply filter capacitor when power is turned off or the load is disconnected. Without a bleed resistor, power terminal may remain charged on the filter capacitors for some time and be potentially hazardous. In addition, bleed resistor also allows for smoother voltage regulation of the power supply as the bleed resistor acts as a minimum voltage load. The bleed resistance can be turned on or off using the configuration setting.

D. 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.

Conventional power supplies under the CV priority mode will produce inrush current and surge voltage at turn-on. The PSU-series has CV and CC priority modes.



V-I Characteristic of Diode



Using GDS-3334 DSD to Test LED Operation Under C/V Priority and C/C Priority Respectively

The CC priority mode can prevent inrush current and surge voltage from occurring at turn-on to protect DUT.

E ADJUSTABLE SLEW RATE

VOLTAGE SLEW RATE	CURRENT SLEW RATE
0.001V-0.060V/msec (PSU 6-300)	0.001A-0.000A / msec (PSU 6-300)
0.001V-0.060V/msec (PSU 6-180)	0.001A-0.000A / msec (PSU 6-180)
0.001V-0.120V/msec (PSU 12.5-120)	0.001A-0.000A / msec (PSU 12.5-120)
0.001V-0.150V/msec (PSU 15-100)	0.001A-0.000A / msec (PSU 15-100)
0.001V-0.200V/msec (PSU 20-75)	0.001A-0.000A / msec (PSU 20-75)
0.001V-0.300V/msec (PSU 30-50)	0.001A-0.000A / msec (PSU 30-50)
0.001V-0.400V/msec (PSU 40-35)	0.001A-0.000A / msec (PSU 40-35)
0.001V-0.300V/msec (PSU 50-30)	0.001A-0.000A / msec (PSU 50-30)
0.001V-0.400V/msec (PSU 40-25)	0.001A-0.000A / msec (PSU 40-25)
0.001V-0.300V/msec (PSU 60-15)	0.001A-0.000A / msec (PSU 60-15)
0.001V-1.000V/msec (PSU 100-11)	0.001A-0.000A / msec (PSU 100-11)
0.001V-1.300V/msec (PSU 150-10)	0.001A-0.000A / msec (PSU 150-10)
0.001V-1.300V/msec (PSU 300-5)	0.001A-0.000A / msec (PSU 300-5)
0.001V-2.000V/msec (PSU 400-3.8)	0.001A-0.000A / msec (PSU 400-3.8)
0.001V-2.400V/msec (PSU 600-2.6)	0.001A-0.000A / 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, slow rate adjustment can mitigate voltage shift to effectively prevent DUT from being damaged by inrush current. This function is ideal for tests such as capacitive load and motor.

F OVP, OCP AND UVL

MODEL	OCP	OVP	UVL
PSU 6-300	5 ~ 220A	0.6 ~ 6.5V	0 ~ 6.5V
PSU 6-180	5 ~ 180A	0.6 ~ 6.5V	0 ~ 6.5V
PSU 12.5-120	5 ~ 112A	1.25 ~ 13.75V	0 ~ 13.12V
PSU 15-100	5 ~ 118A	1.5 ~ 16.5V	0 ~ 15.15V
PSU 20-75	5 ~ 81.6A	2 ~ 22V	0 ~ 21V
PSU 30-50	5 ~ 55A	3 ~ 33V	0 ~ 31.5V
PSU 40-35	5.8 ~ 41.5A	4 ~ 44V	0 ~ 42V
PSU 50-30	5 ~ 31A	5 ~ 55V	0 ~ 52.5V
PSU 60-25	5.5 ~ 27.5A	5 ~ 60V	0 ~ 60V
PSU 66-18	5.8 ~ 26.5A	5 ~ 66V	0 ~ 64V
PSU 100-11	5.5 ~ 16.5A	5 ~ 100V	0 ~ 100V
PSU 150-10	5 ~ 11A	5 ~ 165V	0 ~ 157.5V
PSU 300-5	6.5 ~ 3.5A	5 ~ 330V	0 ~ 315V
PSU 400-3.8	0.35 ~ 4.18A	5 ~ 660V	0 ~ 620V
PSU 600-2.6	0.26 ~ 2.66A	5 ~ 660V	0 ~ 620V

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.

G TRIGGER CONTROL (TRIGGER INPUT/TRIGGER OUTPUT)



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

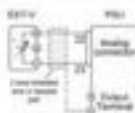
Trigger Input Function :

- Allow users to set the effective pulse width from 0-40ms for trigger input (0: the LOW or HIGH signal of OC level for trigger input).
- Receive trigger input to control PSU series output or to output preset voltage and current.
- Receive trigger input to upload preset memory parameters.

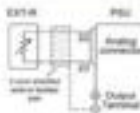
Trigger Output Function :

- Allow users to set the effective pulse width from 0-40ms for trigger output (0: the LOW or HIGH signal of OC level for trigger output).
- Set LOW or HIGH for output OC level.
- PSU produces trigger output signal when setting output or changing preset value or uploading preset memory parameters.

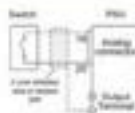
H EXTERNAL ANALOG CONTROL FUNCTION



- Flux21 → EXT-V (-)
- Flux22 → EXT-V (+)
- Wire shield → negative (-) output terminal



- Flux22 → EXT-R
- Flux21 → EXT-R
- Wire shield → negative (-) output terminal



- Flux21 → Switch
- Flux22 → Switch
- Wire shield → negative (-) output terminal

External Voltage Controls Voltage Range

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.

External Resistance Controls Voltage Range

External On-off to Control Output, on or off



Fanless Multi-Range D.C. Power Supply



PFR-100L



PFR-100M



FEATURES

- * Constant Power Output for Fullload Multi-Range(Volt) Operation
- * Natural Convection Cooling Design (Fanless Structure)
- * Protect Memory Function
- * Output ON/OFF Delay Function
- * CV, CC Priority Mode
- * Adjustable Slow Rate for Voltage and Current
- * Bleeder Circuit Control
- * Protection : OVP, OCP, AC FAL and OTP
- * Support Front Panel and Rear Panel Output
- * Interface: USB, LAN, RS-232C(only); 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	0~32V	0~230V
Output Current	0~18A	0~3A
Rated Power	100W	100W

The PFR-100 series, a small and high performance programmable D.C. power supply, adopts natural convection design to dissipate 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 than 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 100W, provides two models: PFR-100L maximum output voltage of 32V (at 2A) or maximum output current of 18A (at 10V); PFR-100M maximum output voltage of 230V (at 0.4A) or maximum output current of 3A (at 10V).

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 rackmount 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, UVP, and the system information can be checked such as unit's serial number, firmware edition and internal setting. Users can remotely adjust PFR-100 settings, including output voltage/current, the slow rate for voltage/current, bleeder circuit control, OCP, delayed time for output voltage and buzzer 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 tests on 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 equipment systems, the bleeder resistor allows PFR-100 series to rapidly discharge to prepare itself for the next operation.

SPECIFICATIONS

Model	PFR-100L	PFR-100M
OUTPUT RANGE		
Rated Output Voltage	32V	230V
Rated Output Current	18A	3A
Rated Output Power	100W	100W
REGULATION (CV)		
Load Regulation (%)	±0.05%	±0.05%
Line Regulation (%)	±0.05%	±0.05%
REGULATION (CC)		
Load Regulation (%)	±0.05%	±0.05%
Line Regulation (%)	±0.05%	±0.05%
WAVE & NOISE (%)		
V _{ripple} (%)	±0.05%	±0.05%
V _{noise} (%)	±0.05%	±0.05%
PROGRAMMING ACCURACY		
Voltage	±0.1% of setting + 40mV	±0.05% of setting + 20mV
Current	±0.1% of setting + 20mA	±0.05% of setting + 10mA
MEASUREMENT ACCURACY		
Voltage	±0.1% of reading + 40mV	±0.05% of reading + 20mV
Current	±0.1% of reading + 20mA	±0.05% of reading + 10mA
RESPONSE TIME		
Rise Time (%)	Rated load	30ms
Fall Time (%)	Rated load	100ms
	No load	300ms
		1.5ms
TRANSIENT RECOVERY TIME (%)		
PROGRAMMING RESOLUTION		
Voltage	3mV	10mV
Current	1mA	0.1mA
MEASUREMENT RESOLUTION		
Voltage	3mV	10mV
Current	1mA	0.1mA
PROTECTION FUNCTION		
Over Voltage Protection (OVP)	Setting range	0~230V
Over Current Protection (OCP)	Setting range	0~11A
Under Voltage Lock (UVP)	Setting range	0~12.5V
Over Temperature Protection (OTP)	Operation	Turn the output off
Low AC Input Protection (AC-ILP)	Operation	Turn the output off
Power Limit (Power Limit)	Operation	Turn the output off



PFR-Series

Rear Panel



SPECIFICATIONS		
Model	PFR-100L	PFR-100M
FRONT PANEL DISPLAY ACCURACY & DIGITS		
Voltage	±1% of reading + 40mV	±0.05mV
Current	±1% of reading + 30mA	±0.5mA
ENVIRONMENT CONDITIONS		
Operating Temperature	0°C to 40°C	
Storage Temperature	-20°C to 70°C	
Operating Humidity	30% to 80% RH, no condensation	
Storage Humidity	30% to 85% RH, no condensation	
REAR PANEL TEMP. COEFFICIENT (at 30 Min. Min. Warm-up)		
Voltage	100ppm/°C	
Current	200ppm/°C	
OTHER		
Arising Control	Yes	
Interface	USB, LAN, RS-232, RS-485 (opt.), GPIB (opt.)	
AC Input	85-265VAC, 47-63Hz, single phase	
DIMENSIONS & WEIGHT		
	76(W) x 242(D) x 100(H)mm, Approx. 2.2kg	

- Note: *1: At 85 ± 10V or 170 ± 20V, constant load.
 *2: From No-load to full load, constant input voltage. Measured at the arising point in female series.
 *3: Measure with 2000 Hz (1% ripple).
 *4: Measurement frequency bandwidth is 10Hz to 20MHz.
 *5: Measurement frequency bandwidth is 5Hz to 10MHz.
 *6: From 100%-90% of rated output voltage, with rated resistive load.
 *7: From 90%-100% 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 90 to 100% of its rated output current.
 *9: For load voltage change, equal to the unit voltage rating, constant input voltage.

ORDERING INFORMATION

- PFR-100L: Features Multi-Range D.C. Power Supply
 PFR-100M: Features Multi-Range D.C. Power Supply (European terminals provided only)

ACCESSORIES

- CD (User Manual, Programming manual) x 1, Power cord, CTL-134 test lead, Accessories Packages
 CTL-104A test lead (for PFR-100L only), CTL-105A test lead (for PFR-100M only)
 CTL-204A test lead (for PFR-100S, European Type Jack Terminal)

OPTIONAL ACCESSORIES

- | | | | |
|-------------------|---|---------|---|
| CTL-208 | CPH Cable, 3000mm | CTL-209 | RS-232 Cable with DB9 connector to RS-485 |
| PSU-232 | RS-232 Cable with DB9 Connector Kit | CTL-240 | RS-485 Cable with DB9 connector to RS-485 |
| PSU-485 | RS-485 Cable with DB9 Connector Kit | CTL-240 | Serial/Parallel Cable Terminator, 5.0Ω |
| CTL-246 | USB Cable, A/B to B Type A-TypeB Cable | CTL-240 | RS-485 Slave cable |
| ORA-431-E-100/200 | Rack mount King/Queen AC 100V/200V | | |
| ORA-431-E-100/200 | Rack mount King/Queen AC 100V/200V | | |
| PSU-GPIB | Optional GPIB Interface for PFR (Factory-installed) | | |

CRA-431 (J/E Rack Mount Kit) (15/EIA)



PSU-232 RS-232 Cable with DB9 Connector Kit



PSU-485 RS-485 Cable with DB9 Connector Kit



CTL-258 GPIB Cable, 3000mm



CTL-134 Test Lead



CTL-259



CTL-260



CTL-261



CTL-262



Fanless Multi-Range D.C. Power Supply

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/us (PFR-100C)
0.1V-100.0V/us (PFR-100M)



Adjustable Current Slew Rate

Current Slew Rate:
0.01A-30.00A/us (PFR-100C)
0.01A-4.00A/us (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 shift to effectively prevent DUT from being damaged by inrush current. This function is ideal for tests such as capacitive load and motor.

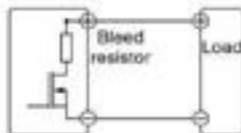
C WEB SERVER REMOTE CONTROL FUNCTION



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 to as to prepare itself for the next operation.

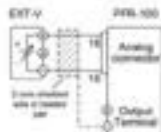
E REMOTE PROGRAM CONTROL (UP TO 33 UNITS CONNECTION)



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 33 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.

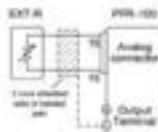
F EXTERNAL ANALOG CONTROL FUNCTION



Pin10 → EXT-V (+)
Pin11 → EXT-V (-)
Wire shield → negative (-) output terminal

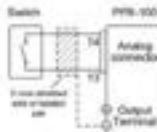
External Voltage Controls Voltage Range

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.



Pin10 → EXT-R (+)
Pin11 → EXT-R (-)
Wire shield → negative (-) output terminal

External Resistance Controls Voltage Range

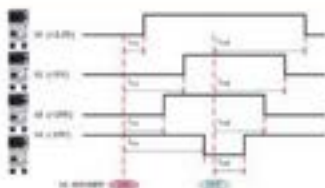


Pin10 → Switch
Pin11 → Switch
Wire shield → negative (-) output terminal

External ON/OFF To Control Output, ON or OFF

The 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

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 Interface
- Standard Interface : RS-232C/USB/Analog Control Interface
- Optional Interface : GPIB
- Power Function (3 Points)
- LabVIEW Driver

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 functionality facilitates flexible combinations 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 DUTs 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 DUTs while the protection mechanism is triggered to function. When conducting battery charging operation, the H-42 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.

SERIES OPERATION

MODEL NUMBER	SINGLE UNIT	TWO UNITS
PSB-2400L	80V/40A	160V/40A
PSB-2800L	80V/80A	160V/80A
PSB-2800LS (Booster Unit for PSB-2800L Only)	N/A	N/A
PSB-2400L2	N/A	N/A
PSB-2400H	N/A	N/A
PSB-2800H	N/A	N/A

PARALLEL OPERATION

MODEL NUMBER	SINGLE UNIT	TWO UNITS	THREE UNITS	FOUR UNITS
PSB-2400L	80V/40A	80V/80A	80V/120A	80V/160A
PSB-2800L	80V/80A	80V/160A	80V/240A	80V/320A
PSB-2800LS	N/A	80V/160A (PSB-2800L x 2) (PSB-2800LS x 1)	80V/240A (PSB-2800L x 3) (PSB-2800LS x 2)	N/A
PSB-2400L2	N/A	N/A	N/A	N/A
PSB-2400H	800V/5A	800V/1A	N/A	N/A
PSB-2800H	800V/6A	800V/12A	N/A	N/A

SPECIFICATIONS						
	PSB-3000L	PSB-2800L	PSB-3400L2	PSB-3400H	PSB-2800H	PSB-2800LS
OUTPUT RATING						
Voltage	0 ~ 80V	0 ~ 80V	0 ~ 80V ± 2CH	0 ~ 80V	0 ~ 80V	80V
Current	0 ~ 45A	0 ~ 30A	0 ~ 45A ± 2CH	0 ~ 3A	0 ~ 3A	30A
Power	400W	800W	800W	400W	300W	300W
REGULATION (CR)						
Load	0.01% ± 1mV of rated voltage			0.01% ± 10mV of rated voltage		N/A
Line	0.01% ± 2mV of rated voltage			0.01% ± 20mV of rated voltage		N/A
REGULATION (CC)						
Load	0.02% ± 1mA of rated current			0.02% ± 10mA of rated current		N/A
Line	0.01% ± 2mA of rated current			0.01% ± 10mA of rated current		N/A
RIPPLE & NOISE (Jitter Bandwidth 20Hz ~ 100kHz, Ripple Bandwidth 100Hz ~ 1MHz)						
CV pp	80mV	100mV	80mV	250mV (only output voltage measures more than 10% of the rated voltage)	200mV (only output voltage measures more than 10% of the rated voltage)	N/A
CV rms	4mV	5mV	4mV	25mV (when current measures 2A) 10mV (when current measures 1A)	20mV (when current measures 2A) 10mV (when current measures 1A)	N/A
CC rms	20mA	30mA	30mA	10mA	20mA	N/A
PROGRAMMING ACCURACY						
Voltage	0.1% settings/digits			0.1% settings/digits		N/A
Current	0.2% settings/digits			0.2% settings/digits		N/A
Power	± 0.5%			± 0.5% (only output voltage measures more than 10% of rated voltage)		N/A
LOAD-REGULATION ACCURACY						
Voltage	0.1% readings/digits			0.1% readings/digits		N/A
Current	0.1% readings/digits			0.1% readings/digits		N/A
Power	0.1% readings/digits			0.1% readings/trist ± 40mA		N/A
RESPONSE TIME						
Rise Time(Full load/No load)	10ms			200ms		N/A
Fall Time(Full load)	100ms			500ms		N/A
Fall Time(No load)	300ms			1000ms		N/A
Load Transient Recovery Time	1ms			2ms		N/A
PROGRAMMING RESOLUTION						
Voltage	10mV			100mV		N/A
Current	10mA			10mA		N/A
Power	10W			10W		N/A
MEASUREMENT RESOLUTION						
Voltage	10mV			100mV		N/A
Current	10mA			10mA		N/A
Power	10W			10W		N/A
SERIES AND PARALLEL CAPABILITY						
Channel Number	1	1	2	1	1	N/A
Series Operation	Up to 2 Units	Up to 2 Units	N/A	N/A	Up to 2 Units	N/A
Parallel Operation	Up to 4 Units	Up to 4 Units	N/A	Up to 2 Units	N/A	N/A
Hydraultic Inter-PSB-3000L	N/A	Up to 2 Units	N/A	N/A	N/A	N/A
PROTECTION FUNCTION						
OCP (Load)	Output off when 110% of rated voltage			Output off when output voltage exceeds 110% of rated voltage		N/A
OCP (Short)	Output off when operating setting range 1A-40A with full power			Resettable in-range from 10V ~ 80V via front panel		N/A
OCP (Load)	Output off when 110% of rated current			Output off when output voltage exceed 110% of rated current		N/A
OCP (Warning)	Output off when operating setting range 1A-40A is not correct			Resettable in-range from 0.1A ~ 4.0A via front panel		N/A
Ort	Output off above heat sink setting temperature			Output off at the internal heat sink temperature over setting value		N/A
ENVIRONMENT COMBINATION						
Operation Temp	0°C ~ 40°C					N/A
Storage Temp	-20°C ~ 70°C					N/A
Operating Humidity	50% ~ 85% RH (no dew condensation)					N/A
Storage Humidity	50% ~ 85% RH (no dew condensation)					N/A
OTHER						
Input Current	25A Max 160VA/0.50	25A Max 1120VA/0.50	20A Max 1120VA/0.50	25A Max 160VA/0.50	25A Max 1120VA/0.50	25A Max 1120VA/0.50
Power Consumption/Power						
Cooling Method	Forced air-cooling with fan motor					
Power Source	100VAC ~ 240VAC, 50/60Hz, Single phase					
Interface (Standard)	RS-232C/USB					
Interface (Optional)	CFB					
Ending Current	Yes					
DIMENSIONS & WEIGHT						
	210(W) × 124(H) × 160(D)mm					
Approx. 2kg	Approx. 7kg	Approx. 7kg	Approx. 3kg	Approx. 4kg	Approx. 3kg	

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



PSB-2400L2



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



PSB-2800L5

Rear Panel



PSB-003 Parallel Connection Kit for
Horizontal Installation



PSB-004 Parallel Connection Kit for
Vertical Installation



PSB-001 GPIB Control Board



PSB-005 Parallel Connection
Signal Cable



GRJ-1101 Modular Cable



PSB-006 Series Connection
Signal Cable



PSB-008 RS-232C Cable (PSB-008-01)



PSB-007 Joint Kit



ORDERING INFORMATION

PSB-2400L	0.80V/0.45A/400W Multi-Range DC Power Supply
PSB-2800L	0.80V/0.45A/800W Multi-Range DC Power Supply
PSB-2400L2	0.80V x 2/0.45A x 2/800W Multi-Range DC Power Supply
PSB-2400H	0.80V/0.5A/400W Multi-Range DC Power Supply
PSB-2800H	0.80V/0.5A/800W Multi-Range DC Power Supply
PSB-2800L5	800W Slave (Bridged) Unit for Current Extension Only

ACCESSORIES :

User Manual (CD) x 1, AC Power Cord x 1, External Control Connector (2pin), Screws for output terminals on rear panel, Protection covers for output terminals on rear panel, Protection caps for output terminals on the front panel, CHD Cable, USB Cable (for Model Number: PSB-2800L, PSB-2800H, PSB-2400L2, PSB-2400H, PSB-2800H) Local Bus (for Model Number: PSB-2400L, PSB-2800L, PSB-2400L2, PSB-2400H, PSB-2800H)

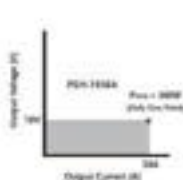
OPTIONAL ACCESSORIES

PSB-001	GPIB Card	CTL-048	USB Cable
PSB-003	Parallel Connection Kit for Horizontal Installation	CTL-048	GPIB Cable
Kit Includes : (PSB-003) x 1, Horizontal Bus Bar x 2, (PSB-001) x 1		CAB-1101	Modular Cable
PSB-004	Parallel Connection Kit for Vertical Installation	CBA-024	Each Mount Kit
Kit Includes : (PSB-004) x 1, Vertical Bus Bar x 1, (PSB-001) x 1			
PSB-005	Parallel Connection Signal Cable		
PSB-006	Series Connection Signal Cable		
PSB-007	Joint Kit		
Kit Includes : 4 joining Plates, (M3x6) screws x 4, (M3x4) screw x 2			
PSB-008	RS-232C Cable (PSB-008-01)		

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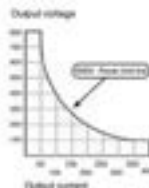
Driver Laboratory Driver

A MULTI-RANGE OUTPUT OPERATION



The operation area of a Conventional Power Supply

Compared with the maximum power output of the conventional power supply that is calculated by the maximum output voltage multiplies 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 300W, the maximum voltage and current outputs are likely to be



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

10V and 30A respectively. Comparatively, PSB-2400L, with the maximum power output of 400W, provides voltage and current output ranges of 0-80V and 0-5A. 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 $P_{max} = V_{max} \times I_{max}$, 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:

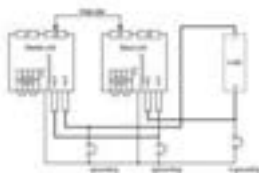
MODEL	PSB-2400L	PSB-2800L	PSB-2400L2	PSB-2400H	PSB-2800H	PSB-2800LS*
Channel Number	1	1	2	1	1	NA
Voltage Rating**	0 ~ 80V	0 ~ 80V	0 ~ 80V x 2CH	0 ~ 800V	0 ~ 800V	80V
Current Rating***	0 ~ 40A	0 ~ 80A	0 ~ 40A x 2CH	0 ~ 5A	0 ~ 6A	80A
Output Power (Max.)	400W	800W	800W	400W	800W	800W

* PSB-2800LS, 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 $400W/80V = 5A$.

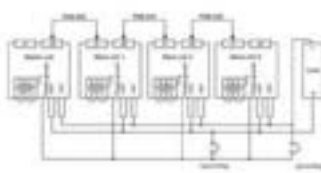
*** Same as above. When PSB-2400L outputs 40A the highest voltage is $400W/40A = 10V$.

C SERIES AND PARALLEL CONNECTIONS



Series 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



Parallel Connection

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 ion battery and electronic parts.

Programmable Multi-Range D.C. Power Supply



PSB-1000 Series



FEATURES

- LCD Display and User-Friendly Menu-Type Functional Interface
- Voltage Rating: 40V/100V, Output Power Rating: 400W/1000W
- Constant Power Output for Multi-Range/V & I Operation
- The I/V Control Functions (adjustable Slope 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 Thermal Control (Busy/Free Point) Rear Panel/Function
- LabVIEW Driver

PSB-106 Basic accessory kit:

Kit includes terminal cables and sockets x 6, 48k Termination resistors, Noise and swashes x 3, Analog current protection diodes x 3, Analog current load x 3, Short bar x 1



PSB-1000 is a series of Multi-Range DC Power Supply, whose maximum voltage output of 100V can be realized by placing 2 sets of 100V units in series connection. By connecting 4 sets of PSB-1000 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-type functionality selection without referring to the user manual. All settings can be done by functional 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-type functionality interface and its built-in functionalities 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-type 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 evolution as soon as power is turned on. For production lines demanding sequential power supply output application requirements, Interval time can be saved by this function, which exempts users from inserting 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. VOL% EBC can be applied to Automatic test system by providing output time for working voltage via BNC adapter. The Output Delay function facilitates users to respectively set action time for power output on and power output off for multiple sets of PSB-1000 to an to realize sequential power output applications.

The PSB-1000 series is equipped with multi-range power output capability providing four-fold rated power output to meet customers' flexible application requirements.

SPECIFICATIONS				
Model Name	PSB-1400L	PSB-1400M	PSB-1800L	PSB-1800M
OUTPUT RATING				
Output Voltage(V)	0-40	0-100	0-40	0-100
Output Current(A)	0-40	0-10	0-30	0-30
Output Power(W)	400W	400W	800W	800W
REGULATION (CV)				
Load Regulation (mV)	23	83	23	83
Line Regulation (mV)	23	83	23	83
REGULATION (CC)				
Load Regulation (mV)	45	15	83	23
Line Regulation (mV)	45	15	83	23
RIPPLE & NOISE (Noise Bandwidth 20MHz; Ripple Bandwidth = 1MHz)				
Ck p-p	60	60	86	86
Ck rms	7	12	11	11
CC rms	90	20	169	49
PROGRAMMING ACCURACY				
Voltage (mV)	0.1% + 10	50	10	10
Current (mA)	0.1% + 20	10	40	20
MEASUREMENT ACCURACY				
Voltage (mV)	0.1% + 10	30	10	10
Current (mA)	0.1% + 20	10	40	20
RESPONSE TIME				
Rise Time (ms)	50	100	50	100
Fall Time(full load) (ms)	50	150	50	150
Fall Time(no load) (ms)	100	1200	500	1100
Load/Range Time (10% 100%)	1	1	1	1
PROGRAMMING RESOLUTION (By PC Remote Control Mode)				
Voltage (mV)	1	1	1	1
Current (mA)	1	1	2	1
MEASUREMENT RESOLUTION (By PC Remote Control Mode)				
Voltage (mV)	1	1	1	1
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	5-170	4-44	5-170
OCV (A)	4-44	5-171	5-88	5-171
OHP	Turn the output off	Turn the output off	Turn the output off	Turn the output off



PSB-1000 Series

SPECIFICATIONS

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	20
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/CPIB (Optional)			
Power Source	100Vac ~ 240Vac, 50Hz ~ 60Hz, single phase			
Dimension	274(W) x 124(H) x 118(D) mm			
Weight	Approx. 5.2kg	Approx. 5.2kg	Approx. 5.8kg	Approx. 5.8kg

ORDERING INFORMATION

PSB-1400L	40V/10A/400W Programmable Multi-Range D.C. Power Supply
PSB-1400M	100V/10A/400W Programmable Multi-Range D.C. Power Supply
PSB-1800L	40V/10A/800W Programmable Multi-Range D.C. Power Supply
PSB-1800M	100V/10A/800W Programmable Multi-Range D.C. Power Supply

ACCESSORIES

CD-ROM (User Manual, Programming Manual) x 1, Power cord for EU/USA or PSE (Region dependent), Output terminal cover, Type A-B USB cable, PSB-100 Basic accessory kit, 5M terminal socket and washers x 2, M3 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

PSB-001	Analog remote control connector kit
PSB-002	Simple GND test
PSB-003	Current terminal test
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	CPIB card
PSB-106	Basic accessory kit
ORA-4101	M3 Terminal socket and washers x 2, M3 Terminal bolts, nuts and washers x 2, Analog control protection dummy x 1, Analog control lock level x 2, Short bar x 1
ORA-4102	Rack Mount Kit (2U)
ORA-4103	Rack Mount Kit (3U)
CTS-101	Test lead, 1m red, 1m black

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Driver	Labview Driver
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Rear Panel



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 CPIB card



Programmable Switching D.C. Power Supply



PSH-Series

RS-232 GPIB Serial Output PC Software LabVIEW Driver

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 (IEEE488.2)
- LabVIEW Driver

Rear Panel



The PSH-Series is a single output from 160W 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. Self test 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.

Specification	PSH-2016A	PSH-3676A	PSH-1626A	PSH-1636A
OUTPUT				
Voltage	20V	20V	30V	30V
Current	16A	18A	20A	30A
REGULATION (C.C.)				
Load	≤ 0.15% (1mV)	≤ 0.15% (1mV)	≤ 0.15% (1mV)	≤ 0.15% (1mV)
Line	≤ 0.05% (1mV)	≤ 0.05% (1mV)	≤ 0.05% (1mV)	≤ 0.05% (1mV)
REGULATION (C.V.)				
Load	≤ 0.25% (1mV)	≤ 0.25% (1mV)	≤ 0.25% (1mV)	≤ 0.25% (1mV)
Line	≤ 0.25% (1mV)	≤ 0.25% (1mV)	≤ 0.25% (1mV)	≤ 0.25% (1mV)
RIPPLE & NOISE				
Voltage (ripple)	≤ 10mVrms	≤ 10mVrms	≤ 10mVrms	≤ 10mVrms
Voltage (ripple)	≤ 10mVpk	≤ 10mVpk	≤ 10mVpk	≤ 10mVpk
Current (ripple)	≤ 0.25%	≤ 0.25%	≤ 0.25% (10mV)	≤ 0.25% (10mV)
RESOLUTION				
Voltage	10mV	10mV	10mV	10mV
Current	10mA	10mA	10mA	10mA
PROGRAM ACCURACY				
Voltage	≤ 0.05% (1mV)	≤ 0.05% (1mV)	≤ 0.05% (1mV)	≤ 0.05% (1mV)
Current	≤ 0.25% (10mA)	≤ 0.25% (10mA)	≤ 0.25% (10mA)	≤ 0.25% (10mA)
REFERENCE 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
REFERENCE ACCURACY (Meter)				
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
RECOVERY TIME (COMMON)				
Voltage (at 25°C)	≤ 100µs/A	≤ 100µs/A	≤ 100µs/A	≤ 100µs/A
RESPONSE (Rise/Fall) TIME				
Voltage (up)	≤ 150ns	≤ 150ns	≤ 150ns	≤ 150ns
noise, rising load	(50% rising load)	(50% rising load)	(50% rising load)	(50% rising load)
Voltage (down)	≤ 150ns	≤ 150ns	≤ 150ns	≤ 150ns
noise, falling load	(50% falling load)	(50% falling load)	(50% falling load)	(50% falling load)
RECOVERY TIME (N/A, Reg Load Change from O/C to N/A)				
CV Mode	≤ 2ms	≤ 2ms	≤ 2ms	≤ 2ms
PROTECTION				
OV/OC/OTP	✓	✓	✓	✓
Back Current	✓	✓	✓	✓
OUTPUT ON/OFF CONTROL				
✓	✓	✓	✓	✓
INTERFACE				
Standard: RS-232C, Optional: GPIB				
POWER SOURCE				
AC70V-250V 50/60Hz				
DIMENSIONS & WEIGHT				
160W (PSH-2016A) (PSH-3676A)	1080W (PSH-1626A) (PSH-1636A)	160W (PSH-2016A) (PSH-3676A)	160W (PSH-2016A) (PSH-3676A)	160W (PSH-2016A) (PSH-3676A)
mm, Approx. 3.3kg	mm, Approx. 3.3kg	mm, Approx. 6.2kg	mm, Approx. 6.2kg	mm, Approx. 9.3kg

ORDERING INFORMATION

PSH-2016A 160W Programmable Switching D.C. Power Supply
 PSH-3676A 160W Programmable Switching D.C. Power Supply
 PSH-1626A 720W Programmable Switching D.C. Power Supply
 PSH-1636A 1080W Programmable Switching D.C. Power Supply

ACCESSORIES:
 User manual + 1, Power cord x 1

OPTION

Opt. 01: GPIB Interface (Factory Installed)

OPTIONAL ACCESSORIES

GR4-400 Rack Mount Kit
 STL-035 RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer
 CTL-102 Test Lead, 14 Inches for Alligator Test Lead, Max. Current 45A, 1200mm
 CTL-348 GPIB Cable, Double Shielded, 3000mm

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.

Programmable Switching D.C. Power Supply



PSP-603/405/2010



FEATURES

- LCD Display
- Output ON/OFF Control
- 3 Step Fan Speed Control
- Voltage/Current/Power Setting
- Key Lock to Avoid Error Operation
- Manual, +%, -% Output Operation Key
- Standard Interface: RS-232C
- Optional European Type Jack Terminal

European Type Jack Terminal



Rear Panel



The PSP Series is a single output, 200W, programmable switching DC power supply. OVL, OCL, OTF, and OPI protect the PSP Series and its loads from unexpected conditions. The PSP Series has a large LCD panel with output and parameter views and a key lock feature to prevent changing the settings. The PSP Series is suitable for generic bench-top applications in laboratories and educational institutions.

SPECIFICATIONS			
Model	PSP-603	PSP-405	PSP-2010
INPUT			
Voltage	0 ~ 80V	0 ~ 40V	0 ~ 20V
Current	0 ~ 3.5A	0 ~ 5A	0 ~ 10A
VOLTAGE REGULATION			
Load	10mV	10mV	10mV
Line	0.02%	0.02%	0.02%
CURRENT REGULATION			
Load	1A 1mA	1A 1mA	1A 1mA
Line	0.02%	0.02%	0.02%
RIPPLE			
Voltage (p-p)	20mV	20mV	20mV
Current (p-p)	10mA	10mA	10mA
RESOLUTION			
Voltage	20mV	10mV	10mV
Current	10mA	10mA	10mA
PROGRAM ACCURACY			
Voltage	± 0.01% (4 digits)	± 0.01% (4 digits)	± 0.01% (4 digits)
Current	± 0.1% (4 digits)	± 0.1% (4 digits)	± 0.1% (4 digits)
READBACK (VOLTAGE) RESOLUTION			
Voltage	Same as Resolution	Same as Resolution	Same as Resolution
Current	Same as Resolution	Same as Resolution	Same as Resolution
READBACK (CURRENT) RESOLUTION			
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			
OVERCURRENT	✓	✓	✓
OVERVOLTAGE	✓	✓	✓
OVERTEMPERATURE	✓	✓	✓
OVERPOWER	✓	✓	✓
DISPLAY			
LCD			
INTERFACE (STANDARD)			
RS-232C			
POWER SOURCE			
AC 115V/230V ± 10%, 50/60Hz			
DIMENSIONS & WEIGHT			
220(W) x 100(H) x 80(D) mm, Approx. 8kg			

ORDERING INFORMATION

- PSP-603 200W Programmable Switching DC Power Supply
- PSP-405 200W Programmable Switching DC Power Supply
- PSP-2010 200W Programmable Switching DC Power Supply

ACCESSORIES

User manual x 1, Power cord x 1, Test lead CTL10A x 1, European test lead CTL200A x 1

OPTIONAL ACCESSORIES

- CTL200A RS-232C Cable
- GMA-405 Rack Mount Kit, 1U, 8U 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 CPS-Series is an ideal solution for power efficient bench-top or portable applications requiring high regulation.

SPS-1230/1820/2415/3610/606



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: $\leq 5\text{mV}$ Load regulation: $\leq 5\text{mV}$				
Ripple & Noise	$\leq 1\text{mVrms}$, 100kHz ~ 20Hz ~ 20MHz				
Recovery Time	$\leq 100\mu\text{s}$				
Temp. Coefficient	$\leq 100\text{ppm}/^\circ\text{C}$				
Output Range	Rising voltage continuously adjustable				
CONSTANT CURRENT OPERATION					
Regulation	Line regulation: $\leq 5\text{mV}$ Load regulation: $\leq 5\text{mV}$				
Ripple Current	$\leq 10\text{mA}$ (SPS-606) $\leq 10\text{mA}$ (SPS-3610) $\leq 10\text{mA}$ (SPS-2415) $\leq 10\text{mA}$ (SPS-1820) $\leq 10\text{mA}$ (SPS-1230)				
Output Range	Rising current continuously adjustable (at 1.0V range sub-steps)				
METER					
Type	3 1/2 digit, 6.3" VCD display				
Accuracy	$\pm 0.05\%$ of rdg. + 2dgt				
INSULATION					
Chassis and Terminal	250V or above (DC 100V)				
Chassis and AC Cord	500V or above (DC 100V)				
POWER SOURCE					
AC 115V/230V 10 1%, 50/60Hz					
DIMENSIONS & WEIGHT					
128(W) x 151(H) x 130(D) mm, Approx. 3.2kg					

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 (75) 2834 x 1

Multiple Output Dual Range D.C. Power Supply



SPD-3606



FEATURES

- Three Independent, Isolated Output
- CH1/CH2: Dual Output Range of 10V/5A or 60V/1A
- CH3 Adjustable Output: 0.1-5V/1A
- High Efficiency Power Conversion (Up to 20% Than Traditional Power Supply)
- Remote Output On/Off Control
- OVP to Protect the DUT
- OTP to Protect SPD-3606 from Reducing the Repair Rate
- Automatically Switches AC 115V/230V Source
- Full Safety Design: Reverse Polarity, CH3 Overload Protection, Safe Output Setting, C.C./C.K. Mode
- Compact Size, Light Weight
- Low Fan Acoustic Noise with Fan Speed Control Circuit
- Voltage/Current Protection Knob(Optional)
- Optional European Jack Type Terminal

European Type Jack Terminal



Rear Panel



GPS-001

Voltage/Current protection Knob



The SPD-3606 DC power supply provides 375W 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 benchmark for satisfying mainstream power supply demands. CH1 & CH2 offer dual-range output either at 10V/5A or 60V/1A (at choice) 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/1A, 60V/5A, or 120V/1A). 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 optimal 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 - 10V / 0 - 5A; 0 - 60V / 0 - 1A
CH1/CH2 Series	0 - 10V / 0 - 5A; 0 - 120V / 0 - 1A
CH1/CH2 Parallel	0 - 10V / 0 - 12A; 0 - 60V / 0 - 6A
CH3	0.1 - 5V / 1A
VOLTAGE REGULATION	
Line Load	≤ 0.01% + 3mV ≤ 0.01% + 3mV (rating current ≤ 5A) ≤ 0.01% + 3mV (rating current ≤ 11A)
Ripple & Noise	≤ 1mVrms (20Hz - 100kHz); ≤ 50mVpk (20Hz - 200kHz)
Recovery Time	≤ 100μs (50% load change, minimum load 0.5A)
CURRENT REGULATION	
Line Load	≤ 0.2% + 3mA ≤ 0.2% + 3mA
Ripple & Noise	≤ 3mA rms
TRACKING OPERATION	
Tracking Error	≤ 0.1% + 10mV of master
Series Regulation	≤ 300mV
Ripple & Noise	≤ 10mVrms (20Hz - 1MHz); ≤ 50mVpk (20Hz - 200kHz)
OUTPUT ON/OFF RESPONSE TIME	
Voltage Up (10% - 90%)	≤ 100ms (≤ 10% rating load)
Voltage Down (90% - 10%)	≤ 100ms (≥ 10% rating load)
OVP	
Accuracy	± 0.5% of reading + 0.1V
METER	
Type	1 "Yellow 0.5" LED display
Accuracy	± 0.5% of reading + 2 digits
Resolution	100mV/10mA
INSULATION	
Chassis & Terminal	1000VDC above (DC 1000V)
Chassis & AC side	1000VDC above (DC 1000V)
TEMPERATURE COEFFICIENT	
Voltage	≤ 10ppm/°C + 3mV
Current	≤ 10ppm/°C + 5mA
REMOTE CONTROL	
Output On/Off	≤ 100ms
FAN NOISE	
≤ 50dB	
OPERATION ENVIRONMENT	
Ambient temperature	0 - 40 °C; Relative humidity ≤ 80%
STORAGE ENVIRONMENT	
Ambient temperature	-10 - 70 °C; Relative humidity ≤ 90%
POWER SOURCE	
AC 115V/230V ± 10%, 50/60Hz	
DIMENSIONS & WEIGHT	
215 (W) × 140 (H) × 205 (D) mm; Approx. 4kg	

ORDERING INFORMATION

SPD-3606 Multiple Output Dual Range D.C. Power Supply

ACCESSORIES

User manual x 1, Power cord x 1, Test lead CTL-100A x 2, CTL-105A x 1
European Test Lead CTL-201A x 1, CTL-205A x 1, CTL-204A x 2

OPTIONAL ACCESSORIES

GPS-001 Voltage/Current protection Knob

Source Measure Unit



GSM-20H10

NEW



FEATURES

- Maximum Output $\pm 210V/\pm 1.05A/22W$
- 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 $\pm 210V/\pm 1.05A/22W$. 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 $1\mu V/10pA/10\mu\Omega$.

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

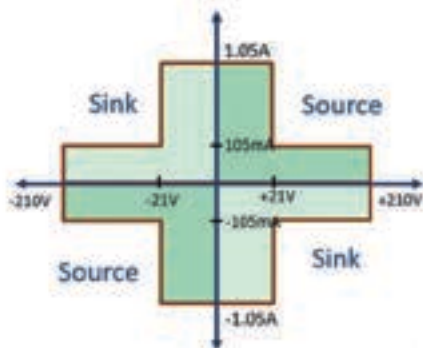
- NOTE:**
- Speed - Nominal (1 NPLC). For 0.1 PLC, add 0.005% of range to offset specifications, except 200mV, 1A ranges, add 0.05%.
 - Required to reach 0.1% of final value after Command is processed. Resistive load, 10pA to 100mA range.
 - Overshoot into a fully resistive 100kΩ load, 10kΩ to 1MΩ for BNC adjacent ranges, 100mV typical, except 20V/200W.
 - Maximum time required for the output to begin to change following the receipt of SOURCE/VOIage/CURRENT/Resistance Command.
 - Reading rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading format.
 - Purely resistive load, 1pA and 10pA ranges -offsets.
 - 1000 point sweep was characterized with the source on a fixed range.
 - Pass/Fail test performed using one high limit and one low math limit.
 - Includes time to re-program source to a new level before making measurement.
 - Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.
 - Command processing time of SOURCE/VOIage/CURRENT/TIMECommand not included.

SPECIFICATIONS

MAXIMUM RANGE	Voltage	±120V											
	Current	±1.85A											
	Power	22W											
	Voltage Resolution	1µV											
	Current Resolution	10µA											
SOURCE	DC Voltage	Output Voltage	±12V / ±1.85A, ±120V / ±195 mA										
		Current Limit	Min. 5.1% of range										
		Programming Resolution & Accuracy ¹	Range	±200.000mV		±2.00000V		±20.000V		±200.000V			
			Resolution	1µV		10µV		100µV		1mV			
			Accuracy	±(0.02%+600µV)		±(0.02%+600µV)		±(0.02%+1.4mV)		±(0.02%+14mV)			
			Load Regulation	0.01% of range ±100µV									
		Line Regulation	0.01% of range										
		Overheat	±0.1% typical (full scale step, sensitive load, 10mA range)										
		Recovery Time (100% Load Change)	±25µs (within 0.1% plus load regulation error, 1A and 100mA compliance)										
		Bleed and Noise	4nVrms(20Hz-10kHz) / 10nVpp(20Hz-10kHz)										
	Temperature Coefficient	±(0.1% accuracy specification)/°C (0°-18°C & 20°-50°C)											
	Output Current	±1.85A / ±12V, ±195mA / ±120V											
	Voltage Limit	Min. 5.1% of range											
	DC Current	Programmed Source Resolution & Accuracy ¹	Range	±1.00000µA		±10.0000µA		±100.000µA		±1.00000A			
			Resolution	10pA		1nA		100nA		1µA			
			Accuracy	±(0.01%+100pA)		±(0.01%+100pA)		±(0.01%+100pA)		±(0.01%+100pA)			
			Load Regulation	0.01% of range ±100pA									
		Line Regulation	0.01% of range										
		Overheat	±0.1% typical (1mA step, R _L =10kΩ, 20V range)										
		Temperature Coefficient	±(0.1% accuracy specification)/°C (0°-18°C & 20°-50°C)										
		Output Settling Time (±20%)	100µs typical time										
		Output Rise Time (±20%)	200µs, 200V range, 100mA compliance; 100µs, 20V range, 100mA compliance										
DC Floating Voltage		Output can be floated up to ±250VDC											
General	Remote Sense	Up to 1V drop per lead lead											
	Compliance Accuracy	Add 0.1% of range and ±0.02% of reading to base specification											
	Range Change Overheat ¹	Adjacent range changes between 200mV, 2V and 20V ranges, 100mV typical											
	Minimum Compliance Value	5.1% of range											
	Command Processing Time ¹	Autorange On/Off Delay, Autorange Off Time											
	Input Resistance	≥10 GΩ											
	Measurement Resolution & Accuracy	Range	±200.000mV		±2.00000V		±20.000V		±200.000V				
	Resolution	1µV		10µV		100µV		1mV					
	Accuracy	±(0.02%+300µV)		±(0.02%+300µV)		±(0.02%+1.4mV)		±(0.02%+14mV)					
	Temperature Coefficient	±(0.1% accuracy specification)/°C (0°-18°C & 20°-50°C)											
MEASUREMENT	Current	Voltage Burden (4-wire mode)	≤1mV										
			Programmed Source Resolution & Accuracy ¹	Range	±1.00000µA		±10.0000µA		±100.000µA		±1.00000A		
				Resolution	10pA		1nA		100nA		1µA		
				Accuracy	±(0.01%+100pA)		±(0.01%+100pA)		±(0.01%+100pA)		±(0.01%+100pA)		
	Temperature Coefficient	±(0.1% accuracy specification)/°C (0°-18°C & 20°-50°C)											
	Resistance	Range	Resolution	±1.00000		20.0000		200.0000		2.00000kΩ		20.0000kΩ	
			Test current	—		100µA		1mA		10mA		100mA	
			Accuracy	Source IACC+Meas IACC		Source IACC+Meas IACC		Source IACC+Meas IACC		Source IACC+Meas IACC		Source IACC+Meas IACC	
			Resolution	200.0000		2.000000		20.0000		200.0000		2.00000kΩ	
			Test current	10µA		100µA		1mA		10mA		100mA	
			Accuracy	±(0.07%+300), Normal		±(0.11%+300), Normal		±(0.11%+300), Normal		±(0.11%+300), Normal		±(0.11%+300), Normal	
		Resolution	10		100		1k		10k		100k		
		Test current	10µA		100µA		1mA		10mA		100mA		
		Accuracy	±(0.07%+300), Normal		±(0.11%+300), Normal		±(0.11%+300), Normal		±(0.11%+300), Normal		±(0.11%+300), Normal		
		Temperature Coefficient	±(0.1% accuracy specification)/°C (0°-18°C & 20°-50°C)										
	Source I mode, Manual OHMS	Total uncertainty = Source accuracy + Measure accuracy (4-wire remote sense)											
	Source V mode, Manual OHMS	Total uncertainty = Source accuracy + Measure accuracy (4-wire remote sense)											
	4-wire OHMS Mode	Available using active shunt guard and guard sense. Max Guard Output Current: 10mA (except 1A range). Accuracy is load dependent											
	Guard Output Impedance	≥10Ω in shunt mode											
	SYSTEM SPEED ¹	Maximum Range Change Rate	75/second										
		Maximum Measure Auto Range Time	40ms (fixed source) ±5										
		Sequence Reading Rate ¹ (µg/second) for 40Hz (20Hz)	Speed	NPLC / 1µg		Measure		Source Measure		Source Measure		Source Measure	
Fast			200 (200)		100 (100)		100 (100)		100 (100)		100 (100)		
Medium			100 (100)		50 (50)		50 (50)		50 (50)		50 (50)		
Normal			50 (50)		25 (25)		25 (25)		25 (25)		25 (25)		
Slow			25 (25)		12.5 (12.5)		12.5 (12.5)		12.5 (12.5)		12.5 (12.5)		
Very Slow			12.5 (12.5)		6.25 (6.25)		6.25 (6.25)		6.25 (6.25)		6.25 (6.25)		
Single Reading Operation Rate (µg/second) for 40Hz (20Hz)		Speed	NPLC / 1µg		Measure		Source Measure		Source Measure		Source Measure		
		Fast	200 (200)		100 (100)		100 (100)		100 (100)		100 (100)		
		Medium	100 (100)		50 (50)		50 (50)		50 (50)		50 (50)		
		Normal	50 (50)		25 (25)		25 (25)		25 (25)		25 (25)		
		Slow	25 (25)		12.5 (12.5)		12.5 (12.5)		12.5 (12.5)		12.5 (12.5)		
		Very Slow	12.5 (12.5)		6.25 (6.25)		6.25 (6.25)		6.25 (6.25)		6.25 (6.25)		
Component Interface Handler Time for 60Hz (50Hz) ±10	Speed	NPLC / 1µg		Measure		Source Measure		Source Measure		Source Measure			
	Fast	200 (200)		100 (100)		100 (100)		100 (100)		100 (100)			
SYSTEM GENERAL	Load Impedance	Stable into 20.000µF typical											
	Differential Mode Voltage	250VAC											
	Common Mode Voltage	250VDC											
	Common Mode Isolation	≥130dB, <1000pF											
	Over Range	100% of range, source and measure											
	Max. Voltage Drop	5V											
	Max. Sense Lead Resistance	100Ω											
	Sense Input Impedance	≥100GΩ											
	Guard Offset Voltage	±150µV typical											
	Source Output Modes	Fixed DC level, Memory List (selected functions), Scan (linear and log)											
Source Memory List	100 points max												
Memory Buffer	1.000 readings @ 1 digit (two 2.500 point buffers). Includes selected measured value(s) and time stamp. Lithium battery backup(2 yr + battery life)												
Programmability	IEEE 488.2 (GPIB), RS-232, 1 user definable power-up status plus factory default and "REST"												
Digital I/O Connector	Active low input, Start of test, end of test, 3 category bits, ±5V @ 380mA supply, 1 trigger input, 4 TTL/Relay Drive outputs (15V @ 500mA, 5Vdc)												
Remote Interface	USB, GPIB, LAN, RS-232												
Isolation	Channels and terminal, 3000V or above (DC 100V); Channels and AC cord, 150V (3 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: -30°C ~ 70°C Humidity: ≤80%												
Input Power	100-240VAC, 50-60Hz												
Power Consumption	80W												
Dimensions & Weight	214 (W) × 88 (H) × 353.3 (D) mm, Approx. 4.8kg												

Source Measure Unit

A. MAXIMUM OUTPUT: $\pm 210V/\pm 1.05A/22W$

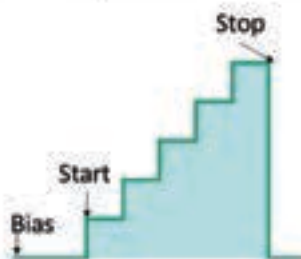


The power source output of the GSM-20H10 has two ranges.

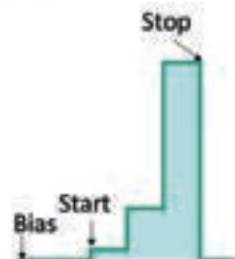
The voltage range is ± 21 volts, and the current is $\pm 1.05A$.
The voltage range is ± 210 volts, and the current range is $\pm 105mA$.
The power capacity is 22W.

Provide a full range of four-quadrant measurement without duty cycle limit.

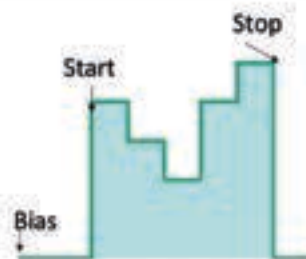
B. BUILT-IN 4 SEQUENCE OUTPUT MODES, UP TO 2500 POINTS



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).

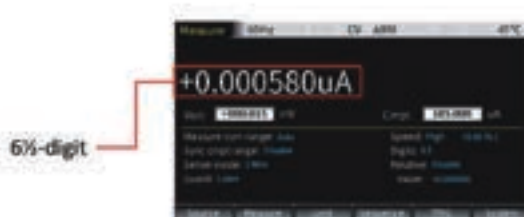
With these output modes, users can quickly generate output as needed. The total number of sequence points is 2,500.

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 6% DIGIT RESOLUTION



GSM-20H10 provides a measurement accuracy of up to 0.012%, and provides a meter display function of up to 6% digits, allowing users to have more accurate results when measuring small signals...

E. VARIABLE SAMPLING SPEED

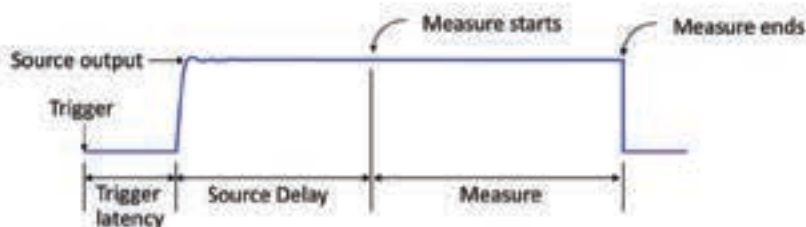


The sampling rate of GSM-20H10 is variable. Therefore, users can choose the sampling rate from 0.01 PLC to 10 PLC according to their needs.

SAMPLING MODE	FAST	MEDIUM	NORMAL	HIGH	OTHER
Speed, NPLC	0.01	0.1	1	10	User defined
Digit	3%	4%	5%	6%	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.

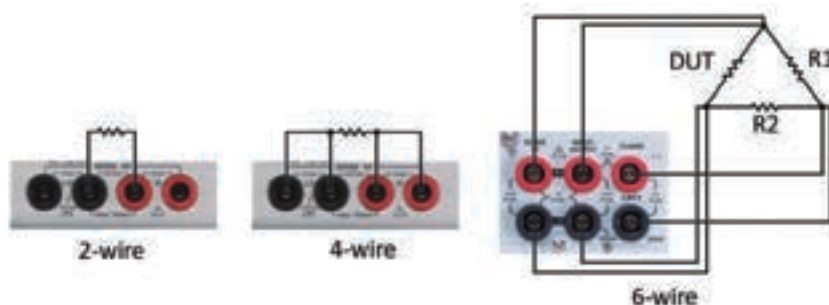
F. SDM (SOURCE DELAY MEASURE) CYCLE



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 = $V \cdot I$
- CompOhms = $\frac{(V2 - V1)}{(I2 - I1)}$
- Vcoef(%) = $\left[\frac{\Delta V}{(R2 - R1)} \right] \cdot 100\%$
- VarAlpha, $\alpha = \frac{\ln(V2/V1)}{\ln(I2/I1)}$
- Dev = $\left[\frac{(X - F)}{F} \right] \cdot 100\%$



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/0.5µA for 5mA range
- Transient Recovery Time: 540µs within 100mV, <30µs within 20mV
- Current Sink Function
- Pulse Current Measurement (Pulse width min.: 10µs)
- Long Integration Current Measurement
- Built-in DVM Measurement Function
- Sequence Function (Sequence power output)
- Built-in Battery Simulation Function (CH1 of PPH-1503B)
- 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/0.5µA and the smallest pulse current width of 10µs that satisfy customers' measurement application requirements of high resolution and pulse current. Fast load current variation will result in voltage sag 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 load 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-1503Drive a rise time of 0.5ms and a fall time of 0.5ms, which are 100-times faster than that of conventional power supplies. Therefore, PPH-1503 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-1503, with the sample rate of 50k, can conduct pulse-current measurement without using a current probe and oscilloscope. The current load back accuracy is 0.2%~1.5k (equivalent to 1µA) at 5mA range, and the load back resolution is 0.1µA 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, computer device, and portable device which produce large transient pulse current. Load for hundreds of µs to dozens of ms when in use. PPH-1503, different from general power supplies, has the characteristics of fast transient recovery time. While simulating battery to output pulse current, PPH-1503 can quickly compensate the voltage drop caused by pulse current. PPH-1503'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-1503 to accurately simulate battery's real behavior pattern so as to conduct product tests.

PPH-1503 is not only suitable for simulating battery charger and supplying powers DUT, but also ideal for simulating an electronic load to conduct charge tests with its sink current capability. The sink current function allows PPH-1503 to simulate a voltage source with the sink current capability. The maximum sink current of PPH-1503's CH1 is 3.5A and for CH2 is 3A. Long integration current measurement can be utilized to conduct average current measurement for periodic pulse current in a long period of time that is applied to analyze power 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 CH2 has a voltage range from 0.1V~200V, that covers the need of purchasing an additional voltmeter.

PPH-1503 provides OTP function and shows heat sink temperature on the upper right corner of the display screen. Other than that, features such as five sets of system setting values for the SAVE/RECALL function, 10 sets of Power On Sequence Settings, Key Lock function to prevent unauthorized inputs, temperature-controlled fan to reduce noise, hardcopy to save screen information, and external relay control device through segment PPH-1503's usability. PPH-Series supports test requirements of Profile1, Profile2 and Profile3 from USB Power Delivery (PD) conducted by USB IF association.

SELECTION GUIDE

Model	PPH-1503	PPH-1503D	PPH-1506D	PPH-1510D
Channel	1	2	2	2
Dual Range Output	Channel 1 0.10V/0.5A or 0.8V/5.5A	0.10V/0.5A or 0.8V/5.5A	0.10V/0.5A or 0.8V/5.5A	0.10V/0.5A or 0.8V/5.5A
	Channel 2 NA	0.10V/0.5A or 0.8V/5.5A	0.10V/0.5A or 0.8V/5.5A	0.10V/0.5A or 0.8V/5.5A
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/5mA	1A/500mA/ 1mA/CH1	1A/500mA/ 1mA/CH1	1A/500mA/ 1mA/CH1
CV/CC	✓	✓	✓	✓
Built-in DVM Measurement Function	✓	✓ (CH2)	✓ (CH2)	✓ (CH2)
Pulse Current Measurement	✓	✓	✓	✓
Long Integration Current Measurement	✓	✓	✓	✓
Battery Simulation	NA	✓ (CH1)	✓ (CH1)	✓ (CH1)
Automated Sequential Output	✓	✓ (CH1)	✓ (CH1)	✓ (CH1)
High Measurement Resolution	✓ (1mV/0.5µA)	✓ (1mV/0.5µA)	✓ (1mV/0.5µA)	✓ (1mV/0.5µA)
Sink Current Capability	✓ (Max.: 3A)	✓ (Max.: 3.5A)	✓ (Max.: 3.5A)	✓ (Max.: 3.5A)
Isolate Output Front Panel or Rear Panel	NA	✓	✓	✓
Relay Output Control	✓	✓	✓	✓
Memory	5 Sets	5 Sets	5 Sets	5 Sets
Sample Rate	40k	40k	40k	40k
Load Function	✓	✓	✓	✓
Protection Function	over-voltage/over-current/over-temperature/over-power	over-voltage/over-current/over-temperature/over-power	over-voltage/over-current/over-temperature/over-power	over-voltage/over-current/over-temperature/over-power
Rear Wire Output Open-Circuit Protection	NA	✓	✓	✓
Temperature Display for Heat Sink	NA	✓	✓	✓
Standard Interface	GPIB	✓ (GPIB)	✓ (GPIB)	✓ (GPIB)
LAN, USB, Analog Control	✓	✓ (GPIB)	✓ (GPIB)	✓ (GPIB)
Inter-Relay	LAN	✓	✓	✓

ORDERING INFORMATION

- PPH-1503 1ch 150W 3A with High-Precision DC Power Supply
 PPH-1503D 2ch 150W 3A with High-Precision DC Power Supply
 PPH-1506D 2ch 150W 6A with High-Precision DC Power Supply
 PPH-1510D 2ch 150W 10A with High-Precision DC Power Supply

ACCESSORIES

- CD (User manual v1, Quick start manual v1) Power cord (Region dependent), Test lead CTL-205A v1, CTL-205A v1, CTL-206A v1

OPTIONAL ACCESSORIES

- CTL-248 USB Cable (USB 2.0, 4.8 Feet)

DESCRIPTION	PPH-1500	PPH-1500D	PPH-1500E	PPH-1510D
GENERAL SPECIFICATIONS				
Model	PPH-1500	PPH-1500D	PPH-1500E	PPH-1510D
Output Power	1500W	1500W	1500W	1500W
Output Voltage	0 - 150V (0 - 150V)	0 - 150V (0 - 150V)	0 - 150V (0 - 150V)	0 - 150V (0 - 150V)
Output Current	0 - 10A (0 - 10A)	0 - 10A (0 - 10A)	0 - 10A (0 - 10A)	0 - 10A (0 - 10A)
Output Voltage Regulation	±0.1% (0 - 150V)	±0.1% (0 - 150V)	±0.1% (0 - 150V)	±0.1% (0 - 150V)
Output Current Regulation	±0.1% (0 - 10A)	±0.1% (0 - 10A)	±0.1% (0 - 10A)	±0.1% (0 - 10A)
Load Regulation	±0.1% (0 - 10A)	±0.1% (0 - 10A)	±0.1% (0 - 10A)	±0.1% (0 - 10A)
Line Regulation	±0.1% (0 - 150V)	±0.1% (0 - 150V)	±0.1% (0 - 150V)	±0.1% (0 - 150V)
Efficiency	85% (0 - 150V)	85% (0 - 150V)	85% (0 - 150V)	85% (0 - 150V)
Power Factor	0.95 (0 - 150V)	0.95 (0 - 150V)	0.95 (0 - 150V)	0.95 (0 - 150V)
Input Voltage	100V - 240V	100V - 240V	100V - 240V	100V - 240V
Input Current	10A (100V)	10A (100V)	10A (100V)	10A (100V)
Input Power	1500W (100V)	1500W (100V)	1500W (100V)	1500W (100V)
Input Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Operating Temperature	0 - 40°C	0 - 40°C	0 - 40°C	0 - 40°C
Storage Temperature	-20 - 60°C	-20 - 60°C	-20 - 60°C	-20 - 60°C
Humidity	10 - 90%	10 - 90%	10 - 90%	10 - 90%
Dimensions	150mm x 150mm x 150mm	150mm x 150mm x 150mm	150mm x 150mm x 150mm	150mm x 150mm x 150mm
Weight	1.5kg	1.5kg	1.5kg	1.5kg
Warranty	3 Years	3 Years	3 Years	3 Years
CE Marking	CE	CE	CE	CE
RoHS Marking	RoHS	RoHS	RoHS	RoHS
UL Marking	UL	UL	UL	UL
EMC Marking	EMC	EMC	EMC	EMC
Safety Marking	Safety	Safety	Safety	Safety
Environmental Marking	Environmental	Environmental	Environmental	Environmental
Other Marking	Other	Other	Other	Other
Accessories	Accessories	Accessories	Accessories	Accessories
Options	Options	Options	Options	Options
Customization	Customization	Customization	Customization	Customization
Support	Support	Support	Support	Support
Documentation	Documentation	Documentation	Documentation	Documentation

Programmable High Precision D.C. Power Supply

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 tens of ms. 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 when a significant voltage drop occurs. Recovery time of 40µs or less is guaranteed when the maximum voltage drop is within 180mV.

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 1A. 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 functions.

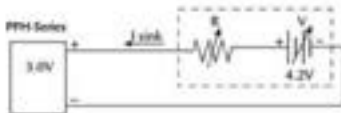
E BUILT-IN DIGITAL VOLT-METER



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 +30VDC, PPH-Series not only provides power supply for DUT but also measures the voltage on DUT. The read back accuracy reaches $\pm 0.05\%$ ($\pm 1mV$) 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.

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 0.3V to 2.3V, 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 CR 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.

D LONG INTEGRATION CURRENT MEASUREMENT



Long Integration Current Measurement

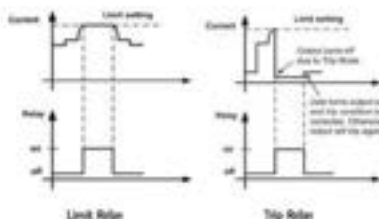
Long integration current measurement is to measure the average current of periodical pulse current in a long period of time. The measured pulse current must be a complete periodical waveform or multiple complete periodical waveforms. The total measurement time is up to 60 seconds. Measurements can be 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.

F MEASUREMENTS FOR POWER CONSUMPTION ANALYSIS



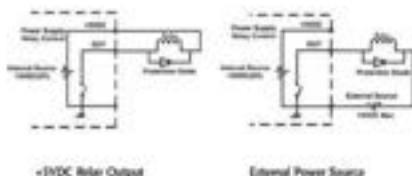
Voltage and Current Waveforms of the Receiving Signals of a Cellular Phone

One particular requirement of power consumption for portable wireless communications devices is Pulse Current. Portable devices such as cellular phones must transmit and receive (absorb) 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.



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 Can be Driven by Using Internal +V or External Power Source:



Using the $\pm$ VDC relay output to drive an external relay. Ensure the current does not exceed 120mA.

Using an external power source to drive the external relay. The voltage of the source cannot exceed 120V and the current can not exceed 120mA.

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.

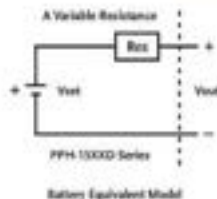
16. SEQUENCE FUNCTION



Functional Setting Page for Sequence Function

For the practical usage, PPH 1500D 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 3600 seconds and the resolution is 0.001 second. Programmable recurring frequency is from 1 to 9999 or it can be set to infinite execution (not recurring frequency to 0).

1. BATTERY SIMULATION FUNCTION



PPH 1500D'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 1500D can be utilized as a battery or an ideal voltage source Vset to be connected with variable resistance Res in series. The following diagram shows battery simulation to produce output voltage Vout.

Programmable High-precision D.C. Power Supply



NEW

PPX-Series



FEATURES

- CC, CV Priority Start Function
- Four Levels of Current Measurement Resolution (min. 0.1µA)/Five Levels of Voltage Measurement Resolution (min. 0.1mV)
- Power Output ON/OFF Delay Function
- Adjustable Voltage and Current Slope Rate
- Breaker 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-500S (10V/5A/50W), PPX-200S (20V/3A/40W), PPX-200S (20V/5A/100W), PPX-500S (30V/5A/150W), PPX-160S (16V/5A/100W), and PPX-1040S (100V/1A/100W). This series has the output low noise (0.15mVrms) 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 time 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 (0.1µA, 1µA, 10µA, 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 collocated with a K-Type Thermocouple, the temperature range can be measured from -200°C ~ +1172°C. Supported standard communication interfaces include USB, LAN, RS-232, RS-485 and optional GPIB interface.



PPX-Series

GTL-205A



GTL-219



GTL-260



GTL-261



GTL-262



SPECIFICATIONS

Model	PPX-100S	PPX-200S	PPX-200S	PPX-340S	PPX-340S	PPX-1040S
DC Output Mode						
Output Voltage	10.00V	20.00V	20.00V	34.00V	34.00V	100.00V
Output Current	1.000A	2.000A	2.000A	1.000A	1.000A	1.000A
Output Power	10W	40W	40W	34W	34W	100W
CONSTANT VOLTAGE OPERATION						
Line Regulation	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint
Load Regulation	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint
Transient Response*	<100µs	<100µs	<100µs	<100µs	<100µs	<100µs
Ripple Noise(peak-to-peak)	0.5mVrms (100kHz)	0.5mVrms (100kHz)	0.5mVrms (100kHz)	0.5mVrms (100kHz)	0.5mVrms (100kHz)	0.5mVrms (100kHz)
Rise Time†	100µs	100µs	100µs	100µs	100µs	100µs
Fall Time†	100µs	100µs	100µs	100µs	100µs	100µs
Set Range (V/V)	10 ~ 100V	20 ~ 200V	20 ~ 200V	34 ~ 340V	34 ~ 340V	100 ~ 1000V
Setting Resolution	1mV	1mV	1mV	1mV	1mV	1mV
Setting Accuracy (25°C±5°C)	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint
Reverse Polarity Protection	Yes	Yes	Yes	Yes	Yes	Yes
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	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint
Load Regulation	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint
Ripple Noise(peak-to-peak)	0.5mVrms (100kHz)	0.5mVrms (100kHz)	0.5mVrms (100kHz)	0.5mVrms (100kHz)	0.5mVrms (100kHz)	0.5mVrms (100kHz)
Set Range (A/V)	10 ~ 100A	20 ~ 200A	20 ~ 200A	34 ~ 340A	34 ~ 340A	100 ~ 1000A
Setting Resolution	1mA	1mA	1mA	1mA	1mA	1mA
Setting Accuracy (25°C±5°C)	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint
Temperature Coefficient (TYP.)	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C
MEASUREMENT AND DISPLAY						
Voltage Range	10.00V	20.00V	20.00V	34.00V	34.00V	100.00V
Current Range	1.000A	2.000A	2.000A	1.000A	1.000A	1.000A
Resolution	1mV	1mV	1mV	1mV	1mV	1mV
Accuracy	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint	<±0.05% of setpoint
Temperature Coefficient (TYP.)	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C
TEMPERATURE MEASUREMENT						
Temperature Range	0°C ~ 100°C	0°C ~ 100°C	0°C ~ 100°C	0°C ~ 100°C	0°C ~ 100°C	0°C ~ 100°C
Resolution	0.1°C	0.1°C	0.1°C	0.1°C	0.1°C	0.1°C
Accuracy	<±0.5°C	<±0.5°C	<±0.5°C	<±0.5°C	<±0.5°C	<±0.5°C
PROTECTION						
Over Voltage Protection(OVP)	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery
Setting Range	10V ~ 100V	20V ~ 200V	20V ~ 200V	34V ~ 340V	34V ~ 340V	100V ~ 1000V
Setting Accuracy	<±0.5%	<±0.5%	<±0.5%	<±0.5%	<±0.5%	<±0.5%
Over Current Protection(OCP)	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery
Setting Range	10mA ~ 100A	20mA ~ 200A	20mA ~ 200A	34mA ~ 340A	34mA ~ 340A	100mA ~ 1000A
Setting Accuracy	<±0.5%	<±0.5%	<±0.5%	<±0.5%	<±0.5%	<±0.5%
Over Temperature Protection(OTP)	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery	Operation: Auto shut-down off display, 100% and 100% auto-recovery
OTHER						
Interface Capabilities	LAN, USB	LAN, USB	LAN, USB	LAN, USB	LAN, USB	LAN, USB
Rated Input Voltage	100V ~ 240V	100V ~ 240V	100V ~ 240V	100V ~ 240V	100V ~ 240V	100V ~ 240V
Rated Input Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Max. Input Current	10A	20A	20A	10A	10A	10A
Max. Power Consumption	100W	400W	400W	340W	340W	1000W
Operating Temperature	0°C ~ 40°C	0°C ~ 40°C	0°C ~ 40°C	0°C ~ 40°C	0°C ~ 40°C	0°C ~ 40°C
Storage Temperature	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C	-20°C ~ 70°C
Operating Humidity	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation
Storage Humidity	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation	20% ~ 80% RH, No condensation
Dimensions & Weight	100mm (H) x 100mm (W) x 100mm (D)	200mm (H) x 200mm (W) x 200mm (D)	200mm (H) x 200mm (W) x 200mm (D)	340mm (H) x 340mm (W) x 340mm (D)	340mm (H) x 340mm (W) x 340mm (D)	1000mm (H) x 1000mm (W) x 1000mm (D)

NOTE: 1) Time for output voltage to recover within ±0.1% of its rated output for a load change from 50% to 100% of its rated output current.

2) Measurement frequency bandwidth is 10 Hz to 10 MHz.

3) Measurement frequency bandwidth is 10 Hz to 10 MHz.

4) From 10% to 100% of rated output voltage, with rated load.

5) From 10% to 100% of rated output voltage, with rated 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 switch of the feature panel is in the correct position of region.

8) Storage time instrument by connecting to the wrong AC line voltage.

Programmable High-precision D.C. Power Supply

Rear Panel



GRA-441-J/E Rack Mount Kit(15/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-10H01	100V/1A/100W Programmable High-precision DC Power Supply

ACCESSORIES

CD (User Manual, Power Cord, Test Lead/CTL-104A for PPX-1005/PPX-2001/PPX-3601, 1m, 10A)/CTL-105A for PPX-1002/PPX-3602, 1m, 30A/CTL-204A for PPX-1003/PPX-2002/PPX-3603-European Type Jack Terminals, 1m, 10A)
CTL-203A for PPX-2003/PPX-3602/PPX-10H01-European Type Jack Terminals, 1m, 3A)
CTL-201A, Ground Lead for European Type Jack Terminals

OPTIONAL ACCESSORIES

CTL-346	USB Cable/USB 2.0 Type A Type B Cable/4m
CTL-205A	Temperature probe adapter(thermal coupling, K Type), about 1000mm
CTL-218	CPIB Cable, 2000mm
CTL-219	RS-232 Cable with DB9 connector in 1941
CTL-260	RS-485 Cable with DB9 connector in 1941
CTL-261	Serial Master Cable/terminals, 0.1M
CTL-242	RS-485 Slave cable
GRA-441-E	Lead for PPX Series(15)
GRA-441-E	Lead for PPX Series(3A)
PPX-C	CP1B Interface(Ethernet Interface)

DISPLAY MODE



Voltage and Current



Voltage, Current and Wattage



Voltage, Current and Sequence Test

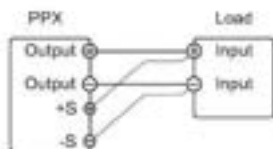


Voltage, Current and Temperature Measurement

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.

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 connector 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 PFX-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 PFX-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 PFX-Series will stop the output. The PFX-Series can measure the temperature range of -200.0°C~1372.0°C (-328.0°F~2501.6°F). Users can choose the display unit as °C or °F according to the requirement.

D DATA LOGGER



Data Logger Function



Save Data Log into USB Disk

The PFX-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 PFX-Series to execute a sequential power output. The PFX-Series will automatically execute the planned power output to the DUT to realize automated measurement. The PFX-Series can store

F. V/I SLEW RATE

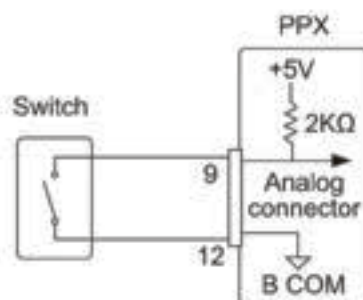
Model	R_V Slew Rate/ F_V Slew Rate Setting Range
PPX-1005	0.0001V/ms ~ 0.1V/ms
PPX-2002	0.0001V/ms ~ 0.2V/ms
PPX-2005	0.0001V/ms ~ 0.2V/ms
PPX-3601	0.0001V/ms ~ 0.36V/ms
PPX-3603	0.0001V/ms ~ 0.36V/ms
PPX-10H01	0.001V/ms ~ 0.5V/ms

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

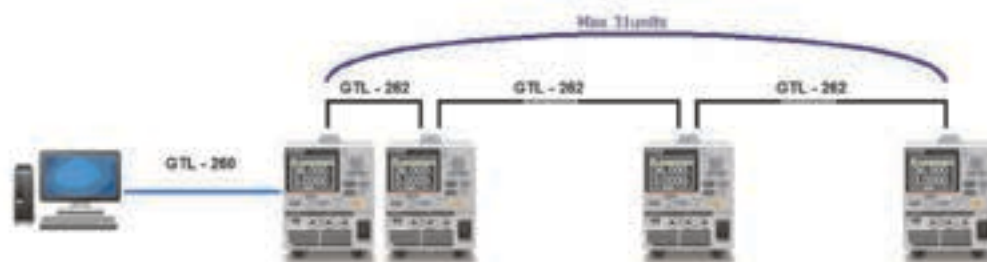


External Control of Output

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



FEATURES

- ◆ 4.3" TFT LCD Display
- ◆ Setting Resolution: 1mV/0.1mA;
Read Back Resolution: 0.1mV/0.1mA
- ◆ Low Ripple Noise: $\leq 1\text{mVrms}/\leq 2\text{mA}$
- ◆ Transient Response Time: $\leq 100\mu\text{s}$
- ◆ 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

GRA-449-J Rack Mount Kit (JIS)



GRA-449-E Rack Mount Kit (EIA)



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 $\leq 1\text{mVrms}/\leq 2\text{mA}$ and $\leq 100\mu\text{s}$ 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/OCV/OPP/OTP protection functions are provided. The protection mechanism of OVP/OCV/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 OCV 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

Rear Panel



European Type Jack Terminal



Triple-channel Programmable DC Power Supply

SPECIFICATIONS

		GPP-3060			GPP-6030			GPP-3650		
Output Mode		CH1			CH1			CH1		
Number of Channel		CH1			CH1			CH1		
Voltage		0 ~ 30.000V			0 ~ 60.000V			0 ~ 36.000V		
Current		0 ~ 6.0000A			0 ~ 1.0000A			0 ~ 1.0000A		
Tracking Series Voltage / Current		0 ~ 60.000V / 0 ~ 6.0000A			0 ~ 120.000V / 0 ~ 1.0000A			0 ~ 72.000V / 0 ~ 1.0000A		
Tracking Parallel Voltage / Current		0 ~ 30.000V / 0 ~ 12.0000A			0 ~ 60.000V / 0 ~ 1.0000A			0 ~ 36.000V / 0 ~ 1.0000A		
Warning		The CH1 output current from the 2 terminals should Not exceed 3A.								
Constant Voltage Operation										
Line Regulation		≤ 0.01% + 3mV			≤ 0.01% + 3mV			≤ 0.01% + 3mV		
Load regulation		≤ 0.01% + 5mV (rating current ≤ 10A)			≤ 0.01% + 5mV (rating current ≤ 10A)			≤ 0.01% + 5mV (rating current ≤ 10A)		
Ripple & noise (10Hz-1MHz)		≤ 1mVrms			≤ 1mVrms			≤ 1mVrms		
Transient recovery time		≤ 200μs								
Temperature coefficient		0.001%/°C								
Constant Current Operation										
Line Regulation		≤ 0.01% + 3mV			≤ 0.01% + 3mV			≤ 0.01% + 3mV		
Load regulation		≤ 0.01% + 3mV			≤ 0.01% + 3mV			≤ 0.01% + 3mV		
Ripple & noise		≤ 2mVrms			≤ 2mVrms			≤ 2mVrms		
Resolution		1mV			2mV			2mV		
Programming	Voltage	1mV			2mV			2mV		
	Current	0.5mA			0.1mA			0.1mA		
Feedback	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 (No Load, with load and load regulation < 200mV)			≤ 0.2% + 20mV of Master (No Load, with load and load regulation < 200mV)			≤ 0.1% + 10mV of Master (No Load, with load and load regulation < 200mV)		
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)		
Series 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)		
Ripple & noise		≤ 200mV			≤ 200mV			≤ 200mV		
Note		Tracking is not supported in Load mode								
Meter										
Full Scale	Voltage	32.0000V			62.0000V			36.0000V		
	Current	6.2000A			1.2000A			1.2000A		
Programming	Voltage	5 digits			5 digits			5 digits		
	Current	5 digits			5 digits			5 digits		
Feedback	Voltage	5 digits			5 digits			5 digits		
	Current	5 digits			5 digits			5 digits		
Setting accuracy	Voltage	± 0.01% of reading + 10mV			± 0.01% of reading + 10mV			± 0.01% of reading + 10mV		
	Current	± 0.1% of reading + 10mA			± 0.1% of reading + 10mA			± 0.1% of reading + 10mA		
Readback accuracy	Voltage	± 0.01% of reading + 10mV			± 0.01% of reading + 10mV			± 0.01% of reading + 10mV		
	Current	± 0.1% of reading + 10mA			± 0.1% of reading + 10mA			± 0.1% of reading + 10mA		
DC Load Mode										
Display	Voltage	0 ~ 32.00V			0 ~ 62.00V			0 ~ 36.00V		
	Current	0 ~ 6.200A			0 ~ 1.200A			0 ~ 1.200A		
CV Mode	CH1/CH2	1.500V ~ 32.00V			1.500V ~ 62.00V			1.500V ~ 36.00V		
	Setting Accuracy	± 0.1% + 10mV			± 0.1% + 10mV			± 0.1% + 10mV		
CC Mode	CH1/CH2	0 ~ 6.200A			0 ~ 1.200A			0 ~ 1.200A		
	Setting Accuracy	± 0.1% + 10mA			± 0.1% + 10mA			± 0.1% + 10mA		
CR Mode	CH1/CH2	10 ~ 140			10 ~ 140			10 ~ 140		
	Setting Accuracy	± 0.1% + 10			± 0.1% + 10			± 0.1% + 10		
Protection										
OVP	Power Mode	OFF (ON: 0.1V/35.0V)			OFF (ON: 0.1V/65.0V)			OFF (ON: 0.1V/38.0V)		
	Load Mode	OFF (ON: 1.1V/35.0V)			OFF (ON: 1.1V/65.0V)			OFF (ON: 1.1V/38.0V)		
OCP	Power Mode	OFF (ON: 0.05A/6.50A)			OFF (ON: 0.05A/1.50A)			OFF (ON: 0.05A/1.50A)		
	Load Mode	OFF (ON: 0.05A/6.50A)			OFF (ON: 0.05A/1.50A)			OFF (ON: 0.05A/1.50A)		
Insulation resistance		20MΩ or above (DC 500V)								
General										
Operation Environment		Indoor use, Altitude ≤ 2000m Ambient temperature: 0 ~ 40°C Relative humidity: ≤ 80% Pollution category II / Pollution degree 2								
Storage Environment		TEMPERATURE: -10°C ~ 70°C HUMIDITY: ≤ 70%								
Power Input		AC 100V/120V/220V/230V/100, 50/60Hz								
Power Consumption		1000VA, 600W								
Accessories		CD User manual x1, Quick Start manual x1, Power Cord x1, Test lead: C1L-104A x 3, European test lead: C1L-204A x 3, C1L-201A x 1								
Dimensions		213 (8) x 145 (4) x 142 (5) 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

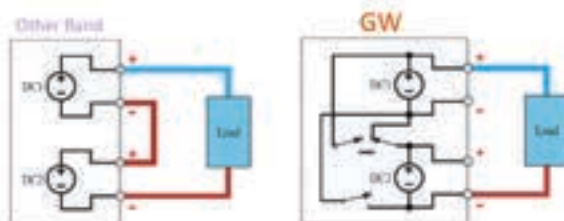
NOTE: Contact local sales if you have issues with Interface purchase.

A. TRACKING SERIES AND PARALLEL FUNCTION



Output in Parallel Connections

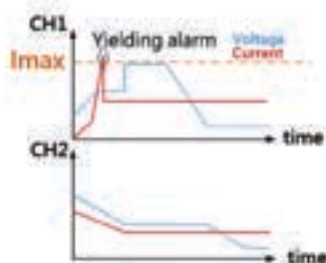
For series and parallel applications of CH1 and CH2, the tracking function of the GPP-Series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output.



Output in Series Connections

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

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

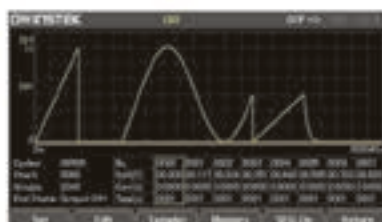


Monitoring Function Setting

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

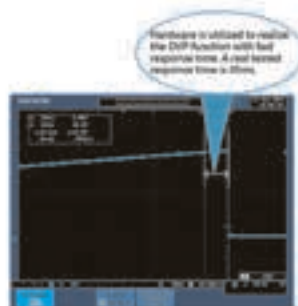
The GPP-Series provides a sequential output function on Channel 1 and Channel 2. This function not only allows users to edit the power output waveform, but also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveform, i.e. a serial power output or a simulation 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.

Triple-channel Programmable DC Power Supply

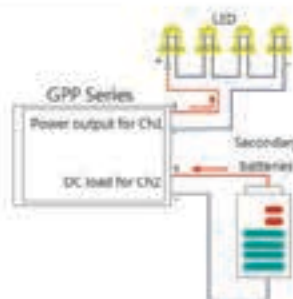
D. HARDWARE PROTECTION FUNCTION(OVP/OCP/OTP)



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

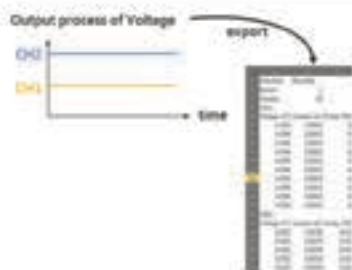


GPP-Series Delayed Waveform

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

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



Recorder Function Setting



Save as *.REC

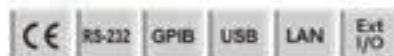
saved in the USB flash drive. The stored *.CSV can be exported into Excel to conduct the future analysis. (*.REC can be saved to 2048 records, *.CSV can be saved to 614400 records)

* Channel 3 does not support the output recorder function

Multi-output Programmable D.C. Power Supply



GPP-Series



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: $\leq 350\mu\text{Vrms}/\leq 2\text{mArms}$
- Transient Response Time: $\leq 30\mu\text{s}$
- 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 $\leq 350\mu\text{Vrms}/\leq 2\text{mArms}$ and output transient recovery capability $\leq 50\mu\text{s}$. 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 1k Ω 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 Template 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.

OUTPUT FUNCTION LIST

Model Number	GPP-4323			
	GPP-3323			
Number of Outputs	GPP-1326			
	CH1	CH2	CH3	CH4
Sequence Output Function	✓	✓		
Load Functions (CC, CV, CR mode)	✓	✓		
Output Delay Function	✓	✓		
Output Monitoring Monitor (10 sets)	✓	✓	(OPP-supported)	✓
Output Recorder Function	✓	✓	(OPP-supported)	✓
Panel Save/Recall	✓	✓	✓	✓

European Type Jack Terminal



Rear Panel (LAN+GPIB)



Rear Panel (LAN)



Rear Panel



Multi-output Programmable D.C. Power Supply

SPECIFICATIONS

		GPP-1326		GPP-2323		GPP-3323		GPP-4323	
OUTPUT MODE									
Number of Channel		CH1		CH1		CH1		CH1	
Voltage		0 ~ 32.000V		0 ~ 32.000V		0 ~ 32.000V		0 ~ 32.000V	
Current		0 ~ 6.0000A		0 ~ 3.0000A		0 ~ 3.0000A		0 ~ 3.0000A	
Tracking Series Voltage/Current		0 ~ 64.000V / 0 ~ 3.0000A		0 ~ 64.000V / 0 ~ 3.0000A		0 ~ 64.000V / 0 ~ 3.0000A		0 ~ 64.000V / 0 ~ 3.0000A	
Tracking Parallel Voltage/Current		0 ~ 32.000V / 0 ~ 6.0000A		0 ~ 32.000V / 0 ~ 6.0000A		0 ~ 32.000V / 0 ~ 6.0000A		0 ~ 32.000V / 0 ~ 6.0000A	
Warning: The CH1 of GPP-2323 output current from the 2 terminals should not exceed 3A									
CONSTANT VOLTAGE OPERATION									
Line Regulation		± 0.01% + 3mV		± 0.01% + 3mV		± 0.01% + 3mV		± 0.01% + 3mV	
Load Regulation		± 0.01% + 3mV(rating current: 3A)		± 0.01% + 3mV(rating current: 3A)		± 0.01% + 3mV(rating current: 3A)		± 0.01% + 3mV(rating current: 3A)	
Ripple & Noise (5Hz-1MHz)		≤ 0.02% + 5mV		≤ 0.02% + 5mV		≤ 0.02% + 5mV		≤ 0.02% + 5mV	
Transient Recovery Time		≤ 100µs		≤ 100µs		≤ 100µs		≤ 100µs	
Temperature Coefficient		± 100ppm/°C							
CONSTANT CURRENT OPERATION									
Line Regulation		± 0.2% + 3mA							
Load Regulation		± 0.2% + 3mA							
Ripple & Noise		≤ 2mA							
Resolution									
Programming		1mV / 0.1mA		1mV / 0.1mA		1mV / 0.1mA		1mV / 0.1mA	
Feedback		1mV / 0.1mA		0.1mV / 0.1mA				0.1mV / 0.1mA	
TRACKING OPERATION(CH1/CH2)									
Tracking Error		±(0.1%+10mV of Master(0-32V)) (No Load, with load add load regulation:100mV)		±(0.1%+10mV of Master(0-32V)) (No Load, with load add load regulation:100mV)				±(0.1%+10mV of Master(0-32V)) (No Load, with load add load regulation:100mV)	
Parallel Regulation		Line Load		Line Load				Line Load	
Series Regulation		Line Load		Line Load				Line Load	
Ripple & Noise		Line Load		Line Load				Line Load	
Note: GPP-1326 does not have Tracking function and Tracking is not supported in LOAD mode									
METER									
Full Scale		32.000V / 6.0000A		32.000V / 3.0000A		32.000V / 3.0000A		32.000V / 3.0000A	
Programming Resolution		5 digits / 5 digits		5 digits / 5 digits		5 digits / 5 digits		5 digits / 5 digits	
Feedback Resolution		8 digits / 5 digits		8 digits / 5 digits		8 digits / 5 digits		8 digits / 5 digits	
Setting Accuracy		± (0.01% of reading + 10mV) ± (0.1% of reading + 10mA)		± (0.01% of reading + 10mV) ± (0.1% of reading + 10mA)		± (0.01% of reading + 10mV) ± (0.1% of reading + 10mA)		± (0.01% of reading + 10mV) ± (0.1% of reading + 10mA)	
Readback Accuracy		± (0.01% of reading + 10mV) ± (0.1% of reading + 10mA)		± (0.01% of reading + 10mV) ± (0.1% of reading + 10mA)		± (0.01% of reading + 10mV) ± (0.1% of reading + 10mA)		± (0.01% of reading + 10mV) ± (0.1% of reading + 10mA)	
DC LOAD MODE									
Display		Voltage Current Power		Voltage Current Power		Voltage Current Power		Voltage Current Power	
CV Mode		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution	
CC Mode		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution	
CR Mode		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution		CH1/CH2 Setting/Feedback Accuracy Resolution	
PROTECTION									
OVP		Power Mode Load Mode Setting Accuracy Resolution		Power Mode Load Mode Setting Accuracy Resolution		Power Mode Load Mode Setting Accuracy Resolution		Power Mode Load Mode Setting Accuracy Resolution	
OCP		Power Mode Load Mode Setting Accuracy Resolution		Power Mode Load Mode Setting Accuracy Resolution		Power Mode Load Mode Setting Accuracy Resolution		Power Mode Load Mode Setting Accuracy Resolution	
Insulation Resistance		Between chassis and terminal: 20MΩ or above (DC 500V) Between chassis and DC power cord: 10MΩ or above (DC 500V)							
GENERAL									
Operation Environment		Indoor use, Altitude: ≤ 1000m; Ambient temperature: 0 ~ 40°C / Relative humidity: ≤ 80%; Installation category: 2 / Pollution degree: 2							
Storage Environment		TEMPERATURE: -10°C ~ 40°C / HUMIDITY: ≤ 70%							
Power Input		AC 100V/120V/220V/230V±10% 50/60Hz							
Power Consumption		100W							
Dimensions & Weight		215 (W) x 145 (H) x 75 (D) mm, Approx. 3.5kg							

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 4

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-203A x 2, GTL-204A x 2, GTL-201A x 1

GPP-4323 GTL-204A x 3, 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-2303S/3303S/ 4303S/3303D



FEATURES

- 2, 3 and 4 Independent Isolated Output
- 4 LED Display Sets: 3 Digits After Decimal Point (CPD-2303S/3303S/4303S)
- Minimum Resolution:
CPD-2303S/3303S/4303S (1mV/1mA)
CPD-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 CPD 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 1950Watt. The power supplies include four sets of memory for voltage and current setting, a USB remote interface, high-resolution (CPD-2303S / CPD-3303S / CPD-4303S) and intelligent fan control to reduce noise. The durable features along with the free output monitoring software make the CPD-Series suitable for any lab as well as the LED industry.

SPECIFICATIONS												
	CPD-2303S			CPD-3303S			CPD-4303S			CPD-1303D		
OUTPUT												
Channel	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12
Voltage	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V	0-30V / 0-30V
Current	0-3A	0-3A	0-3A	0-3A	3A	0-3A	0-3A	0-3A	0-3A	0-3A	0-3A	3A
CONSTANT VOLTAGE OPERATION												
Regulation	Line regulation: $\leq 0.01\%/10V$ Load regulation: $\leq 0.01\%/10V$ (rating current $\leq 3A$); $\leq 0.02\%/10V$ (rating current $> 3A$)											
Ripple & Noise	$\leq 10mV$ (5Hz-10MHz)											
Recovery Time	$\leq 100\mu s$ (10% load change, Maximum load 3.5A)											
Temp.Coefficient	$\pm 0.005\%/^{\circ}C$											
CONSTANT CURRENT OPERATION												
Regulation	Line regulation: $\leq 0.2\%/1mA$; Load regulation: $\leq 0.2\%/1mA$											
Ripple Current	$\leq 10mA$											
TRACKING OPERATION												
Regulation of PA	Line regulation: $\leq 0.01\%/1mA$ Load regulation: $\leq 0.01\%/1mA$ (rating current $\leq 3A$); $\leq 0.02\%/1mA$ (rating current $> 3A$)											
Regulation of SR	Line regulation: $\leq 0.01\%/1mA$ Load regulation: $\leq 0.01\%/1mA$											
Tracking time	$\leq 6.1\mu s$ (10V/3A $\rightarrow$ 300mA load, with load added load regulation $\leq 100mV$)											
METER												
Display	Voltage: 3 digits 0.4" LED Display (Full scale 32V) Current: 4 digits 0.4" LED Display (Full scale 1.2A)									Voltage: 3 digits 0.4" LED Display (Full scale 32V) Current: 4 digits 0.4" LED Display (Full scale 1.2A)		
Resolution	Voltage: 1mV Current: 1mA									Voltage: 10mV Current: 10mA		
Program	Voltage: $\pm 0.01\%$ of RDC (+10 digits) Accuracy: $\pm 0.2\%$ Current: $\pm 0.01\%$ of RDC (+10 digits) Accuracy: $\pm 0.2\%$									Voltage: $\pm 0.01\%$ of RDC (+10 digits) Accuracy: $\pm 0.2\%$ Current: $\pm 0.01\%$ of RDC (+10 digits) Accuracy: $\pm 0.2\%$		
Feedback	Voltage: $\pm 0.01\%$ of RDC (+10 digits) Accuracy: $\pm 0.2\%$									Voltage: $\pm 0.01\%$ of RDC (+10 digits) Accuracy: $\pm 0.2\%$		
CH5 SPECIFICATIONS												
Output Voltage	1.10V/1.10V/1.10V (10V/10V/10V)				0-3V / 0-3V				1.10V/1.10V/1.10V (10V/10V/10V)			
Output Current	3A				0-3A / 0-3A				3A			
Regulation	Line regulation: $\leq 0.01\%/10V$ Load regulation: $\leq 0.01\%/10V$				Line regulation: $\leq 0.01\%/10V$ Load regulation: $\leq 0.01\%/10V$				Line regulation: $\leq 0.01\%/10V$ Load regulation: $\leq 0.01\%/10V$			
(25 $^{\circ}C$)	-				-				-			
Ripple & Noise	$\leq 10mV$ (5Hz-10MHz)				$\leq 10mV$ (5Hz-10MHz)				$\leq 10mV$ (5Hz-10MHz)			
KEY LOCK												
Yes												
MEMORY SAVE/SCALE												
4 sets												
POWER SOURCE												
AC100V/100V/100V/100V $\pm 10\%$, 50/60Hz	Power consumption: 180W max											
DIMENSION & WEIGHT												
270(D) x 110 (H) x 240(D) mm, Approx. 7kg												

ORDERING INFORMATION

CPD-2303S CPD-2303S 3 Channels, 180W Programmable Linear DC Power Supply
CPD-3303S CPD-3303S 3 Channels, 180W Programmable Linear DC Power Supply
CPD-4303S CPD-4303S 4 Channels, 195W Programmable Linear DC Power Supply
CPD-3303D CPD-3303D 3 Channels, 195W Programmable Linear DC Power Supply

ACCESSORIES

User Manual x1, Power cord x1

CPD-2303S Test Lead CTL-100A x1, European Test Lead CTL-200A, CTL-201A x1

CPD-3303S Test Lead CTL-100A x1, CCTL-100A x1, European Test Lead CTL-200A x1, CCTL-200A x1, CCTL-201A x1

CPD-4303S Test Lead CTL-100A x1, CCTL-100A x1, European Test Lead CTL-200A x1, CCTL-200A x1, CCTL-201A x1

CPD-3303D Test Lead CTL-100A x1, CCTL-100A x1, European Test Lead CTL-200A x1, CCTL-200A x1, CCTL-201A x1

OPTIONAL ACCESSORIES

CTL-200 USB Cable

FREE DOWNLOAD

PC Software: PC Software including User 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, 100µVrms Ripple
- 100 Sets Memory
- Auto Stop 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, 100W 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 <100µVrms, 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 ~ 8V/0.8A	0 ~ 15V/1A	0 ~ 30V/0.4A
High Range	0 ~ 20V/15A	0 ~ 30V/4A	0 ~ 60V/1.5A
CONSTANT VOLTAGE OPERATION			
Regulation (no-load + full)	Load regulation $\pm 0.01\%$ + 2mV / Line regulation $\pm 0.01\%$ + 2mV		
Ripple & Noise	$\pm 100\mu\text{Vrms}/1\text{mpps}$	$\pm 100\mu\text{Vrms}/1\text{mpps}$	$\pm 100\mu\text{Vrms}/1\text{mpps}$
CONSTANT CURRENT OPERATION			
Regulation (no-load + full)	Load regulation $\pm 0.01\%$ + 20µA / Line regulation $\pm 0.01\%$ + 20µA		
Ripple & Noise	$\pm 2\text{mVrms}$		
RESOLUTION			
Programming	Voltage: 1mV Current: 1mA	1mV 0.1mA	2mV 0.1mA
Readback	Voltage: 0.1mV Current: 1mA	0.1mV 0.1mA	1mV 0.1mA
Front Panel	Voltage: 1mV Current: 1mA/10mA/100mA		
ON/OFF	Voltage: 10mV Current: 10mA		
ACCURACY			
Programming	Voltage: 0.005% + 10mV Current: 0.2% + 10mA		
Readback	Voltage: 0.005% + 1mV Current: 0.11% + 5mA		
ON/OFF	Voltage: 0.1% + 10mV Current: 0.4% + 10mA		
TRANSIENT RESPONSE	$\pm 30\mu\text{s}$ (to output to recover within 1mV following a change in output current from full load to half load)		
COMMAND PROCESSING TIME	100 ms		
WAKEUP PROGRAMMING RESPONSE TIME (for relative load/10% ~ 90%)			
Voltage Up	Full Load: 25 ms No Load: 45 ms	20 ms 10 ms	40 ms 100 ms
Voltage Down	Full Load: 30 ms No Load: 410 ms	40 ms 400 ms	30 ms 410 ms
STABILITY (% of output + offset)			
Voltage	0.11% + 1mV		
Current	0.11% + 1mA		
MEMORY	Store/Recall: 100 sets		
TEMPERATURE COEFFICIENT RMR (% of output + offset)			
Voltage	0.01% + 2mV		
Current	0.02% + 5mA		
POWER SOURCE	AC: 100V/120V/220V $\pm 10\%$, 50Hz $\pm 0.5\%$, 50/60Hz		
INTERFACE	Standard: RS-232C, GPIB		
PHYSICALS & WEIGHT	200mm $\times$ 140mm $\times$ 80mm / Approx. 1.5kg		

ORDERING INFORMATION

PSM-2010	200W Single Output, Programmable Power Supply
PSM-6003	600W Single Output, Programmable Power Supply
PSM-3004	100W Single Output, Programmable Power Supply
ACCESSORIES	
Option 1	1. Power cord x 1, Test lead CT-100A x 1, European test lead CT-300A x 1, Ground lead CT-100A x 1 (European version), Sense lead CT-250 x 1 (European version)
OPTION	Opt. 01: CRA-407 Rack Mount Kit
OPTIONAL ACCESSORIES	
CT-232	RS-232C Cable, 9-pin female to 9-pin, Full Modem for PC Computer
CT-248	GPIB Cable, Double Shielded, 2880mm
CRA-407	Rack Mount Kit
FREE DOWNLOAD	
PC Software	PC Software including Data Log, Remote Control Software
Driver	Labview/Driver: PSM V8 Example / PSM V9 Example

Programmable Linear D.C. Power Supply



PSS-2005/3203



FEATURES

- Digitized Programmable Interface
- High Resolution 10mV, 1mA
- High Stability, Low Drift
- Over Voltage, Over Current, Over Temperature Protection
- Intelligent Fan Control (Change by Output Power)
- Built-in Battery Alarm
- LabVIEW Driver
- Standard Interface: RS-232C
- Optional Interface: CPB (IEEE488.2)
- Optional European Jack Type Terminal

European Type Jack Terminal



Rear Panel



The PSS-Series is a single output, 90W or 180W, 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 CPB interfaces, SCPI command sets and LABVIEW drivers make remote control and ATE software development easier. (Note: only RS-232C or CPB 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 ~ 27V	0 ~ 33V
LOAD REGULATION		
Voltage	≤ 3mV (≤ 1mA, rating current > 3.0A)	
Current	≤ 3mA (≤ 5mA, rating current > 3.0A)	
LINE REGULATION		
Voltage	≤ 3mV	
Current	≤ 5mA	
RESOLUTION		
Voltage	10mV	
Current	1mA (3mA, rating current > 3.0A)	
OVP	10mV	
PROGRAM ACCURACY (25 ± 3°C)		
Voltage	± 0.05% ± 20mV	
Current	± 0.1% ± 5mA (± 10mA, rating current > 3.0A)	
OVP	± 0.05% ± 20mV	
RIPPLE & NOISE (20Hz ~ 200kHz)		
Voltage	Ripple ≤ 1mVrms/10mVp-p, Noise ≤ 30mVrms/100mVp-p	
Current	≤ 5mA (≤ 10mA, rating current > 3.0A)	
TEMPERATURE COEFFICIENT (25 ± 40°C)		
Voltage	≤ 100ppm/10mV	
Current	≤ 100ppm/5mA	
FEEDBACK RESOLUTION		
Voltage	10mV	
Current	1mA (3mA, rating current > 3.0A)	
FEEDBACK ACCURACY (25 ± 3°C)		
Voltage	± 0.05% ± 10mV	
Current	± 0.1% ± 5mA (± 10mA, rating current > 3.0A)	
FEEDBACK TEMPERATURE COEFFICIENT		
Voltage	≤ 100ppm/10mV	
Current	≤ 100ppm/5mA (30mA, rating current > 3.0A)	
RESPONSE TIME		
Voltage Up (90%~99%)	≤ 100mS	
Voltage Down (90%~100%)	≤ 100mS (200% rating load)	
DRIFT		
Voltage	≤ 100ppm/10mV	
Current	≤ 150ppm/10mA	
INTERFACE		
Standard	RS-232C, Option: CPB	
POWER SOURCE		
AC	100V/120V/230V ± 10%, 50Hz (± 10%) 47Hz, 50/60Hz	
DIMENSIONS & WEIGHT		
	100(W) × 140(H) × 170(D) mm, Approx. 4.8kg	

ORDERING INFORMATION

PSS-2005 180W Single Output Programmable D.C. Power Supply

PSS-3203 90W Single Output Programmable D.C. Power Supply

ACCESSORIES

(User manual × 1, Power cord × 1, Test lead CTL-100A × 1 (PSS-2005) or CTL-105A × 1 (PSS-3203), European Test Lead CTL-200A × 1 (PSS-2005) or CTL-205A × 1 (PSS-3203))

OPTION

(Opt-01: CPB Interface (Factory-installed))

OPTIONAL ACCESSORIES

CTL-012 RS-232C Cable, 9-pin Female to 9-pin, male Modem for Computer

CRS-008 Rack Adapter Panel (2U × 6U)

CTL-048 CPB Cable, Double Shielded, 2000mm

FREE DOWNLOAD

PC Software: PC Software including Data Log, Remote Control Software, LabVIEW Driver

Note: When Opt-01 CPB Interface is ordered, the standard interface RS-232C will be deleted.

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 Data Memory
- Self Test and Software Calibration
- Auto Stop Running With Timer Setting
- Triple Output
- Auto Tracking
- RS-232C Communication
- High Stability, Low Drift
- 4 Digit Display
- IEC Safety Regulation

Rear Panel



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, manual operation, and auto stopping 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~+12V0~+25V/3V/10V0
Current	0~+1A0~+1A/1A/2A/0
OVP	0~+12V0~+25V
LOAD REGULATION	
Voltage	10mV
Current	10mA
LINE REGULATION	
Voltage	10mV
Current	10mA
RESOLUTION	
Voltage	10mV (20mV rating voltage > 20V)
Current	10mA (20mA rating current > 1A)
OVP	10mV (20mV rating voltage > 20V)
PROGRAM ACCURACY (25°C)	
Voltage	±0.05% + 20mV (20mV rating voltage > 20V)
Current	±0.2% + 10mA
OVP	±0.2% + 10mA
NOISE & RISE TIME - 200W	
Voltage	Regen. Loadless / 10mV/μs
Current	Water Injection / 20mV/μs
	10mA/μs (10mA rating current > 1A)
TEMPERATURE COEFFICIENT (20~40°C)	
Voltage	±10ppm + 2mV
Current	±10ppm + 2mA
READBACK RESOLUTION/ACCURACY (20~40°C)	
Voltage	10mV (20mV rating voltage > 20V)
Current	10mA (20mA rating current > 1A)
Residual	±0.05% + 20mV (20mV rating voltage > 20V)
	±0.2% + 10mA
RESPONSE TIME	
Voltage UP 10%~90%	100mV
Voltage DOWN 90%~10%	100mV (10mV rating lead)
READBACK TEMPERATURE COEFFICIENT	
Voltage	±10ppm + 10mV (20mV rating voltage > 20V)
Current	±10ppm + 10mA
DRIFT	
Voltage	±10ppm + 10mV
Current	±10ppm + 10mA
TRACK OPERATION	
Tracking Error	±0.1% + 10mV
Source Regulation	10mV
ANALOG OPERATION (PPE Series only)	
Program Accuracy (25°C)	±0.05% + 20mV (20mV rating voltage > 20V)
Current	±0.2% + 20mA
OVP	±0.2% + 20mA
Load Effect	10mV (10mA rating current > 1A)
Source Effect	10mV (10mA rating current > 1A)
MEMORY	
Store/Recall	10 sets
TIMER	
Setting Time	1 second - 99 minutes (999 minutes > 9999)
Resolution	1 second
Function	For output working long (Auto Stop running)
STANDARD INTERFACE	
RS-232C	
POWER SOURCE	
AC 100V/200V/230V/240V/100V/160V/240V	
DIMENSIONS & WEIGHT	
215(W) × 145(D) × 140(H) mm Approx. 10kg	

ORDERING INFORMATION

PPE-3323	20Pin Triple Output Programmable D.C. Power Supply				
Model	Independent	Series	Panel	Display Type	Weight (kg)
PPE-3323	0~12V0~1A/2A/0/10V0/10V0	4A/1A	25A/1A	LED	10

RECOMMEND:
Use Manual & T. Power cord & S. Test lead CTS-100A & F

OPTIONAL ACCESSORIES

SA-400: Rack Mount Kit

FREE DOWNLOAD

PC Software: Remote Control Software

Multiple Output Programmable Linear D.C. Power Supply



PPT-1830/PPT-3615



FEATURES

- Easy Operation with UP/DOWN Key
- High Resolution, 10bit, 1uV
- Over Voltage Protection, Over Current Protection (PPT-Series by Hardware)
- 32 Sets Memory
- Self Test and Software Calibration
- Auto Stop 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
- CPIS Standard Interface
- LabVIEW Driver
- High Stability, Low Drift
- 4 Digit Display
- 5IC Safety Regulation

Rear Panel



The PPT Series is a 3-channel, programmable linear DC power supply with 120W or 120W outputs. 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 serial or parallel operation, and auto stopping for continuous testing. The series has Labview drivers and SCPI commands to standard for remote control and PC interfacing via GPIB. The versatile PPT-Series is ideal for high-level applications requiring high-resolution, multiple outputs, and an extra level of safety.

SPECIFICATION		
MODEL	PPT-1830	PPT-1615
OUTPUT		
Voltage	0-18V(0.0-40V)	0-16V(0.0-40V)
Current	0-3A(0.0-5A)	0-3A(0.0-5A)
OVP	0-20V(0.0-7V)	0-18V(0.0-7V)
LOAD REGULATION		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
LINE REGULATION		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
RESOLUTION		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
OVP	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
PROGRAM ACCURACY (0.01%)		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
OVP	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
RIPEL & NOISE (20Hz ~ 20MHz)		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
TEMPERATURE COEFFICIENT (0.01%)		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
REMARKS RESOLUTION/ACCURACY (0.01%)		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
OVP	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
REMARKS TIME		
VOLTAJE UP 10% ~ 90%	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
VOLTAJE DOWN 90% ~ 10%	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
REMARKS TEMPERATURE COEFFICIENT		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
REMARKS		
Voltage	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
REMARKS TRACK OPERATION		
Tracking Error	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Sense Regulation	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
PARALLEL OPERATION		
Program Accuracy	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Output	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
REMARKS LOAD EFFECT		
Output	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Current	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
REMARKS MEMORY		
Store/Recall	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
TIMER		
Setting Time	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Timeout	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
Function	10mV (10mV rating voltage) / 10mV (10mV rating current) = 0.1%	
STANDARD INTERFACE		
GPIB		
POWER SOURCE		
AC 100V/200V/220V/240V/100V/100V		
DIMENSIONS & WEIGHT		
220/200 x 140/140 x 34/35 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 Type	Weight (kg)
PPT-1830	0-18V(0.0-40V) 0-3A(0.0-5A)	34V/1.5A	18V/3A	LED	10
PPT-3615	0-36V(0.0-70V) 0-6A(0.0-10A)	70V/1.5A	36V/3A	LED	10

ACCESSORIES

Order manual & 1. Power cord & 2. Test lead & 3. 50A x 1. 2. 50A x 1

OPTIONAL ACCESSORIES

GA-401 Rack Mount Kit
 G-100 100V/200V/220V/240V/100V/100V
 G-100 100V/200V/220V/240V/100V/100V

FREE DOWNLOAD

Driver Software Driver

Multiple Output Programmable Linear D.C. Power Supply



PST-3201/3202



FEATURES

- 1 Digitized Programmable Interface
- 1 High Resolution 10mV, 1mA
- 1 160 x 128 LCD Display, Simultaneously Shows Settings and Measuring Result
- 1 Over-Voltage, Over-Current, Over-Temperature Protection
- 1 Intelligent Fan Control (Changes by Output Power)
- 1 100 Sets Memory
- 1 Auto Stop Running With Timer Setting
- 1 Auto Series and Parallel function
- 1 LabVIEW Driver
- 1 Standard Interface: RS-232C
- 1 Optional Interface: GPIB (IEEE-488.2)
- 1 Optional European Jack Type Terminal

European Type Jack Terminal



Rear Panel



PST Series is a 3-channel, 80W or 150W programmable linear DC power supply. High resolution is maintained at 10mV, 1mA (3A). OVP, OCP and OTP protect the PST Series and its loads from unexpected conditions. PST Series is capable of independent, series or parallel operation for increased flexibility. The large LCD display conveniently displays all outputs and configurations simultaneously to simplify operation. The programmable interface allows automatic stepping, 100 sets of memory and comprehensive timing operations. GPIB and RS232C interfaces, Labview drivers and SCPI compatibility allow easy RTI software development and remote control. The versatile PST Series is ideal for high resolution, multiple output, automated operations such as production testing and rack mounting systems.

SPECIFICATIONS		
	PST-3202	PST-3201
OUTPUT		
Voltage	0-30Vdc, 0-40Vdc	0-30Vdc
Current	0-30Adc, 0-5Adc	0-3Adc
OVP	0-30Vdc, 0-40Vdc	0-30Vdc
LOAD REGULATION		
Voltage	± 0.01% (± 3mV, rating current ~0.5A)	
Current	± 0.01% (± 3mA, 1A, 30mA, rating current ~0.5A)	
LINE REGULATION		
Voltage	± 0.01%	
Current	± 0.01%	
RESOLUTION		
Voltage	10mV	
Current	1mA (2mA, rating current ~0.5A)	
OVP	10mV	
PROGRAM ACCURACY (± 1%)		
Voltage	± 0.01% (± 3mV)	
Current	± 0.01% (± 3mA, 1A, 30mA, rating current ~0.5A)	
OVP	± 0.01% (± 3mV)	
RIPPLE & NOISE (20Hz-20MHz)		
Voltage	Ripple: ≤ 10mVrms (30mVp-p, 10mVp-p, 10mVp-p)	
Current	≤ 5mVrms (10mVp-p, 10mVp-p, 10mVp-p, rating current ~0.5A)	
TEMPERATURE COEFFICIENT (0-40°C)		
Voltage	± 0.005%/°C	
Current	± 0.005%/°C	
REVERSE RESOLUTION		
Voltage	10mV (20mV, rating voltage ~0.5V)	
Current	1mA (2mA, rating current ~0.5A)	
REVERSE ACCURACY (± 1%)		
Voltage	± 0.01% (± 3mV) (± 20mV, rating voltage ~0.5V)	
Current	± 0.01% (± 3mA) (± 30mA, rating current ~0.5A)	
REVERSE TEMPERATURE COEFFICIENT		
Voltage	± 0.005%/°C (± 20mV, rating voltage ~0.5V)	
Current	± 0.005%/°C (± 30mA, rating current ~0.5A)	
RESPONSE TIME		
Voltage Up (mV-10mV)	≤ 100μs	
Voltage Down (10mV-10mV)	≤ 100μs (2 10% rating load)	
ONSET		
Voltage	± 0.005% (± 3mV) (± 20mV, rating voltage ~0.5V)	
Current	± 0.005% (± 3mA)	
TRUCK OPERATION		
Tracking Error	± 0.1% (± 3mV)	
Series Load Effect	± 0.01%	
PARALLEL OPERATION		
Program Accuracy (± 1%)	Voltage: ± 0.01% (± 3mV) Current: ± 0.01% (± 3mA), OVP: ± 0.01% (± 3mV)	
Load Effect	Voltage: ± 0.01% (± 3mV) Current: ± 0.01% (± 3mA), OVP: ± 0.01% (± 3mV)	
Source Effect	Voltage: ± 0.01% Current: ± 0.01%	
MEMORY		
Store/Recall	100 Sets	
TIMER		
Setting Time	0.1 second-99 Minutes 59 second (99s, 99 Minutes 59 second + 99s)	
Resolution	0.1 second	
Function	Auto stop running (for output working time)	
INTERFACE		
Standard	RS-232C, Option: GPIB (IEEE-488.2)	
POWER SOURCE		
Ac	100V-110V/220V-240V, 100V-110V/220V, 100V/240V	
DIMENSIONS & WEIGHT		
320 (H) x 140 (W) x 38 (D) mm, Approx. 15kg		

ORDERING INFORMATION

PST-1202 15W Triple Output Programmable D.C. Power Supply

PST-3201 80W Triple Output Programmable D.C. Power Supply

Model	Independent	Series	Parallel	Display Type	Weight (kg)
PST-3201	0-30V/0-1A/0	80V/3A	30V/3A	LCD	10
PST-3202	0-30V/0-3A/0, 0-4V/0-1A/1	80V/3A	30V/3A	LCD	10

ACCESSORIES

User manual x 1, Power cord x 1, Test lead: GTL-100A x 3 (PST-3202) or GTL-100A x 3 (PST-3201)

European test lead: GTL-300A x 3 (PST-3202) or GTL-300A x 3 (PST-3201)

OPTION

Opt-01 GPIB Interface (factory standard)

OPTIONAL ACCESSORIES

CR6-40P Rack Mount Kit

GTL-300 GPIB Cable, Double Shielded, 3000mm

GTL-200 RS-232C Cable, 8-pin Female to 8-pin, null Modem for Computer

FREE DOWNLOAD

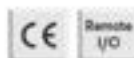
PC Software PC Software including Data Log, Remote Control Software

Driver LabVIEW Driver

Multiple Output Linear D.C. Power Supply



GPE-X323 Series



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		CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH1	CH2	CH1
Number of Channel		0-32V	0-32V	0-5V	0-15V	0-32V	0-32V	5V	0-32V	0-32V	0-32V
Voltage		0-3A	0-3A	0-1A	0-1A	0-3A	0-3A	5A	0-3A	0-3A	0-6A
Current		0-64V				0-64V				0-64V	
Tracking Series Voltage		0-6A		-		0-6A		-		0-6A	
Tracking Parallel Current											
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 p.15.
When using a higher resolution, the current or voltage adjustment may be limited by the knob sensibility.

Multiple Output Linear D.C. Power Supply



GPS-2303/3303/4303



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-100

The GPS Series linear power supplies have 2-4 independent output channels, 180W to 2000W 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.

SPECIFICATIONS		GPS-4303		GPS-3303		GPS-2303	
OUTPUT MODE		CH1	CH2	CH3	CH4	CH1	CH2
Voltage		0 ~ 30V	3.2 ~ 5.2V	0 ~ 15V	0 ~ 30V	0 ~ 30V	0 ~ 30V
Current		0 ~ 1A	1A Max	1A Max	0 ~ 1A	1A Max	0 ~ 1A
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% ± 5mV					
Load Regulation		±0.01% ± 5mV (rating current ± 1A)					
Ripple & Noise		±10mVrms, 5Hz ~ 1MHz					
Recovery Time		±100µs (50% Load change, Minimum load 0.1A)					
CONSTANT CURRENT OPERATION (CH1, CH2)							
Line Regulation		±0.2% ± 3mV					
Load Regulation		±0.2% ± 3mV					
Ripple & Noise		±10mVrms					
TRACKING OPERATION (CH1, CH2)							
Tracking Error		±0.5% ± 10mV of CH1					
Series Regulation		±0.01% ± 5mV					
Load Regulation		±100mV					
Ripple & Noise		±20mVrms, 5Hz ~ 1MHz					
CH3 OPERATION (for GPS-100/100S)							
CH3 Voltage		GPS-4303: 2.2V ~ 5.2V, GPS-100S: 1V ~ 5V					
Line Regulation		±1mV					
Load Regulation		±15mV					
Ripple & Noise		±20mVrms, 5Hz ~ 1MHz					
Current Output		GPS-4303: 1A, GPS-100S: 5A					
CH4 OPERATION (for GPS-4303)							
CH4 VOLTAGE		0V ~ 15V					
Line Regulation		±1mV					
Load Regulation		±10mV					
Ripple & Noise		±20mVrms, 5Hz ~ 1MHz					
Current Output		1A					
METER							
Display		4 digits 0.7" LED display					
		GPS-4303/100S: Out CH Accuracy ± 0.2% of rdg + 2 digits					
		GPS-4303/100S: Out CH Accuracy ± 0.1% of rdg + 8 digits					
		GPS-2303 Accuracy ± 0.1% of rdg + 2 digits					
INSULATION							
Channels and Terminal		±DC 300V / 30mA					
Channels and AC Cord		±DC 300V / 30mA					
POWER SOURCE							
AC 100V/105V/110V/115V/120V/125V/130V/140V/150V		50/60Hz					
DIMENSIONS & WEIGHT							
211(W) x 143(H) x 203(D) mm, Approx. 1 kg							
ORDERING INFORMATION							
GPS-4303: 4 channels, 200W Multiple Output Linear DC Power Supply							
GPS-3303: 3 channels, 100W 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 C75, 1044 x 1, C75, 1014 x 1, European test lead C75, 0034 x 1, C75, 0044 x 1, C75, 007 x 1							
GPS-3303: Test lead C75, 1044 x 1, C75, 1014 x 1, European test lead C75, 0034 x 1, C75, 0044 x 1, C75, 007 x 1							
GPS-2303: Test lead C75, 1044 x 1, European test lead C75, 0044 x 1, C75, 007 x 1							
OPTIONAL ACCESSORIES							
GPS-001: Voltage/Current Protection Knob							

Triple Output Linear D.C. Power Supply



CPC-3060D/6030D

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
- 3x 3A Fixed Output

The CPC 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 2mVrms. Overload and reverse polarity protection keep CPC Series and its loads safe from unexpected conditions. CPC features continuous or dynamic internal load selection and series or parallel tracking for application flexibility. The CPC Series is an ideal solution for inexpensive bench-top applications requiring low noise and multiple outputs.

SPECIFICATIONS	
OPERATION MODE	
Independent	Two independent outputs and 3rd fixed output
Series	Output from 3rd rating with and 2 in rating ampere
Parallel	Output from 3rd double rating with in rating ampere Output from 3rd double rating ampere at rating with
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation: $\pm 0.01\%$ - 3mA Load regulation: $\pm 0.01\%$ - 3mA (rating current 0.3A) $\pm 0.01\%$ - 3mA (rating current 0.5A) $\pm 0.01\%$ - 3mA (rating current 10A)
Ripple & Noise	4 Channels (200 - 1000Hz)
Recovery Time	$\pm 100\mu s$ (50% load change, Minimum load 0.3A)
CONSTANT CURRENT OPERATION	
Regulation	Line regulation: $\pm 0.2\%$ - 3mA Load regulation: $\pm 0.2\%$ - 3mA
Ripple Current	$\pm 3mA$
FIXED OUTPUT	
Regulation	Line regulation: $\pm 0.01\%$ Load regulation: $\pm 0.01\%$
Ripple & Noise	$\pm 2mV$
Voltage Accuracy	$\pm 0.5\%$
Output Current	3A
TRACKING OPERATION	
Tracking Error	$\pm 0.2\%$ - 10mV of the master
Series Regulation	$\pm 0.01\%$
METER	
Digital	3 1/2 Digits 0.5" LED display Accuracy: $\pm 0.1\%$ of rdg. - 2 digits
INSULATION	
Chassis and Terminal	1000V or above (DC 1000V)
Chassis and AC Cord	1000V or above (DC 1000V)
POWER SOURCE	
AC: 100V $\pm 10\%$ (200V/240V $\pm 10\%$, 50/60Hz)	
DIMENSIONS	
110(W) x 140(H) x 400(D) mm	

ORDERING INFORMATION

Model	Independent	Series	Parallel	High Jig
CPC-4000D	175W D.C. Power Supply (V = 0V/0 - 30V) $\pm 1\%$ (0.1/0.5A MAX) $\times 1$	100V 3A	80V 3A	18.5
CPC-3060D	175W D.C. Power Supply (V = 0V/0 - 30V) $\pm 1\%$ (0.1/0.5A MAX) $\times 1$	80V 3A	80V 12A	18.5
ACCESSORIES:				
User manual x 1, Power cord x 1				
Two-wire CTS 100A x 1 (0.5A) for CTS 100A x 2 (0.5A)				
OPTIONAL ACCESSORIES				
CNA-401 Rack Mount Kit				

Linear D.C. Power Supply



GPR-H Series



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
- Internal Select for Continuous or Dynamic Load (for GPR-3510HD/GPR-4000D/GPR-7550D)

The GPR-H Series consists of single output linear DC power supplies with voltage outputs rating from 0 to 300V. The series includes overload and reversed polarity protection to protect devices under test from being damaged due to inappropriate 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.

SPECIFICATIONS	
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation $\leq 0.01\%$ + 5mV Load regulation $\leq 0.01\%$ + 5mV ($\geq 10A$) $\leq 0.02\%$ + 5mV ($\geq 50A$)
Ripple & Noise	$\leq 10mV$ (400 - 100kHz)
Recovery Time	$\leq 100\mu s$ (10% load change, minimum load 0.5A)
Output Range	0 to rating voltage continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation $\leq 0.2\%$ + 5mV Load regulation $\leq 0.2\%$ + 5mV
Ripple Current	$\leq 10mV$ ($\geq 20A$) $\leq 20mV$ ($\geq 50A$)
Output Range	0 to rating current continuously adjustable
METER	
Type	3 1/2 Digit 0.1% LED Display
Accuracy	± 1 (0.1% of rdg. + 2 digits)
INSULATION	
Chassis and Terminal	100M Ω or above (DC 1000V)
Chassis and AC Cord	100M Ω or above (DC 1000V)
POWER SOURCE	
AC 100V/120V/200V/240V $\pm 10\%$, 50/60Hz	
DIMENSIONS	
234mm x 122mm x 45mm (9.2" x 4.8" x 1.8")	

Rear Panel



ORDERING INFORMATION				
Model	Output Voltage (V)	Output Amps (A)	Weight (kg)	
GPR-4000HD	240V D.C. Power Supply	0 - 8	0 - 10	18.5
GPR-1820HD	300V D.C. Power Supply	0 - 18	0 - 20	18.5
GPR-3510HD	350V D.C. Power Supply	0 - 35	0 - 10	18.5
GPR-4000D	300V D.C. Power Supply	0 - 40	0 - 8	18.5
GPR-7550D	370V D.C. Power Supply	0 - 75	0 - 5	18.5
GPR-10000D	330V D.C. Power Supply	0 - 100	0 - 3	15.5
GPR-10010D	300V D.C. Power Supply	0 - 100	0 - 1	13.5
ACCESSORIES:				
User manual's 1, Power cord x 1				
Test lead CTL105A x 1 (1.5M) or CTL106 x 1 (1.5M) or Test Leadable ($\geq 10A$)				
OPTIONAL ACCESSORIES				
CTL122	Test Lead, Copper to Alligator Test Lead, Max. Current 40A, 1200mm			

Note: CE Approved Only for GPR-1820HD, GPR-3510HD, GPR-3500D, GPR-11000D

Rear Panel Output Only for GPR-3000HD, GPR-10000D

Linear D.C. Power Supply



GPR-M Series



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

The GPR-M Series is a single output, 180W, linear DC power supply which features 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.

SPECIFICATIONS				
CONSTANT VOLTAGE OPERATION				
Regulation	Line regulation $\leq 0.01\% \pm 3mV$ Load regulation $\leq 0.01\% \pm 3mV$ ($\geq 10mA$) Load regulation $\leq 0.02\% \pm 3mV$ ($\leq 10mA$) $\leq 10mA$ 50 $\mu s \pm 10mV$ $\leq 100\mu s$ 10% load change, minimum load 0.5A 0 to rating voltage continuously adjustable			
Ripple & Noise				
Recovery Time				
Output Range				
CONSTANT CURRENT OPERATION				
Regulation	Line regulation $\leq 0.2\% \pm 3mA$ Load regulation $\leq 0.1\% \pm 3mA$ $\leq 5mA$ below			
Ripple Current				
Output Range	0 to rating current continuously adjustable			
METER				
Signal	3 1/2 Digits 0.1" LED display Accuracy $\pm 0.5\%$ of rdy ± 2 digits			
INSULATION				
Chassis and Terminal	20M Ω or above (DC 500V)			
Chassis and AC Cord	50M Ω or above (DC 500V)			
POWER SOURCE				
AC 100V/100V/200V/240V 50/60Hz, 50/60Hz				
DIMENSIONS				
215(90) x 112(45) x 140(55) mm				
ORDERING INFORMATION				
Model	Output Volts (V)	Output Amper (A)	Weight (kg)	
GPR-1870MD	180W D.C. Power Supply	0 - 18	0 - 10	11.5
GPR-1040D	180W D.C. Power Supply	0 - 30	0 - 6	11.5
GPR-4020D	180W D.C. Power Supply	0 - 40	0 - 5	11.5
ACCESSORIES				
Over Manual (1), Power cord x 5 Non-load CTS 10A x 1 (GPR-4020D) CTS 10A x 1 (GPR-1040D/2000D)				
OPTIONAL ACCESSORIES				
CR4-01 Rack Adapter Panel (19", 4U)				

Linear D.C. Power Supply



GPS-1830D/1850D/3030D



GPS-3030DD



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



The GPS Series is a single output, 34W to 90W, 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.

SPECIFICATIONS	
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation: $\leq 0.01\% + 3mV$ Load regulation: $\leq 0.01\% + 3mV$ (rating current $\pm 5A$) $\leq 0.01\% + 3mV$ (rating current $\pm 5A$)
Ripple & Noise	$\leq 0.5mVrms$ 5Hz – 1MHz (rating current $\pm 5A$) $\leq 1mVrms$ 5Hz – 10kHz (rating current $\pm 5A$) $\leq 100\mu V$ (50% load change, minimum load 0.5A) $\leq 300ppm / ^\circ C$ 0 to rating voltage continuously adjustable
Recovery Time	$\leq 100\mu s$ (50% load change, minimum load 0.5A)
Temp. Coefficient	$\leq 300ppm / ^\circ C$
Output Range	0 to rating voltage continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation: $\leq 0.2\% + 3mA$ Load regulation: $\leq 0.2\% + 3mA$
Ripple Current	$\leq 3mA_{rms}$
Output Range	0 to rating current continuously adjustable (Hi/Low range switchable)
METER	
Digital	3 1/2 digits 0.1" LED display (GPS-1830D/1850D/3030D) 3 1/2 digits 0.18" LED display (GPS-3030DD) Accuracy: $\pm 0.1\%$ of rdg. ± 3 digits
INSULATION	
Chassis and Terminal	2000V or above (DC 100V)
Chassis and AC Cord	2000V or above (DC 100V)
POWER SOURCE	
AC 100V, 120V, 220V, 240V $\pm 10\%$, 50/60Hz	
DIMENSIONS	
115 (W) x 145 (H) x 225 (D) mm	

ORDERING INFORMATION

Model	Output Watts(W)	Output Amps(A)	Weight (kg)
GPS-1830D	34W D.C. Power Supply	0 ~ 1.8	0 ~ 1
GPS-1850D	50W D.C. Power Supply	0 ~ 1.8	0 ~ 1
GPS-3030D	90W D.C. Power Supply	0 ~ 3.0	0 ~ 1
GPS-3030DD	90W D.C. Power Supply	0 ~ 3.0	0 ~ 1

ACCESSORIES

- User manual x 1, Power cord x 1
- Test lead CTL-100A x 1 ($\geq 3A$) or CTL-100A x 1 ($\geq 10A$)
- European test lead CTL-200A x 1 ($\geq 3A$) or CTL-200A x 1 ($\geq 10A$)

NOTE



AC POWER SOURCES

CW 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 45~300Hz. The maximum rated output for APS 7050 is 500VA, 310Vrms, 4.2Arms and APS 7100 is 1000VA, 310Vrms, 8.4Arms. The APS-7000 Series comprises nine 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

Our models not only provide compact and lightweight switching AC/DC power sources but also features AC, DC and AC-DC power outputs and the real-time measurements of: Voltage, Voltage, Current, Power, P, S, Q, PF, THD, 40 Harmonic THD and Current Harmonic. Four signal outputs are collected as: Internal (INT), External (EXT), Internal (INT), and External (EXT), and External (EXT) is available to provide power to as to meet customer 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

Our models 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 (Voltage, Current, P, S, Q, PF, THD, 40 Harmonic THD and Current Harmonic). It has 4 signal outputs: Internal (INT), External (EXT), Internal (INT), and External (EXT). 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. 0.5%, is the total selection.

2K-4KVA PROGRAMMABLE SWITCHING AC/DC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
ASR-1200	2KVA	1~999.9Hz	AC 100V Range 0.0V~200.0V AC 200V Range 0.0V~400.0V DC 100V Range -350V~+200V DC 200V Range -570V~+570V	AC 100V Range 20A AC 200V Range 10A DC 100V Range 20A DC 200V Range 10A	LCD	25	D67-72
ASR-3300	3KVA	1~999.9Hz	AC 100V Range 0.0V~200.0V AC 200V Range 0.0V~400.0V DC 100V Range -350V~+200V DC 200V Range -570V~+570V	AC 100V Range 30A AC 200V Range 15A DC 100V Range 30A DC 200V Range 15A	LCD	25	
ASR-3400	4KVA	1~999.9Hz	AC 100V Range 0.0V~200.0V AC 200V Range 0.0V~400.0V DC 100V Range -350V~+200V DC 200V Range -570V~+570V	AC 100V Range 40A AC 200V Range 20A DC 100V Range 40A DC 200V Range 20A	LCD	25	
ASR-3400HF	4KVA	1~5000Hz	AC 100V Range 0.0V~200.0V AC 200V Range 0.0V~400.0V DC 100V Range -350V~+200V DC 200V Range -570V~+570V	AC 100V Range 40A AC 200V Range 20A DC 100V Range 40A DC 200V Range 20A	LCD	25	

PROGRAMMABLE SWITCHING AC/DC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
ASR-2500/ ASR-2500H	500VA	1~999.9Hz	AC 100V Range 0.0V~175.0V AC 200V Range 0.0V~350.0V DC 100V Range -250.0V~+250.0V DC 200V Range -500.0V~+500.0V	AC 100V Range 5A AC 200V Range 2.5A DC 100V Range 5A DC 200V Range 2.5A	LCD	11.3 ASR-2500 Series 10.3 ASR-2500H Series	D73-74
ASR-2100/ ASR-2100H	1000VA	1~999.9Hz	AC 100V Range 0.0V~175.0V AC 200V Range 0.0V~350.0V DC 100V Range -250.0V~+250.0V DC 200V Range -500.0V~+500.0V	AC 100V Range 10A AC 200V Range 5A DC 100V Range 10A DC 200V Range 5A	LCD	11.3 ASR-2100 Series 10.3 ASR-2100H Series	

PROGRAMMABLE LINEAR AC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
APS-7010	100 VA	45~500Hz Option: 45~400 kHz	0~110V, 0~115V Option: 0~400V	2.1A, 4.2A	LCD	24	D77-80
APS-7100	1800 VA	45~500Hz Option: 45~400 kHz	0~110V, 0~115V Option: 0~400V	4.2A, 8.4A	LCD	18	
APS-7200	2800 VA	45~500Hz Option: 45~400 kHz	0~110V, 0~115V Option: 0~400V	8.4A, 16.8A	LCD	90	
APS-7300	3800 VA	45~500Hz Option: 45~400 kHz	0~110V, 0~115V Option: 0~400V	11.6A, 23.2A	LCD	128	

LINEAR AC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
APS-7000	100 VA	45~500Hz	0~110V, 0~115V	2.1A, 4.2A	LCD	24	D81-82
APS-7100	1K VA	45~500Hz	0~110V, 0~115V	4.2A, 8.4A	LCD	18	

Programmable AC/DC Power Source



ASR-3000 Series

NEW



FEATURES

- Output Rating: AC 0 ~ 450 Vrms, DC 0 ~ ± 570 V
- Output frequency up to 999.9 Hz (50/60 Hz for ASR3400H only)
- DC Output (100% of Rated Power)
- Measurement Items: Vrms, Vavg, Vpeak, Irms, Ipk, Iavg, Ispeak, P, S, Q, PF, CF
- Voltage and Current Harmonic Analysis (THDn, THDi)
- Remote Sensing Capability
- OCF, OVP, OVP, AC Fail Detection and Fan Fail Alarm
- Support Arbitrary Waveform Function
- Output Capacity: 25VA/25VA/10VA
- Customized Phase Angle for Output On/Off
- Sequence and Simulation Functions (up to 10 sets)
- Interface(s): USB, LAN, RS-232, GPIB
- Built-in External Control (VO 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 ($\leq 100\mu s$). There are four models of the series: ASR-3200(SHA), ASR-3300(SHA), and ASR-3400(S400H) (WVA). 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 superposition mode (AC-ADO Mode), 7) External AC/DC signal superposition mode (AC-DC-ADO 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, Ispeak, P, S, Q, PF, CF, 100th-order Voltage Harmonic and Current Harmonic. In addition, the remote sensing function ensures accurate voltage output, and the Customized 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, Ispeak-Limit and F-Limit can be set according to user requirements. Over voltage limit, OCF, OVP will protect the OLT 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 as to test 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



- * Basic Measurement of 0.0000% to 4000 Series
- * Measurement of 1000 Series models of ASR-002
- * To ASR-3000 Series, the ASR-002 RS-232C+USB interface is required
- * Functions of ASR-002 Series are:
 - 1. No Self-Temperature
 - 2. Measurement Items: only currently, power (Output 0W to 1000W)
 - 3. No Output and Current/Power/Power Supply
 - 4. No Remote Sensing Capability
 - 5. No Arbitrary Waveform Function
 - 6. No Sequence and Simulation Function
 - 7. Not supported External Control I/O
 - 8. No Sequence Function
 - 9. Only support 0Vdc, as LAN port for communication

GRA-442-J Rack Mount Adapter(GS)



GRA-442-E Rack Mount Adapter(E18)



GFL-137 Output power wire



APS-008 Air inlet filter



CPW-005 Power cord



CPW-006 Power cord



CPW-007 Power cord



Programmable AC/DC Power Source



Rear Panel



ASR-3000 Series

SPECIFICATIONS		ASR-3200	ASR-3300	ASR-3400	ASR-3400HF
MAXIMUM CURRENT	Range	Up to 3000 A (up to 100 A continuous output)			
EFFECTIVE OUTPUT POWER	Full Load	200 VA, 200 W	300 VA, 300 W	400 VA, 400 W	
MAXIMUM (W)	Maximum	200 VA, 200 W			
POWER FACTOR (PF)	Accuracy*	Up to 99%	Up to 99%	Up to 99%	Up to 99%
		±0.1% of reading (4 A to 2 A)	±0.1% of reading (4 A to 2 A)	±0.1% of reading (4 A to 2 A)	±0.1% of reading (4 A to 2 A)
		±0.1% of reading (4 A to 2 A)	±0.1% of reading (4 A to 2 A)	±0.1% of reading (4 A to 2 A)	±0.1% of reading (4 A to 2 A)
1. The output voltage is 0.1% to 100% of the rated output voltage. 2. At 50 Hz for an output voltage of 0.1% to 100% of the rated output voltage, the output current is 0.1% to 100% of the rated output current. 3. The output current is 0.1% to 100% of the rated output current, and the output voltage is 0.1% to 100% of the rated output voltage. 4. The output voltage is 0.1% to 100% of the rated output voltage, and the output current is 0.1% to 100% of the rated output current. 5. The output current is 0.1% to 100% of the rated output current, and the output voltage is 0.1% to 100% of the rated output voltage. 6. The output voltage is 0.1% to 100% of the rated output voltage, and the output current is 0.1% to 100% of the rated output current. 7. The output current is 0.1% to 100% of the rated output current, and the output voltage is 0.1% to 100% of the rated output voltage. 8. The output voltage is 0.1% to 100% of the rated output voltage, and the output current is 0.1% to 100% of the rated output current. 9. The output current is 0.1% to 100% of the rated output current, and the output voltage is 0.1% to 100% of the rated output voltage. 10. The output voltage is 0.1% to 100% of the rated output voltage, and the output current is 0.1% to 100% of the rated output current.					
FEATURES		1. Output voltage range: 0.1% to 100% of the rated output voltage. 2. Output current range: 0.1% to 100% of the rated output current. 3. Output power range: 0.1% to 100% of the rated output power. 4. Output voltage accuracy: ±0.1% of reading (4 A to 2 A). 5. Output current accuracy: ±0.1% of reading (4 A to 2 A). 6. Output power accuracy: ±0.1% of reading (4 A to 2 A). 7. Output voltage range: 0.1% to 100% of the rated output voltage. 8. Output current range: 0.1% to 100% of the rated output current. 9. Output power range: 0.1% to 100% of the rated output power. 10. Output voltage accuracy: ±0.1% of reading (4 A to 2 A). 11. Output current accuracy: ±0.1% of reading (4 A to 2 A). 12. Output power accuracy: ±0.1% of reading (4 A to 2 A).			
OPTIONAL ACCESSORIES		1. Output voltage range: 0.1% to 100% of the rated output voltage. 2. Output current range: 0.1% to 100% of the rated output current. 3. Output power range: 0.1% to 100% of the rated output power. 4. Output voltage accuracy: ±0.1% of reading (4 A to 2 A). 5. Output current accuracy: ±0.1% of reading (4 A to 2 A). 6. Output power accuracy: ±0.1% of reading (4 A to 2 A). 7. Output voltage range: 0.1% to 100% of the rated output voltage. 8. Output current range: 0.1% to 100% of the rated output current. 9. Output power range: 0.1% to 100% of the rated output power. 10. Output voltage accuracy: ±0.1% of reading (4 A to 2 A). 11. Output current accuracy: ±0.1% of reading (4 A to 2 A). 12. Output power accuracy: ±0.1% of reading (4 A to 2 A).			

ORDERING INFORMATION

ASR-3200 200A Programmable AC/DC Power Source

ASR-3300 300A Programmable AC/DC Power Source

ASR-3400 400A Programmable AC/DC Power Source

ASR-3400HF 400A Programmable AC/DC Power Source

ACCESSORIES

CD (User manual/Programming manual), Safety guide, Input Terminal Cover, Output terminal cover include remote sensing

CRA-442-1 Rack mount adapter (51A), CTL-346 USB Cable

OPTIONAL ACCESSORIES

CPW-005 Power cord, 3m, 105°C, UL/CMA type

CPW-006 Power cord, 3m, 105°C, VDE type

CPW-007 Power cord, 3m, 105°C, PS2 type

CRA-442-1 Rack mount adapter (51A)

CRA-442-2 Rack mount adapter (51A)

CTL-137 Output power wire/buss wire, 10AWG/50A,

600V (wires wire, 10AWG/50A, 600V)

CTL-233 RS232C Cable, approx. 2m

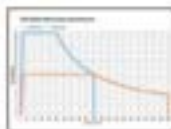
CTL-240 GPIB Cable, approx. 2m

ASR-002 External three phase control unit for IP2W, IP1W, IP4W output

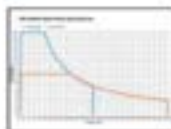
APS-006 Air inlet filter

* European output (factory installed)

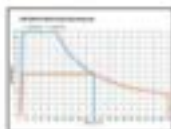
A. OPERATING AREA FOR ASR-3000 SERIES



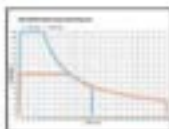
AC Output for ASR-3200



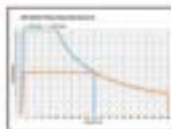
DC Output for ASR-3200



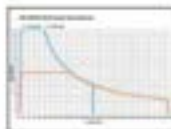
AC Output for ASR-3300



DC Output for ASR-3300



AC Output for ASR-3400



DC Output for ASR-3400

Model Name	Power Range	Max Output Current	Max Output Voltage
ASR-3100	2k VA	20 / 10 A	400 Vrms / ± 170 Vdc
ASR-3200	3k VA	30 / 15 A	400 Vrms / ± 250 Vdc
ASR-3300	4k VA	40 / 20 A	400 Vrms / ± 370 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 Mean Display



RVC Mean Display



Peak Mean Display



Voltage Harmonic



Current Harmonic

The ASR-3000 Series provides users with measurement capabilities including Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, 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



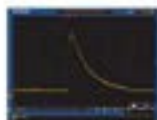
SEQ6: Momentary Drop in Supply Voltage



SEQ7: Reset Behavior at Voltage Drop with 12V System



SEQ8: Starting Profile Waveform



SEQ9: Load Dump with Tr, 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 in 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 Tr, 10ms, and Td, 40ms built in at SEQ9.

Programmable AC/DC Power Source

D. 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.

E. FUNCTION WAVEFORM (ARBITRARY EDIT) MODE



TRI Waveform



STAIR Waveform



CLIP Waveform



SURGE Waveform



Fourier Series Synthesis 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 ASR 1-16 waveform register through the access procedures, and return to the main menu output mode to perform ARB Waveform output.

F. PC SOFTWARE



Basic Controller



Sequence Mode



ARB Waveform Edit

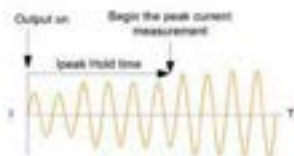


The Waveform is Observed with DSO

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.

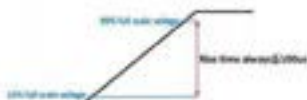


T, Ipk Measurement

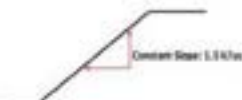
T, Ipk Hold is used to set the delay time after the output (Tons = 40,000ms) to capture the Ipk value and keep the maximum value. The update only functions when the measurement value is greater than the original value. The T, Ipk Hold delay time setting can be used to measure surge current at the power 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.

H SLEW RATE MODE



Time Mode



Slope Mode

The ASR3000 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, ASR3000 Series can increase output to 10~90% of the set voltage within 100µs; and when selecting "Slope" mode, ASR3000 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 ASR3000 Series voltage by editing the Sequence mode.



ASR-2000 Series

[illegible]

DEFINING INTERVENTION

[illegible]

THE DOORWAY

1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 26

DOI: 10.1002/for

ASR-2040/2100 Rear Panel



ASB-20508/J21-008 Rear Panel



CRA-459-1/E Rack Mount KITTS/EA1

For 100,000 Euros



GTL-358 CPU Cable, 200Gbps



458-001 Air Inlet Filter



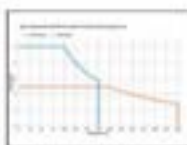
A5R-002 External three phase control unit

- 1. *How can the French wine market, or EU wine, be regulated?*
 - 2. *Is EU wine market, or EU wine, a perfect market?*
- Functions of EU wine can be divided into two categories:
- 1. *Regulatory functions*
 - 2. *Administrative functions*
- Regulatory functions can be divided into two categories:
- 1. *Regulatory functions*
 - 2. *Administrative functions*
- Administrative functions can be divided into two categories:
- 1. *Regulatory functions*
 - 2. *Administrative functions*

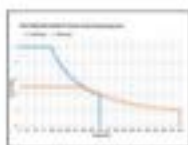


Compact Programmable A.C./D.C. Power Source

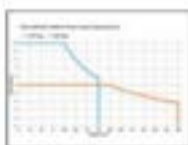
A. OPERATING AREA FOR ASR-2000 SERIES



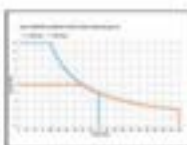
AC Output for
ASR-2050/ASR-2050R



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 W	5 / 2.5 A	100 Vrms / 100 Vdc
ASR-2100	1000 W	10 / 5 A	100 Vrms / 100 Vdc
ASR-2050R	500 W	5 / 2.5 A	100 Vrms / 100 Vdc
ASR-2100R	1000 W	10 / 5 A	100 Vrms / 100 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, THD, P, S, Q, PF, CF, 40th-order Voltage Harmonic and Current Harmonic. During the power output, the measurement

parameters including Vrms/rms, Vavg/avg and Vpeak/peak/ Irms/rms, Iavg/avg and Ipeak/peak 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 of 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.

D. SIMULATE MODE



Power Outage



Voltage Rise

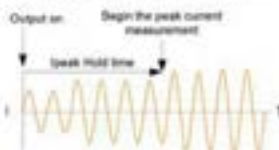


Voltage Fall

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.

E. T_{pk} HOLD & I_{pk} HOLD FUNCTIONS



T_{pk} I_{pk} Measurement

T_{pk} Hold is used to set the delay time after the output (1ms~60,000ms) to capture the peak value and keep the maximum value. The update only functions when the measurement value is greater than the original value. The T_{pk} Hold delay time setting can be used to measure surge current at the power on process of the DUT.

I_{pk} Hold can be used to measure the transient surge current of the DUT at power on without using an oscilloscope and a current probe.

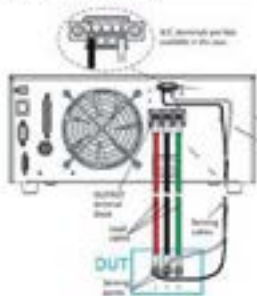
F. SLEW RATE MODE



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.

G. 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



FEATURES

- 4.3-inch TFT-LCD
- Output Capacity: APS-7050 (500VA, 1000VA, 2000VA); APS-7100 (1000VA, 2000VA, 3000VA); APS-7200 (2000VA, 3000VA, 4000VA); APS-7300 (3000VA, 4000VA, 5000VA)
- Output Augmentation by Optional External SMPS
- Low Ripple & Noise
- Measurement and Test Functions Include VOLT, CURR, PWR, ENR, IPE, IPRN, FREQ, PF, CF
- Support a Small AC Current Measurement Desk -35A, Min. Resolution 0.01mA (rms), max 40A
- Reverse Current Alarm Function
- 10 sets of Sequence Function to Edit Output Waveforms (10 sets of Simulate Mode to Replicate 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/RS-232/USB CDC (only for APS-7050/APS-7100 only; RS-232 (only for APS-7200, APS-7300 only)

APS-001/APS-002 Interface Card



APS-001

APS-002

Support Voltage Capacity

Support Frequency Capacity



APS-007 RS-232 Interface Card

For APS-7000 Series, APS-7000 Series



Circuitry introduces APS-7000 series programmable AC power sources, which consists of 1000VA of APS-7050, 1000VA of APS-7100, 2000VA of APS-7200, 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 or stereo, video and audio device applications. etc. The maximum rated voltage is 0~300Vrms, 25.2Amps, 1000VA peak current and the output frequency range is 45~500Hz. Users can conveniently adjust the output voltage from 0Vrms to 300Vrms and output frequency from 45Hz to 500 Hz by purchasing options without sending equipment back to CSR Inc.

One of the popular alternative energy solutions is to market a low-cost inverter to convert DC to AC, and the converted AC is then used to power grid or products require electricity. For instance, AC produced by PV inverter is sent to power grid or equipment requires electricity. While simulating power grid to verify inverter connecting with power grid, general AC power sources cannot withstand DUT's feedback energy, hence, additional power consumption resistors are needed to prevent AC power source from being damaged. On the contrary, APS-7000 series has the characteristics 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 can send an additional "isolation device" to protect DUT. APS-7000 series is suitable for simulating power grid and conducting power source characteristics tests, including synchronized phase and frequency, reverse current and power detected by APS-7000 series will be displayed in real-time to facilitate user's test observation. APS-7000 series output Simulate mode and Sequence mode to provide a single step or consecutive power changes; and to simulate power grid a Voltage Amplitude by Test and Frequency Amplitude by Test.

APS-7000 series supports time measurement and test functions (Vrms, Irms, Ipk, Vpk, Vpk, Ipk, hold, OF) and provides user interface either to test of Power Source. APS-7000 series is ideal for the LED industry and standby mode power consumption test. Under the APS mode, APS-7000 series provides simulation in seven categories including Test waveform, Single waveform, Standalone waveform (Square wave), Clipped Sinewave, Crest factor waveform, Surge waveform, and Fourier series and 2000 waveform combinations to fit to meet the requirements of simulating different input power waveform test of various industries. Test Point settings allow users to store test sets of data. Power On/Off 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, set any of the Simulate mode to simulate power surge, voltage rise, and voltage fall ten sets of the Sequence mode also users to define parameters and produce six sets of editing steps ten sets of the Program mode can edit AC waveform output and define the editing and four sets of measurement items for different DUTs. Ramp Control allows users to set the variation speed for output voltage rise and fall. Surge/Clipping simulation: DUT's input power producing a Surge or Clipping voltage exceeding set-point voltage waveform at a specific time for large current output applications. Voltage drop across the output cables should be avoided. APS-7000/7100 also provide the remote sense function, which senses DUT's voltage and sends the information back to APS-7000/7100 for program controlled voltage compensation. Therefore, APS-7200/7300 can avoid the voltage drop of the cable to affect output voltage.

External Port, on the rear panel, can be used for remote program control. Sync Output Socket provides external 10V sync output. Signal Output Connector provides a variety of program execution results. APS-7000 series also provides users with Trigger In/Out and Output output remote control functions from 3 connector on the rear panel.

SPECIFICATIONS				
Model	APS-7050	APS-7100	APS-7200	APS-7300
AC Output/PSU				
Power Rating	1000VA	1000VA	2000VA	3000VA
Output Voltage	0 ~ 150Vrms, 0 ~ 150Vrms	0 ~ 150Vrms, 0 ~ 150Vrms	0 ~ 150Vrms, 0 ~ 150Vrms	0 ~ 150Vrms, 0 ~ 150Vrms
Output Frequency	45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz
Maximum	0.020rms	0.020	0.020	0.020
Current (rms)	2.0A	2.0A	4.0A	6.0A
Maximum	0.020rms	0.020	0.020	0.020
Current (peak)	16.8A	16.8A	33.6A	50.4A
OPT APS-002 (peak)	0.020rms	0.020	0.020	0.020
OPT APS-002 (peak)	0.020rms	0.020	0.020	0.020
Total Harmonic Distortion (THD) %	0.01% at 0.1 ~ 100Hz (Resistor Load)			
Crest Factor	≤ 4			
Line Regulation	0.1% /% of full scale			
Load Regulation	0.1% /% of full scale			
Response Time	≤ 100ms			
Reverse Current	20% of Maximum Output RMS Current (Continuous), 100% of Maximum Output RMS Current (Within 1 minute)			
SETTING				
Voltage	Range 0 ~ 150Vrms, 0 ~ 300Vrms, Auto			
Resolution	0.01V at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 300.0Vrms			
Accuracy	±0.2% of reading ± 0.000V			
Frequency	Range 45 ~ 500Hz			
Resolution	0.01 Hz at 45.00 ~ 99.99 Hz, 0.1 Hz at 100.0 ~ 500.0 Hz			
Accuracy	±0.02% of setting			
Power On/Off	Range 0 ~ 100V			
Phase Angle	Resolution 0.1° ~ 35.9°			
MEASUREMENT				
Voltage (RMS)	Range 0.01 ~ 150Vrms, 0.1 ~ 300Vrms			
Resolution	0.01V at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 300.0Vrms			
Accuracy	±0.2% of reading ± 0.000V			
Frequency	Range 45 ~ 500Hz			
Resolution	0.01 Hz at 45.00 ~ 99.99 Hz, 0.1 Hz at 100.0 ~ 500.0 Hz			
Accuracy	±0.02% of setting			
Current (RMS)	Range 0.01 ~ 150Vrms, 0.1 ~ 300Vrms			
Resolution	0.01A at 0.00 ~ 99.99A, 0.1A at 100.0 ~ 300.0A			
Accuracy	±0.2% of reading ± 0.000A			



APS-7200



APS-7300

SPECIFICATIONS

Model	APS-7050	APS-7100	APS-7200	APS-7300
Current(Arms)	0.0 - 70.0A	0.0 - 140.0A	0.0 - 140.0A	0.0 - 140.0A
Resolution	0.1A	0.1A	0.1A	0.1A
Accuracy	±1% of reading + 1 count	±1% of reading + 1 count	±1% of reading + 1 count	±1% of reading + 1 count
Power(W)	0.01W - 0.10W	0.01W - 0.10W	0.01W - 0.10W	0.01W - 0.10W
Resolution	0.01W	0.01W	0.01W	0.01W
Accuracy	±0.5% of reading + 0.0001W	±0.5% of reading + 0.0001W	±0.5% of reading + 0.0001W	±0.5% of reading + 0.0001W
Apparent(VA)	0.01VA - 0.10VA	0.01VA - 0.10VA	0.01VA - 0.10VA	0.01VA - 0.10VA
Resolution	0.01VA	0.01VA	0.01VA	0.01VA
Accuracy	±1% of reading + 0.0001VA	±1% of reading + 0.0001VA	±1% of reading + 0.0001VA	±1% of reading + 0.0001VA
Power Factor	0.001	0.001	0.001	0.001
Resolution	0.001	0.001	0.001	0.001
Accuracy	±1% of reading + 0.0001	±1% of reading + 0.0001	±1% of reading + 0.0001	±1% of reading + 0.0001

GENERAL

Remote output signal	Pass, Fail, Test-in Progress, Trigger in, Trigger out, Out On/Off
Sync output signal	Output Signal 10V, 5V, 0V, 1V
Number of Phase Protection	10 (0-9 numeric keys)
Trigger Out	OCF, CFF, CTF and Alarm
Trigger in	Maximum low level output = 0.0V. Minimum high level output = 2V. Maximum source current = 50mA. Maximum low level input voltage = 0.0V. Minimum high level input voltage = 2.0V. Maximum sink current = 50mA.

SEQUENCE/SIMULATION FUNCTION

Number of Memories	10 (0-9 numeric keys)
Time of Delay	250 max. (Per 1 digit)
Step Time Setting Range	0.01 - 999.99s
Operation Method	Constant, Ramp, Linear Sweep
Output Range	Output Range, Frequency, Waveform (sine wave only), On Phase, Off Phase, Test Lamp Count (0 - 255) jumps, 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/120V	115/230VAC/120V	230VAC/120V	230VAC/120V
Input Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Max. Current	15A/16A	15A/16A	15A	15A
Power Factor	0.7typ.	0.7typ.	0.7typ.	0.7typ.
Power Consumption	1.5kW or less	1.5kW or less	1.5kW or less	1.5kW or less

ENVIRONMENT CONDITIONS

Operating Temperature Range	0 - 40°C
Storage Temperature Range	-10 - 50°C
Operating Humidity Range	20 - 80% RH (No Condensation)
Storage Humidity Range	5% to 95% RH (No Condensation)

INTERFACE

Standard	USB Host, LAN	USB Host, USB-C, LAN
Optional	Wi-Fi, RS-485	Wi-Fi, RS-485

DIMENSIONS & WEIGHT

Model	APS-7050	APS-7100	APS-7200	APS-7300
Dimensions (mm)	400(W) x 200(H) x 100(D) mm	400(W) x 200(H) x 100(D) mm	400(W) x 200(H) x 100(D) mm	400(W) x 200(H) x 100(D) mm
Weight	Approx. 1.2kg	Approx. 1.2kg	Approx. 1.2kg	Approx. 1.2kg

ORDERING INFORMATION

APS-7050 1000VA Programmable AC Power Source	APS-7200 2000VA Programmable AC Power Source
APS-7100 1000VA Programmable AC Power Source	APS-7300 2000VA Programmable AC Power Source
ACS5500-15	
CD 1024 User Manual, Programming Manual for APS-7000 v.1 Power Configuration Dependent, CTS-125 Test Lead	

OPTIONAL ACCESSORIES

APS-001 CTS interface card	APS-004 Output Frequency Capable (50-999.9Hz)
APS-002 RS-485 interface card (APS-7050, APS-7100)	CRA-020 APS-7050, APS-7100 wall mount kit
APS-003 RS-485 interface card (APS-7200, APS-7300)	CRA-020 APS-7200, APS-7300 wall mount kit
APS-005 Output Voltage Capable (0-999Vrms)	CRA-020 APS-7200, APS-7300 wall mount kit

Note: 1. APS-7300/APS-7300 v.1 is not CE approved.

2. The maximum line voltage of sequence mode or simulate mode must be greater than 1 cycle of the waveform built.

APS-7300 Rear Panel



APS-7200 Rear Panel



APS-7100 Rear Panel



APS-7050 Rear Panel



APS-7300 Series

Europe Type Output Outlet



Note:

- The specifications are not suitable for 400V mode.
- Maximum output current at working voltage 120Vrms, 50/60Hz.
- At 40, 500Hz, 120V or higher of the rated output voltage, the maximum current is lower.
- At 50, 60 measurement accuracy is at 23±1°C.
- At the case of 75-125°C, 50-60Hz sine wave, no load.

Main Terminal Cover Set



A. CONTROL PANEL CHARACTERISTICS



Standard Mode

There are two control panel modes: Standard mode and Simple mode. Both modes are shown on the above. Standard mode contains settings and AC Power Meter measurement window display. Users apply Function key (F1-F5) to select required measurement items. There are nine items for selection. Simple mode shows all measurement items on the display.

Simple Mode

B. REVERSE CURRENT DISPLAY



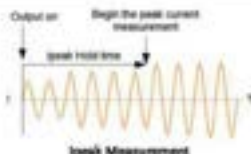
Standard Mode

When output terminal detects 180 degree phase difference between voltage and current (reverse current), the Host panel of APS-7000 Series will remind users the power and power factor measurement result is not numerical display. This 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 can withstand reverse current 10% of the maximum effective current or maximum current output within three minutes.

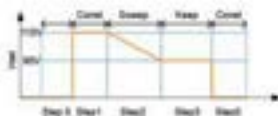
Simple Mode

C. T-PEAK, HOLD FUNCTION



T-peak Hold sets delay time (Time=60 seconds) for measurement after the output of T-peak value and the maximum value will be removed. Updates will be proceeded only if measured value is greater than the original value. T-peak 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-peak Hold delay time setting can be applied to measure inrush current of sequentially activated O/U.

D. SEQUENCE MODE



Sequence Mode

There are two 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

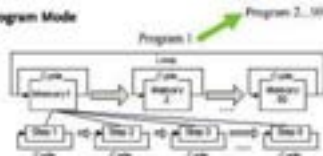


Voltage Fall

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 O/U posed by the transient phenomena. For instance, capacitor endurance test.

F. PROGRAM MODE

Program Mode



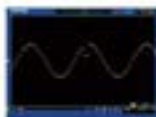
This mode allows users to set setting and four specifications to produce PASS/FAIL result after the measurement is done. It can also show test results for each test procedure or only show the last result.

There are ten sets of Program mode and each set has 50 sets of memory. Each memory comprises 5 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 Ups



Clipped Sine Wave
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



Up → 0.1 ~ 999.9ms
Dn → 0.1 ~ 999.9ms



Up → 0.01 ~ 99.99 Vrms
Dn → 0.01 ~ 99.99 Vrms



Mode=Time, Up=linear,
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 (Tms) or voltage (TVrms) unit.

500/1000 VA AC Power Source



APS-7050E



APS-7100E



FEATURES

- 4.3" large LCD Display
- Output Capacity:
APS-7050E (500VA, 110Vrms, 4.3/0.1Arms)
APS-7100E (1000VA, 110Vrms, 8.4/0.2Arms)
- 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/OVP/OTP Protection
- Variable Voltage, Frequency and Current Limiter
- Universal Power Input

CEC Input launches the APS-7000 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, 110Vrms, 4.3Arms and APS-7100E is 1000VA, 110Vrms, 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-7000 series comprises six measurement and test functions (Vrms, Irms, F, Ipk, W, PF), and provides user interface similar to that of AC Power Mate. The APS-7000E series, via switching many sets of current levels to increase small 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 electronics 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.

SPECIFICATIONS		
Model	APS-7050E	APS-7100E
Power Rating	500VA	1000VA
Output Voltage	0 ~ 110Vrms/0 ~ 57.0Vrms 45.00 ~ 100.0 Hz	0 ~ 110Vrms/0 ~ 57.0Vrms 45.00 ~ 100.0 Hz
Output Frequency	45.00 ~ 100.0 Hz	45.00 ~ 100.0 Hz
Maximum Current (rms)	4.3A	8.4A
Maximum Current (peak)	7.1A	13.2A
Maximum Current (burst)	16.8A	31.6A
Maximum Current (short)	3.6A	16.8A
Total Harmonic Distortion (THD)	≤0.3% at 45 ~ 100 Hz (Resistive Load)	
Crest Factor	≤4	
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 (Continuous); 100% of Maximum Output RMS Current (Within 5 minutes)	
SETTING		
Voltage	Range: 0 ~ 110Vrms/0 ~ 57.0Vrms/0.1Vrms Resolution: 0.01V at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 110.0Vrms Accuracy: ±0.3% of reading + 2 counts	
Frequency	Range: 45 ~ 100Hz Resolution: 0.01 Hz at 45.00 ~ 99.99Hz, 0.1 Hz at 100.0 ~ 100.0 Hz Accuracy: ±0.02% of setting	
MEASUREMENT		
Voltage(RMS)	Range: 0.20~10.0Vrms/10.0~110.0Vrms/11.0~111.0Vrms/110.0~111.0Vrms Resolution: 0.01V at 0.00 ~ 99.99Vrms, 0.1V at 100.0 ~ 110.0Vrms Accuracy: ±0.3% of reading + 2 counts	
Frequency	Range: 45 ~ 100Hz Resolution: 0.01 Hz (at 45~99.99Hz), 0.1 Hz (at 100.0~110.0Hz) Accuracy: ±0.02%	
Current(RMS)	Range: 1.00 ~ 70.0mA/0.01 ~ 100.0mA/0.100 ~ 1.00A/1.00 ~ 17.0A Resolution: 0.01mA, 0.1mA, 0.01A, 0.1A Accuracy: ±0.6% of reading + 5 counts; 2.00~10.0mA (±0.3% of reading + 5 counts); 0.100~1.00A (±0.3% of reading + 5 counts); 1.00A~17.0A (±0.6% of reading + 5 counts)	
Current(Peak)	Range: 0.0 ~ 70.0A Resolution: 0.1A Accuracy: ±1% of reading + 5 counts	
Power(W)	Resolution: 0.01W, 0.1W, 1W Accuracy: ±0.6% of reading + 5 counts; 0.25~99.99W (±0.3% of reading + 5 counts); 100.0~999.9W (±0.6% of reading + 5 counts); 1000~9999W (±0.6%)	
Power Factor	Resolution: 0.001 Accuracy: ±0.2% of reading + 2 counts	
GENERAL		
Number of Preset	100~10 Harmonic Test	
Protection	OCP, OVP, OTP and Alarm	



APS-7050E



APS-7100E

APS-7050E Rear Panel



APS-7100E Rear Panel



SPECIFICATIONS

Model	APS-7050E	APS-7100E
ENVIRONMENT CONDITIONS		
Operation Temperature	0 ~ +40°C	
Storage Temperature	-10 ~ +35°C	
Operating Temperature	20 ~ 80% RH (No Condensation)	
Storage Humidity	80% RH or less (No Condensation)	
AC INPUT		
Input Power Source	1Φ AC 115/230V $\pm$ 10%	
DIMENSIONS & WEIGHT		
	430(W) x 88(H) x 480(D) mm; Approx. 24kg	430(W) x 88(H) x 580(D) mm; Approx. 26kg

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, CTL-121 Test Lead

OPTIONAL ACCESSORIES

CRA-425 Rack Mount Kit (APS-7000E Series)

Mains Terminal Cover Set

For APS-7050E/7100E Series



For APS-7050E/7100E Series



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+UNP, CP+UNP 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(B)	0 ~ 80V	20A	100/100W	2	3.8	D95-102
PEL-2030A(B)	0 ~ 80V	5/40A	30/150W	2	3.8	
PEL-2040A(B)	0 ~ 80V	70A	350W	1	3.8	
PEL-2041A(B)	0 ~ 500V	70A	350W	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-503-80-140	0 ~ 80V	140A	700W	1	10.3	
PEL-3201	0 ~ 150V	35A	175W	1	6	D67-92
PEL-3031E	0 ~ 150V	60A	300W	1	7.5	D93-98
PEL-3041	0 ~ 150V	70A	350W	1	7	
PEL-3111	0 ~ 150V	210A	1050W	1	17	
PEL-3211	0 ~ 150V	420A	2100W	1	23	
PEL-3212	0 ~ 150V	420A	2100W	1	67.5	D67-92
PEL-3322	0 ~ 150V	630A	3150W	1	73	
PEL-3323	0 ~ 150V	630A	3150W	1	85.5	
PEL-3424	0 ~ 150V	840A	4200W	1	110	
PEL-3533	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-3953	0 ~ 150V	1890A	9450W	1	149	
PEL-3032E	0 ~ 500V	75A	300W	1	7.5	D93-98
PEL-504-300-15	0 ~ 300V	75A	350W	1	5.3	
PEL-503-300-30	0 ~ 300V	30A	700W	1	10.3	D111-112
PEL-3021H	0 ~ 800V	8.75A	175W	1	6	
PEL-3041H	0 ~ 800V	17.5A	350W	1	7	D67-92
PEL-3111H	0 ~ 800V	52.5A	1050W	1	17	
PEL-3211H	0 ~ 800V	105A	2100W	1	23	
PEL-3212H	0 ~ 800V	105A	2100W	1	67.5	
PEL-3322H	0 ~ 800V	157.5A	3150W	1	73	
PEL-3323H	0 ~ 800V	157.5A	3150W	1	85.5	
PEL-3424H	0 ~ 800V	210A	4200W	1	110	
PEL-3533H	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-3952H	0 ~ 800V	472.5A	9450W	1	149	

HIGH POWER DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
PEL-5066C-150-600	150V	600A	6kW	1	62	D119-119
PEL-5066C-150-800	150V	800A	8kW	1	77.5	
PEL-5079C-150-1000	150V	1000A	18kW	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	28kW	1	140.5	
PEL-5024C-150-2000	150V	2000A	24kW	1	155	
PEL-5066C-600-420	600V	420A	6kW	1	62	
PEL-5066C-600-560	600V	560A	8kW	1	77.5	
PEL-5079C-600-700	600V	700A	18kW	1	84.8	
PEL-5012C-600-840	600V	840A	12kW	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	28kW	1	140.5	
PEL-5024C-600-1680	600V	1680A	24kW	1	155	
PEL-5066C-1200-240	1200V	240A	6kW	1	62	
PEL-5066C-1200-320	1200V	320A	8kW	1	77.5	
PEL-5079C-1200-490	1200V	490A	18kW	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	28kW	1	140.5	
PEL-5024C-1200-960	1200V	960A	24kW	1	155	D119-122
PEL-5064C-150-400	150V	400A	4kW	1	28	
PEL-5065C-150-500	150V	500A	5kW	1	28	
PEL-5066C-150-600	150V	600A	6kW	1	28	
PEL-5064C-600-280	600V	280A	4kW	1	29	
PEL-5065C-600-350	600V	350A	5kW	1	29	
PEL-5066C-600-420	600V	420A	6kW	1	29	
PEL-5064C-1200-160	1200V	160A	4kW	1	29	
PEL-5065C-1200-200	1200V	200A	5kW	1	29	
PEL-5066C-1200-240	1200V	240A	6kW	1	29	

AC/DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
AEL-5002-330-18.75	330V	18.75A	1875W	1	21.5	D113-118
AEL-5003-330-28	330V	28A	2800W	1	27.5	
AEL-5004-330-37.5	330V	37.5A	3750W	1	33.5	
AEL-5006-330-56	330V	56A	5600W	1	58	
AEL-5008-330-75	330V	75A	7500W	1	70	
AEL-5012-330-112.5	330V	112.5A	11250W	1	105	
AEL-5015-330-112.5	330V	112.5A	15000W	1	140	
AEL-5019-330-112.5	330V	112.5A	18750W	1	200	
AEL-5023-330-112.5	330V	112.5A	22500W	1	295	
AEL-5002-425-18.75	425V	18.75A	1875W	1	21.5	
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	200	
AEL-5023-425-112.5	425V	112.5A	22500W	1	295	
AEL-5003-480-18.75	480V	18.75A	3800W	1	27.5	
AEL-5004-480-28	480V	28A	3750W	1	33.5	

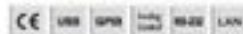
Programmable D.C. Electronic Load



PEL-3111H/3111H



PEL-3041H/3041H/3021H/3021H



FEATURES

- Operating Voltage [DC]: 0-150V(PEL-3000)/0-500V(PEL-3000H)
- Operating Mode: C/C/C+V/C/C+V/C/C+V/C/C+V/C/C+V
- Parallel Connection of Inputs for Higher Capacity (Max.: 3,450W)
- Support of High Time Rate / Max 100μs (PEL-3000H/3041H/3021H)
- Run Program Function (C/C/C+V Test)
- Sequence Function for High Efficient Load Simulations
- Dynamic (Switching) Function: 0.0140Hz-20kHz
- Soft Start Function: Off/On (1-200ms, Rise, Time)
- Adjustable OCP/OVP/OPP/UVF Setting
- Short Circuit Protection
- Timer Function: Elapsed Time of Load on
- Cut Off Time (Auto Load Off Time): 1s to 9999 Seconds 1s 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 (GPIB), GPIB, LAN (Opt.)

Rear Panel



The PEL-3000 Series, a single-channel, programmable D.C. electronic load with 600mA current resolution and 14A/μs current Slew Rate, is very ideal for testing server power supply and UPS (Switching Power Supply) for commercial and industrial computers. For a heavy-duty device like cloud-computing running 24-hour monitoring operations, a stable and high-power power supply, ranging from 150W to 1500W, is required to maintain the normal operation of server Hub, and the acquisition 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 peak 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 D.C. Electronic load, which not only inherited functions and features from the PEL-3000 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 800V and 0.84A/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 tools, battery module and automobile battery, PEL-3000H Series has three stand-alone models to offer including 177W, 350W, 1050W and Boosters. By connecting Booster 2700W units with master units, the maximum load capacity of the whole system can reach 5,400W. Hence, the PEL-3000H Series fulfills various power testing requirements including medium (medium power) or high-power power supply.

The PEL-3000H 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. Basic, Dynamic and Sequence are to assist users to simulate the genuine load changes. For instance, PEL-3000H 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 devise product quality and reliability.

The Self Test function of the PEL-3000H Series can set current rise time for the moment PEL-3000H Series is turned on to reduce the abnormal situation of the voltage drop of power supply under test. The adjustable Under Voltage Protection (UVP), CC/NC CO voltage input monitoring function, current monitoring function and Timer Function to control load activation time can be jointly applied to the characteristic test of battery bleeding to avoid battery damage during bleeding operation. Based upon the functionalities described above, the PEL-3000H Series can test a vast variety of power supply ranging from the fundamental static load current to complex dynamic load simulations so as to enhance product quality and reliability.

The single unit D.C. Electronic Load of PEL-3000H Series

The PEL-3000H Series is a high speed, single channel and programmable D.C. electronic load and its power functionality, parallel combination and size are listed on the following chart.

MODEL	PEL-3021H/3021H	PEL-3041H/3041H	PEL-3111H/3111H	PEL-3211H/3211H
Power	177W	350W	1050W	3,700W Boosters
Function	Full-function Single Unit	Full-function Single Unit	Full-function Single Unit	No control panel, test section operated alone
Parallel Combination	Parallel with same model, 3 units the maximum	Parallel with same model, 3 units the maximum	Parallel with same model, 3 units the maximum Parallel with the maximum of four PEL-3111H's	Parallel with PEL-3111H's
Size	Half Rack	Half Rack	Full Rack	Full Rack

Note:

- Full scale of 11 range
- Vin: Input terminal voltage of electronic load
- 10 range applies to the full scale of 11 range
- Current [C] = Input current [A] / Input voltage [V] × 1/resistance [Ω]
- Constant value in the input current. At the input current, it is not applied for the condition of the parallel operation.
- Set = Vin/10V
- At the setting point during remote sensing under the operating range of the input voltage, it is also applied for the condition of the parallel operation.
- It is not applied for the condition of the parallel operation.
- Time to reach from 10% to 90% when the current is raised from 2.5% to 100% (20% to 100% in A range) of the rated current
- N = Number of units in parallel (same model)
- N = Number of units in parallel (same model) or N = 1 + 3 (Number of units in parallel (PEL-3111H))

SPECIFICATIONS

Model	PEL-3021				PEL-3041				PEL-3111				PEL-3211			
Voltage	90-130V				90-130V				90-130V				90-130V			
Current	10A				10A				20A				20A			
Power	1700W				2200W				2200W				2200W			
Input Resistance	500 Ω				500 Ω				500 Ω				500 Ω			
Min. Operating Voltage(DC)(V _{in})	8.7V@17.5A				8.7V@17.5A				8.7V@17.5A				8.7V@17.5A			
Min. Operating Voltage(DC)(V _{in})	1.7V@15A				1.7V@15A				1.7V@17.5A				1.7V@17.5A			
CONSTANT CURRENT MODE																
Operating Range	H, M, L		0.15A, 0.15A, 0.15A		0.70A, 0.70A, 0.70A		0.70A, 0.70A, 0.70A		0.70A, 0.70A, 0.70A		0.70A, 0.70A, 0.70A		0.70A, 0.70A, 0.70A			
Accuracy of Setting	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Accuracy of Setting	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Accuracy of Setting(Parallel)	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Resolution	H, M, L		1mA		1mA		1mA		1mA		1mA		1mA			
CR MODE																
Operating Range	H, M, L		20.00A-400.0A (10.00A-400.0A)		40.00A-400.0A (20.00A-400.0A)		40.00A-400.0A (20.00A-400.0A)		40.00A-400.0A (20.00A-400.0A)		40.00A-400.0A (20.00A-400.0A)		40.00A-400.0A (20.00A-400.0A)			
Accuracy of Setting	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Accuracy of Setting	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Parallel	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Resolution	H, M, L		400A		400A		400A		400A		400A		400A			
CONSTANT VOLTAGE MODE																
Operating Range	H, M, L		1.2V-1.50V		1.2V-1.50V		1.2V-1.50V		1.2V-1.50V		1.2V-1.50V		1.2V-1.50V			
Accuracy of Setting	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Resolution	H, M, L		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV			
CONSTANT POWER MODE																
Operating Range	H, M, L		1.00W-1.00W		1.00W-1.00W		1.00W-1.00W		1.00W-1.00W		1.00W-1.00W		1.00W-1.00W			
Accuracy of Setting	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Resolution	H, M, L		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV			
PARALLEL SHUNT																
Capacity	H, M, L		1000F		1000F		1000F		1000F		1000F		1000F			
SLEW RATE																
Operation Mode	H, M, L		DC, CR		DC, CR		DC, CR		DC, CR		DC, CR		DC, CR			
Setting Range (DC mode)	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Setting Range (CR Mode)	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Accuracy of Setting	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Resolution	H, M, L		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV		10mV/10mV			
METER																
Indicator	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Accuracy	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
Accuracy(Parallel Operation)	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
DYNAMIC MODE																
Operation Mode	H, M, L		DC, CR		DC, CR		DC, CR		DC, CR		DC, CR		DC, CR			
7.5 & 7.5	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Slow Rise (CR Mode)	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Slow Rise (CR Mode)	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Current Accuracy	H, M, L		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o		0.1% of set + 0.1% of I _o			
PROTECTION FUNCTION																
Function	H, M, L		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(RCP)		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(RCP)		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(RCP)		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(RCP)		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(RCP)		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(RCP)			
GENERAL																
Input Range	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Power(Phn)	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Interface	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			
Dimensions & Weight	H, M, L		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V		0.1V-1.50V			

Programmable D.C. Electronic Load

SPECIFICATIONS											
Model	PEL-3252	PEL-3253	PEL-3424	PEL-3535	PEL-3232	PEL-3533	PEL-3744	PEL-3955			
Voltage	0~120V	0~120V	0~120V	0~120V	0~120V	0~120V	0~120V	0~120V			
Current	0~325A	0~325A	0~424A	0~353A	0~323A	0~353A	0~374A	0~395A			
Power	1700W	1700W	4200W	3700W	3700W	3700W	7100W	9000W			
Output Resistance	20 mΩ	20 mΩ	10 mΩ	10 mΩ	10 mΩ	10 mΩ	10 mΩ	10 mΩ			
Max Operating Voltage (DC/AC)	0~120V/170V 1.75V/120V	0~120V/170V 1.75V/120V	0~120V/170V 1.75V/120V	0~120V/170V 1.75V/120V	0~120V/170V 1.75V/120V	0~120V/170V 1.75V/120V	0~120V/170V 1.75V/120V	0~120V/170V 1.75V/120V			
CONSTANT CURRENT MODE											
Operating Range	H.M.L.	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A									
Accuracy of Setting	H.M.L.	±0.1% of set + 0.1 mV (A) × 100 (mV/A)									
Resolution	H.M.L.	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)			
DC MODE											
Operating Range	Range	H	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
		M	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
		L	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
		S	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
Accuracy of Setting	H.M.L.	±0.1% of set + 0.1 mV (A) × 100 (mV/A)									
Resolution	H.M.L.	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)			
CONSTANT VOLTAGE MODE											
Operating Range	Range	H	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
Accuracy of Setting	H.M.L.	±0.1% of set + 0.1 mV (A) × 100 (mV/A)									
Resolution	H.M.L.	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)			
PROTECT MODE											
Operating Range	Range	H	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
Accuracy of Setting	H.M.L.	±0.1% of set + 0.1 mV (A) × 100 (mV/A)									
Resolution	H.M.L.	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)	0.0001 A (set), 0.0001 A (load)			
METER											
Reference Accuracy	Accuracy	±0.1% of set + 0.1 mV (A) × 100 (mV/A)									
Dynamic Mode	Accuracy	±0.1% of set + 0.1 mV (A) × 100 (mV/A)									
Operating Mode	DC and AC										
Test & ID Accuracy	±0.1% of set + 0.1 mV (A) × 100 (mV/A)										
Slow Rate (DC Mode)	Range	H	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
		L	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
Slow Rate (DC Mode)	Range	H	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
		L	0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A, 0.0000~420.0 A								
Current Accuracy	±0.1% of set + 0.1 mV (A) × 100 (mV/A)										
PROTECTION FUNCTION											
Function	Overvoltage protection (OVP), Overcurrent protection (OCP), Overpower protection (OPP), Overheat protection (OHP), Undervoltage protection (UVP), Reverse connection protection (RCP)										
GENERAL											
Input Range	1000W, 1000W, 1000W, 1000W, 1000W, 1000W, 1000W, 1000W, 1000W, 1000W										
Power (Max)	1000W, 1000W, 1000W, 1000W, 1000W, 1000W, 1000W, 1000W, 1000W, 1000W										
Interface	USB, RS-485, RS-232C, RS-485, RS-232C, RS-485, RS-232C, RS-485, RS-232C, RS-485, RS-232C										
Dimensions & Weight	100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D), 100mm (H) x 100mm (W) x 100mm (D)										

SPECIFICATIONS															
Model	PEL-3021H				PEL-3041H				PEL-3111H				PEL-3211H		
Voltage	0V-800V				0V-800V				0V-800V				0V-800V		
Current	8.75A				17.5A				17.5A				100A		
Power	735W				1400W				1400W				1400W		
Input Resistance	3.2mΩ				3.2mΩ				3.2mΩ				3.2mΩ		
Min. Operating Voltage (OCV)	0.001V				0.001V				0.001V				0.001V		
Voltage (OCV) Test	2.5V/0.25A				2.5V/0.25A				2.5V/0.25A				2.5V/0.25A		
CONSTANT CURRENT MODE															
Operating Range	H, M, L	0.1-73.5A (0.1mA/0.01mA/0.1mA)			H, M, L	0.1-73.5A (0.1mA/0.01mA/0.1mA)			H, M, L	0.1-73.5A (0.1mA/0.01mA/0.1mA)			H, M, L	0.1-73.5A (0.1mA/0.01mA/0.1mA)	
Accuracy of Setting	H, M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)	
Accuracy of Setting	L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)	
Accuracy of Setting (Parallel)	H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)	
Resolution	H, M, L	0.001A / 0.001A / 0.001A			H, M, L	0.001A / 0.001A / 0.001A			H, M, L	0.001A / 0.001A / 0.001A			H, M, L	0.001A / 0.001A / 0.001A	
CR MODE															
Operating Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			M	0.1-73.5A (0.1mA/0.01mA/0.1mA)			L	0.1-73.5A (0.1mA/0.01mA/0.1mA)			H	0.1-73.5A (0.1mA/0.01mA/0.1mA)	
Accuracy of Setting	H	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)	
Accuracy of Setting	M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)	
Accuracy of Setting	L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)	
Parallel	H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)	
Resolution	H, M, L	0.001A / 0.001A / 0.001A			H, M, L	0.001A / 0.001A / 0.001A			H, M, L	0.001A / 0.001A / 0.001A			H, M, L	0.001A / 0.001A / 0.001A	
CONSTANT VOLTAGE MODE															
Operating Range	Range	H	0V-800V			Range	H	0V-800V			Range	H	0V-800V		
Accuracy of Setting	Range	H, A	±0.05% of set + 0.05% of V _{set}			Range	H, A	±0.05% of set + 0.05% of V _{set}			Range	H, A	±0.05% of set + 0.05% of V _{set}		
Resolution	Parallel	V/V	±0.05% of set + 0.05% of V _{set}			Parallel	V/V	±0.05% of set + 0.05% of V _{set}			Parallel	V/V	±0.05% of set + 0.05% of V _{set}		
Resolution	Range	H, L	0.001V (0.001V)			Range	H, L	0.001V (0.001V)			Range	H, L	0.001V (0.001V)		
CONSTANT POWER MODE															
Operating Range	Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)		
Accuracy of Setting	Range	H, M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			Range	H, M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			Range	H, M	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)		
Resolution	Range	H, M, L	0.001A / 0.001A / 0.001A			Range	H, M, L	0.001A / 0.001A / 0.001A			Range	H, M, L	0.001A / 0.001A / 0.001A		
Public-LED Mode															
Capacity	875W				1750W				1750W				PEL-3111H with 4 Resistor units: 30A x 475W		
BULK MODE															
Operation Mode	CC, CR				CC, CR				CC, CR				N/A		
Setting Range (CC mode)	Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)		
Setting Range (CR mode)	Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)		
Accuracy of Setting	Range	H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			Range	H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			Range	H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)		
Resolution (Setting Range)	Range	H, M, L	0.001A / 0.001A / 0.001A			Range	H, M, L	0.001A / 0.001A / 0.001A			Range	H, M, L	0.001A / 0.001A / 0.001A		
WATER															
Voltage	Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set} (I _{set} > 1mA)	
Accuracy	Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set} (I _{set} > 1mA)	
Accuracy (Parallel Operation)	Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set}			Accuracy	±0.1% of set + 0.1% of V _{set} (I _{set} > 1mA)	
DYNAMIC MODE															
Operation Mode	CC, CR, CP				CC, CR, CP				CC, CR, CP				N/A		
Setting	0.1-73.5A (0.1mA/0.01mA/0.1mA)				0.1-73.5A (0.1mA/0.01mA/0.1mA)				0.1-73.5A (0.1mA/0.01mA/0.1mA)				0.1-73.5A (0.1mA/0.01mA/0.1mA)		
Setting Rate (CR Mode)	Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)		
Setting Rate (CP Mode)	Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)			Range	H	0.1-73.5A (0.1mA/0.01mA/0.1mA)		
Current Accuracy	Range	H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			Range	H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)			Range	H, M, L	±0.1% of set + 0.1% of I _{set} (I _{set} > 1mA)		
Resolution	Range	H, M, L	0.001A / 0.001A / 0.001A			Range	H, M, L	0.001A / 0.001A / 0.001A			Range	H, M, L	0.001A / 0.001A / 0.001A		
PROTECTION FUNCTION															
Functions	Overvoltage protection (OVP), Overcurrent protection (OCP), Overpower protection (OPP), Overheat protection (OHP), Undervoltage protection (UVP), Reverse connection protection (RCV)														
GENERAL															
Input Range	0V-800V, 0V-800V, 0V-800V				0V-800V, 0V-800V, 0V-800V				0V-800V, 0V-800V, 0V-800V				0V-800V, 0V-800V, 0V-800V		
Power (Max)	735W, 1400W, 1400W				735W, 1400W, 1400W				735W, 1400W, 1400W				735W, 1400W, 1400W		
Interface	RS-232C, RS-485, RS-485				RS-232C, RS-485, RS-485				RS-232C, RS-485, RS-485				RS-232C, RS-485, RS-485		
Dimensions & Weight	100mm x 100mm x 100mm, Approx. 1kg				100mm x 100mm x 100mm, Approx. 1kg				100mm x 100mm x 100mm, Approx. 1kg				100mm x 100mm x 100mm, Approx. 1kg		

ORDERING INFORMATION

PEL-001 (100/15A/1700) Single Channel Programmable D.C. Electronic Load
PEL-004 (100/15A/11000) Single Channel Programmable D.C. Electronic Load
PEL-011 (100/15A/12000) Single Channel Programmable D.C. Electronic Load
PEL-021 (100/400A/10000) 2100W Buckler for PEL-011 only
PEL-0212 (100/400A/10000) Single Channel Programmable D.C. Electronic Load
PEL-032 (100/400A/11000) Single Channel Programmable D.C. Electronic Load
PEL-002 (100/400A/12000) Single Channel Programmable D.C. Electronic Load
PEL-004 (100/400A/12000) Single Channel Programmable D.C. Electronic Load
PEL-005 (100/1000A/12000) Single Channel Programmable D.C. Electronic Load
PEL-006 (100/1000A/12000) Single Channel Programmable D.C. Electronic Load
PEL-007 (100/145A/11000) Single Channel Programmable D.C. Electronic Load
PEL-008 (100/195A/14000) Single Channel Programmable D.C. Electronic Load
ACCESSORIES
 Quick Start Guide, CD-ROM (Programming Manual), Power Cord
PEL-011 Load Input Terminal Cover **PEL-012** Terminal Stripping Kit

PEL-021H (800/1.75A/1700) Single Channel Programmable D.C. Electronic Load
PEL-021H (800/1.75A/11000) Single Channel Programmable D.C. Electronic Load
PEL-021H (800/1.75A/12000) Single Channel Programmable D.C. Electronic Load
PEL-021H (800/100A/10000) 1000W Buckler for PEL-021H only
PEL-021H2 (800/100A/10000) Single Channel Programmable D.C. Electronic Load
PEL-021H2 (800/1.75A/11000) Single Channel Programmable D.C. Electronic Load
PEL-021H2 (800/1.75A/12000) Single Channel Programmable D.C. Electronic Load
PEL-021H2 (800/19A/10000) Single Channel Programmable D.C. Electronic Load
PEL-021H2 (800/20.5A/12000) Single Channel Programmable D.C. Electronic Load
PEL-021H2 (800/20.5A/12000) Single Channel Programmable D.C. Electronic Load
PEL-021H2 (800/30.5A/12000) Single Channel Programmable D.C. Electronic Load
PEL-021H2 (800/40.5A/12000) Single Channel Programmable D.C. Electronic Load

CTL-201 Frame Link Cable 300mm **PEL-011** Front Terminal Wrench
PEL-011 Flexible Terminal Cover **PEL-014** 7-1/2" Protection Plug

OPTIONAL ACCESSORIES

GL-134 3V Lithium Battery for Clock **CTL-126** Test Lead (Max. 40A)
GRA-413 Rack Mount Bracket for Buckler PEL-021 (H) (2A-175) **CTL-244** GPIB Cable, 250m
GRA-414 Rack Mount Frame for PEL-001 (H) PEL-004 (H) PEL-011 (H) PEL-014
CTL-244 GPIB Cable Type A Type B **PEL-019** Dual Filter
GRA-414 Rack Mount Frame for PEL-001 (H) PEL-004 (H) PEL-011 (H) PEL-014

FREE DOWNLOAD

Driver LabView Driver

PEL-004



PEL-005



PEL-006



PEL-007



PEL-008



PEL-009



PEL-011



PEL-019



PEL-011



PEL-012



PEL-013



PEL-014



CTL-255



CTL-126



GRA-413 (H)



GRA-413 (H)



GRA-414 (H)



GRA-414 (H)

GRA-413 Rack Mount Kit (EIA-19)
for PEL-021 (H)



GRA-414 Rack Mount Kit (EIA)
for PEL-001 (H) PEL-004 (H) PEL-011 (H) PEL-014



GRA-414 Rack Mount Kit (EIA)
for PEL-001 (H) PEL-004 (H) PEL-011 (H) PEL-014



GRA-413 (H)



GRA-413 (H)



GRA-414 (H)



GRA-414 (H)

Programmable D.C. Electronic Load



PEL-3031E



PEL-3032E



FEATURES

- 8-100V(PEL-3031E)/Min. Operating Voltage(s) : 1V at 60A, 0.5V at 30A
- 8-500V(PEL-3032E)/Min. Operating Voltage(s) : 2.5V at 11A, 1.25V at 7.5A
- 7 Operating Modes : CC, CR, CP, CR, CC+CR, CR+CV, CP+CV
- Normal Sequence Function: Max Steps: 1000 steps/Step Time: 999s 99ms (3199940 sec)/Test Sequence Function: Max Steps: 1000 steps/Step Time: 25us-400ms
- Soft Start
- BATT Test Automation: Max Test Time: 999s 99ms (3199940 sec) Max Test A/C: 9999.99A
- OCP, OVP Test Automation
- Max. Slew Rate : 2.5A/s
- Dynamic Mode
- Protection : OVP, OCP, OPR, OTR, RVP, UVF
- Remote Sense
- Integrate Voltage, Current and Power Measurement Functions
- External Voltage or Resistance Control
- Rear Panel BNC, Trigger IN/OUT
- Analog External Control
- USB(H), GPIB & LAN(Optional) RS-232C (Manufacturer Installed Only)

CW Instrument launches new PEL-3000 series programmable single-channel electronic load. In the series, PEL-3031E provides 100W (7V-130V/30A) and PEL-3032E provides 300W(2V-500V/11A) current sink capability. Inferred from the PEL-3000 series, PEL-3000E has an easy-to-use 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 ranging from 100mA and aims at measurement applications, including charger, adapter, various power supply equipment, and portable charger.

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 initiate load power sinking operation (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 means of generating complex sequences that can facilitate users to establish a set of changing current sink conditions based upon different working conditions (C.C, C.R, C.V or C.P mode) and time-adjustable range: 1ms to 999s (30ms 99s). Fast sequence allows time reduction of this to be set for the smallest step. Setting parameters for multiple steps can simulate consecutive current changes of various real load conditions. For instance, while using an electronic load to test a power-driven load's power supply, we can first obtain waveforms by an oscilloscope and a current probe from the load, and subsequently use the obtained waveforms to set a simulated current waveform, via electronic load's sequence function, to test the power-driven load 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 to reach 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 OLT's (power supply) transient regulation. It is worth noting, General O.C loads do not have the soft start function. When conducting high speed current sink operation, the inductance effect on the cable connecting electronic load and DUT will lead to transient voltage drop on electronic load's input terminal. Therefore, this will result in voltage non-monotonic 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, when using a power supply, LED and a O.C load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.

The built-in BATT Test Automation of PEL-3000E provides battery discharge applications with more flexible discharge test setting as well as rise and fall time data for discharge current settings, OCP, OVP test Automation for DUT test. Power Supply, provide users with high-resolution measurement values to verify DUT's activation points. 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 status.

SPECIFICATIONS				
Model	PEL-3031E		PEL-3032E	
	Power Range	Power Range	Power Range	Power Range
	100W	300W	300W	300W
	Low	High	Low	High
	8 ~ 130V	8 ~ 130V	8 ~ 500V	8 ~ 500V
	0 ~ 30A	0 ~ 30A	0 ~ 11A	0 ~ 11A
	Min. Operating Voltage(s)	1V ~ 6A	2.5V ~ 1.3A	2.5V ~ 1.3A
STATIC MODE				
Constant Current Mode				
Range	0 ~ 6A	0 ~ 60A	0 ~ 1.3A	0 ~ 13A
Setting Range	0 ~ 0.12A	0 ~ 0.12A	0 ~ 0.13A	0 ~ 0.13A
Resolution	0.2mA	2mA	0.05mA	0.1mA
Accuracy	($\pm 0.05\%$ of set + 0.1% of F.S.)	($\pm 0.05\%$ of set + 0.2% of F.S.)	($\pm 0.05\%$ of set + 0.2% of F.S.)	($\pm 0.05\%$ of set + 0.2% of F.S.)
	Max/Min	Max/Min	Max/Min	Max/Min
	(Full scale of high range)	(Full scale of high range)	(Full scale of high range)	(Full scale of high range)
Constant Resistance Mode				
Range	0.05-0.0025(0.10000-10000)(100W/15A)	0.05-0.0025(0.10000-10000)(300W/30A)	0.05-0.0025(0.10000-10000)(300W/30A)	0.05-0.0025(0.10000-10000)(300W/30A)
Setting Range	0.05-0.0025(0.10000-10000)(100W/15A)	0.05-0.0025(0.10000-10000)(300W/30A)	0.05-0.0025(0.10000-10000)(300W/30A)	0.05-0.0025(0.10000-10000)(300W/30A)
Resolution	0.0005(0.5A)	0.0005(0.5A)	0.0005(0.5A)	0.0005(0.5A)
Accuracy	($\pm 0.05\%$ of set + 0.05%)	($\pm 0.05\%$ of set + 0.05%)	($\pm 0.05\%$ of set + 0.05%)	($\pm 0.05\%$ of set + 0.05%)
Constant Voltage Mode				
Range	1 ~ 15V	1 ~ 100V	2.5 ~ 50V	2.5 ~ 500V
Setting Range	0 ~ 10.2V	0 ~ 100V	0 ~ 100V	0 ~ 100V
Resolution	0.5mV	5mV	1mV	1mV
Accuracy	($\pm 0.05\%$ of set + 0.1% of F.S.)	($\pm 0.05\%$ of set + 0.1% of F.S.)	($\pm 0.05\%$ of set + 0.1% of F.S.)	($\pm 0.05\%$ of set + 0.1% of F.S.)
	(Full scale of high range)	(Full scale of high range)	(Full scale of high range)	(Full scale of high range)
Constant Power Mode				
Range	1W ~ 30W(3A)	1W ~ 100W(30A)	1W ~ 30W(3A)	1W ~ 300W(30A)
Setting Range	0W ~ 30.0W	0W ~ 100.0W	0W ~ 30.0W	0W ~ 300.0W
Resolution	1mW	10mW	1mW	10mW
Accuracy	($\pm 0.05\%$ of set + 0.4% of F.S. (Full scale of 11 range) + 0.05(0.0001W)			



PEL-3032E

SPECIFICATIONS			
Model	PEL-3031E	PEL-3032E	
DYNAMIC MODE			
General	0.00ms-30ms/Reg./Typ.30ms-30s/Reg./Typ.	0.00ms-30ms/Reg./Typ.30ms-30s/Reg./Typ.	
Accuracy	Typ.1ms±0.001ppm	Typ.1ms±0.001ppm	Typ.1ms±0.001ppm
Line Regulation 50%	0.00% ±0.23A/A	0.00% ±0.23A/A	0.20% ±0.23mA/A
Load Regulation	0.001A/A	0.01A/A	0.0001A/A
Line Rate Accuracy of Setting	±100% ±1% ±1% ±1 Time to reach from 10 to 90% when the current is varied from 0 to 100% (0.1 to 100 Hz, 1% length of the load current)		
Constant Current Mode			
Current	0 ~ 4A	0 ~ 80A	0 ~ 1.5A
Setting Range	0 ~ 6.32A	0 ~ 10.3A	0 ~ 1.53A
Current Resolution	0.2mA	2mA	0.0001A
Current Accuracy	±0.8% FS	±0.8% FS	±0.8% FS
Constant Resistance Mode			
Resistance	0.0001Ω-0.0144Ω-0.0001Ω (0.0001Ω) ±1%	0.0001Ω-0.0144Ω-0.0001Ω (0.0001Ω) ±1%	0.0001Ω-0.0144Ω-0.0001Ω (0.0001Ω) ±1%
Setting Range	0.0001Ω-0.0144Ω-0.0001Ω (0.0001Ω) ±1%	0.0001Ω-0.0144Ω-0.0001Ω (0.0001Ω) ±1%	0.0001Ω-0.0144Ω-0.0001Ω (0.0001Ω) ±1%
Resistance Resolution	0.0001Ω	0.0001Ω	0.0001Ω
Resistance Accuracy	±1% (1% Load ±0.001%) ±0.001%	±1% (1% Load ±0.001%) ±0.001%	±1% (1% Load ±0.001%) ±0.001%
STATIC MODE			
Voltage Feedback			
Range	0 ~ 15V	0 ~ 150V	0 ~ 30V
Resolution	0.3mV	3mV	20V
Accuracy	(T_{10}) ±0.1% of setp. ±0.1% of FS	(T_{10}) ±0.1% of setp. ±0.1% of FS	(T_{10}) ±0.1% of setp. ±0.1% of FS
Current Feedback			
Range	0 ~ 4A	0 ~ 80A	0 ~ 1.5A
Resolution	0.2mA	2mA	0.0001A
Accuracy	(T_{10}) ±0.1% of setp. ±0.1% of FS	(T_{10}) ±0.1% of setp. ±0.1% of FS	(T_{10}) ±0.1% of setp. ±0.1% of FS
Power Feed back H&L Range	(Full scale of high range) 0 ~ 300W	(Full scale of high range) 0 ~ 300W	(Full scale of high range) 0 ~ 300W
CP Mode I - Range	0 ~ 32W	0 ~ 32W	0 ~ 32W
FUNCTION			
Sequence (Normal/Reg)	Normal sequence function: Max steps: 1000 steps/Step time: 1ms ~ 999s (0.001s) (100000ms)		
BATT Test Automation	Fast sequence function: Max steps: 1000 steps/Step time: 20us ~ 600ms Max test time: 999s (1000000ms) Max test time: 999s (1000000ms)		
Test Function	OCF Asymptotic function, OCF Asymptotic function		
Self Start	Yes		
In/Out Terminal	Analog External Control, Constant Monitor Output, Trigger In/Out Terminal (BNC)		
Protect Data	10 Data		
Protection	OCP, OVP, UVP, OVF, OVF, RUF		
OTHER			
Power Source	100 ~ 120VAC/0 ~ 24VAC, 47 ~ 63VDC		
Interface	USB (UART), GPIB & LAN (Type 10/100) (Optional, Not Included)		
Dimensions & Weight	271.4(W) × 134.4(H) × 48.5(D)mm, Approx. 7.1kg		

Note: 1) If the ambient temperature is over 35°C (indicated 30°C, then $T = 1 + (35 - T_a) \times 0.001$ (Ampere/1%) ±1%
2) If the ambient temperature is within range of 20°C ~ 35°C, then $T = 0.0$ for the ambient temperature

ORDERING INFORMATION

PEL-3031E 150V/40A/300W Programmable Single-channel D.C. Electronic Load
PEL-3032E 300V/13A/300W Programmable Single-channel D.C. Electronic Load

ACCESSORIES

Quick Start Guide, CD ROM (User Manual, Programming Manual), Power Cord (Region dependent), Front Terminal Washers (Spring Washer (M3) x 2), ICL105A Remote Sense Cables (Red & L, Black & G)

OPTIONAL ACCESSORIES

CPH-045 GPIB Cable, 2m PEL-610 Dust Filter CBA-414-Rack Mount Kit (E) CPH-046 USB Cable, Type A - Type B PEL-004 GPIB Option CBA-414-E Rack Mount Kit (EIA) PEL-618 LAN Card

Rear Panel



PEL-610 Dust Filter



PEL-004 GPIB Option



PEL-618 LAN Card



CBA-414-Rack Mount Kit (E)

For PEL-3031E/3032E



CBA-414-E Rack Mount Kit (EIA)

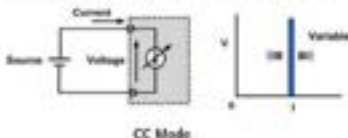
For PEL-3031E/3032E



Programmable D.C. Electronic Load

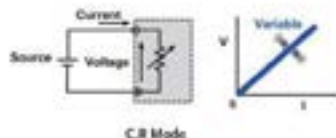
A. OPERATING MODE

The PEL-3000E series provides four fundamental operating modes and three additional modes of CC, CR, CR + CP and CP separately combining with CV. Users can set different load condition under different operating modes such as setting operating range for load level, Current Sense Ratio, input voltage and load current. The input

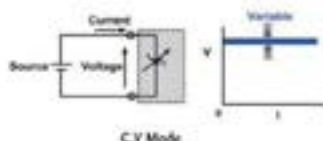


Under constant current mode, electronic load will sink the amount of current users has set. Different current settings via CC mode allow users to test the voltage changes of DC power supply which is called load regulation test.

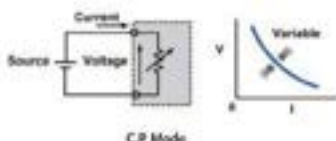
voltage range has two levels - high and low. The load current operating range has two levels - high and low current levels which possess different resolution to meet test requirements of different power product specifications.



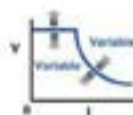
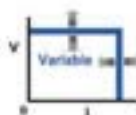
Under constant resistance mode, electronic load will sink load current, which is linearly direct proportion to input voltage. This mode can be utilized in testing voltage or the activation and current limit of power supply.



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.



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.



+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 sinks 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 OCV is lower than the set voltage under +CV mode.

B. STATIC/DYNAMIC/SEQUENCE MODE

Function	Operation	Static	Dynamic	Sequence	
				Fast	Normal
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	- Initial At - Initial B - Stop Rate	- Level 1/Level 2 - Time 1/Time 2 - Stop Rate 1/Stop Rate 2	- Level - Time - Stop Rate - Others...	- Level - Time - Stop Rate - Others...	
Sequence Step Combination	N/A	N/A	1 Sequence 1,000 steps	1 Sequence 1 step/step 1,000 steps	1 Sequence 1 step/step 1,000 steps
Other Functions	N/A	Trigger Start Function	Trigger Start Function	- Trigger Start Function - Range Function	- Trigger Start Function - Range Function

The PEL-3000E series, according to different test conditions, step or continuous changes, test speed, and selectable modes, has three operating functions: Static, Dynamic and Sequence.

C FAST SEQUENCE & NORMAL SEQUENCE



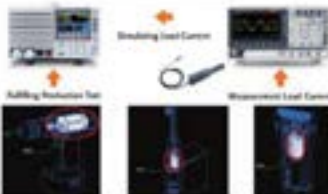
Fast Sequence Diagram



Normal Sequence Diagram



When operating the Sequence Function, PEL-1000E Series follows the time and load settings of step1, step2, step3, etc. so as to realize different load current variation.



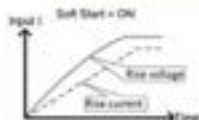
Power-driven Tools Simulation Test

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.



Ramp Function of PEL-1000E 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

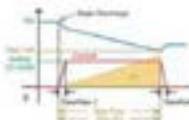


The Soft Start Function of PEL-1000E Series allows users to determine the rise time of current sink that is to decide how much time is required to reach electronic load's set current, resistance or power value. PEL-1000E's soft start function prevents inrush current and surge voltage from happening on DUT.

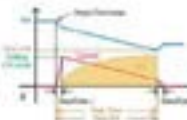


For instance, test applications using a power supply, LED and a DC load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.

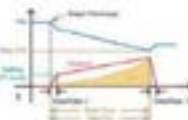
E BATT TEST AUTOMATION



CC Mode



CR Mode



CP Mode



BATT Test Automation Editing

The built-in BATT Test Automation of PEL-1000E 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

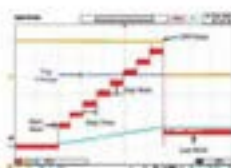
conditions for stop discharge can be set respectively. For instance, set the Input voltage for stop-discharge current, the execution time for discharge current or total discharge current/time(AH) to satisfy the verification of battery capability.

F OCP TEST AUTOMATION



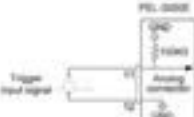
OCP test Automation for DUT (Power Supply). Provide users with high resolution OCP measurement values to verify DUT's OCP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OCP activation point meets the regulations. Test the value of OCP by setting 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-3000E. 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 Fast/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.

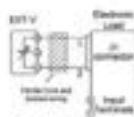
The TRIG IN BNC on the rear panel is used to resume a sequence after a pause. This action is useful to synchronize the execution of a sequence with another device. To resume a pause sequence, apply a high signal for 10us or more. The TRIG IN BNC is pulled down to earth internally using a 100Kohm resistor.

I PROTECTION MODES

Function \ Protection	OCP	OVP	OPP	OTP	UVP
Adjustable Thresholds	✓	✓	✓	N/A	✓
Load Off	✓	✓	✓	Fixed	✓
Limit Function	✓	N/A	✓	N/A	N/A

The PEL-3000E 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 protective functions, Limit function can also be utilized to maintain electronic load in operation at a preset value.



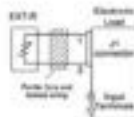
External Voltage Control



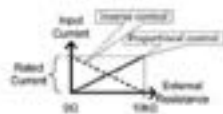
CC Mode

$$\text{Input current} = \text{rated current} \times (\text{external voltage}/10)$$


J1 Connector



External Resistance Control



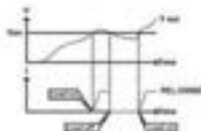
CC Mode

$$\text{Proportional Control Input current} = \text{rated current} \times (\text{external resistance}/1000)$$

$$\text{Inverse Control Input current} = \text{rated current} \times (1 - \text{external resistance}/1000)$$

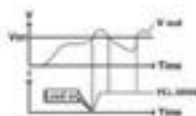
The PEL 3000E series provides the external analog channel control function, which allows users to connect J1 connectors on the rear panel to input voltage or to connect resistance to control electronic load operation. Users can integrate this function into test system and utilize signals generated from the test system to control PEL 3000E.

Von 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.

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 999h 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 provide information and application related to time. Users can obtain the total time of limiting electronic load operation to increase the ability of electronic load tests.

Programmable D.C. Electronic Load



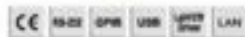
PEL-2004A(B)

NEW



PEL-2002A(B)

NEW



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
- OVP/OCP/OPP/OTF/REV/VUP 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-2000A(B) and PEL-2000B(B) are multiple-channel, programmable DC electronic loads with a modularized structure. The PEL-2000A(B) Series is designed to meet the combining 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 characterization verification using high-speed semiconductor loads have become necessary. The PEL-2000A(B) Series includes two types of mainframes and 4 types of load modules to accommodate user 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-2000A(B) is a 4-channel mainframe with a master control unit to hold 2 load modules, while PEL-2000B(B) is a 2-slot mainframe with master control unit to hold 2 load modules. When PEL-2000A(B) is configured with 4 load modules rated at 150W each, the PEL-2000A(B) Series is able to sink 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 70W for high-current and high-power applications. Using 4 dual channel load modules, PEL-2000A(B) is able to test 8 power supply outputs simultaneously.

The Sequence function allows each channel to change its load set according to a predefined sequence at a rate of up to 1000/s per step. Each sequence is able to run continuously 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 automatically simulate a multi-output power supply load. Under Dynamic mode, the load current or load resistance pulsates between two preset levels at a predefined speed up to 25/s 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 test Dynamic tests synchronously under a single clock. This 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 prevent both the load modules and the DUT's.

A buzzer can be set to alert when a protection setting has been triggered. When a protection mode has been triggered, the load unit will display an alarm and stop sinking current/voltage. When a load unit is operating in CE or CV mode, the unit will need 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 burn-out 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 OVP is triggered, 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 triggered, an alarm tone will sound until the reverse voltage is removed. Under Voltage Protection will turn off the load when the voltage drops below a set limit.

The Go/NoGo 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 RS-232C interface for external device control. This Go/NoGo function is available for CC mode, CV mode and UR mode (Under Program) mode. If program is not containing 10 guard-swing operations, can be relied to create work routines for repetitive tests. After a program has been completed, the results of all test steps, along with the Go/NoGo 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 Data 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-2000B Series Power)



GTL-249 France Link Cable



GTL-120 Test Lead



GTL-121 Sense Lead



Programmable D.C. Electronic Load



PEL-2000A(B) Series

PEL-2004A Rear Panel



PEL-2003DA Rear Panel



PEL-2004B Rear Panel



PEL-2003DB Rear Panel



SPECIFICATIONS					
	PEL-2000A(B)	PEL-2000A(B)	PEL-2004A(B)	PEL-2004A(B)	PEL-2004A(B)
General Information					
Range	0-100A	0-100A	0-100A	0-100A	0-100A
Resolution	0.01A	0.01A	0.01A	0.01A	0.01A
Accuracy	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA
Over Current Protection					
Range	0.01-100A	0.01-100A	0.01-100A	0.01-100A	0.01-100A
Resolution	0.01A	0.01A	0.01A	0.01A	0.01A
Accuracy	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA
Over Voltage Protection					
Range	0.01-100V	0.01-100V	0.01-100V	0.01-100V	0.01-100V
Resolution	0.01V	0.01V	0.01V	0.01V	0.01V
Accuracy	±0.5% + 1.0mV	±0.5% + 1.0mV	±0.5% + 1.0mV	±0.5% + 1.0mV	±0.5% + 1.0mV
Over Temperature Protection	140°C	140°C	140°C	140°C	140°C
Power/Power Factor					
Power	100W	100W	100W	100W	100W
Accuracy	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
Channel					
Output (CH1)					
Current (A)	0-100A	0-100A	0-100A	0-100A	0-100A
Voltage (V)	0-100V	0-100V	0-100V	0-100V	0-100V
Resolution (A)	0.01A	0.01A	0.01A	0.01A	0.01A
Resolution (V)	0.01V	0.01V	0.01V	0.01V	0.01V
Accuracy (A)	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA	±0.5% + 1.0mA
Accuracy (V)	±0.5% + 1.0mV	±0.5% + 1.0mV	±0.5% + 1.0mV	±0.5% + 1.0mV	±0.5% + 1.0mV
Safety					
Input Protection	100V	100V	100V	100V	100V
Output Protection	100V	100V	100V	100V	100V
Accessories					
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W
Power Cord	100W	100W	100W	100W	100W

ORDERING INFORMATION

- PEL-2000A(B) Dual Channel Module, (0-80V, 0-30A, 100W) x 2
- PEL-2000A(B) Dual Channel Module, (0-80V, 0-3A, 30W) x (0-80V, 0-40A, 100W)
- PEL-2004A(B) Single Channel Module, (0-80V, 0-75A, 100W)
- PEL-2004A(B) Single Channel Module, (0-100V, 0-10A, 100W)
- PEL-2004A(B) 4 Slot Programmable D.C. Electronic Load Mainframe
- PEL-2003A(B) 2 Slot Programmable D.C. Electronic Load Mainframe

Note: Load module cannot be used without a mainframe

ACCESSORIES

- PEL-2000A(B)/2004A(B) User Manual x1, Power Cord x1
- PEL-2000A(B)/2004A(B)/2004A(B)/2004A(B) CTL-120 Test Lead x1, CTL-121 Sense Lead x1
- PEL-001 x1 (PEL-2004A(B)), PEL-001 x1 (PEL-2003A(B))

OPTIONAL ACCESSORIES

- | | | | |
|---------|--|---------|---|
| PEL-001 | CPB Card | CTL-345 | CPB Cable (2m) |
| PEL-002 | PEL-2000A(B) Series Rack Mount Kit | CTL-349 | Power Line Cable |
| PEL-003 | Panel Cover | CTL-346 | USB Cable, USB 2.0 A-B TYPE, CABLE, 4P |
| PEL-004 | LAN Card (for PEL-2000A(B) Main Frame) | CTL-353 | RS-232C Cable, 8pin, R-F Type, null modem, 3000mm |

Modularized Structure

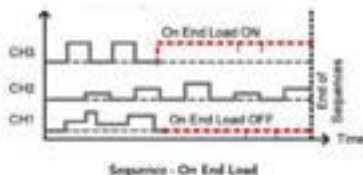
PEL 2004A(B) is a 4 slot mainframe with a master control unit made to hold 4 load modules, and PEL 2002A(B) is a 2 slot mainframe with a master control unit made to hold 2 load modules. The modularized structure of the PEL 2000A(B) Series allows any combination of mainframes and load module (PEL 2000A(B), PEL 2005A(B), PEL 2045A(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 16 sequences to each program. With a total of up to 128 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 on/off control/monitoring connector to externally turn a load on/off and to externally monitor load input current and voltage.

B. AUTOMATICALLY SEQUENCE FUNCTION



The Sequence function allows each channel to change its load sink according to a predefined sequence at a rate of up to 130µs 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.



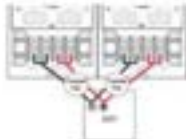
The figure above shows the current waveform of a simulation using the sequence function.

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. FRAME LINK



The PEL 2000A(B) Series allows multiple mainframes to be linked together with standard Mini 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 7kW load capacity for high-current and high-power applications.

High Power DC Electronic Load



PEL-5000C Series



FEATURES

- Maximum Power up to 100kW
- 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 (800V, 1000V 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

CEI's new PEL-5000C series single-channel electronic load provides 100V/600V/1200V models with a power range of 60W-240kW. 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 100kW.

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+UVP battery discharge test mode, and CP+UVP 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 slow 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 inrush current test mode, solar panel MPPT test mode, automated OCP, OPP test functions and 150 sets of parameter storage function. The 1000V model of PEL-5000C not only provides full power output at 1000V, but also provides 80% 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 start, 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-5000C-100-60W	100V/600A/60W	High Power DC Electronic Load
PEL-5000C-100-80W	100V/800A/80W	High Power DC Electronic Load
PEL-5010C-100-100W	100V/1000A/100W	High Power DC Electronic Load
PEL-5012C-100-120W	100V/1200A/120W	High Power DC Electronic Load
PEL-5015C-100-150W	100V/1500A/150W	High Power DC Electronic Load
PEL-5018C-100-180W	100V/1800A/180W	High Power DC Electronic Load
PEL-5020C-100-200W	100V/2000A/200W	High Power DC Electronic Load
PEL-5024C-100-200W	100V/2000A/240W	High Power DC Electronic Load
PEL-5006C-600-420	600V/420A/60W	High Power DC Electronic Load
PEL-5008C-600-540	600V/540A/80W	High Power DC Electronic Load
PEL-5010C-600-750	600V/750A/100W	High Power DC Electronic Load
PEL-5012C-600-840	600V/840A/120W	High Power DC Electronic Load
PEL-5015C-600-1050	600V/1050A/150W	High Power DC Electronic Load
PEL-5018C-600-1260	600V/1260A/180W	High Power DC Electronic Load
PEL-5020C-600-1400	600V/1400A/200W	High Power DC Electronic Load
PEL-5024C-600-1680	600V/1680A/240W	High Power DC Electronic Load
PEL-5006C-1200-340	1200V/340A/60W	High Power DC Electronic Load
PEL-5008C-1200-330	1200V/330A/80W	High Power DC Electronic Load
PEL-5010C-1200-480	1200V/480A/100W	High Power DC Electronic Load
PEL-5012C-1200-480	1200V/480A/120W	High Power DC Electronic Load
PEL-5015C-1200-600	1200V/600A/150W	High Power DC Electronic Load
PEL-5018C-1200-720	1200V/720A/180W	High Power DC Electronic Load
PEL-5020C-1200-800	1200V/800A/200W	High Power DC Electronic Load
PEL-5024C-1200-960	1200V/960A/240W	High Power DC Electronic Load

Rear Panel



PEL-5015C-1200-600

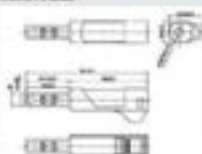


STANDARD ACCESSORIES

- PEL-5000C Series operation manual
- SANAN PLUGS - Please refer to Fig. 3-1
- BNC - BNC CABLE - BNC to BNC CABLE Test x1
- 40D-0506 - 100W Parallel wire Parallel Wire x1

OPTIONAL ACCESSORIES

PEL-022	CPB Card	PEL-498	CPB-493-232 Card
PEL-023	RS-232 Card	CTL-246	15W Cable, USB 2.0, A-B Type, 1200mm
PEL-034	LAN Card	CTL-240	CPB Cable, Double Shielded, 2000mm
PEL-025	USB Card	CTL-250	CPB Cable, Double Shielded, 600mm
PEL-026	Inrush Ring		
PEL-025-1	Back Mount Kit For PEL-5006C		
PEL-025-2	Back Mount Kit For PEL-5008C, PEL-5010C, PEL-5012C		
PEL-025-3	Back Mount Kit For PEL-5015C, PEL-5018C		
PEL-025-4	Back Mount Kit For PEL-5020C, PEL-5024C		
PEL-026	15W/232S, 15-shielded (used to be locked)		





PEL-0006C-130-400
PEL-0006C-400-420
PEL-0006C-1200-340



PEL-0006C-130-800
PEL-0006C-800-500
PEL-0006C-1200-330



PEL-0010C-130-1000
PEL-0010C-400-700
PEL-0010C-1200-400



PEL-0010C-130-1200
PEL-0010C-400-840
PEL-0010C-1200-400



PEL-0015C-130-1500
PEL-0015C-400-1000
PEL-0015C-1200-600



PEL-0018C-130-1800
PEL-0018C-400-1200
PEL-0018C-1200-720



PEL-0020C-130-2000
PEL-0020C-400-1400
PEL-0020C-1200-800



PEL-0024C-130-2000
PEL-0024C-400-1600
PEL-0024C-1200-900

Power / Voltage	130V	600V	1200V
6W	PEL-0006C-130-400 (300A)	PEL-0006C-400-420 (420A)	PEL-0006C-1200-340 (340A)
6W	PEL-0006C-130-800 (300A)	PEL-0006C-400-500 (500A)	PEL-0006C-1200-330 (330A)
10W	PEL-0010C-130-1000 (700A)	PEL-0010C-400-700 (700A)	PEL-0010C-1200-400 (400A)
12W	PEL-0010C-130-1200 (700A)	PEL-0010C-400-840 (840A)	PEL-0010C-1200-400 (400A)
15W	PEL-0015C-130-1500 (700A)	PEL-0015C-400-1000 (1000A)	PEL-0015C-1200-400 (400A)
18W	PEL-0018C-130-1800 (700A)	PEL-0018C-400-1200 (1200A)	PEL-0018C-1200-720 (720A)
20W	PEL-0020C-130-2000 (700A)	PEL-0020C-400-1400 (1400A)	PEL-0020C-1200-800 (800A)
24W	PEL-0024C-130-2000 (700A)	PEL-0024C-400-1600 (1600A)	PEL-0024C-1200-900 (900A)

PEL-003 C78 Card



PEL-003 RS-232 Card



PEL-004 LAN Card



PEL-003 USB Card



PEL-006 Hook Ring



PEL-027 5-4 Rack Mount Kit



PEL-028 Handles

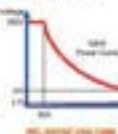
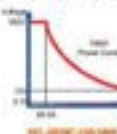
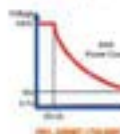
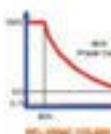


High Power DC Electronic Load

SPECIFICATIONS				
MODEL	PEL-5000C 150-400		PEL-5000C 150-800	
Power ¹⁾	50 W		50 W	
Current	0 ~ 40A		0 ~ 80A	
Voltage	0 ~ 400V		0 ~ 800V	
Min. Operating Voltage	0.7V @ 500A		0.7V @ 500A	
Protection	0.7V @ 1000A		0.7V @ 1000A	
Over-Temp Protection (OTP)	100%		100%	
Over-Current Protection (OCP)	100%		100%	
Over-Voltage Protection (OVP)	100%		100%	
Over-Load Protection (OLP)	100%		100%	
Constant Current Mode	100%		100%	
Range ²⁾	40A		80A	
Resolution	0.001A		0.001A	
Accuracy ³⁾	±0.05%		±0.05%	
Constant Resistance Mode	100%		100%	
Range	1000Ω ~ 0.1Ω		1000Ω ~ 0.1Ω	
Resolution	0.001Ω		0.001Ω	
Accuracy	±0.05%		±0.05%	
Constant Voltage Mode	100%		100%	
Range	0.7V ~ 400V		0.7V ~ 800V	
Resolution	0.001V		0.001V	
Accuracy	±0.05%		±0.05%	
Constant Power Mode	100%		100%	
Range	50W ~ 500W		50W ~ 500W	
Resolution	0.001W		0.001W	
Accuracy	±0.05%		±0.05%	
Constant Voltage Mode + Constant Current Mode	100%		100%	
Range	0.7V ~ 400V		0.7V ~ 800V	
Resolution	0.001V		0.001V	
Accuracy	±0.05%		±0.05%	
Constant Voltage Mode + Constant Power Mode	100%		100%	
Range	50W ~ 500W		50W ~ 500W	
Resolution	0.001W		0.001W	
Accuracy	±0.05%		±0.05%	
Surge Test	100%		100%	
Surge & Normal current	0 ~ 400A		0 ~ 800A	
Surge time	10 ~ 1000ms		10 ~ 1000ms	
Surge stop	10 ~ 1000ms		10 ~ 1000ms	
WIFI Mode	100%		100%	
Algorithm	PID		PID	
Load mode	CV		CV	
P&ID interval	1000ms ~ 4000ms		1000ms ~ 4000ms	
Dynamic Mode	100%		100%	
Tuning	100%		100%	
Thigh & Low	100%		100%	
Resolution	0.001V		0.001V	
Accuracy	±0.05%		±0.05%	
Time Rate	0.001A/100ms		0.001A/100ms	
Resolution	0.001A		0.001A	
Min. Rise Time	0.001s		0.001s	
Current	0 ~ 40A		0 ~ 80A	
Range	0 ~ 40A		0 ~ 80A	
Resolution	0.001A		0.001A	
Measurement	100%		100%	
Voltage Read Back	100%		100%	
Range (3 Digits)	0 ~ 400V		0 ~ 800V	
Resolution	0.001V		0.001V	
Accuracy	±0.05%		±0.05%	
Current Read Back	100%		100%	
Range (3 Digits)	0 ~ 40A		0 ~ 80A	
Resolution	0.001A		0.001A	
Accuracy	±0.05%		±0.05%	
Power Read Back	100%		100%	
Range (3 Digits)	0 ~ 500W		0 ~ 500W	
Resolution	0.001W		0.001W	
Accuracy	±0.05%		±0.05%	
General	100%		100%	
Typical Short Resistance	0.001Ω		0.001Ω	
Maximum Short Current	0.001A		0.001A	
Load On Voltage	0.7V ~ 400V		0.7V ~ 800V	
Load Off Voltage	0.7V ~ 400V		0.7V ~ 800V	
Power Consumption	100W		100W	
Dimensions (mm)	440 (mm) x 200 (mm)		440 (mm) x 200 (mm)	
Weight	10 kg		10 kg	
Temperature ⁴⁾	0 ~ 40°C		0 ~ 40°C	
Setup & Port	100%		100%	

Cooling : Advanced Fan Cooled

Input AC Power : 100-240 Vac ±10% / 50/60Hz, Single-phase



Note 1) : The rated rating specification is ambient temperature = 25°C

Note 2) : The surge is automatically set to 10% in range 100W

Note 3) : The operating current is below 10% (the accuracy specification is 0.1% FS)

Note 4) : Operating temperature range is 0~40°C (all specifications apply for 0~40°C)

High Power DC Electronic Load

SPECIFICATIONS

MODEL	PEL-5000C-400-020	PEL-5000C-400-100	PEL-5010C-400-100	PEL-5010C-400-500
Power ¹⁾	50 W	50 W	50 W	50 W
Current	0 ~ 43A	0 ~ 430A	0 ~ 300A	0 ~ 700A
Voltage	0 ~ 430V	0 ~ 430V	0 ~ 700V	0 ~ 700V
Min. Operating Voltage	10V @ 430A	10V @ 430A	10V @ 700A	10V @ 700A
Protection				
Over Power Protective (OPR)			100%	100%
Over Current Protective (OCR)			100%	100%
Over Voltage Protective (OVR)			100%	100%
Over Temp Protective (OTR)			95% (T _{amb})	95% (T _{amb})
Constant Current Mode				
Range ²⁾	43A	430A	300A	700A
Resolution	0.01mA	0.1mA	0.1mA	1.1mA
Accuracy ³⁾				± 0.05% of (Setting + Range)
Constant Resistance Mode				
Range	0.01Ω ~ 430Ω	0.001Ω ~ 430Ω	0.001Ω ~ 430Ω	0.001Ω ~ 430Ω
Resolution	10.000μΩ	0.100μΩ	0.100μΩ	1.000μΩ
Accuracy				± 0.1% of (Setting + Range)
Constant Voltage Mode				
Range	430V	430V	700V	700V
Resolution	10mV	10mV	10mV	10mV
Accuracy				± 0.05% of (Setting + Range)
Constant Power Mode				
Range	400W	4000W	4000W	4000W
Resolution	0.001W	0.001W	0.001W	0.001W
Accuracy	± 0.2% 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	430V	430V	700V	700V
Resolution	10mV	10mV	10mV	10mV
Accuracy				± 0.05% of (Setting + Range)
Constant Voltage Mode + Constant Power Mode				
Range	400W	4000W	4000W	4000W
Resolution	0.001W	0.001W	0.001W	0.001W
Accuracy	± 0.2% of (Setting + Range)	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)	± 0.1% of (Setting + Range)
Burst Test				
Burst & Normal current	0 ~ 430A	0 ~ 430A	0 ~ 700A	0 ~ 700A
Burst time	10 ~ 1000ms	10 ~ 1000ms	10 ~ 1000ms	10 ~ 1000ms
Burst duty			1 ~ 5	1 ~ 5
MFVT Mode				
Algorithm			FLO	FLO
Load mode			CV	CV
P&O Terminal			1000ms ~ 4000ms / Maximum 1000ms	1000ms ~ 4000ms / Maximum 1000ms
Dynamic Mode				
Tuning				
Flags & Flow			0.010 ~ 0.999 / 10.00 / 99.9 / 999.99	0.010 ~ 0.999 / 10.00 / 99.9 / 999.99
Resolution			1μV / 10μV / 100μV / 1mA	1μV / 10μV / 100μV / 1mA
Accuracy			± 0.05% of (Setting + Range)	± 0.05% of (Setting + Range)
Slow Rate	0.0001 ~ 1.0000 / 10.0000	0.0001 ~ 1.0000 / 10.0000	0.0001 ~ 1.0000 / 10.0000	0.0001 ~ 1.0000 / 10.0000
Resolution	0.000001	0.000001	0.000001	0.000001
Current	0 ~ 43A	0 ~ 430A	0 ~ 300A	0 ~ 700A
Range	43A	430A	300A	700A
Resolution	0.01mA	0.1mA	0.1mA	1.1mA
Accuracy				± 0.05% of (Setting + Range)
Measurement				
Voltage Load Back				
Range (1 Digit)	0 ~ 430V	0 ~ 430V	0 ~ 700V	0 ~ 700V
Resolution	1mV	1mV	1mV	1mV
Accuracy				± 0.05% of (Setting + Range)
Current Load Back				
Range (1 Digit)	0 ~ 43A	0 ~ 430A	0 ~ 300A	0 ~ 700A
Resolution	0.01mA	0.1mA	0.1mA	1.1mA
Accuracy				± 0.05% of (Setting + Range)
Power Load Back				
Range (1 Digit)	0 ~ 400W	0 ~ 4000W	0 ~ 4000W	0 ~ 4000W
Accuracy				± 0.05% of (Setting + Range)
General				
Control Short Resistance	0.01Ω ~ 430Ω	0.001Ω ~ 430Ω	0.001Ω ~ 430Ω	0.001Ω ~ 430Ω
Maximum Short Current	430A	430A	700A	700A
Load ON Voltage			0.4 ~ 100V	0.4 ~ 100V
Load OFF Voltage			0 ~ 100V	0 ~ 100V
Power Consumption	100W	100W	100W	100W
Dimension (WxHxD)	481.6mm x 711.2mm	481.6mm x 711.2mm	481.6mm x 711.2mm	481.6mm x 711.2mm
Weight	30 kg	71.2 kg	54.8 kg	55 kg
Temperature ⁴⁾			0 ~ 40°C	0 ~ 40°C
Safety & EMC				

Cooling : Advanced Fan Cooled

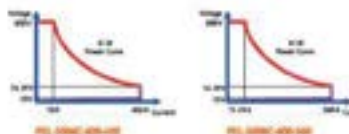
Input AC Power : 100-240 Vac ±10% / 50/60Hz, Single phase

Note 1) : The power rating specification is ambient temperature = 25°C

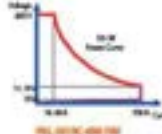
Note 2) : The range is adjustable or setting is range 0.01 to 10.00

Note 3) : If the operating current is below 0.1%, the accuracy specification is ±0.1%

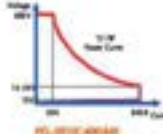
Note 4) : Operating temperature range is 0-40°C or at specifications apply for 0-40°C



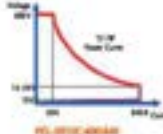
PEL-5000C-400-020



PEL-5000C-400-100



PEL-5010C-400-100



PEL-5010C-400-500

SPECIFICATIONS

Model	PEL-M70C-400-1000	PEL-M70C-400-1200	PEL-M70C-400-1400	PEL-M70C-400-1600
Power ¹⁾	11.0W	16.0W	20.0W	24.0W
Current	0 ~ 100A	0 ~ 1000A	0 ~ 100A	0 ~ 1000A
Voltage	0 ~ 100V	0 ~ 100V	0 ~ 100V	0 ~ 100V
Min. Operating Voltage	10V @ 1000A	10V @ 1000A	10V @ 1000A	10V @ 1000A
Protection	100% Over Power Protection (OPP) 100% Over Current Protection (OCP) 100% Over Voltage Protection (OVP) 100% Over Temp Protection (OTP) 0.5°C/V			
Constant Current Mode	Range ²⁾ 100A 1000A 100A 1000A Resolution 1.00mA 1.00mA 1.00mA 1.00mA Accuracy ³⁾ ± 0.5% of (Setting + Range)			
Constant Resistance Mode	Range 100A/0.1Ω to 1000A/0.001Ω 100A/0.1Ω to 1000A/0.001Ω 100A/0.1Ω to 1000A/0.001Ω 100A/0.1Ω to 1000A/0.001Ω Resolution 20.0A/0.01Ω 20.0A/0.01Ω 20.0A/0.01Ω 20.0A/0.01Ω Accuracy ± 0.5% of (Setting + Range)			
Constant Voltage Mode	Range 0V 100V 0V 100V Resolution 1.00mV 1.00mV 1.00mV 1.00mV Accuracy ± 0.5% of (Setting + Range)			
Constant Power Mode	Range 100W 1000W 100W 1000W Resolution 10.0W 10.0W 10.0W 10.0W Accuracy ± 0.5% of (Setting + Range)			
Constant Voltage Mode + Constant Current Mode	Range 100V 1000V 100V 1000V Resolution 1.00V 1.00V 1.00V 1.00V Accuracy ± 0.5% of (Setting + Range)			
Constant Voltage Mode + Constant Power Mode	Range 100V 1000V 100V 1000V Resolution 1.00V 1.00V 1.00V 1.00V Accuracy ± 0.5% of (Setting + Range)			
Surge Test	Surge & Thermal current 0 ~ 1000A Surge time 10 ~ 1000ms Surge duty 10 ~ 1000ms			
Surge Mode	Surge 100V 1000V 100V 1000V Resolution 1.00V 1.00V 1.00V 1.00V Accuracy ± 0.5% of (Setting + Range)			
Algorithm	PID			
Load mode	1000mA ~ 40000mA resolution 1000mA			
P&O Interval	Dynamic Mode			
Tuning	Thigh & Flow Resolution 0.010 ~ 0.001 / 0.010 / 0.001 / 0.001 Accuracy 0.001 / 0.01 / 0.01 / 0.01			
View Rate	0.001A / 0.001V 0.001A / 0.001V 0.001A / 0.001V 0.001A / 0.001V			
Current	0 ~ 100A 100 ~ 1000A 0 ~ 100A 100 ~ 1000A			
Resolution	1.00mA 1.00mA 1.00mA 1.00mA			
Voltage	0 ~ 100V 100 ~ 1000V 0 ~ 100V 100 ~ 1000V			
Resolution	1.00mV 1.00mV 1.00mV 1.00mV			
Power	100W 1000W 100W 1000W			
Resolution	1.00W 1.00W 1.00W 1.00W			
Accuracy	± 0.5% of (Setting + Range)			
Power Factor	0.9 ~ 1.0			
Temperature ⁴⁾	0 ~ 40°C			
Safety & EMC	CE			

Cooling : Advanced Fan-Cooled

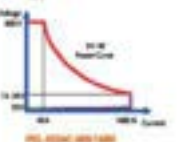
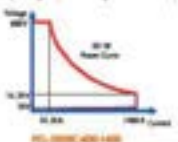
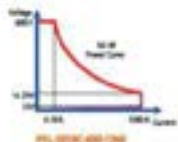
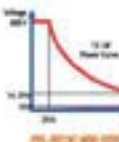
Input AC Power : 100-240 Vac ±10% / 50/60Hz, Single-phase

Note 1) : The power rating specification is ambient temperature = 25°C

Note 2) : This range is automatically set by the range of the load

Note 3) : If the operating current is below range 0.1%, the accuracy specification is 0.1% or less

Note 4) : Operating temperature range is 0~40°C, all specifications apply for CE, CUL, ETL



High Power DC Electronic Load

SPECIFICATIONS

MODEL	PEL5000C-1200-240	PEL5000C-1200-320	PEL5000C-1200-400	PEL5000C-1200-480
Power ⁽¹⁾	51W	51W	51W	51W
Current	0-240A	0-240A	0-320A	0-400A
Voltage	0-240V	0-240V	0-400V	0-480V
Min. Operating Voltage	10V @ 240A	10V @ 240A	10V @ 320A	10V @ 400A
Protection	Over Temp Protection (OTP) Over Current Protection (OCP) Over Voltage Protection (OVP) Over Temp Protection (OTR) 99.9% d.t.			
Constant Current Mode	Range ⁽²⁾ Resolution Accuracy ⁽³⁾			
Constant Resistance Mode	Range Resolution Accuracy ⁽³⁾			
Constant Voltage Mode	Range Resolution Accuracy ⁽³⁾			
Constant Power Mode	Range Resolution Accuracy ⁽³⁾			
Constant Voltage Mode + Constant Current Mode	Range Resolution Accuracy ⁽³⁾			
Constant Voltage Mode + Constant Power Mode	Range Resolution Accuracy ⁽³⁾			
Burst Test	Surge & Normal current Surge time Surge rate MPTT Mode Algorithm Load mode P.O. Internal Dynamic Mode Timing			
Thigh & Time	Resolution Accuracy ⁽³⁾ Slow Rate Resolution Current Range Resolution Accuracy ⁽³⁾			
Measurement	Voltage Load Back Range (1 Digit) Resolution Accuracy ⁽³⁾ Current Load Back Range (1 Digit) Resolution Accuracy ⁽³⁾ Power Load Back Range (1 Digit) Accuracy ⁽³⁾			
General	Typical Short Resistance Maximum Short Current Load ON Voltage Load OFF Voltage Power Consumption Dimension (WxHxD) Weight Temperature ⁽⁴⁾ Safety & EMC			

Cooling - Advanced Fan Cooled

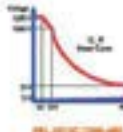
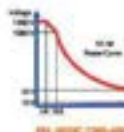
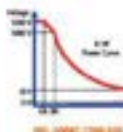
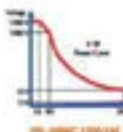
Input AC Power - 100-240 Vac ±10% - 30/60Hz, Single phase

Note (1) - The power rating specifications at ambient temperature = 25°C

Note (2) - The range is automatically set during its range of only 10-240V

Note (3) - If the operating current is below range ±1%, the accuracy specification is ±0.1%

Note (4) - Operating temperature range is 0-40°C - all specifications apply to 25°C ±2°C



SPECIFICATIONS

MODEL	PEL-5000C-1200-600		PEL-5000C-1200-720		PEL-5000C-1200-800		PEL-5000C-1200-900	
Power ¹⁾	120W		120W		120W		120W	
Current	0 ~ 60A		0 ~ 75A		0 ~ 80A		0 ~ 90A	
Voltage	0 ~ 600V		0 ~ 750V		0 ~ 800V		0 ~ 900V	
MVA, Operating Voltage	12V @ 600A		12V @ 720A		12V @ 800A		12V @ 900A	
Protection								
Over Power Protection (OPP)	100%							
Over Current Protection (OCP)	100%							
Over Voltage Protection (OVP)	100%							
Over Temp Protection (OTP)	90°C ± 1.5							
Constant Current Mode								
Range	60A	60A	72A	72A	80A	80A	90A	90A
Resolution	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A
Accuracy ³⁾	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	10Ω ~ 10	10Ω ~ 1000Ω	10Ω ~ 1000Ω	10Ω ~ 1000Ω	10Ω ~ 1000Ω	10Ω ~ 1000Ω	10Ω ~ 1000Ω	10Ω ~ 1000Ω
Resolution	0.001Ω	0.001Ω	0.001Ω	0.001Ω	0.001Ω	0.001Ω	0.001Ω	0.001Ω
Accuracy	± 0.1% of (Setting + Range)							
Constant Voltage Mode								
Range	100V	100V	120V	120V	120V	120V	120V	120V
Resolution	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	100W	100W	120W	120W	120W	120W	120W	120W
Resolution	0.001W	0.001W	0.001W	0.001W	0.001W	0.001W	0.001W	0.001W
Accuracy	± 0.1% of (Setting + Range)							
Constant Voltage Mode + Constant Current Mode								
Range	100V	100V	120V	120V	120V	120V	120V	120V
Resolution	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V
Accuracy	± 0.1% of (Setting + Range)							
Burst Test								
Burst & Normal current	0~600A		0~750A		0~800A		0~900A	
Burst time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Burst duty	1:1							
WFT ⁴⁾ Mode								
Algorithm	PID							
Load mode	ON							
P/O Interval	1000ms~40000ms (Selectable 1000ms)							
Dynamic Mode								
Timing								
Thigh & Flow	0.01%~0.0001 / 10 Hz ~ 999.9 / 9999Hz							
Accuracy	± 0.01 / 0.01 / 0.1 / 1%							
Flow Rate	1.0000~1.0000 / 0.0001~1.0000 / 0.0001~1.0000 / 0.0001~1.0000							
Resolution	0.00001 / 0.0001	0.00001 / 0.0001	0.00001 / 0.0001	0.00001 / 0.0001	0.00001 / 0.0001	0.00001 / 0.0001	0.00001 / 0.0001	0.00001 / 0.0001
Current								
Range	0~60A	0~60A	0~75A	75~750A	0~80A	0~800A	0~90A	90~900A
Resolution	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A
Voltage Read Back								
Range (D-Digit)	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V
Resolution	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V	0.001V
Accuracy	± 0.05% of (Reading + Range)							
Current Read Back								
Range (D-Digit)	0~60A	0~60A	0~75A	75~750A	0~80A	0~800A	0~90A	90~900A
Resolution	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A	0.0001A
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (D-Digit)	1000W		1200W		1200W		1200W	
Accuracy	± 0.05% of (Reading + Range)							
General								
Typical Short Resistance	0.00002Ω		0.00002Ω		0.00002Ω		0.00002Ω	
Minimum Short Current	0.000A		0.000A		0.000A		0.000A	
Load ON Voltage	0~120V							
Load OFF Voltage	0~120V							
Power Consumption	120W		120W		120W		120W	
Dimension (mm)	70.0mm x 75.0mm		70.0mm x 75.0mm		70.0mm x 75.0mm		70.0mm x 75.0mm	
Weight	10.0 kg		10.0 kg		10.0 kg		10.0 kg	
Temperature ⁵⁾	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

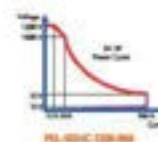
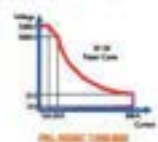
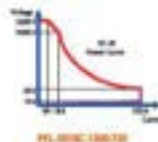
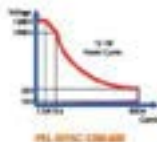
Input AC Power : 100~240 Vac ±10% / 30V/50Hz, Single-phase

Note 1) : The power rating specifications are ambient temperature is 25°C.

Note 2) : The range is automatically set to range 1 duty by 100W.

Note 3) : If the operating current is below range 0.05%, the accuracy specification will be 0.1%.

Note 4) : Operating voltage range is 0~90V, if specifications apply for 0~90V.





PEL-503-80-50

NEW



PEL-507-80-140

NEW



FEATURES

- 1. Light Digital Voltage, Current and Power Meter
- 2. Simultaneous Display of Voltage, Current, and Watts
- 3. Short-circuit Time Can Be Set During Short-circuit Test
- 4. Automatic Test Function of Overcurrent Protection/Overpower Protection
- 5. The Battery Discharge Test Function Can Set the Discharge Stop Voltage(V_{stop}), Discharge Capacity(Ah, Wh) and Stop Discharge Time
- 6. Surge Test Can Simulate Fast Overload Current and Transient Current From Hot Plugging
- 7. Constant Current, Constant Resistance, Constant Voltage, Constant Power and Dynamic Mode
- 8. Overvoltage, Overcurrent, Overpower, Over Temperature Protection and Reverse Polarity Detection
- 9. Voltage Polarity Display Can be set to Positive Value "+" or Negative Value "-"
- 10. Communications Interface: RS232, USB

The PEL-500 series single channel electronic load has a total of 5 models and provides 0-80V/0-100V voltage operating ranges and 250-700W 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 for current limiting test, battery simulation, and battery discharge test.

The PEL-500 series provides a 4-digit digital display of voltage, current and power. Users can monitor the measurement data of the OUT 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 fast 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 (V_{stop}), 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 CO/PG 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 1mV/div, the PEL-500 series also provides overvoltage, overcurrent, overpower and over temperature protection, and reverse polarity detection. When any one of them 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/250W DC Electronic Load
PEL-504-80-70	80V/70A/350W DC Electronic Load
PEL-504-500-15	500V/15A/350W DC Electronic Load
PEL-507-80-140	80V/140A/700W DC Electronic Load
PEL-507-500-30	500V/30A/700W DC Electronic Load

PEL-507-500-30



OPTIONAL ACCESSORIES

CTL-232	RS-232 Cable, 9-pin, M/F Type, 1000mm
CTL-246	USB Cable, USB 2.0, A/B Type, 1200mm

Note: * Regarding the product delivery date, please contact your regional sales representative.



Rear Panel



CTL-232 RS-232 Cable, 9-pin, M/F Type, 1000mm



Model	PEL-503-80-50	PEL-504-80-70	PEL-504-500-15	PEL-507-80-140	PEL-507-500-30
INPUT RATINGS					
Power(Watt)	200 W	200 W	200 W	200 W	200 W
Connectivity	20-A	20-A	15-A	140-A	30-A
Voltage(Volt)	80 V	80 V	100 V	80 V	100 V
W/o Flipping Voltage	1.5V @ 10A	1.5V @ 10A	8V @ 10A	1.5V @ 140A	1.5V @ 30A
PROTECTION					
Over Power Protection(OPP)	1:0.5:10	1:0.5:10	1:0.5:10	1:1:10	1:1:10
Over Current Protection(OCP)	1:1:10	1:1:10	1:1:10	1:1:10	1:1:10
Over Voltage Protection(OVP)	1:0.5:10	1:0.5:10	1:0.5:10	1:0.5:10	1:0.5:10
Over Temp. Protection(OTP)	1:1	1:1	1:1	1:1	1:1
DC Mode					
Range	0-12V-20A	0-12V-10A	0-12-15A	0-140V-140A	0-1-30A
Resolution	0.001mV/1mA	0.11mV/1.1mA	0.001mV/0.01mA	0.001mV/0.01mA	0.001mV/0.01mA
Accuracy	±1.0% of (SETPOINT + RANGE)				
CF Mode					
Range	0.01V-1.0-1000V	0.01V-1.0-1000V	0.01V-1.0-1000V	0.001V-0.01-1000V	0.01-1.0-1000V
Resolution	0.001mV/0.001mA	0.001mV/0.001mA	0.001mV/0.001mA	0.001mV/0.001mA	0.001mV/0.001mA
Accuracy	±1.0% of (SETPOINT + RANGE)				
CP Mode					
Range	0-1-10V	0-1-10V	0-0-100V	0-1-10V	0-0-100V
Resolution	0.11mV/0.01mA	0.11mV/0.01mA	0.001mV	0.11mV/0.01mA	0.001mV
Accuracy	±1.0% of (SETPOINT + RANGE)				
CP Mode					
Range	0-10V-100A	0-10V-100A	0-10V-100A	0-10V-100A	0-10V-100A
Resolution	0.01mV/0.01mA	0.01mV/0.01mA	0.01mV/0.01mA	0.01mV/0.01mA	0.01mV/0.01mA
Accuracy	±1.0% of (SETPOINT + RANGE)				
Dynamic Mode					
Sampling Time	100ms-1000ms				
Resolution	0.001mV/0.01mA				
Over-volt	L: 0.01-10V H: 1.0-100V	0.01-10V 0.1-100V	1.0-10V 10.0-100V	0.01-10V 0.1-100V	0-10V 10-100V
Accuracy	±1.0%				
Measurement					
Voltage Real-Back	Range (V High)	0-1-10V	0-1-10V	0-1-10V	0-1-10V
	Resolution	0.11mV/0.01mA	0.11mV/0.01mA	0.001mV	0.11mV/0.01mA
	Accuracy	±1.0% of (SETPOINT + RANGE)			
Current Real-Back	Range (V High)	0-10V-100A	0-10V-100A	0-1-10V	0-10V-100A
	Resolution	0.001mV/0.01mA	0.11mV/0.01mA	0.001mV/0.01mA	0.001mV/0.01mA
	Accuracy	±1.0% of (SETPOINT + RANGE)			
Power Real-Back	Range (V High)	0-10V	0-10V	0-10V	0-10V
	Resolution	0.001W	0.001W	0.001W	0.001W
	Accuracy	±1.0% of (SETPOINT + RANGE)			
Single Test					
Single (Normal current)	0-10V	0-10V	0-10V	0-10V	0-10V
Single (Time)	10-1000ms	10-1000ms	10-1000ms	10-1000ms	10-1000ms
Single (Step)	1-1	1-1	1-1	1-1	1-1
Battery/Charger Test					
Unit	0-10V	0-10V	0-100V	0-10V	0-100V
Time	1-1000ms	1-1000ms	1-1000ms	1-1000ms	1-1000ms
Capacity	0.1-1000mA/1-1000V				
Others					
Load (V High)	0-1-10V				
Accuracy	±1.0% of (SETPOINT + RANGE)				
Load (V High)	0-1-10V				
Accuracy	±1.0% of (SETPOINT + RANGE)				
Monitor (Not loaded)	0.01A/V	0.01A/V	0.01A/V	0.01A/V	0.01A/V
Current Monitor	Full supply 10V				
Accuracy	±1.0% of (SETPOINT + RANGE)				
Typical Short Resistance	0.01Ω	0.01Ω	0.01Ω	0.01Ω	0.01Ω
Max short Current	10A	10A	10A	10A	10A
Power Input	110V/220V/240V/250V/260V				
Interface (Standard)	USB/RS232				
Power Consumption	40W				
Dimension (HxWxD)	20 x 12 x 47mm				
Weight	0.1g				



AEL-5002-350-18.75 AEL-5006-350-56 AEL-5013-350-112.5 AEL-5015-350-112.5 AEL-5019-350-112.5 AEL-5023-350-112.5
 AEL-5005-350-28 AEL-5008-350-75 AEL-5012-425-112.5 AEL-5014-425-112.5 AEL-5018-425-112.5 AEL-5022-425-112.5
 AEL-5004-350-37.5 AEL-5006-425-56
 AEL-5002-425-18.75 AEL-5008-425-75
 AEL-5003-425-28
 AEL-5004-425-37.5
 AEL-5005-480-18.75
 AEL-5004-480-28

MODEL	Power [W]		Current [Apeak]		Voltage [Vdc]
	Turbo OFF	Turbo ON	Turbo OFF	Turbo ON	
AEL-5002-350-18.75	1875 W	3750W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	50-350Vrms / 500Vdc
AEL-5003-350-28	2800W	5600W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	
AEL-5004-350-37.5	3750 W	7500W (x2)*	37.5 Arms / 112.5Apeak	75.0Arms/112.5Apeak (x2)*	
AEL-5002-425-18.75	1875 W	3750W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	50-425Vrms / 600Vdc
AEL-5003-425-28	2800W	5600W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	
AEL-5004-425-37.5	3750 W	7500W (x2)*	37.5 Arms / 112.5Apeak	75.0Arms/112.5Apeak (x2)*	
AEL-5006-350-56	5600 W	11200W (x2)*	56.0 Arms / 168Apeak	112.0Arms/168Apeak (x2)*	50-350Vrms / 500Vdc
AEL-5008-350-75	7500 W	15000W (x2)*	75.0 Arms / 225Apeak	150.0Arms/225Apeak (x2)*	
AEL-5012-350-112.5	11250W	22500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5013-350-112.5	15000W	30000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	50-425Vrms / 600Vdc
AEL-5015-350-112.5	18750W	37500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5019-350-112.5	22500W	45000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5006-425-56	5600 W	11200W (x2)*	56.0 Arms / 168Apeak	112.0Arms/168Apeak (x2)*	50-425Vrms / 600Vdc
AEL-5008-425-75	7500 W	15000W (x2)*	75.0 Arms / 225Apeak	150.0Arms/225Apeak (x2)*	
AEL-5012-425-112.5	11250W	22500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5013-425-112.5	15000W	30000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	50-425Vrms / 600Vdc
AEL-5015-425-112.5	18750W	37500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5019-425-112.5	22500W	45000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5005-480-18.75	2800W	5600W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	50-480Vrms / 700Vdc
AEL-5004-480-28	3750 W	7500W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	

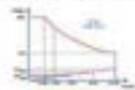
* Power and current boost rate of Turbo ON

► www.pearsoncmg.com

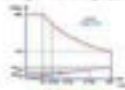
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* Torque made for use in 20 Current rating & Phase rating systems. For 3-Phase 480VAC use function

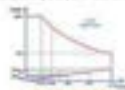
* All specifications apply for liquidite



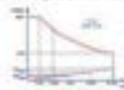
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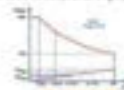
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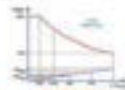
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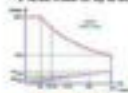


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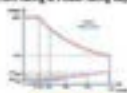
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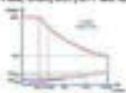
*H₂ gas preflowing rate is the sum of ambient and cell gas current equal to 1.0L



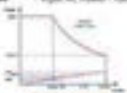
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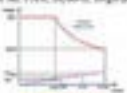
doi:10.1016/j.jmb.2005.08.019



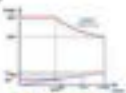
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1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

[illegible]^a All are untransformed in the unit of untransformed β_0 and variance equal to 1.0.

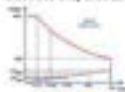
*Q Operating temperature range is 0-40°C, all specifications apply for 25°C±5°C. Except as noted.

*H Series ready for up to 28 Current rating & Power rating support Ase, Shunt,OC,PO,OP and function

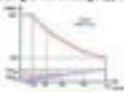
* All specifications apply for 1000000

* All specifications subject to change without notice

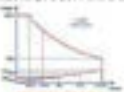
* Input 400, Power = 100 (40) sec, 1 kHz, 5000 Hz, length phase



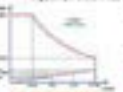
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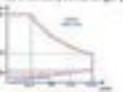
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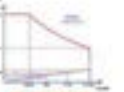
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* All specifications apply for 10/10/00
* All specifications subject to change without notice
* Input 40: Power: 100-240 Vac, 50/60Hz, Single phase

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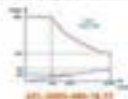
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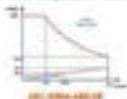
PE1-008 1-800-225-1212, U-shaped handle
(for 1/2, 5/8, 1/008, 1/012, 1/016)



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(for ALL 5000/5000/5000)



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High Power DC Electronic Load



PEL-5000G Series

NEW



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 TC

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, OSCP and OCPD 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:

PEL-022 GPIB Card PEL-023 RS-232 Card PEL-024 LAN Card PEL-025 USB Card



PEL-031 Rack Mount Kit

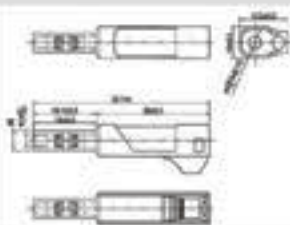


ORDERING INFORMATION

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

PEL-5006G-1200-240

Power rating: 4000W
Maximum output current: 240A ± 240mA
Maximum output voltage: 1200V ± 120mV



Rear Panel



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-026 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.

MODEL	PEL-16000-150-400	PEL-16000-150-500	PEL-16000-150-600			
Power ¹⁾	0-4000W	0-4000W max ²⁾	0-1000W	0-1000W max ²⁾	0-4000W	0-4000W max ²⁾
Current	0-400A	0-400A max ²⁾	0-150A	0-150A max ²⁾	0-400A	0-400A max ²⁾
Voltage	0-120V	0-120V	0-120V	0-120V	0-120V	0-120V
Min. Operating Voltage	0.7V @ 400A		0.7V @ 150A		0.7V @ 400A	
Resolution				100%		
Over Power Protection (OPP)				100%		
Over Current Protection (OCP)				100%		
Over Voltage Protection (OVP)				100%		
Over Temp Protection (OTP)				90 °C ± 3 °C		
Constant Current Mode						
Range ³⁾	0-400A	0-400A	0-150A	0-100A	0-400A	0-400A
Resolution	0.0005A	0.0005A	0.0005A	0.0005A	0.0005A	0.0005A
Accuracy ⁴⁾			± 0.1% of Setting + Range ⁵⁾			
Constant Resistance Mode						
Range	0.171-1.000Ω	0.101-1.4-5Ω	0.1-1.000Ω	0.101-1.4-5Ω	0.171-1.000Ω	0.101-1.4-5Ω
Resolution	0.00001Ω	0.00001Ω	0.00001Ω	0.00001Ω	0.00001Ω	0.00001Ω
Accuracy	± 1.0% (Setting + 1.0V), ± 0.5% of Setting + Range ⁵⁾	± 1.0% (Setting + 1.0V), ± 0.5% of Setting + Range ⁵⁾	± 1.0% (Setting + 1.0V), ± 0.5% of Setting + Range ⁵⁾	± 1.0% of Setting + Range ⁵⁾	± 1.0% (Setting + 1.0V), ± 0.5% of Setting + Range ⁵⁾	± 1.0% (Setting + 1.0V), ± 0.5% of Setting + Range ⁵⁾
Constant Voltage Mode						
Range			0-120V			
Resolution			0.0001V			
Accuracy			± 0.1% of Setting + Range ⁵⁾			
Constant Power Mode						
Range	0-400W	0-4000W	0-1000W	0-1000W	0-4000W	0-4000W
Resolution	0.0001W	0.0001W	0.0001W	0.0001W	0.0001W	0.0001W
Accuracy			± 0.1% of Setting + Range ⁵⁾			
Constant Voltage + Constant Load Mode						
Range	120V	400A	120V	100A	120V	400A
Resolution	0.0001V	0.0001A	0.0001V	0.0001A	0.0001V	0.0001A
Accuracy	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾
Constant Voltage + Constant Load Mode						
Range	120V	400A	120V	100A	120V	400A
Resolution	0.0001V	0.0001A	0.0001V	0.0001A	0.0001V	0.0001A
Accuracy	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾	± 0.1% of Setting + Range ⁵⁾
Torque Mode ⁶⁾	0V	0V	0V	0V	0V	0V
Min./Max. Load Function						
Minimum Current	400A	400A	400A	100A	400A	400A
Min. Accuracy			± 0.1% of Reading + Range ⁵⁾			
Load Time	100-1000ms	100-1000ms	100-1000ms or Continues	100-1000ms	100-1000ms	100-1000ms
Min. Accuracy			NA			
OCF Time (Total)	30ms	20ms	30ms	20ms	30ms	20ms
Min. Accuracy			NA			
OCF Time (Step)	30ms	20ms	30ms	20ms	30ms	20ms
Min. Accuracy			NA			
Min. Load Mode ⁷⁾						
Short Load Compensation	400A	400A	400A	100A	400A	400A
Min. Accuracy			± 0.1% of Reading + Range ⁵⁾			
Load Time			30ms-20ms			
Min. Accuracy			± 0.1%			
OCF Time (Total)			0.25ms-10ms, 10-100ms			
Min. Accuracy			± 0.1% of Reading + Range ⁵⁾			
Super Current	0-400A		0-700A		0-400A	
Normal Current	0-400A		0-700A		0-400A	
Range ³⁾	10-1000ms		10-1000ms		10-1000ms	
Super Stop	1-3		1-3		1-3	
Min/Max Mode						
Operation			16.0			
Load Mode			CV			
Min. Internal			1000-4000ms			
Resolution			100ms			
Dynamic Mode						
Timing			0.015-4.000s	0.001-0.001s	0.015-4.000s	
High & Low			0.001-0.001s	0.001-0.001s	0.001-0.001s	
Resolution			1 / 10 / 100 / 1000 ms			
Accuracy			± 0.1% of Reading + Range ⁵⁾			
Min. Rate	0.001-0.001s	0.001-0.001s	0.001-0.001s	0.001-0.001s	0.001-0.001s	0.001-0.001s
Resolution	0.0001s	0.0001s	0.0001s	0.0001s	0.0001s	0.0001s
Min. Rate Time			0.001s			
Current						
Range ³⁾	0-400A	0-400A	0-400A	0-100A	0-400A	0-400A
Resolution	0.0005A	0.0005A	0.0005A	0.0005A	0.0005A	0.0005A
Accuracy			± 0.1% of Setting + Range ⁵⁾			
Min. Load						
Range ³⁾	0-120V	0-120V	0-120V	0-120V	0-120V	0-120V
Resolution	0.0001V	0.0001V	0.0001V	0.0001V	0.0001V	0.0001V
Accuracy			± 0.1% of Setting + Range ⁵⁾			
Constant Load Mode						
Range ³⁾	0-400A	0-400A	0-400A	0-100A	0-400A	0-400A
Resolution	0.0005A	0.0005A	0.0005A	0.0005A	0.0005A	0.0005A
Accuracy			± 0.1% of Setting + Range ⁵⁾			
Power Load Mode						
Range ³⁾	0-400W		0-100W		0-400W	
Resolution			0.0001W			
Accuracy			± 0.1% of Setting + Range ⁵⁾			
Constant						
Input Short Resistance						
Minimum Load Current	0.01-400A		0.01-100A		0.01-400A	
Load On Voltage			0.01-40.7V			
Load Off Voltage			0.01-1V			
Power Consumption			100W			
Dimensions (WxHxD)			175mm x 140mm x 70mm			
Weight			10kg			
Temperature ⁸⁾			0-40 °C			
Safety & EMC			CE			

Note 1): The power rating specification is maximum temperature = 25 °C

Note 2): The range is continuously in loading in range 3 only in 25 °C

Note 3): 100% loading current in 100ms range 1-3, the accuracy specification is 0.1% ± 0.1

Note 4): Power range - range 3 only

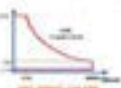
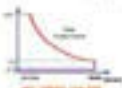
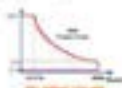
Note 5): Power range - range 3 only

Note 6): Power range - range 3 only

Note 7): Torque mode for up to 100% loading with 16.0ms loading speed, 0.001s/0.001s or 0.001s

Note 8): EMC: CE for Emission, CE for Safety, CE for Emission, CE for Safety, CE for Emission, CE for Safety

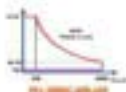
Note 9): Operating temperature range is 0-40 °C, all specifications are for 25 °C ± 3 °C, Negative value



THE ELECTRONIC LOAD

State 1: The pump only performs a water operation (0.0)
 State 2: The pump is automatically in firing if only 1.00 read
 State 3: The spring water is in the range 1.00, the pump operates (0.00 + 1)
 State 4: The pump is broken (0.00)

Notes: (1) Turbo starts for up to 1.5h (2) not using 3-phase supply system (3) 400V/50Hz/3-phase supply
Note: (4) 3000 Rev/min for 3-phase supply system (5) 1500 Rev/min for 230V and 50Hz line
Note: (1) Operating temperature range is 2-40 °C, All specifications apply for 23 °C/1 °C, unless stated



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Figure 22. The same data as in Figure 19, but with the data points plotted as open circles.

Figure 10. The change in growth rate of *Chlamydomonas reinhardtii* in response to different concentrations of H_2O_2 . The change in growth rate is measured as the difference in optical density (OD) between the control and the treated cells.

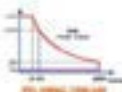
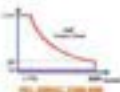
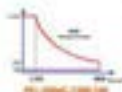
body 10 : 276 (opening context) & below right 178. The opening inscription is: 179/12

Table 10. Mean values of α and β for the 1000 trials.

Step 15. Study each figure's left figure using 8 lines using www.mathedland.com

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Note: T1 (operating temperature) was 40 °C; T2 (quenching temperature) was 15 °C; length of time



ACCESSORIES

[illegible]

ACCESSORIES

CTL-101



CTL-101A



CTL-106A



CTL-120



CTL-121



CTL-122



CTL-123



CTL-201A



CTL-202



CTL-203A



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CTL-246



CTL-248



CTL-249



CTL-250



ACCESSORIES

CTL-253



CTL-254



CTL-255



CTL-260



CTL-261



CTL-262



CRA-401 Rack Mount Kit



CRA-408 Rack Mount Kit



PEI-002 Rack Mount Kit

For PEI-2000 Series



CRA-409 Rack Mount Kit

For MP1100A



CRA-403 Rack Mount Kit

For P50 Series



CRA-410 Rack Mount Kit (IT)

For P50 Series



CRA-407 Rack Mount Kit

For P50B Series, P57 Series



CRA-410 E Rack Mount Kit (EA)

For P50 Series



CRA-413 Rack Mount Kit (IT)

For P6L3071-3070



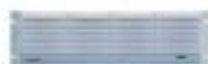
CRA-414 Rack Mount Kit (IT)

For P6L3071-3070 (P6L3071, P6L3072, P6L3073, P6L3074, P6L3075)



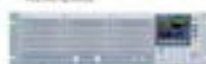
CRA-413-E Rack Mount Kit (EIA)

For PSL-1071-1073W



CRA-414-E Rack Mount Kit (EIA)

For PSL-1073-1075W/1076W/1077W/1078W/1079W/1080W



CRA-421 Rack Mount Kit

For APX-1000/1100/1090/1100 Series



CRA-424 Rack Mount Kit

For P20-000 Series



CRA-416-J Rack Mount Kit (JIS)

For P20-100 Series



CRA-419 Rack Mount Kit (JIS)

For P20-1000



CRA-419-E Rack Mount Kit (EIA)

For P20-1000 Series



CRA-419 (EIA) Rack Mount Kit

For P20-1000



CRA-424 Rack Mount Kit

For P20-000 Series



CRA-426 Rack Mount Kit (EIA)

For P20 Series



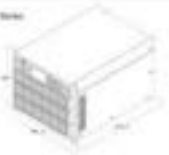
CRA-429 Rack Mount Kit

For APX-1000



CRA-430 Rack Mount Kit

For APX-1000 Series



CRA-431-J Rack Mount Kit (JIS) with AC 100V/50Hz

For PPH Series



CRA-431-E Rack Mount Kit (EIA) with AC 100V/50Hz

For PPH Series



GBA-439-J Rack Mount Kit (JIS)

For: 439-2000 Series



GBA-439-E Rack Mount Kit (EIA)

For: 439-2000 Series



GBA-441-J Rack Mount Kit (JIS)

For: 441 Series



GBA-441-E Rack Mount Kit (EIA)

For: 441 Series



GBA-442-J Rack Mount Kit (JIS)

For: 442-2000 Series



GBA-442-E Rack Mount Kit (EIA)

For: 442-2000 Series



GBA-449-J Rack Mount Kit (JIS)

For: 449 Series



GBA-449-E Rack Mount Kit (EIA)

For: 449 Series





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 1/2 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 5 1/2 digits and 5 1/2 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 1/2 digits and 4 1/2 digits (50,000 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 9000/3000 Series can deliver a measurement accuracy of up to 0.0005% and with high current fuse protection can withstand up to 12A. With the design focused on superior performance and ease of use, the GDM 9000/3000 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 9010	GDM 9050	GDM 9070	GDM 9074
Display	6 1/2 (120000 Counts) TFT LCD Dual Measurement	6 1/2 (120000 Counts) TFT LCD Dual Measurement	6 1/2 (120000 Counts) VFD Dual Measurement	5 1/2 (19999 Counts) VFD Dual Measurement
Autorange	✓	✓	✓	✓
DCV Basic Accuracy	0.001%	0.001%	0.001%	0.01%
Major Measurement Functions	AC & DC Voltage AC & DC Current (1A/10A) 2- & 4-wire resistance Continuity & Diode Frequency & Period Temperature (RTD) Thermocouple (Thermistor) Capacitance	AC & DC Voltage AC & DC Current (1A) 2- & 4-wire resistance Continuity & Diode Frequency & Period Temperature (RTD) Thermocouple (Thermistor) Capacitance	AC & DC Voltage AC & DC Current 2- & 4-wire resistance Continuity & Diode Frequency & Period Temperature (RTD) Thermocouple	AC & DC Voltage AC & DC Current 2- & 4-wire resistance Continuity & Diode Frequency & Period Temperature (Thermocouple)
Advanced Functions	Math, REL, dB, dBm, Compare, MA-B, Percent, 1/20 STAT (Min/Max/Average/P.P. STDV), Display (Number, Trend Chart, Bar Meter, Histogram), Rear Input	Math, REL, dB, dBm, Compare, MA-B, Percent, 1/20 STAT (Min/Max/Average/P.P. STDV), 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 (USBMC/USBCDC) RS-232C, LAN, Digital I/O USB Host	USB device (USBMC/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	E3-4	E3-6	E7-8	E9-10

BENCH-TOP DIGITAL MULTIMETER

Model	GDM 8011	GDM 8013	GDM 8011	GDM 8013
Display	5 1/2 (120000 Counts) VFD Dual Measurement	50000 Counts VFD Dual Measurement	50000 Counts VFD Dual Measurement	50000 Counts LED Dual Display
Autorange	✓	✓	✓	✓
DCV Basic Accuracy	0.01%	0.02%	0.02%	0.08%
Major Measurement Functions	AC & DC Voltage AC & DC Current 2- & 4-wire resistance Continuity & Diode Frequency & Period Capacitance Temperature (Thermocouple)	AC & DC Voltage AC & DC Current 3-wire resistance Continuity & Diode Frequency & Period Capacitance Temperature (Thermocouple)	AC & DC Voltage AC & DC Current 3-wire resistance Continuity & Diode Frequency & Period Capacitance	AC & DC Voltage AC & DC Current 2-wire 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/DC, AC-DC True RMS
Interface (Std.)	USB device (support USBMC) USB CDC RS-232C, Digital I/O	USB device (USBCDC) USB Host	USB device (USBCDC)	—
Optional	—	GPIB	—	—
Page	E11-12	E13-14	E13-14	E15

6 1/2 Digit Dual Measurement Multimeter



GDM-906X Series



FEATURES

- 6 1/2 Digit Display: 1,000,000 Counts
- 4.3" TFT Graphic LCD
- DCV Basic Accuracy: 0.0031% (GDM-906T)/0.0071% (GDM-906D)
- 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 (GDM-906T)
- 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

CIP In-circuit launcher. GDM-906X series 6 1/2 digit dual measurement multimeter (2 models: GDM-906T and GDM-906D), featuring high-precision DC voltage accuracy, fast sampling rate, 12 measurement functions (DC voltage/current, AC voltage/current, 2-wire/4-wire resistance, frequency, period, diode, continuity, beep, temperature, capacitance), 8 mathematical functions (ABS/Min/Compare/Min/Max/Percent and I/Q), as well as a variety of communication interfaces (USB device/host, RS-232C, LAN, digital I/O and optional GPIB) to provide comprehensive measurement capabilities, higher speed and accuracy.

The series adopts a 4.3-inch TFT graphical display and a fast sampling rate (GDM-906T: 10k/s, GDM-906D: 1k/s/sec). In addition to the conventional digital display, displays can be soft-cut with bar meter, trend chart or histogram to make the panoramic view of the entire measurement process more complete and quickly presented. At the same time, the internal memory capacity (GDM-906T: 100k, GDM-906D: 10k) can automatically facilitate the trend plot or histogram measurement process and perform statistical calculations to simplify the complex trend analysis.

For user-friendly, the GDM-906X series incorporates some ingenious operational ideas, such as numeric soft keys for settings that require numerical input, upper/lower limits, LAN for operational interfaces or messages, and multiple languages (English / Traditional Chinese / Simplified Chinese / Japanese / Korean) to shorten the operational and learning time of the meter.

For KPS measurement or remote control applications, the GDM-906X series provides GPIB (option can be installed at customer site) other than standard communications interfaces (USB, RS-232 and LAN). With respect to software support, the GDM-906X series provides SIMM View2 to assist users in observing or recording the data from the measurement process. In addition, LABVIEW driver is also provided to facilitate the program requirements of different system integrations.

SPECIFICATIONS				Accuracy: ±1% of reading, ±1% of range	
DC CHARACTERISTICS				Accuracy: ±1% of reading, ±1% of range	
DC Voltage				Accuracy: ±1% of reading, ±1% of range	
Range	Resolution	Test Function		GDM-906T	GDM-906D
100.0000 mV	0.1µV	1000 mV or 1000		±0.0031 ± 0.0001	±0.0071 ± 0.0001
1.000000 V	1µV	10000 mV or 10000		±0.004 ± 0.0001	±0.009 ± 0.0001
10.00000 V	10µV	100000 mV or 100000		±0.004 ± 0.0001	±0.009 ± 0.0001
100.0000 V	0.1mV	1000000 mV or 1000000		±0.004 ± 0.0001	±0.009 ± 0.0001
1000.000 V	1mV	10000000 mV or 10000000		±0.004 ± 0.0001	±0.009 ± 0.0001
Resistance				Accuracy: ±1% of reading, ±1% of range	
Range	Resolution	Test Current		GDM-906T	GDM-906D
100.0000 Ω	100µΩ	1mA		±0.01 ± 0.004	±0.01 ± 0.004
1.000000 kΩ	1mΩ	1mA		±0.01 ± 0.001	±0.01 ± 0.001
10.000000 kΩ	10mΩ	100µA		±0.01 ± 0.001	±0.01 ± 0.001
100.00000 kΩ	100µΩ	10µA		±0.01 ± 0.001	±0.01 ± 0.001
1.000000 MΩ	1Ω	100nA		±0.01 ± 0.001	±0.01 ± 0.001
10.000000 MΩ	10Ω	10nA		±0.01 ± 0.001	±0.01 ± 0.001
DC Current				Accuracy: ±1% of reading, ±1% of range	
Range	Resolution	Test Current		GDM-906T	GDM-906D
10.000000 µA	100nA	< 0.001 V		±0.01 ± 0.001	±0.01 ± 0.001
1.000000 mA	10µA	< 0.11 V		±0.01 ± 0.001	±0.01 ± 0.001
10.000000 mA	0.1mA	< 0.84 V		±0.01 ± 0.001	±0.01 ± 0.001
100.00000 mA	1mA	< 4.4 V		±0.01 ± 0.001	±0.01 ± 0.001
1.000000 A	10µA	< 3.7 V		±0.01 ± 0.001	±0.01 ± 0.001
10.00000 A	100µA	< 2.0 V		±0.01 ± 0.001	±0.01 ± 0.001
100.0000 A	1mA	< 0.8 V		±0.01 ± 0.001	±0.01 ± 0.001
Continuity				Accuracy: ±1% of reading, ±1% of range	
Range	Resolution	Test Current		GDM-906T	GDM-906D
1000.000 Ω	0.001 Ω	1 mA		±0.01 ± 0.001	±0.01 ± 0.001
Diode Test				Accuracy: ±1% of reading, ±1% of range	
Range	Resolution	Test Current		GDM-906T	GDM-906D
1.000000 V	1µV	1 mA		±0.01 ± 0.001	±0.01 ± 0.001
DC Ratio				Accuracy: ±1% of reading, ±1% of range	
TEMPERATURE CHARACTERISTICS				Accuracy: ±1% of reading, ±1% of range	
RTD				Accuracy: ±1% of reading, ±1% of range	
Range	Resolution	Test Current		GDM-906T	GDM-906D
200.0°C ~ 100.0°C	0.001°C	0.001°C		±0.01°C	±0.01°C
100.0°C ~ 20.0°C	0.001°C	0.001°C		±0.01°C	±0.01°C
20.0°C ~ 20.0°C	0.001°C	0.001°C		±0.01°C	±0.01°C
20.0°C ~ 100.0°C	0.001°C	0.001°C		±0.01°C	±0.01°C
100.0°C ~ 500.0°C	0.001°C	0.001°C		±0.1°C	±0.1°C
500.0°C ~ 900.0°C	0.001°C	0.001°C		±0.1°C	±0.1°C
Thermocouples				Accuracy: ±1% of reading, ±1% of range	
Type	Range	Resolution		GDM-906T	GDM-906D
B	200.0°C ~ +1000.0°C	0.001°C		±0.1°C	±0.1°C
E	275.0°C ~ +1000.0°C	0.001°C		±0.1°C	±0.1°C
J	200.0°C ~ +1000.0°C	0.001°C		±0.1°C	±0.1°C
K	200.0°C ~ +1300.0°C	0.001°C		±0.1°C	±0.1°C
N	200.0°C ~ +1300.0°C	0.001°C		±0.1°C	±0.1°C
R	300.0°C ~ +1300.0°C	0.001°C		±0.1°C	±0.1°C
S	300.0°C ~ +1300.0°C	0.001°C		±0.1°C	±0.1°C
T	300.0°C ~ +1300.0°C	0.001°C		±0.1°C	±0.1°C
Thermistor				Accuracy: ±1% of reading, ±1% of range	
Range	Resolution	Test Current		GDM-906T	GDM-906D
100.0°C ~ 100.0°C	0.001°C	0.001°C		±0.01°C	±0.01°C
AC CHARACTERISTICS				Accuracy: ±1% of reading, ±1% of range	
AC Voltage (True RMS)				Accuracy: ±1% of reading, ±1% of range	
Range	Resolution	Frequency		GDM-906T	GDM-906D
100.0000 mV	0.1µV	20Hz ~ 20kHz		±0.01 ± 0.001	±0.01 ± 0.001
		20Hz ~ 100Hz		±0.01 ± 0.001	±0.01 ± 0.001
		100Hz ~ 200Hz		±0.01 ± 0.001	±0.01 ± 0.001
		200Hz ~ 500Hz		±0.01 ± 0.001	±0.01 ± 0.001
		500Hz ~ 1000Hz		±0.01 ± 0.001	±0.01 ± 0.001
		1000Hz ~ 2000Hz		±0.01 ± 0.001	±0.01 ± 0.001



GDM-906X Series

SPECIFICATIONS					
	1,000,000 V rms 750,000 V	1µV ~ 10kV			
AC Current (True RMS)	10,000 µA 10,000 mA	100µA 10mA	20Hz ~ 50Hz	1.00 ± 0.04	1.00 ± 0.04
			50Hz ~ 100Hz	0.11 ± 0.04	0.10 ± 0.04
			100Hz ~ 500Hz	0.05 ± 0.04	0.05 ± 0.04
			500Hz ~ 1000Hz	0.10 ± 0.04	0.10 ± 0.04
			1000Hz ~ 5000Hz	0.05 ± 0.10	0.05 ± 0.10
			Accuracy: 100Hz ~ 500Hz	0.05 ± 0.04	0.05 ± 0.04
	1,000,000 mA 10,000,000 mA	1mA 100A	20Hz ~ 50Hz	1.00 ± 0.04	1.00 ± 0.04
			50Hz ~ 100Hz	0.11 ± 0.04	0.10 ± 0.04
			100Hz ~ 500Hz	0.05 ± 0.04	0.05 ± 0.04
			500Hz ~ 1000Hz	0.10 ± 0.04	0.10 ± 0.04
			1000Hz ~ 5000Hz	0.05 ± 0.10	0.05 ± 0.10
			Accuracy: 100Hz ~ 500Hz	0.05 ± 0.04	0.05 ± 0.04
CAPACITANCE CHARACTERISTICS	1,000 µF 10,000 µF 100 µF 10 nF 100 nF	100µF 10µA	20Hz ~ 50Hz	1.00 ± 0.04	1.00 ± 0.04
			50Hz ~ 100Hz	0.11 ± 0.04	0.10 ± 0.04
			100Hz ~ 500Hz	0.05 ± 0.04	0.05 ± 0.04
			500Hz ~ 1000Hz	0.10 ± 0.04	0.10 ± 0.04
			1000Hz ~ 5000Hz	0.05 ± 0.10	0.05 ± 0.10
			Accuracy: 100Hz ~ 500Hz	0.05 ± 0.04	0.05 ± 0.04
	1,000,000 A 10,000,000 A	1µA 100A	20Hz ~ 50Hz	1.00 ± 0.04	1.00 ± 0.04
			50Hz ~ 100Hz	0.11 ± 0.04	0.10 ± 0.04
			100Hz ~ 500Hz	0.05 ± 0.04	0.05 ± 0.04
			500Hz ~ 1000Hz	0.10 ± 0.04	0.10 ± 0.04
			1000Hz ~ 5000Hz	0.05 ± 0.10	0.05 ± 0.10
			Accuracy: 100Hz ~ 500Hz	0.05 ± 0.04	0.05 ± 0.04
FREQUENCY AND PERIOD CHARACTERISTICS					
Frequency/Period	Range	Resolution	Accuracy: ±1% of reading ± 1 digit		
			Frequency	Accuracy/Range	Accuracy/Range
GENERAL INFORMATION	Display	Resolution	20Hz ~ 50Hz	0.1	0.1
			50Hz ~ 100Hz	0.01	0.01
			100Hz ~ 500Hz	0.001	0.001
			500Hz ~ 1000Hz	0.0001	0.0001
			1000Hz ~ 5000Hz	0.00001	0.00001
			Accuracy: 100Hz ~ 500Hz	0.00001	0.00001

ORDERING INFORMATION

GDM-9061 6 1/2 (1,000,000 counts) Digit Dual Measurement Multimeter
GDM-9060 6 1/2 (1,000,000 counts) Digit Dual Measurement Multimeter

ACCESSORIES:
Safety Instructions & 1 Power cord x 1, USB cable (CTL-044) x 1, Test lead (CTL-217) x 1,
CD x 1 (including the complete user manual, upgrade program and PC software, DMM-Viewer2)

OPTION

GDM-9061 GPIB card (1) GPIB card can be installed at customer site

OPTIONAL ACCESSORIES

CTL-205A Temperature Probe Adaptor with Thermal Coupling (K type), approx. 1000mm

CTL-214 RS-232C Cable, 9-pin, female-to-female cable, approx. 3000mm

CTL-245 GPIB Cable, approx. 2000mm

GDM-01 4 Wire (Kelvin) test lead, 90V/mm, approx. 1100mm

GDM-402 Back Mount Kit, 10" 22 case

GDM-TL1 Test Lead Set

GDM-476 Back Mount Kit, 10" 20 case for base unit

GSC-014 Soft Carrying Case for DMM Accessories

GDM-9061 Rear Panel



GDM-9060 Rear Panel



GTL-217 Test Lead



GSC-014 Soft Carrying Case for DMM Accessories



GDM-TL1 Test Lead Set



GTL-205A Temperature probe adaptor with thermocouple (K type)
Approx. 1m



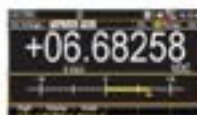
6 ½ Digit Dual Measurement Multimeter

A. IDEAL BENCHMARK PARTNER

	COM-9001	COM-9002
DCV Accuracy	±0.001%	±0.001%
Sampling Rate	10k/s	10k/s
Measuring	1900	100
Bar Input	No	No
Current Terminal (Peak)	3A, 10A	3A
Current Terminal (Rear)	1A	No
Display	Number, Trend Chart, Bar Meter, Histogram	
Function	Voltage/Current, AC, DC, Resistance, 1-999k, 4-999k, Diode, Continuity, Temperature Frequency, Period, Capacitance	
Math	REL, dB, dBm, Compare, MIN-MAX, Percent, 1/2X	
EMC	Min./Max/Average P.P., STDEV	
Interface	RS-232C, USB Host/Device, LAN	

The COM-9001 series provides all fundamental measurement functions engineers require to design, develop, and test electronic circuits or products, including voltage, current, resistance, diode, and continuity tester, frequency, temperature and capacitance. In addition, the series also features mathematical functions (dB, dBm, Compare, MIN-MAX, 1/2X 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 built insight into the systematic measurement.

C. DUAL MEASUREMENT AND DUAL TREND LINE



The dual measurement function has always been a unique feature of GW's 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

COM-9001 MEASUREMENT TYPE: 100V/100mA/10W			
Refresh Rate Available			
0.1% Resolution	1% Resolution	4% Resolution	
5/s / 25/s / 40/s / 120/s	400/s / 1.2/s / 3.4/s	4.0/s / 7.2/s / 108/s	

COM-9002 MEASUREMENT TYPE: 100V/200mA/10W			
Refresh Rate Available			
0.1% Resolution	1% Resolution	4% Resolution	
5/s / 25/s / 40/s / 120/s	400/s / 1/s	-	-

The COM-9001 series provides high resolution of 0.1µV for voltage measurement, 100µA for current measurement, and 100Ω for resistance measurement to meet the necessary requirements for precision measurement in specific applications. In addition, COM-9001 is capable of achieving 10k readings per second with a display resolution of 0.01 digits, while COM-9002 achieves 1k measurement readings per second with a display resolution of 0.01 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 allocated 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 RS232C, 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-906X) or 1k readings per second (GDM-906Y) via USB/LAN/GPIB interfaces.

G. CONVENIENT PC SOFTWARE



The PC software GMM-Viewer2 is suitable for any computer communications interfaces (RS232C/LAN/USB/ GPIB) 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 results 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 LAMVIEW driver to meet the software application requirements of system integration.

6 1/2 Digit Dual Measurement Multimeter



GDM-8261A



FEATURES

- 6 1/2 Digit Display / 2,000,000 Counts
- DCV Basic Accuracy: 0.0031%
- Dual Measurements to Perform Two Selected Measurements Simultaneously
- Bright Vacuum Fluorescent Display (VFD)
- 31 Measurement Functions & 18 Math Functions
- High Resolution: Up to 100pA Resolution with DCI and 1nA with ACI Measurements
- Temperature Measurement (RTD & Thermocouple) from: 200°C to ±120°C
- High Data Transmission Speed: Up to 2,400 readings/s Through USB Interface
- Standard Interface: USB, RS-232C, Digital (D)
- Optional Interface: GPIB or LAN
- Optional Scanner Card: CDM-SC1A (V or A, 1S, 1nA x 2)
- Free PC Software: Excel ADD-IN, LabVIEW Driver

CDM-SC1A Scanner card

Multipoint testing can be facilitated by simple insertion of scanner card.



GTU-247 USB Cable

A-A type cable, Approx. 1.8m



CDM-01 Calibration key



GDM-8261A is a high-precision 6 1/2-digit Digital Multimeter with dual measurement displays, 11 measurement functions and 18 math functions at high accuracy (50ppm DC voltage accuracy) to accommodate the most frequently performed parametric measurements in various application fields today. GDM-8261A adopts a scanner card, which carries 16V-Channels and 21-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 testing or as a data logger to perform long-term monitoring or characterization of a DUT. A PC Software, ExcelADDINS, 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 you create higher own virtual instrument on the PC system 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.

SPECIFICATION

FUNCTION	Range (%)	Resolution	Test Current or etc.	24 Hours 23°C ± 1°C	90 Days 23°C ± 1°C	1 Year 23°C ± 1°C	Temperature Coefficient 0.1°C/20-10°C
DC VOLTAGE							
100,000.0 mV	0.1 μ V	15M Ω or $\pm$ 10C	0.0008 ± 0.0008	0.0004 ± 0.0004	0.0003 ± 0.0003	0.0001 ± 0.0001	0.0001 ± 0.0001
1,000.000 V	1 μ V	15M Ω or $\pm$ 10C	0.0008 ± 0.0004	0.0002 ± 0.0002	0.0002 ± 0.0002	0.0001 ± 0.0001	0.0001 ± 0.0001
10,000.00 V	10 μ V	11.1M Ω 20%/1%	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
100,000.0 V	0.1mV	10.1M Ω 20%/1%	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
1,000,000 V	1mV	10.1M Ω 20%/1%	0.0001 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
RESISTANCE							
100,000.0 Ω	10k Ω	1mA	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
1,000,000 Ω	1m Ω	1mA	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
10,000,000 Ω	10m Ω	100 μ A	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
100,000.0 k Ω	100m Ω	10 μ A	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
1,000,000.0 M Ω	1 Ω	1 μ A	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
10,000,000 M Ω	10 Ω	100 μ A	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
100,000.0 M Ω	100 Ω	10 μ A	0.0008 ± 0.0008	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
DC CURRENT							
100,000.0 μ A	100pA	$\pm$ 0.01V	0.010 ± 0.001	0.001 ± 0.001	0.001 ± 0.001	0.0001 ± 0.0001	0.0001 ± 0.0001
1,000,000 μ A	1nA	$\pm$ 0.1V	0.001 ± 0.001	0.001 ± 0.001	0.001 ± 0.001	0.0001 ± 0.0001	0.0001 ± 0.0001
10,000,000 μ A	10nA	$\pm$ 0.01V	0.001 ± 0.001	0.001 ± 0.001	0.001 ± 0.001	0.0001 ± 0.0001	0.0001 ± 0.0001
100,000.0 mA	0.1 μ A	$\pm$ 0.1V	0.010 ± 0.001	0.001 ± 0.001	0.001 ± 0.001	0.0001 ± 0.0001	0.0001 ± 0.0001
1,000,000 A	1 μ A	$\pm$ 0.8V	0.010 ± 0.001	0.001 ± 0.001	0.001 ± 0.001	0.0001 ± 0.0001	0.0001 ± 0.0001
10,000,000 A	10 μ A	$\pm$ 0.1V	0.010 ± 0.001	0.001 ± 0.001	0.001 ± 0.001	0.0001 ± 0.0001	0.0001 ± 0.0001
TEMPERATURE							
100,000.0°C	0.001°C	1mA	0.001 ± 0.001	0.001 ± 0.001	0.001 ± 0.001	0.0001 ± 0.0001	0.0001 ± 0.0001
1,000,000.0°C	1 μ V	1mA	0.001 ± 0.001	0.001 ± 0.001	0.001 ± 0.001	0.0001 ± 0.0001	0.0001 ± 0.0001

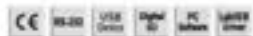
OPTIONAL ACCESSORY

FUNCTION	Range (%)	Resolution	Frequency or etc.	24 Hours 23°C ± 1°C	90 Days 23°C ± 1°C	1 Year 23°C ± 1°C	Temperature Coefficient 0.1°C/20-10°C
TRUE RMS AC VOLTAGE (%)							
100,000.0mV	0.1 μ V	10Hz-50Hz 10Hz-100Hz 10Hz-300Hz 20Hz-300Hz 50Hz-1000Hz 100Hz-1000Hz	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00
1,000,000.0mV	1 μ V	10Hz-50Hz 10Hz-100Hz 10Hz-300Hz 20Hz-300Hz 50Hz-1000Hz 100Hz-1000Hz	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00
10,000,000.0mV	10mV	10Hz-50Hz 10Hz-100Hz 10Hz-300Hz 20Hz-300Hz 50Hz-1000Hz 100Hz-1000Hz	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00
100,000.0mA	100pA	10Hz-50Hz 10Hz-100Hz 10Hz-300Hz 20Hz-300Hz 50Hz-1000Hz 100Hz-1000Hz	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	1.00 ± 0.04 0.21 ± 0.03 0.04 ± 0.03 0.10 ± 0.03 0.21 ± 0.08 0.00 ± 0.00	0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00 0.00 ± 0.00

5 1/2 Digit Dual Display Digital Multimeter



GDM-8255A



FEATURES

- 5 1/2 Digits (199,999 Counts Max.)
- 19D Two Colors Display
- 0.012% DCV Accuracy
- True RMS (AC, AC+DC)
- 9 Major Measuring Functions and 10 Advanced Measurement Functions
- 2W/4W Resistance Measurement
- High Voltage 1000V and 10A Current Range
- Standard Interface : RS-232C, USB Device, Digital I/O
- Free PC Software (DMM VIEWER), LUBVIEW Driver
- Optional 16+2 Channels Scanner Card

GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m



GTL-247 USB Cable

A/B type cable, Approx. 1.8m



GDM-01 Calibration key



GDM-SC1A Scanner card

Multipoint testing can be facilitated by simple insertion of scanner card.



GDM-8255A portable precision multimeters feature 199,999 counts, a dual display, a 0.012% DCV accuracy and 2w/4w measurement. The VFD display technology provides the excellent observation of contrast and brightness.

GDM-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 suitable for a multiplicity 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 RTE applications.

For convenient PC-based remote control and extensive data capture, GDM-8255A includes DMM Viewer software at no additional cost. DMM Viewer minimizes the operation of the multimeters on the PC, allowing you to quickly use the software with little effort.

The optional scanner card (GDM-SC1A) creates a self-contained multipoint measurement solution with plug-in design. This approach eliminates the complexities of multipoint measurements and data processing. The scanner lets users effectively measure multiple channels connected to a single GDM-8255A. Each scanner card has 16 general purpose channels and 2 extra channels for current (AC, DC) measurements. All channels are fully isolated (Hi and Lo). Up to two scanner cards can be inserted into each multimeter for a maximum of 36 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.

SPECIFICATIONS	
FULL SCALE	5 1/2 Digits (199,999 Counts Max.)
SAMPLE RATE	Slow : 3 1/2 digits, 10 readings/second Medium : 4 1/2 digits, 30 readings/second Fast : 5 1/2 digits, 60 readings/second
DC VOLTAGE	
Range	1000V : 1V 10V 100V 1000V : 3 ranges
Accuracy	1000V : ±0.012% rdg + 8 digits 1V ~ 1000V : ±0.012% rdg + 5 digits (100V)
AC VOLTAGE True RMS	
Range	1000V : 1V 10V 100V 1000V : 3 ranges 1000V range :
Accuracy	20Hz ~ 45Hz : ±0.7% rdg + 100 digits 45Hz ~ 100Hz : ±0.25% rdg + 100 digits 100Hz ~ 300Hz : ±0.75% rdg + 300 digits 300Hz ~ 1000Hz : ±0.75% rdg + 300 digits 1V, 10V, 100V, 1000V ranges :
	20Hz ~ 45Hz : ±0.7% rdg + 100 digits 45Hz ~ 100Hz : ±0.25% rdg + 100 digits 100Hz ~ 300Hz : ±0.75% rdg + 100 digits 300Hz ~ 1000Hz : ±0.75% rdg + 200 digits 1.79V : in parallel with approx. 100pF
DC CURRENT	
Range	100mA, 1000mA, 1A, 10A : 4 ranges
Accuracy	100mA : ±0.05% rdg + 15 digits 1000mA : ±0.05% rdg + 5 digits 1A, 10A range : ±0.2% rdg + 5 digits
AC CURRENT True RMS	
Range	100mA, 1000mA, 1A, 10A : 4 ranges
Accuracy	100mA, 1000mA range :
	20Hz ~ 30Hz : ±0.7% rdg + 100 digits 30Hz ~ 100Hz : ±0.25% rdg + 300 digits 100Hz ~ 200Hz : ±0.75% rdg + 200 digits 1A, 10A range : ±0.2% rdg + 100 digits
RESISTANCE	
Range	100Ω, 1VΩ, 10kΩ, 100kΩ, 1MΩ, 10MΩ, 100MΩ : 7 ranges
2W Accuracy	100Ω range : ±0.1% rdg + 5 digits(1%) 1kΩ range : ±0.08% rdg + 5 digits(1%) 10kΩ range : ±0.08% rdg + 5 digits(1%) 100kΩ ~ 1MΩ range : ±0.08% rdg + 5 digits 10MΩ range : ±0.1% rdg + 5 digits 100MΩ range : ±0.2% rdg + 8 digits
4W Accuracy	100Ω range : ±0.08% rdg + 5 digits 1kΩ ~ 10kΩ : 4 ranges : ±0.05% rdg + 5 digits 100kΩ range : ±0.1% rdg + 5 digits 100MΩ range : ±0.2% rdg + 8 digits



CDM-8255A

SPECIFICATIONS

BASIC TEST

Open Circuit Voltage 10V, Test Current 10mA, Accuracy (200Hz) = 1 digit

FREQUENCY

10Hz-100kHz: Sensitivity 0.1% Accuracy (200Hz) = 1.5 digit

100Hz-500kHz: Sensitivity 1% Accuracy (200Hz) = 3 digit

500Hz-500kHz: Sensitivity 2.5% Accuracy (200Hz) = 3 digit

CONTINUITY BEEPER

1-1000Ω Define by user, Accuracy (200Hz) = 5 digit

TEMPERATURE

0°C - 140°C, ± 0.1°C, 1 Type

OTHER FUNCTIONS

Auto range / Manual, Math: Mx, ÷, % / √, X Max, Min, dBm, dB, REL, Hold, Compare, Store, Recall

DISPLAY

VFD, Red Colors Display

INTERFACE

Signal: G, USB, RS-232C

POWER SOURCE

AC 100V-240V, 50/60Hz, Standby Power Consumption: Max. 20mA

DIMENSIONS & WEIGHT

Size (mm) (W x H x D) mm, Approx. 2.4 kg

Note: (*) 1000: 900° Mode

ORDERING INFORMATION

CDM-8255A, 5 1/2 Digit Dual Display Digital Multimeter

ACCESSORIES

Quick start user manual x 1, Power cord x 1, Test lead CGL-207A x 1, USB Cable CUL-247

CD x 1 (including complete user manual, upgrade program and PC software (BNA, Wave),

Calibration key (CDM-81) x 1

OPTION

CDM-8C18 Scanner Card (1.5 x 6 x 1.5 cm x 2)

OPTIONAL ACCESSORIES

CFL-100A

4W Type war lead

CFL-232 RS-232C Cable, 9-pin female to 9-pin, male module for computers, Approx. 2000mm

CFL-205A Temperature probe adapter with thermocouple (K type), Approx. 1000mm

CRA-432 Rack Mount Kit (19", 2U)

CRA-436 Rack Mount Kit, 19" 2U slot for two slots

GDM-TL1

Test Lead Set

GSC-014 Soft Carrying Case for DMM Accessory

FREE DOWNLOAD

PC Software: Digital Unit Driver

Driver: LabVIEW Driver

USB Driver

Rear Panel



GDM-TL1 Test Lead Set



GTL-108A 4W Type Test Lead

Approx. 1.5m



GTL-232 RS-232C Cable

Approx. 2m



GSC-014 Soft Carrying Case for DMM Accessory



GTL-207A Test Lead

Approx. 0.8m



5 1/2 Digit Dual Measurement Multimeter



GDM-8351



FEATURES

- 5 1/2 Digit (120,000 Counts), VFD Display
- Dual Measurement/Dual Display
- The Basic Precision of DC Voltage: 0.012%
- Selectable Measurement Speeds, the Maximum: 320 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, IR/IR Resistance, Continuity, Beep, Diode Test, Capacitance, Frequency, Temperature
- Many Auxiliary Functions: Max./Min., REL, RELA, Compare, Hold, dB, dBm, Math(MR+R, %, 1/X)
- Digital I/O Provides Dual Mode(Standard Compare and User Definition Mode)
- Standard RS-232C and USB Device Interface (Support USB CDC and USB TMC Modes)

CIF Instruments presents the brand new 5 1/2 Digit Dual Measurement Multimeter GDM-8351 to replace GDM-8311A of the same category. GDM-8351 equips VFD dual-display, maximum 120,000 counts, 0.012% basic DC voltage accuracy and USB/RS232C connectors to provide users with measurement precision, valid 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/current, IR/IR resistance, frequency, temperature measurement, continuity beeper and diode test, GDM-8351 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, algorithms (MR+R, 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 external 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 interface 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 USB TMC mode. While USB TMC 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.

ELECTRONIC SPECIFICATIONS			
Range/Unit	Resolution	Test Current or Load	Accuracy(1s) Year(25°C±5°C)
DC VOLTAGE			
100.000mV	1µV	10mA or >10GΩ	0.012 ± 8
1.00000V	10µV	10mA or >10GΩ	0.012 ± 5
10.0000V	100µV	10 mA	0.012 ± 5
100.000V	1mV	10 mA	0.012 ± 5
1000.00V	10mV	10mA	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	0.10 ± 5
100.000MΩ	1kΩ	0.5µA(11MΩ)	1.00 ± 8
DC CURRENT			
10.0000mA	100µA	1.1Ω	0.05 ± 15
100.000mA	1µA	1.1Ω	0.05 ± 5
1.00000A	10µA	0.1Ω	0.10 ± 5
10.0000A	100µA	0.01Ω	0.10 ± 5
CONTINUITY			
1000.00Ω	10mΩ	1mA	0.05 ± 5
DIODE TEST			
6.0000V	100µV	1mA@0.6V	0.05 ± 15
CAPACITANCE			
10.00nF	0.01nF	10µA	2.0 ± 10
100.0nF	0.1nF	10µA	2.0 ± 4
1.00µF	0.001µF	100µA	2.0 ± 4
10.0µF	0.01µF	1mA	2.0 ± 4
100.0µF	0.1µF	1mA	2.0 ± 4

General

Display Interface	VFD, Two Colors Display
Power Source	RS-232C, USB device (USB CDC & USB TMC) AC 100 V / 120 V / 230 V / 240 V ±10%, 50/60Hz Power Consumption Max. 15W
Dimensions & Weight	261(W) × 137(H) × 303(D) mm, approx. 2.1kg

Note:

1. All specifications are applicable to the main 120 display only and warmed up for at least 30 minutes and operated in the room air.
2. 20% overrange on all ranges, except 100V/10A range.
3. Accuracy = (% of Reading + Offset)

GTL-207A Test Lead

Approx. 0.5m





GDM-8351

SPECIFICATIONS (%)

Range(%)	Resolution	Frequency or Etc.	Accuracy 1 Year (20°C±1°C)
True RMS AC (or AC+DC - AC Coupled) Voltage			
100.000mV	1 μ V	20Hz - 45Hz 45Hz - 100Hz 100Hz - 300Hz 300Hz - 1000Hz	1.0 ± 100 0.5 ± 100 1.5 ± 100 1.0 ± 100
1.00000V	10 μ V	20Hz - 45Hz 45Hz - 100Hz 100Hz - 300Hz 300Hz - 1000Hz	1.0 ± 100 0.2 ± 100 1.0 ± 100 1.0 ± 100
10.0000V	100 μ V	20Hz - 45Hz 45Hz - 100Hz 100Hz - 300Hz 300Hz - 1000Hz	1.0 ± 100 0.2 ± 100 1.0 ± 100 1.0 ± 100
100.000V	1mV	20Hz - 45Hz 45Hz - 100Hz 100Hz - 300Hz 300Hz - 1000Hz	1.0 ± 100 0.2 ± 100 1.0 ± 100 1.0 ± 100
750.00V	10mV	20Hz - 45Hz 45Hz - 100Hz 100Hz - 300Hz 300Hz - 1000Hz	1.0 ± 100 0.2 ± 100 1.0 ± 100 1.0 ± 100
True RMS AC (or AC+DC - AC Coupled) Current			
10.0000mA	100nA	20Hz - 45Hz 45Hz - 100Hz 200Hz - 1000Hz	1.5 ± 100 0.5 ± 100 2.0 ± 100
100.000mA	1 μ A	20Hz - 45Hz 45Hz - 100Hz 200Hz - 1000Hz	1.5 ± 100 0.5 ± 100 2.0 ± 100
1.00000A	10 μ A	20Hz - 45Hz 45Hz - 100Hz 200Hz - 1000Hz	1.5 ± 100 0.5 ± 100 2.0 ± 100
10.0000A	100 μ A	20Hz - 45Hz 45Hz - 100Hz 200Hz - 1000Hz	1.5 ± 100 0.5 ± 100 2.0 ± 100
FREQUENCY			
(Voltage) 10Hz - 1MHz	—	—	0.01 ± 3
(Current) 20Hz - 100Hz	—	—	0.01 ± 3
TEMPERATURE (Thermocouple)			
100 °C - 0 °C	0.01 °C	1 / T / R	0.6 °C(typical)
0 °C - +300 °C	0.01 °C	1 / T / R	0.3 °C(typical)

ORDERING INFORMATION

GDM-8351 5 1/2 Digit Dual Measurement Multimeter

ACCESSORIES

Safety Instruction Sheet x 1, Power cord x 1, Test Lead CPL-205A x 1, CD x 1 (including complete User manual, driver and software)

OPTIONAL ACCESSORIES

CPL-100A	400V Test Lead (Shallow Clip), Approx. 1100mm
CPL-205A	Temperature probe adaptor with thermocouple (K type), Approx. 1000mm
CPL-302	RS-232C Cable, 9 pin female to 9 pin, shield, module for computer, Approx. 2000mm
CPL-246	1/32 Cable, A/B type, Approx. 1500mm
GDM-422	Rock Mount Kit (1/4", 2x)
GDM-TL1	Test Lead Set
GSC-014	Soft Carrying Case for DMM Accessory

Rear Panel



GSC-014 Soft Carrying Case for DMM accessory



GDM-TL1 Test Lead Set



GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m





GDM-8300 Series

SPECIFICATIONS (TYPICAL)

True RMS AC (w/ AC/DC + AC Couple) Current (% FS)

100 nA	10 nA	30Hz ~ 30Hz	1.50 ~ 50
		30Hz ~ 30Hz	0.50 ~ 40
		30Hz ~ 30Hz	1.50 ~ 50
		30Hz ~ 30Hz	0.50 ~ 40
1000 nA	100 nA	30Hz ~ 30Hz	1.50 ~ 40
		30Hz ~ 30Hz	0.50 ~ 30
		30Hz ~ 30Hz	1.50 ~ 40
		30Hz ~ 30Hz	0.50 ~ 40
10000 nA	100 nA	30Hz ~ 30Hz	1.50 ~ 40
		30Hz ~ 30Hz	0.50 ~ 30
		30Hz ~ 30Hz	1.50 ~ 40
		30Hz ~ 30Hz	0.50 ~ 40
10000 nA	100 nA	30Hz ~ 30Hz	1.50 ~ 40
		30Hz ~ 30Hz	0.50 ~ 30
		30Hz ~ 30Hz	1.50 ~ 40
		30Hz ~ 30Hz	0.50 ~ 40
10000 nA	100 nA	30Hz ~ 30Hz	1.50 ~ 40
		30Hz ~ 30Hz	0.50 ~ 30
		30Hz ~ 30Hz	1.50 ~ 40
		30Hz ~ 30Hz	0.50 ~ 40

FREQUENCY / PERIOD

10Hz ~ 300Hz	100Hz	1.00 ~ 5.00
300Hz ~ 3000Hz	100Hz	0.01 ~ 5.00
3000Hz ~ 100kHz	100Hz	0.01 ~ 5.00

TEMPERATURE (THERMOCOUPLE)

-100 °C ~ +100 °C	0.1 °C	1.00 ~ 5.00
100 °C ~ +100 °C	0.1 °C	1.00 ~ 5.00

DISPLAY

YTO, Two Colors Display

INTERFACE

USB device, USB Host (22M-B40 series)

POWER SOURCE

AC 100V/120V/220V/240V ±10%, 50 ~ 60Hz, Power Consumption: Max. 15W

DIMENSIONS & WEIGHT

210 (W) × 107 (H) × 30 (D) mm, Approx. 270g

Note: The specifications apply when the DMM is warmed up for at least 30 minutes and operates in class one.

ORDERING INFORMATION

GDM-8342 40000 counts Dual Measurement Multimeter with USB Host/Device and opt. GPIB

GDM-8342 50000 counts Dual Measurement Multimeter with USB Host/Device

GDM-8341 50000 counts Dual Measurement Multimeter with USB Device

ACCESSORIES

Safety test cable (Shunt + L power cord + L test lead CTS-205A + L CD + L) (including complete user manual, USB driver and PC software)

OPTION

GDM-8341 GPIB Interface

* Firmware included for GDM-8342 only

OPTIONAL ACCESSORIES

CTS-205A Temperature probe adaptor with thermocouple (K type), Approx. 1000mm

CTS-246 USB Cable, USB 2.0, A-B Type, 1000mm

CTS-248 GPIB Cable, Double Shielded, 2000mm

CAH-402 Rack Mounting Kit (1U, 2U)

GDM-111 Test Lead Set

GSC-014 Self-Carrying Case for DMM Accessory

Rear Panel



- All specifications are measured only under mean (Tol) display.
- Accuracy: ± (1% of reading + 1 digit)
- 2% overrange on all ranges, except TGA ± 20% overrange.
- Min. function is on.
- The accuracy of AC/DC in square AC with 14 round digit value.
- AC Characteristics are for sinusoidal input ± 1% of range.
- Specifications do not include probe accuracy.

GSC-014 Self-Carrying Case for DMM Accessory



GDM-TL1 Test Lead Set



GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 100



50000 Counts Dual Display Digital Multimeter



GDM-8245 (50000 Counts)



FEATURES

- 50000 Counts Display
- Multi-Function ACV, DCV, ACA, DCA, R, C, Hz, Continuity Buzzer, Diode Test, Max/Min, REL, Hold, dBm
- Dual Display Indicate ACV and Hz, DCV(ACV) and dBm
- Manual or Auto Ranging
- 0.05% DCV Accuracy
- ACV Measuring Frequency Up to 30kHz
- AC True RMS or AC + DC True RMS

Rear Panel



CTL-117 Test Lead

Approx. 1.5m



GDM-8245 is an economical bench top DMM equipped with a rich set of features. GDM-8245 has large 7 segments 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 buzzer), 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, GDM-8245 is the perfect general purpose DMM.

SPECIFICATIONS

DC VOLTAGE

Range	100mV, 5V, 50V, 500V, 1000V 5 ranges
Accuracy	$\pm (0.01\% \text{ rdg} + 4 \text{ digits})$
Input Impedance	10M Ω

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: $\pm (1\% \text{ rdg} + 15 \text{ digits})$ 45Hz - 20kHz: $\pm (0.5\% \text{ rdg} + 15 \text{ digits})$ 20kHz - 10kHz: $\pm (1\% \text{ rdg} + 15 \text{ digits})$ 10kHz - 20kHz: $\pm (2\% \text{ rdg} + 30 \text{ digits})$ 20kHz - 50kHz: $\pm (3\% \text{ rdg} + 30 \text{ digits})$ 500V, 1000V range: 45Hz - 10kHz: $\pm (0.5\% \text{ rdg} + 15 \text{ digits})$
Input Impedance	10M Ω

DC CURRENT

Range	100 μ A, 1mA, 50mA, 500mA, 2A, 20A 6 ranges
Accuracy	500 μ A, 500mA 4 ranges: $\pm 0.2\% \text{ rdg} + 2 \text{ digits}$; 2A - 20A 2 ranges: $\pm 0.5\% \text{ rdg} + 3 \text{ digits}$

AC CURRENT TRUE RMS (AC OR AC + DC TRUE RMS)

Range	500 μ A, 5mA, 10mA, 500mA, 2A, 20A 6 ranges
Accuracy	500 μ A - 20A 6 ranges: 20Hz - 45Hz: $\pm (1\% \text{ rdg} + 15 \text{ digits})$; 45Hz - 20kHz: $\pm (0.5\% \text{ rdg} + 15 \text{ digits})$ 500 μ A - 500mA 3 ranges: 20Hz - 10kHz: $\pm (0.5\% \text{ rdg} + 15 \text{ digits})$; 10kHz - 20kHz: $\pm (2\% \text{ rdg} + 15 \text{ digits})$

RESISTANCE

Range	100 Ω , 3k Ω , 30k Ω , 300k Ω , 3M Ω , 20M Ω 6 ranges
Accuracy	100 Ω - 30k Ω : $\pm (0.1\% \text{ rdg} + 4 \text{ digits})$; 30k Ω - 500k Ω : 3 ranges: $\pm (0.1\% \text{ rdg} + 2 \text{ digits})$ 500k Ω - 20M Ω : $\pm (0.2\% \text{ rdg} + 2 \text{ digits})$; 20M Ω - 20M Ω : $\pm (0.5\% \text{ rdg} + 2 \text{ digits})$

DIODE TEST

	The one range can check the forward voltage of diode. Maximum forward voltage 1.5V open voltage 2.8V
--	--

CAPACITANCE

Range	1nF, 10nF, 100nF, 1 μ F, 10 μ F 5 ranges
Accuracy	$\pm (2\% \text{ rdg} + 4 \text{ digits})$

FREQUENCY

Input Level (Sine Wave)	mV range: 10Hz - 10kHz: $\pm (20\text{Hz} - 50k - 150kHz) < 200\text{mV}$ 1V - 30V range: 10Hz - 200kHz > 1.2V, 300V range: 20Hz - 10kHz > 12V
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FUNCTIONS

	Auto Manual Range, Max, Min, dBm, REL, Hold
--	---

CONTINUITY BEEPER

	Built-in Buzzer sounds when conductance is less than 3 Ω
--	---

DISPLAY

	Dual Display 0.4" and 0.5", 7 segment LED display
--	---

POWER SOURCE

	AC 100V, 120V, 220V @ 10W, 50/60Hz, Power Consumption: Max 8W
--	---

DIMENSIONS & WEIGHT

	231 (W) x 91 (H) x 29 (D) mm, Approx. 2.8kg
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OPTIONAL 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

GDM-751	Test Lead Set
GDM-814	Soft-Carrying Case for DMM Accessories

HAND-HELD DIGITAL MULTIMETER

MODEL	CDM-541	CDM-531	CDM-512	CDM-531
Max. Display	21000	6000	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	25A	20A	9.99A	10A
AC Current	30A	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 (D)	✓	✓	✓	
Transistor (hFE)	✓			
NCV Function	✓	✓	✓	✓
REL	✓	✓	✓	
Data Hold	✓	✓	✓	✓
Peak Hold	✓	✓		
MAX MIN	✓	✓		
LoZ ACV		✓		
LFF 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

Hand-Held Digital Multimeter



GDM-541



GDM-533



GDM-532



GDM-541 FEATURES

- 25000 Counts Auto/Manual Ranging
- 46 Segments Analog Bar
- ACV Measurement up to 1000V
- AC/DC Voltage Measurement
- Current Measurement up to 25A
- Transistor (hFE) Measurement
- Audible/Visual Alarm when Overload
- True RMS/USB Interface

GDM-533 FEATURES

- 4000 Counts Auto/Manual Ranging
- 31 Segments Analog Bar
- LxZ ACV Measurement
- ACV Measurement up to 1000V
- Current Measurement up to 25A
- 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 Beep/Diode Test
- Temperature Measurement
- Non-Contact Voltage (NCV) Detection
- Data Hold and Relative Mode

The CDM 500 Series Hand Held DMM are a compact, high precision, battery operated multimeter series designed to meet of service engineers. The CDM 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	250.00mV, 2.500V, 25.00V, 250.0V, 1000V (CDM-541) 60.00mV, 600.0mV, 6.00V, 60.0V, 600.0V, 1000V (CDM-533) 6.00mV, 60.0mV, 600.0mV, 6.00V, 60.0V, 600.0V, 1000V (CDM-532)
Best Accuracy	±0.05% ± 1 digit for CDM-541, ±0.1% ± 1 digit for CDM-533 ±0.1% ± 1 digit for CDM-532, ±0.2% ± 1 digit for CDM-531
Input Impedance	10 MΩ (0.1mV range), 10 MΩ for CDM-541/533, 9 MΩ for CDM-532
AC VOLTAGE	
Range	250.00mV, 2.500V, 25.00V, 250.0V, 1000V (CDM-541) 60.00mV, 600.0mV, 6.00V, 60.0V, 600.0V, 1000V (CDM-533) 6.00mV, 60.0mV, 600.0mV, 6.00V, 60.0V, 600.0V, 1000V (CDM-532)
Best Accuracy	±0.1% ± 1 digit for CDM-541, ±0.2% ± 1 digit for CDM-533 ±0.2% ± 1 digit for CDM-532, ±0.3% ± 1 digit for CDM-531
Frequency Response	40Hz-100Hz for CDM-541, 40Hz-100Hz for CDM-533 40Hz-100Hz for CDM-532, 40Hz-100Hz for CDM-531
Input Impedance	10 MΩ
DC CURRENT	
Range	250.00µA, 2.500mA, 25.00mA, 250.0mA, 10.00A (CDM-541) 60.00µA, 600.0µA, 6.00mA, 60.0mA, 6.00A, 10.0A (CDM-533) 6.00µA, 60.0µA, 600.0µA, 6.00mA (CDM-532)
Best Accuracy	±0.1% ± 1 digit for CDM-541, ±0.2% ± 1 digit for CDM-533 ±0.2% ± 1 digit for CDM-532, ±0.3% ± 1 digit for CDM-531
AC CURRENT	
Range	250.00µA, 2.500mA, 25.00mA, 250.0mA, 10.00A (CDM-541) 60.00µA, 600.0µA, 6.00mA, 60.0mA, 6.00A, 10.0A (CDM-533) 6.00µA, 60.0µA, 600.0µA (CDM-532)
Best Accuracy	±0.1% ± 1 digit for CDM-541, ±0.2% ± 1 digit for CDM-533 ±0.2% ± 1 digit for CDM-532, ±0.3% ± 1 digit for CDM-531
RESISTANCE	
Range	250.0Ω, 2.500kΩ, 25.00kΩ, 250.0kΩ, 2.500MΩ, 25.00MΩ, 250.0MΩ (CDM-541) 60.0Ω, 6.00kΩ, 60.0kΩ, 600.0kΩ, 6.00MΩ, 60.0MΩ (CDM-533) 6.00Ω, 60.0Ω, 600.0Ω, 6.00kΩ, 60.0kΩ (CDM-532)
Best Accuracy	±0.1% ± 1 digit for CDM-541, ±0.2% ± 1 digit for CDM-533 ±0.2% ± 1 digit for CDM-532, ±0.3% ± 1 digit for CDM-531
CONTINUITY BEEPER	
	Buzzer sounds if Resistance less than 50Ω for CDM-541/533 Buzzer sounds if Resistance less than 30Ω for CDM-532 Buzzer sounds if Resistance less than 10Ω for CDM-531
DIODE TEST	
Open Circuit Voltage	CDM-541/533: 2V (Approx.), CDM-532: 1.2V (Approx.), CDM-531: 2.1V (Approx.)
CAPACITANCE	
Range	25.000nF, 250.0nF, 2.500µF, 25.00µF, 250.0µF, 2.500mF, 25.00mF, 250.0mF (CDM-541) 60.0nF, 600.0nF, 6.00µF, 60.0µF, 600.0µF, 6.00mF, 60.0mF (CDM-533) 6.00nF, 60.0nF, 600.0nF, 6.00µF, 60.0µF, 600.0µF, 6.00mF (CDM-532)
Best Accuracy	±0.1% ± 1 digit for CDM-541/533, ±0.2% ± 1 digit for CDM-532/531
FREQUENCY	
Range	10Hz - 200kHz (CDM-541), 10Hz - 100kHz (CDM-533), 99.99Hz - 9.999kHz (CDM-532)
Best Accuracy	±0.1% ± 1 digit for CDM-541, ±0.1% ± 1 digit for CDM-533 ±0.1% ± 1 digit for CDM-532
Input Amplitude	≤20Vrms
TEMPERATURE	
Range	-40°C - 1000°C, -40°F - 3217°F
Best Accuracy	±0.1% ± 1 digit for CDM-533, ±0.1% ± 1 digit for CDM-532 ±0.1% ± 1 digit for CDM-531, ±0.2% ± 1 digit for CDM-530

SPECIFICATIONS

SPECIAL FUNCTION

Auto Ranging (GDM-541/533/532); True RMS (GDM-541/533/532); Arising Bar (GDM-541/532);
LED (GDM-541/533/532/531); Display Backlight (GDM-541/533/532/531); HCV Function (GDM-541/533/532/531);
Audible/Visual Alarm (GDM-541/533/532); AC/DC voltage (GDM-541); V/F ACV (GDM-541); NFI Test (GDM-541);
Load ACV (GDM-531)

LED DISPLAY

2000 counts (GDM-541); 8000 counts (GDM-531/532); 9999 counts (GDM-533)

POWER SOURCE

1.5V AAA x 4 (GDM-541/531); 1.5V AAA x 2 (GDM-532); 1.5V AAA x 2 (GDM-533)

DIMENSIONS & WEIGHT

85(H) x 184(W) x 45(D) mm, Approx. 480g (GDM-541/533)

81(H) x 189(W) x 46(D) mm, Approx. 480g (GDM-532)

74.3(H) x 173(W) x 49(D) mm, Approx. 333g (GDM-531)

ORDERING INFORMATION

GDM-541 2000-Counts Hand-Held DMM with True RMS Measurement and USB Interface

GDM-533 8000-Counts Hand-Held DMM with True RMS Measurement and USB Interface

GDM-532 9999-Counts Hand-Held DMM with True RMS Measurement

GDM-531 8000-Counts Hand-Held DMM

ACCESSORIES

User manual; Test leads; Battery; USB cable & Adapter socket (GDM-541/533 only);
K-type thermocouple (GDM-531/532 only)

FREE DOWNLOAD

GDM-541 PC Software Remote Software

GDM-533 PC Software Remote Software



GDM-531



GDM-531 FEATURES

- 4000-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 hand-held 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 specific frequency like component's datasheet specification or at 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, θ (θ_r or θ_d) as well as X 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 Features)	Page
LCR 8210A	10MHz High Frequency LCR Meter	E21-24
LCR 8210A	10MHz High Frequency LCR Meter	
LCR 8230A	10MHz High Frequency LCR Meter	
LCR 8210A	10MHz High Frequency LCR Meter	
LCR 8261A	10MHz High Frequency LCR Meter	
LCR 8210	10MHz High Frequency LCR Meter	
LCR 8220	10MHz High Frequency LCR Meter	
LCR 8210	10MHz High Frequency LCR Meter	
LCR 8205	10MHz High Frequency LCR Meter	
LCR 8201	10MHz High Frequency LCR Meter	
LCR 4000	10Hz ~ 100kHz Precision LCR Meter	E25-26
LCR 4000	10Hz ~ 100kHz Precision LCR Meter	
LCR 4000	10Hz ~ 100kHz Precision LCR Meter	
LCR 4000	10Hz ~ 100kHz Precision LCR Meter	
LCR 4002	10Hz ~ 20MHz Precision LCR Meter	
LCR 4002	10Hz ~ 20MHz Precision LCR Meter	

HANDHELD LCR METER

Model	Description (Main Features)	Page
LCR 910	100Hz/120Hz/1k/10k/100kHz Hand Held LCR Meter	E27-28
LCR 913	100Hz/120Hz/1k/10k/100kHz Hand Held LCR Meter	
LCR 914	100Hz/120Hz/10k/100kHz Hand Held LCR Meter	



LCR-8200(A) Series

NEW



FEATURES

- Wide Test Frequency :
LCR-8200A : DC, 10Hz ~ 50/50/20/10/5 MHz
LCR-8200 : DC, 10Hz ~ 30/20/10/5 MHz
- 7" LCD color Display
- 0.08% Basic Accuracy
- Displaying Four Measurement Results Simultaneously from 13 Selectable Measurement Parameters Freely
- 10 Steps List Measurement
- Two-Curves Sweep Mode
- Equivalent Circuit Model Analysis (ECM mode only)
- Internal DC Bias Voltage ±2V
- USB Storage Available
- AUT Function Available
- Standard Interfaces : RS-232C, USB Host/Device, LAN, GPIB and Handler
- Universal Power Input

Our latest high-frequency LCR meter – LCR-8200 (A), which includes two series, LCR-8200A and LCR-8200, has ten models and the maximum test frequency is up to 50MHz. 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 present 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 are allowed to set 15 test points and each test point can set parameters independently, including frequency/voltage/bias, and it even 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 exclusive of standby trigger. Users only need to place the next DUT, until 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 limited according to the actual needs of users. Besides, the LCR-8200A series provides 7 different equivalent circuit models which allow user analysis by 3 components or 4 components combination to characterize 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 sweep graphics (img) and values (txt) can be saved to the flash drive for subsequent analysis and applications.

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 servers.

OPTIONAL ACCESSORIES SELECTION GUIDE

ACCESSORY	BRIEF DESCRIPTION	LCR-8200A	LCR-8200A	LCR-8200A	LCR-8200A	LCR-8200A	LCR-8200A
		LCR-8200A	LCR-8200A	LCR-8200A	LCR-8200A	LCR-8200A	LCR-8200A
LCR-05A	Test Fixture for axial & radial lead components (up to 50MHz)	✓	✓	✓	✓	✓	✓
LCR-06A	Test Lead with Ribbon clip (0 wire type)	✓	✓	✓	✓	✓	✓
LCR-07	Test Lead with Alligator clip (2 wire type)	✓	✓	✓	✓	✓	✓
LCR-08	Test Fixture (Thermistor) for SMD / Chip components	✓	✓	✓	✓	✓	✓
LCR-10A	Test Fixture for bottom electrode components (up to 50MHz)	✓	✓	✓	✓	✓	✓
LCR-11	Test Lead with Ribbon clip (0 wire type)	✓	✓	✓	✓	✓	✓
LCR-15A	Test Fixture for SMD / Chip components (up to 50MHz)	✓	✓	✓	✓	✓	✓
CTL-03A	RS-232C cable	✓	✓	✓	✓	✓	✓
CTL-04B	GPIB Cable	✓	✓	✓	✓	✓	✓
CTL-04A	USB Cable	✓	✓	✓	✓	✓	✓
QIR-045	Flash Memory 64, 128, 256 MB	✓	✓	✓	✓	✓	✓

Note: 1. For more details accessories and their required interfaces, please refer to the manual.

LCR-05A



LCR-06A



LCR-07



LCR-08



LCR-10A



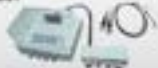
LCR-11



LCR-15A



LCR-081





LCR-E200(A) Series

Rear Panel



SPECIFICATIONS

	LCR-E210A	LCR-E230A	LCR-E230A	LCR-E210A	LCR-E235A	~
	~	LCR-E230	LCR-E230	LCR-E210	LCR-E230	LCR-E201
TEST FREQUENCY	DC, 10Hz~200kHz 8 Digits, <0.0001%	DC, 10Hz~200kHz 8 Digits, <0.0001%	DC, 10Hz~200kHz 8 Digits, <0.0001%	DC, 10Hz~200kHz 4 Digits, <0.0001%	DC, 10Hz~200kHz 8 Digits, <0.0001%	DC, 10Hz~200kHz 8 Digits, <0.0001%
OUTPUT IMPEDANCE	25Ω / 100Ω SELECTABLE					
BASIC ACCURACY	±0.05%					
TEST SPEED	MAX. 1.3sec/104Hz, 1ACT. 10sec/104Hz, MEDIAN: 100ms, SLOW: 100ms, SLOW: 100ms					
TEST SIGNAL LEVEL	10mV ~ 10Vrms (FREQ. 10Hz~100kHz), 10mV ~ 10Vrms (FREQ. 10Hz~100kHz), 10mV ~ 10Vrms (FREQ. 10Hz~100kHz), 10mV ~ 10Vrms (FREQ. 10Hz~100kHz)					
AC Voltage	10mV ~ 10Vrms (FREQ. 10Hz~100kHz), 10mV ~ 10Vrms (FREQ. 10Hz~100kHz), 10mV ~ 10Vrms (FREQ. 10Hz~100kHz), 10mV ~ 10Vrms (FREQ. 10Hz~100kHz)					
AC Current	100μA ~ 10mA (FREQ. 10Hz~100kHz), 100μA ~ 10mA (FREQ. 10Hz~100kHz), 100μA ~ 10mA (FREQ. 10Hz~100kHz), 100μA ~ 10mA (FREQ. 10Hz~100kHz)					
DC Voltage	10mV ~ 10V (FREQ. 10Hz~100kHz), 10mV ~ 10V (FREQ. 10Hz~100kHz), 10mV ~ 10V (FREQ. 10Hz~100kHz), 10mV ~ 10V (FREQ. 10Hz~100kHz)					
MEASUREMENT PARAMETERS	Maximum four parameters can be measured and displayed at the same time: Impedance (Z), Inductance (L) / Capacitance (C) / Resistance (R) / Quality Factor (Q), Dissipation Factor (D), Admittance (Y), Conductance (G), Reactance (X), Phase Angle (φ) / θ, Susceptance (S), DC Resistance (RDC)					
TEST MEASUREMENT	1.5					
Tested Parameters	Freq/Hz, Vac/V, DC Bias/Comp/BIN					
Trigger	AUTO, REPEAT, SINGLE					
TRIGGER MEASUREMENT	None					
Target Parameters	None					
EQUIVALENT CIRCUIT MODEL ANALYSIS (DC mode only)	7 different equivalent circuit models, 3 components, 4 types, 4 components, 3 types					
OTHER FUNCTIONS	Standard					
Auto Load Control (Auto)	Standard					
DC Bias	0 ~ ±10V					
Transfer	RATIO, ABS, and CH, LCR to BIN 1-9					
OTHER FEATURES	Standard					
Correction	Open/Short/Load/Load					
V/I Monitor	Yes, Vac, Vac, Vac					
Comparator	Value, S, S, S					
buzzer	ON/OFF, Pass, Fail					
Average	1 to 54					
DISPLAY	7" LCD color display (300 x 400)					
INTERFACE	USB, GPIB, LAN, RS-485, RS-232C, RS-485, RS-232C, RS-485, RS-232C					
POWER SOURCE	AC 100V~240V, 50/60Hz, Consumption: 10W (max.)					
DIMENSIONS & WEIGHT	340 (W) x 140 (H) x 110 (D) mm, Approx. 3.0kg					

Reference values of accuracy and test speed are only for the "R" mode accuracy for equivalent circuit model analysis.

ORDERING INFORMATION

LCR-E250A	DC, 10Hz~200kHz High Frequency LCR Meter	LCR-E270	DC, 10Hz~200kHz High Frequency LCR Meter
LCR-E230A	DC, 10Hz~200kHz High Frequency LCR Meter	LCR-E230	DC, 10Hz~200kHz High Frequency LCR Meter
LCR-E230A	DC, 10Hz~200kHz High Frequency LCR Meter	LCR-E210	DC, 10Hz~200kHz High Frequency LCR Meter
LCR-E210A	DC, 10Hz~200kHz High Frequency LCR Meter	LCR-E235	DC, 10Hz~200kHz High Frequency LCR Meter
LCR-E235A	DC, 10Hz~200kHz High Frequency LCR Meter	LCR-E201	DC, 10Hz~200kHz High Frequency LCR Meter

ACCESSORIES:

User Manual (CD) x 1, AC Power Cord x 1, Test Fixture (LCR-E200 x 1, Safety Sheet x 1)

OPTION

LCR-E250	Test Fixture for Real & Mutual Load Components (up to 100A)	LCR-E270	Test Lead with Inductance (up to 100A)
LCR-E230	Test Lead with Inductance (up to 100A)	LCR-E230	Test Fixture for Self-Inductance Component
LCR-E210	Test Lead with Inductance (up to 100A)	LCR-E210	Test Lead with Inductance (up to 100A)
LCR-E235	Test Fixture for Mutual Load Components	LCR-E235	Test Lead with Inductance (up to 100A)
LCR-E201	Test Fixture for Mutual Load Components	LCR-E201	Test Lead with Inductance (up to 100A)

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 13-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 judgment. When the trigger mode is set to "AUTO", the display "WAIT 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.

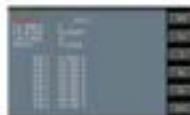
D. TWO CURVE SWEEP



Up to 2 characteristic parameters of the DUT can be swept at the same time. Sweep type (frequency/vdc/vac), 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. Sweep displays and point values can be saved to the flash drive via the USB host on the panel for subsequent analysis.

E. BIN FUNCTION



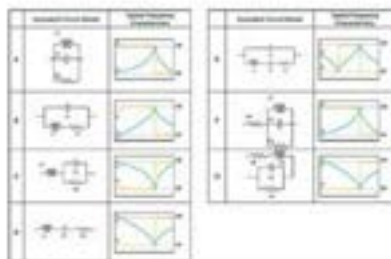
BIN settings for one specific parameter of the selected measurement parameters provide up to 9 BIN positions. Set the judgment basis for individual classifications according to the desired BIN methods (EQUAL/SEQUENTIAL/TOLERANCE/

RANDOM) and limit value mode (VALUE/delta/delta%). The result of this setting can be obtained through the Handler interface. If directly connected to an external device such as a sorter, an immediate sorting can be performed.

F. EQUIVALENT CIRCUIT MODEL ANALYSIS



This function, which adopts the algorithm based on resonance theory, consists of 7 different equivalent circuit models. The 3-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.

Precision LCR Meter



LCR-6000 Series



FEATURES

- 3.5" Color LCD
- 5 Models: 10Hz ~ 20Hz/200Hz/1000Hz/2000Hz/3000Hz
- Consistent Test Frequency
- Basic Accuracy: 0.05%
- Measuring Speed up to 25ms (Max.)
- Full Frequency Range or Spot OPEN/SHORT
- 18 Major/Secondary Parameter Measurement Combinations and Two Additional Monitoring Parameters (Maximum Four Different Parameters Can Be Shown Simultaneously)
- DCR Measurement and Internal D.C. Bias Voltage (1.3.3V)
- PASS/FAIL Judgment
- Auto Level Control (Auto) Function
- 8Hz Frequency Between 50Hz and 140K, Totally 100Hz
- 10 Steps Linked Tests to Select Different Frequency Voltage and Current Criteria
- Standard Interface: RS-232C, Handler and USB Host/Device
- Compact Size, Ideal for Automatic Integration (PL, T/T Rack)

CFI Inc. introduces the brand-new high-precision LCR meter—LCR-6000 series, which, with five models, has a test frequency range extending from 10Hz/20Hz/200Hz/1000Hz/2000Hz (maximum) and with 0.05% basic accuracy. The compact size design, 3.5" height and 1.7" width is one of the practical features of the series which is the optimum space saver suitable for either bench top or in-line rack. The compact LCR-6000 series with abundant features is absolutely the excellent tool for R&D, production line, QC, etc. or 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 spandrel display parameters. In addition to simultaneously displaying setting criteria and measurement results, the series includes two additional monitoring parameters. In other words, there are four parameters, primary/secondary and two monitoring, simultaneously shown on the screen that tremendously enhance the measurement efficiency. The large 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 measuring zero specimen. Additionally, frequency range of the series is conservative that allows users to input precise frequency value to conduct the most precise test on components.

The LCR-6000 series also features diverse and flexible measurements to meet the measurement requirements of different materials. For instance, the series provides the automatic level control (Auto) function to satisfy the test voltage requirement of MTC. For inductive component measurement, the series provides the adjustable test current function and the D.C. resistance measurement function. The optional external test current adapter (T-2.1A) (also satisfy the measurement requirements. With respect to the D.C. bias voltage test for capacitive components requirements, the series allows users to conduct calibration measurement on materials by its internal 3.3.3V adjustable voltage or via an optional external bias voltage adapter (T-3.3V). Furthermore, 10 steps of linked test functionalities allow users to set testing parameters (either by frequency or voltage, or current) for each step based on users' requirements in order to observe the trend of DUT characteristics.

The LCR-6000 series has 10 memory slots defined by panel setting criteria to facilitate users in selecting test criteria and saving time in repeated settings. 10,000 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 LCR-6000 also allows USB to remove and store data as is to avoid users in compiling setting guidelines.

For the internal control, the LCR-6000 series provides handler interface and synchronizes with its measurement setting function (PASS, FAIL, 18Hz) to facilitate the connection with testing machine as well 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 look to store measurement results that saves time in developing programs.

The brand-new compact LCR-6000 series can effectively improve the limitation of space. Diverse measurement functionalities and display methods are making the series the high CF ratio choice in meeting the requirements of R&D, component assessment for engineering departments, quality setting requirements for component production, and QC for verification on component specifications.

SPECIFICATIONS	
TEST FREQUENCY	
	LCR 4300: 10Hz ~ 200Hz (±0.01%) (4 digits resolution)
	LCR 4200: 10Hz ~ 200Hz (±0.01%) (4 digits resolution)
	LCR 4100: 10Hz ~ 100Hz (±0.01%) (4 digits resolution)
	LCR 4000: 10Hz ~ 200Hz (±0.01%) (4 digits resolution)
	LCR 4002: 10Hz ~ 20Hz (±0.01%) (4 digits resolution)
OUTPUT IMPEDANCE	
	10 Ω / 30 Ω / 100 Ω adjustable
BASIC ACCURACY	
Slow / Mod	0.05%
Fast	0.1%
TEST SPEED	
	FAST: 25ms / MID: 100ms / SLOW: 333ms
TEST SIGNAL LEVELS	
AC Voltage	10.00mV ~ 3.00V (±10%) CV: 10.00mV ~ 3.00V (±4%)
Current	100.00μA ~ 30.00mA (±10%) CC: 100.00μA ~ 20.00mA (±6%) (@2VMax)
DCR	±2% 0.000A(Max), Output Impedance Fixed 10 Ω
DC BIAS	
Internal	+2.3V (0.5%), ±0.001V
DISPLAY RANGE	
R, X, Z	0.00001 Ω ~ 99.9999MΩ
G, B, Y	0.00001 Ω ~ 999.999S
C	0.00001 pF ~ 9999.99 nF
D	0.00001 ~ 9.9999S
Q	0.00001 ~ 99999.9
θ	-179.999° ~ 179.999°
θ+	-3.14159 ~ 3.14159
DCR	0.00001 Ω ~ 99.9999MΩ
Δ%	99999% ~ 99999%
TEST MODE	
Combinations	Cv R1, Cv R2, Cv Rp, Cv D, Cv Rp, Cv Q, Lx R1, Lx Q, Rx Q, Rx Q, R X, DCR, Z θ, Z θ+, Z θ-, Z D, Z Q, Auto LCR
Monitor Parameter (7 Selectable)	Z, D, Q, Var, Var+, Δ%, θ, θ+, θ-, R, X, C, R, Y



LCR-6000 Series

Rear Panel



SPECIFICATIONS	
LISTED MODE	18 steps
BIN FUNCTION	Comparator (BIN PASS / BIN FAIL)
MEMORY	
INT - Panel Setting	10 file name
INT - Measured Data	10000 Data (100)
USB Storage	10 file name for setting, 9999 file name for data, 999 Log file for LCD screen
OTHER FUNCTION	
Auto Level Control (AUC)	ON/OFF
Average	1~256 times
Trigger	INT / MAIN / EXT / BUS
Delay	0ms~40s
Judgment	PASS / FAIL
Screen Capture	Saving into USB (Bmp format)
DISPLAY	
3.5" LCD	RGB color (120x240)
INTERFACE	
RS-232C (SCPI), Handler, USB Host/USB Device	
POWER SOURCE	
AC 100V ~ 240V, 50 ~ 60Hz, Max. 15W	
DIMENSIONS & WEIGHT	
283(W) x 107(H) x 812(D) mm / Approx. 3kg	

ORDERING INFORMATION

LCR-6300	104Hz ~ 300kHz Precision LCR Meter
LCR-6200	104Hz ~ 200kHz Precision LCR Meter
LCR-6100	104Hz ~ 100kHz Precision LCR Meter
LCR-6000	104Hz ~ 20kHz Precision LCR Meter
LCR-6002	104Hz ~ 20kHz Precision LCR Meter

ACCESSORIES:
Safety Sheet x 1, Power Cord x 1, Test Fixture LCR-008 x 1, CD x 1 (User manual/PC software)

OPTION

LCR-16	+17V DC Bias Voltage Box
LCR-17	+2.5A DC Bias Current Box

OPTIONAL ACCESSORIES

LCR-05	Test Fixture for Auto & Fixed Lead Components
LCR-06	Reflow Chip Test Lead
LCR-07	Test Fixture, Test Wire with Alligator Clip
LCR-08	Test Fixture (Reflow) for SMD/Chip Components
LCR-15	Test Fixture for THT/Chip Components (E201 to LF10)
CTL-232	RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer, Approx. 2m
CTL-246	USB Cable, USB 2.0 A-B TYPE CABLE, 4P
CBA-423	Back Mount Kit
CBA-436	Back Mount Kit, 1P, 2P wire for test cable

FREE DOWNLOAD

PC Software	LCR-6000 Series
Driver	LabVIEW Driver

LCR-05

Reflow 100-40



Description:
Reflow for reflowing
and auto level test
component
Measuring ESR, Inductance
Max. Inductance: 100uH

LCR-06

Reflow 100-40



Description:
Reflow for reflowing
and auto level test
component
Measuring ESR, Inductance
Max. Inductance: 100uH

LCR-07

Reflow 100-40



Description:
Reflow for reflowing
and auto level test
component
Measuring ESR, Inductance
Max. Inductance: 100uH

LCR-08

Reflow 100-40



Description:
Reflow for reflowing
and auto level test
component
Measuring ESR, Inductance
Max. Inductance: 100uH

LCR-15

Reflow 100-40



Description:
Reflow for reflowing
and auto level test
component
Measuring ESR, Inductance
Max. Inductance: 100uH

LCR-16

Reflow 100-40



Description:
Reflow for reflowing
and auto level test
component
Measuring ESR, Inductance
Max. Inductance: 100uH

LCR-17

Reflow 100-40



Description:
Reflow for reflowing
and auto level test
component
Measuring ESR, Inductance
Max. Inductance: 100uH

Hand Held LCR Meter



LCR-916/915/914 (100kHz/10kHz/1kHz)



FEATURES

- * 20,000/2,000 Counts Dual Display
- * Test Frequency : 100Hz/10kHz/1kHz/100Hz/100kHz Depend on Model
- * Auto LCR Mode for DUT Measuring
- * 0.2% Basic Accuracy
- * Measurement Parameters : L, C, R(AC/DC), Q, G, ESR, θ
- * Parallel/Series Testing Mode
- * Sorting Mode for Quality Control
- * 2Wire or 3Wire Measurement Available
- * Data Hold and Zero Mode Supported
- * Max and Min (LCR-914 Only)
- * Auto Range, Auto Backlit
- * Low Battery Indication
- * Auto Power Off
- * Data Collection or DC Power Operation (Optional for LCR-913)

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 MHz/10/1kHz, providing greater flexibility to test a wider range of components. The LCR-916/915/914 uses a dual 20,000/2,000 count display. The 20,000 count display is used for displaying primary parameters such as capacitance, inductance, reactance and resistance and a 2,000 count display is for secondary parameters such as Q, G, ESR and θ 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 Max/Min (LCR-914 only).

The meter's 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.

SPECIFICATIONS			
	LCR-916	LCR-915	LCR-914
TEST FREQUENCY	100Hz/10kHz/1kHz/100kHz/100kHz Selectable	100Hz/10kHz/1kHz/100kHz Selectable	100Hz/10kHz/1kHz Selectable
DUAL SCALE	Main Display : 20,000/2,000 count Selectable; Sub Display : 2,000 count		
INDUCTANCE			
Range	20mH ~ 30mH depends on the selected test frequency		
Best Accuracy	± (0.2% rdg + 2 dgt)		
Resolution	0.001μH ~ 0.001mH depends on the selected range		
CAPACITANCE			
Range	20pF ~ 30mF depends on the selected test frequency		
Best Accuracy	± (0.2% rdg + 2 dgt)		
Resolution	0.001pF ~ 0.001mF depends on the selected range		
RESISTANCE			
Range	20Ω ~ 200MΩ depends on the selected test frequency		
Best Accuracy	± (0.2% rdg + 2 dgt)		
Resolution	0.001Ω ~ 0.001MΩ depends on the selected range		
DC RESISTANCE			
Range	200Ω ~ 200MΩ		
Best Accuracy	± (0.2% rdg + 2 dgt)		
Resolution	0.01Ω ~ 0.01MΩ depends on the selected range		
QUALITY FACTOR (Q)			
Range	0.000 ~ 999		
Accuracy	± 3 (main parameter accuracy)		
Best Resolution	0.001		
DISSIPATION FACTOR (D)			
Range	0.000 ~ 999		
Accuracy	± 3 (main parameter accuracy)		
Best Resolution	0.001		
PHASE ANGLE (θ)			
Range	-90.0° ~ 90.0°		
Accuracy	± (0.2% rdg + 3 dgt)		
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	10.0%, 10.2%, 10.25%, 10.5%, 10.8%, 11.0%, 11.2%, 11.4%, 11.6%, 11.8%, 12.0%, 12.2%, 12.4%, 12.6%, 12.8%, 13.0%, 13.2%, 13.4%, 13.6%, 13.8%, 14.0%, 14.2%, 14.4%, 14.6%, 14.8%, 15.0%, 15.2%, 15.4%, 15.6%, 15.8%, 16.0%, 16.2%, 16.4%, 16.6%, 16.8%, 17.0%, 17.2%, 17.4%, 17.6%, 17.8%, 18.0%, 18.2%, 18.4%, 18.6%, 18.8%, 19.0%, 19.2%, 19.4%, 19.6%, 19.8%, 20.0%, 20.2%, 20.4%, 20.6%, 20.8%, 21.0%, 21.2%, 21.4%, 21.6%, 21.8%, 22.0%, 22.2%, 22.4%, 22.6%, 22.8%, 23.0%, 23.2%, 23.4%, 23.6%, 23.8%, 24.0%, 24.2%, 24.4%, 24.6%, 24.8%, 25.0%, 25.2%, 25.4%, 25.6%, 25.8%, 26.0%, 26.2%, 26.4%, 26.6%, 26.8%, 27.0%, 27.2%, 27.4%, 27.6%, 27.8%, 28.0%, 28.2%, 28.4%, 28.6%, 28.8%, 29.0%, 29.2%, 29.4%, 29.6%, 29.8%, 30.0%, 30.2%, 30.4%, 30.6%, 30.8%, 31.0%, 31.2%, 31.4%, 31.6%, 31.8%, 32.0%, 32.2%, 32.4%, 32.6%, 32.8%, 33.0%, 33.2%, 33.4%, 33.6%, 33.8%, 34.0%, 34.2%, 34.4%, 34.6%, 34.8%, 35.0%, 35.2%, 35.4%, 35.6%, 35.8%, 36.0%, 36.2%, 36.4%, 36.6%, 36.8%, 37.0%, 37.2%, 37.4%, 37.6%, 37.8%, 38.0%, 38.2%, 38.4%, 38.6%, 38.8%, 39.0%, 39.2%, 39.4%, 39.6%, 39.8%, 40.0%, 40.2%, 40.4%, 40.6%, 40.8%, 41.0%, 41.2%, 41.4%, 41.6%, 41.8%, 42.0%, 42.2%, 42.4%, 42.6%, 42.8%, 43.0%, 43.2%, 43.4%, 43.6%, 43.8%, 44.0%, 44.2%, 44.4%, 44.6%, 44.8%, 45.0%, 45.2%, 45.4%, 45.6%, 45.8%, 46.0%, 46.2%, 46.4%, 46.6%, 46.8%, 47.0%, 47.2%, 47.4%, 47.6%, 47.8%, 48.0%, 48.2%, 48.4%, 48.6%, 48.8%, 49.0%, 49.2%, 49.4%, 49.6%, 49.8%, 50.0%, 50.2%, 50.4%, 50.6%, 50.8%, 51.0%, 51.2%, 51.4%, 51.6%, 51.8%, 52.0%, 52.2%, 52.4%, 52.6%, 52.8%, 53.0%, 53.2%, 53.4%, 53.6%, 53.8%, 54.0%, 54.2%, 54.4%, 54.6%, 54.8%, 55.0%, 55.2%, 55.4%, 55.6%, 55.8%, 56.0%, 56.2%, 56.4%, 56.6%, 56.8%, 57.0%, 57.2%, 57.4%, 57.6%, 57.8%, 58.0%, 58.2%, 58.4%, 58.6%, 58.8%, 59.0%, 59.2%, 59.4%, 59.6%, 59.8%, 60.0%, 60.2%, 60.4%, 60.6%, 60.8%, 61.0%, 61.2%, 61.4%, 61.6%, 61.8%, 62.0%, 62.2%, 62.4%, 62.6%, 62.8%, 63.0%, 63.2%, 63.4%, 63.6%, 63.8%, 64.0%, 64.2%, 64.4%, 64.6%, 64.8%, 65.0%, 65.2%, 65.4%, 65.6%, 65.8%, 66.0%, 66.2%, 66.4%, 66.6%, 66.8%, 67.0%, 67.2%, 67.4%, 67.6%, 67.8%, 68.0%, 68.2%, 68.4%, 68.6%, 68.8%, 69.0%, 69.2%, 69.4%, 69.6%, 69.8%, 70.0%, 70.2%, 70.4%, 70.6%, 70.8%, 71.0%, 71.2%, 71.4%, 71.6%, 71.8%, 72.0%, 72.2%, 72.4%, 72.6%, 72.8%, 73.0%, 73.2%, 73.4%, 73.6%, 73.8%, 74.0%, 74.2%, 74.4%, 74.6%, 74.8%, 75.0%, 75.2%, 75.4%, 75.6%, 75.8%, 76.0%, 76.2%, 76.4%, 76.6%, 76.8%, 77.0%, 77.2%, 77.4%, 77.6%, 77.8%, 78.0%, 78.2%, 78.4%, 78.6%, 78.8%, 79.0%, 79.2%, 79.4%, 79.6%, 79.8%, 80.0%, 80.2%, 80.4%, 80.6%, 80.8%, 81.0%, 81.2%, 81.4%, 81.6%, 81.8%, 82.0%, 82.2%, 82.4%, 82.6%, 82.8%, 83.0%, 83.2%, 83.4%, 83.6%, 83.8%, 84.0%, 84.2%, 84.4%, 84.6%, 84.8%, 85.0%, 85.2%, 85.4%, 85.6%, 85.8%, 86.0%, 86.2%, 86.4%, 86.6%, 86.8%, 87.0%, 87.2%, 87.4%, 87.6%, 87.8%, 88.0%, 88.2%, 88.4%, 88.6%, 88.8%, 89.0%, 89.2%, 89.4%, 89.6%, 89.8%, 90.0%, 90.2%, 90.4%, 90.6%, 90.8%, 91.0%, 91.2%, 91.4%, 91.6%, 91.8%, 92.0%, 92.2%, 92.4%, 92.6%, 92.8%, 93.0%, 93.2%, 93.4%, 93.6%, 93.8%, 94.0%, 94.2%, 94.4%, 94.6%, 94.8%, 95.0%, 95.2%, 95.4%, 95.6%, 95.8%, 96.0%, 96.2%, 96.4%, 96.6%, 96.8%, 97.0%, 97.2%, 97.4%, 97.6%, 97.8%, 98.0%, 98.2%, 98.4%, 98.6%, 98.8%, 99.0%, 99.2%, 99.4%, 99.6%, 99.8%, 100.0%, 100.2%, 100.4%, 100.6%, 100.8%, 101.0%, 101.2%, 101.4%, 101.6%, 101.8%, 102.0%, 102.2%, 102.4%, 102.6%, 102.8%, 103.0%, 103.2%, 103.4%, 103.6%, 103.8%, 104.0%, 104.2%, 104.4%, 104.6%, 104.8%, 105.0%, 105.2%, 105.4%, 105.6%, 105.8%, 106.0%, 106.2%, 106.4%, 106.6%, 106.8%, 107.0%, 107.2%, 107.4%, 107.6%, 107.8%, 108.0%, 108.2%, 108.4%, 108.6%, 108.8%, 109.0%, 109.2%, 109.4%, 109.6%, 109.8%, 110.0%, 110.2%, 110.4%, 110.6%, 110.8%, 111.0%, 111.2%, 111.4%, 111.6%, 111.8%, 112.0%, 112.2%, 112.4%, 112.6%, 112.8%, 113.0%, 113.2%, 113.4%, 113.6%, 113.8%, 114.0%, 114.2%, 114.4%, 114.6%, 114.8%, 115.0%, 115.2%, 115.4%, 115.6%, 115.8%, 116.0%, 116.2%, 116.4%, 116.6%, 116.8%, 117.0%, 117.2%, 117.4%, 117.6%, 117.8%, 118.0%, 118.2%, 118.4%, 118.6%, 118.8%, 119.0%, 119.2%, 119.4%, 119.6%, 119.8%, 120.0%, 120.2%, 120.4%, 120.6%, 120.8%, 121.0%, 121.2%, 121.4%, 121.6%, 121.8%, 122.0%, 122.2%, 122.4%, 122.6%, 122.8%, 123.0%, 123.2%, 123.4%, 123.6%, 123.8%, 124.0%, 124.2%, 124.4%, 124.6%, 124.8%, 125.0%, 125.2%, 125.4%, 125.6%, 125.8%, 126.0%, 126.2%, 126.4%, 126.6%, 126.8%, 127.0%, 127.2%, 127.4%, 127.6%, 127.8%, 128.0%, 128.2%, 128.4%, 128.6%, 128.8%, 129.0%, 129.2%, 129.4%, 129.6%, 129.8%, 130.0%, 130.2%, 130.4%, 130.6%, 130.8%, 131.0%, 131.2%, 131.4%, 131.6%, 131.8%, 132.0%, 132.2%, 132.4%, 132.6%, 132.8%, 133.0%, 133.2%, 133.4%, 133.6%, 133.8%, 134.0%, 134.2%, 134.4%, 134.6%, 134.8%, 135.0%, 135.2%, 135.4%, 135.6%, 135.8%, 136.0%, 136.2%, 136.4%, 136.6%, 136.8%, 137.0%, 137.2%, 137.4%, 137.6%, 137.8%, 138.0%, 138.2%, 138.4%, 138.6%, 138.8%, 139.0%, 139.2%, 139.4%, 139.6%, 139.8%, 140.0%, 140.2%, 140.4%, 140.6%, 140.8%, 141.0%, 141.2%, 141.4%, 141.6%, 141.8%, 142.0%, 142.2%, 142.4%, 142.6%, 142.8%, 143.0%, 143.2%, 143.4%, 143.6%, 143.8%, 144.0%, 144.2%, 144.4%, 144.6%, 144.8%, 145.0%, 145.2%, 145.4%, 145.6%, 145.8%, 146.0%, 146.2%, 146.4%, 146.6%, 146.8%, 147.0%, 147.2%, 147.4%, 147.6%, 147.8%, 148.0%, 148.2%, 148.4%, 148.6%, 148.8%, 149.0%, 149.2%, 149.4%, 149.6%, 149.8%, 150.0%, 150.2%, 150.4%, 150.6%, 150.8%, 151.0%, 151.2%, 151.4%, 151.6%, 151.8%, 152.0%, 152.2%, 152.4%, 152.6%, 152.8%, 153.0%, 153.2%, 153.4%, 153.6%, 153.8%, 154.0%, 154.2%, 154.4%, 154.6%, 154.8%, 155.0%, 155.2%, 155.4%, 155.6%, 155.8%, 156.0%, 156.2%, 156.4%, 156.6%, 156.8%, 157.0%, 157.2%, 157.4%, 157.6%, 157.8%, 158.0%, 158.2%, 158.4%, 158.6%, 158.8%, 159.0%, 159.2%, 159.4%, 159.6%, 159.8%, 160.0%, 160.2%, 160.4%, 160.6%, 160.8%, 161.0%, 161.2%, 161.4%, 161.6%, 161.8%, 162.0%, 162.2%, 162.4%, 162.6%, 162.8%, 163.0%, 163.2%, 163.4%, 163.6%, 163.8%, 164.0%, 164.2%, 164.4%, 164.6%, 164.8%, 165.0%, 165.2%, 165.4%, 165.6%, 165.8%, 166.0%, 166.2%, 166.4%, 166.6%, 166.8%, 167.0%, 167.2%, 167.4%, 167.6%, 167.8%, 168.0%, 168.2%, 168.4%, 168.6%, 168.8%, 169.0%, 169.2%, 169.4%, 169.6%, 169.8%, 170.0%, 170.2%, 170.4%, 170.6%, 170.8%, 171.0%, 171.2%, 171.4%, 171.6%, 171.8%, 172.0%, 172.2%, 172.4%, 172.6%, 172.8%, 173.0%, 173.2%, 173.4%, 173.6%, 173.8%, 174.0%, 174.2%, 174.4%, 174.6%, 174.8%, 175.0%, 175.2%, 175.4%, 175.6%, 175.8%, 176.0%, 176.2%, 176.4%, 176.6%, 176.8%, 177.0%, 177.2%, 177.4%, 177.6%, 177.8%, 178.0%, 178.2%, 178.4%, 178.6%, 178.8%, 179.0%, 179.2%, 179.4%, 179.6%, 179.8%, 180.0%, 180.2%, 180.4%, 180.6%, 180.8%, 181.0%, 181.2%, 181.4%, 181.6%, 181.8%, 182.0%, 182.2%, 182.4%, 182.6%, 182.8%, 183.0%, 183.2%, 183.4%, 183.6%, 183.8%, 184.0%, 184.2%, 184.4%, 184.6%, 184.8%, 185.0%, 185.2%, 185.4%, 185.6%, 185.8%, 186.0%, 186.2%, 186.4%, 186.6%, 186.8%, 187.0%, 187.2%, 187.4%, 187.6%, 187.8%, 188.0%, 188.2%, 188.4%, 188.6%, 188.8%, 189.0%, 189.2%, 189.4%, 189.6%, 189.8%, 190.0%, 190.2%, 190.4%, 190.6%, 190.8%, 191.0%, 191.2%, 191.4%, 191.6%, 191.8%, 192.0%, 192.2%, 192.4%, 192.6%, 192.8%, 193.0%, 193.2%, 193.4%, 193.6%, 193.8%, 194.0%, 194.2%, 194.4%, 194.6%, 194.8%, 195.0%, 195.2%, 195.4%, 195.6%, 195.8%, 196.0%, 196.2%, 196.4%, 196.6%, 196.8%, 197.0%, 197.2%, 197.4%, 197.6%, 197.8%, 198.0%, 198.2%, 198.4%, 198.6%, 198.8%, 199.0%, 199.2%, 199.4%, 199.6%, 199.8%, 200.0%, 200.2%, 200.4%, 200.6%, 200.8%, 201.0%, 201.2%, 201.4%, 201.6%, 201.8%, 202.0%, 202.2%, 202.4%, 202.6%, 202.8%, 203.0%, 203.2%, 203.4%, 203.6%, 203.8%, 204.0%, 204.2%, 204.4%, 204.6%, 204.8%, 205.0%, 205.2%, 205.4%, 205.6%, 205.8%, 206.0%, 206.2%, 206.4%, 206.6%, 206.8%, 207.0%, 207.2%, 207.4%, 207.6%, 207.8%, 208.0%, 208.2%, 208.4%, 208.6%, 208.8%, 209.0%, 209.2%, 209.4%, 209.6%, 209.8%, 210.0%, 210.2%, 210.4%, 210.6%, 210.8%, 211.0%, 211.2%, 211.4%, 211.6%, 211.8%, 212.0%, 212.2%, 212.4%, 212.6%, 212.8%, 213.0%, 213.2%, 213.4%, 213.6%, 213.8%, 214.0%, 214.2%, 214.4%, 214.6%, 214.8%, 215.0%, 215.2%, 215.4%, 215.6%, 215.8%, 216.0%, 216.2%, 216.4%, 216.6%, 216.8%, 217.0%, 217.2%, 217.4%, 217.6%, 217.8%, 218.0%, 218.2%, 218.4%, 218.6%, 218.8%, 219.0%, 219.2%, 219.4%, 219.6%, 219.8%, 220.0%, 220.2%, 220.4%, 220.6%, 220.8%, 221.0%, 221.2%, 221.4%, 221.6%, 221.8%, 222.0%, 222.2%, 222.4%, 222.6%, 222.8%, 223.0%, 223.2%, 223.4%, 223.6%, 223.8%, 224.0%, 224.2%, 224.4%, 224.6%, 224.8%, 225.0%, 225.2%, 225.4%, 225.6%, 225.8%, 226.0%, 226.2%, 226.4%, 226.6%, 226.8%, 227.0%, 227.2%, 227.4%, 227.6%, 227.8%, 228.0%, 228.2%, 228.4%, 228.6%, 228.8%, 229.0%, 229.2%, 229.4%, 229.6%, 229.8%, 230.0%, 230.2%, 230.4%, 230.6%, 230.8%, 231.0%, 231.2%, 231.4%, 231.6%, 231.8%, 232.0%, 232.2%, 232.4%, 232.6%, 232.8%, 233.0%, 233.2%, 233.4%, 233.6%, 233.8%, 234.0%, 234.2%, 234.4%, 234.6%, 234.8%, 235.0%, 235.2%, 235.4%, 235.6%, 235.8%, 236.0%, 236.2%, 236.4%, 236.6%, 236.8%, 237.0%, 237.2%, 237.4%, 237.6%, 237.8%, 238.0%, 238.2%, 238.4%, 238.6%, 238.8%, 239.0%, 239.2%, 239.4%, 239.6%, 239.8%, 240.0%, 240.2%, 240.4%, 240.6%, 240.8%, 241.0%, 241.2%, 241.4%, 241.6%, 241.8%, 242.0%, 242.2%, 242.4%, 242.6%, 242.8%, 243.0%, 243.2%, 243.4%, 243.6%, 243.8%, 244.0%, 244.2%, 244.4%, 244.6%, 244.8%, 245.0%, 245.2%, 245.4%, 245.6%, 245.8%, 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271.0%, 271.2%, 271.4%, 271.6%, 271.8%, 272.0%, 272.2%, 272.4%, 272.6%, 272.8%, 273.0%, 273.2%, 273.4%, 273.6%, 273.8%, 274.0%, 274.2%, 274.4%, 274.6%, 274.8%, 275.0%, 275.2%, 275.4%, 275.6%, 275.8%, 276.0%, 276.2%, 276.4%, 276.6%, 276.8%, 277.0%, 277.2%, 277.4%, 277.6%, 277.8%, 278.0%, 278.2%, 278.4%, 278.6%, 278.8%, 279.0%, 279.2%, 279.4%, 279.6%, 279.8%, 280.0%, 280.2%, 280.4%, 280.6%, 280.8%, 281.0%, 281.2%, 281.4%, 281.6%, 281.8%, 282.0%, 282.2%, 282.4%, 282.6%, 282.8%, 283.0%, 283.2%, 283.4%, 283.6%, 283.8%, 284.0%, 284.2%, 284.4%, 284.6%, 284.8%, 285.0%, 285.2%, 285.4%, 285.6%, 285.8%, 286.0%, 286.2%, 286.4%, 286.6%, 286.8%, 287.0%, 287.2%, 287.4%, 287.6%, 287.8%, 288.0%, 288.2%, 288.4%, 288.6%, 288.8%, 289.0%, 289.2%, 289.4%, 289.6%, 289.8%, 290.0%, 290.2%, 290.4%, 290.6%, 290.8%, 291.0%, 291.2%, 291.4%, 291.6%, 291.8%, 292.0%, 292.2%, 292.4%, 292.6%, 292.8%, 293.0%, 293.2%, 293.4%, 293.6%, 293.8%, 294.0%, 294.2%, 294.4%, 294.6%, 294.8%, 295.0%, 295.2%, 295.4%, 295.6%, 295.8%, 296.0%, 296.2%, 296.4%, 296.6%, 296.8%, 297.0%, 297.2%, 297.4%, 297.6%, 297.8%, 298.0%, 298.2%, 298.4%, 298.6%, 298.8%, 299.0%, 299.2%, 299.4%, 299.6%, 299.8%, 300.0%, 300.2%, 300.4%, 300.6%, 300.8%, 301.0%, 301.2%, 301.4%, 301.6%, 301.8%, 302.0%, 302.2%, 302.4%, 302.6%, 302.8%, 303.0%, 303.2%, 303.4%, 303.6%, 303.8%, 304.0%, 304.2%, 304.4%, 304.6%, 304.8%, 305.0%, 305.2%, 305.4%, 305.6%, 305.8%, 306.0%, 306.2%, 306.4%, 306.6%, 306.8%, 307.0%, 307.2%, 307.4%, 307.6%, 307.8%, 308.0%, 308.2%, 308.4%, 308.6%, 308.8%, 309.0%, 309.2%, 309.4%, 309.6%, 309.8%, 310.0%, 310.2%, 310.4%, 310.6%, 310.8%, 311.0%, 311.2%, 311.4%, 311.6%, 311.8%, 312.0%, 312.2%, 312.4%, 312.6%, 312.8%, 313.0%, 313.2%, 313.4%, 313.6%, 313.8%, 314.0%, 314.2%, 314.4%, 314.6%, 314.8%, 315.0%, 315.2%, 315.4%, 315.6%, 315.8%, 316.0%, 316.2%, 316.4%, 316.6%, 316.8%, 317.0%, 317.2%, 317.4%, 317.6%, 317.8%, 318.0%, 318.2%, 318.4%, 318.6%, 318.8%, 319.0%, 319.2%, 319.4%, 319.6%, 319.8%, 320.0%, 320.2%, 320.4%, 320.6%, 320.8%, 321.0%, 321.2%, 321.4%, 321.6%, 321.8%, 322.0%, 322.2%, 322.4%, 322.6%, 322.8%, 323.0%, 323.2%, 323.4%, 323.6%, 323.8%, 324.0%, 324.2%, 324.4%, 324.6%, 324.8%, 325.0%, 325.2%, 325.4%, 325.6%, 325.8%, 326.0%, 326.2%, 326.4%, 326.6%, 326.8%, 327.0%, 327.2%, 327.4%, 327.6%, 327.8%, 328.0%, 328.2%, 328.4%, 328.6%, 328.8%, 329.0%, 329.2%, 329.4%, 329.6%, 329.8%, 330.0%, 330.2%, 330.4%, 330.6%, 330.8%, 331.0%, 331.2%, 331.4%, 331.6%, 331.8%, 332.0%, 332.2%, 332.4%, 332.6%, 332.8%, 333.0%, 333.2%, 333.4%, 333.6%, 333.8%, 334.0%, 334.2%, 334.4%, 334.6%, 334.8%, 335.0%, 335.2%, 335.4%, 335.6%, 335.8%, 336.0%, 336.2%, 336.4%, 336.6%, 336.8%, 337.0%, 337.2%, 337.4%, 337.6%, 337.8%, 338.0%, 338.2%, 338.4%, 338.6%, 338.8%, 339.0%, 339.2%, 339.4%, 339.6%, 339.8%, 340.0%, 340.2%, 340.4%, 340.6%, 340.8%, 341.0%, 341.2%, 341.4%, 341.6%, 341.8%, 342.0%, 342.2%, 342.4%, 342.6%, 342.8%, 343.0%, 343.2%, 343.4%, 343.6%, 343.8%, 344.0%, 344.2%, 344.4%, 344.6%, 344.8%, 345.0%, 345.2%, 345.4%, 345.6%, 345.8%, 346.0%, 346.2%,		



ORDERING INFORMATION

LCR-916	100kHz Handheld LCR Meter
LCR-915	15kHz Handheld LCR Meter
LCR-914	10kHz Handheld LCR Meter

ACCESSORIES:
Use MAX443, Battery

OPTIONAL ACCESSORIES

Opt01	4Wire DCP test lead
Opt02	Accessory Pack for LCR-915
Opt03	Accessory Pack for LCR-914
Opt04	Magnetic Hang Kit for LCR-914
CT1-253	USB Cable, USB 2.0 A-male B type, Approx. 1400mm

Note: 1. The accessory pack for LCR-915 includes 5Wire test probe, AC adapter, USB cable and CD.



ACCESSORIES GUIDE

MODEL	LCR-916	LCR-915	LCR-914
① Shorting Cable	Standard	Standard	Standard
② Alligator Clip	Standard	Standard	Standard
③ Magnetic Hang Kit	Standard	Standard	Opt. 04
④ 4 Wire SMD Probe	Standard	Opt. 02	Opt. 03
⑤ AC Power Adapter	Standard	Opt. 02	Opt. 03
⑥ USB Cable	Standard	Opt. 02	Opt. 03
⑦ PC Software (CD)	Standard	Opt. 02	N/A
⑧ 4 Wire DP 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 CPT 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. Those 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, CSB-01/03, has a function that distributes the test voltage or current provided by the CPT-9905A/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/R/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. Thus, 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. CW Testis offers a series of Safety Testers for manufacturers to meet the mentioned regulations. The Safety Testers offered by CW Testis, CPT-15000/12000/9900/9800/9600/9500 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: Verifies that an electrical connection exists between the main 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 300VA, 200VA and 100VA test capacity which combines AC/DC Hi-pot, Insulation Resistance and high current ground (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 shut off 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-9900/9800/9600 Series offer selectable Arc detection setting value 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 unfavorable 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 190 AU/TO, Each AUTO 16 Menu Steps of Test Set-Up

The GPT-9900/9800 Series provide 16 steps for test set-ups, each Menu step containing one electrical safety test. All 16 steps can be executed just by pressing a button. The GPT-9900/9800 Series offer 190 AUTO of memories to facilitate testing of up to 190 different products in a production line.

SAFETY TESTING INSTRUMENTS

Model	Description / Key Features	Type
CPT-15004	AC 500V AC/DC/IR/USB Electrical Safety Analyzer	E33-38
CPT-15003	AC 500V AC/DC/IR Electrical Safety Analyzer	E33-38
CPT-15002	AC 500V AC/DC Electrical Safety Analyzer	E33-38
CPT-15001	AC 500V AC Electrical Safety Analyzer	E33-38
CPT-12004	AC 200V AC/DC/IR/USB Electrical Safety Analyzer	E33-38
CPT-12003	AC 200V AC/DC/IR Electrical Safety Analyzer	E33-38
CPT-12002	AC 200V AC/DC Electrical Safety Analyzer	E33-38
CPT-12001	AC 200V AC Electrical Safety Analyzer	E33-38
CPT-9904	AC 500V AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester	E39-40
CPT-9903A	AC 500V AC/DC Withstanding Voltage/Insulation Resistance Tester	E39-40
CPT-9902A	AC 500V AC/DC Withstanding Voltage Tester	E39-40
CPT-9901A	AC 500V AC Withstanding Voltage Tester	E39-40
CPT-9804	AC 200V AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester	E39-40
CPT-9803	AC 200V AC/DC Withstanding Voltage/Insulation Resistance Tester	E39-40
CPT-9802	AC 200V AC/DC Withstanding Voltage Tester	E39-40
CPT-9801	AC 200V AC Withstanding Voltage Tester	E39-40
CSB-01	Multiplex Scanner Box – 6CH HV	E43-42
CSB-02	Multiplex Scanner Box – 6CH HV/2CH G.B.	E43-42
GCT-9040	AC Ground Bond Tester	E43-44
CPT-9605	AC 100V AC/DC Withstanding Voltage/Insulation Resistance Tester	E43-46
CPT-9612	AC 100V AC Withstanding Voltage/Insulation Resistance Tester	E43-46
CPT-9602	AC 100V AC/DC Withstanding Voltage Tester	E43-46
CPT-9601	AC 100V AC Withstanding Voltage Tester	E43-46
CPT-9513	Multi-Channel Input Tester	E43-50
CPT-9505	Multi-Channel Input Tester	E43-50
GLC-10000	Leakage Current Tester	E51-52
GLC-9000	Leakage Current Tester	E53-54

GPT-SERIES QUICK SELECTION GUIDE

MODEL	Output Capacity	Inputs						Outputs				
		ACW	DCW	IR	CB	CC	SWEEP	ARC Detect	RAMP Up	RAMP Down	Rear Output	Barcode
GPT-15004	500VA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPT-15003	500VA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
GPT-15002	500VA	✓				✓	✓	✓	✓	✓	✓	✓
GPT-15001	500VA	✓				✓	✓	✓	✓	✓	✓	✓
GPT-12004	200VA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPT-12003	200VA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
GPT-12002	200VA	✓	✓			✓	✓	✓	✓	✓	✓	✓
GPT-12001	200VA	✓				✓	✓	✓	✓	✓	✓	✓
GPT-9904	500VA	✓	✓	✓	✓		✓	✓	✓		✓	
GPT-9903A	500VA	✓	✓	✓			✓	✓	✓		✓	
GPT-9902A	500VA	✓	✓				✓	✓	✓		✓	
GPT-9901A	500VA	✓					✓	✓	✓		✓	
GPT-6804	200VA	✓	✓	✓	✓			✓	✓			
GPT-6803	200VA	✓	✓	✓				✓	✓			
GPT-6802	200VA	✓	✓					✓	✓			
GPT-6801	200VA	✓						✓	✓			
GPT-6403	100VA	✓	✓	✓				✓				
GPT-6412	100VA	✓		✓				✓				
GPT-6402	100VA	✓	✓					✓				
GPT-6401	100VA	✓						✓				
GPT-8513	150VA	✓	✓	✓		✓		✓	✓	✓	BDH Scanner	
GPT-8503	150VA	✓	✓	✓		✓		✓	✓	✓	BDH Scanner	

* Short Circuit < 200mA

AC/DC/IR/GB Electrical Safety Analyzer



GPT-15004

NEW



GPT-15003/15002/15001

NEW



GPT-12004

NEW



GPT-12003/12002/12001

NEW



FEATURES

- 200V/500V AC Test Capacity (500V short circuit current > 200mA)
- 7" TFT LCD
- Comply with IEC 61010-2-014 Design Requirement
- Manual Test Mode/Auto Test Mode
- RMS Current Measurement
- Zero Crossing Turn-on Operation
- Controlable Ramp-up & Ramp-down Time
- Diagnostic & Analysis Function
- Capacitive Load Testing Capability up to 4.7µF
- Sweep Function for DUT Characteristic Analysis
- Convenience Label AUTO Mode Easy to Read Result and Judge
- Internal Storage and USB Storage Available
- Barcode Function Available
- Setting Data Export/Import
- Real Point Output Available
- Standard Interface: RS-232C, USB host/device and Signal I/O
- Optional Interface: GPIB or LAN
- Universal Power Input

GPT series introduces the flagship model 200V/500V output capacity safety analyzer the GPT-10000 Series, which is the first safety analyzer in the world to comply with IEC 61010-2-014 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, which stipulates that the requirements of the software and hardware interface must be followed while designing high voltage and insulation resistance test and measurement instruments or so as to ensure that users are provided with necessary protection and warning while using the instruments.

The GPT-10000 Series safety analyzer has eight models: GPT-10004/GPT-10004A features AC/DC withstanding voltage test, insulation resistance test, AC ground bond test and continuity test; GPT-10002/GPT-10002A conducts AC/DC withstanding voltage test, insulation resistance test, and continuity test; GPT-10003/GPT-10003A carries on AC/DC withstanding voltage test and continuity test; GPT-10001/GPT-10001A executes AC 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 waveforms so as to guarantee a stable high-voltage output while conducting AC withstanding voltage test on the DUT to meet safety regulations such as IEC - EN - UL - CSA - GB - (R) that demand the test requirements for various electronic/electrical products or parts.

To comply with IEC 61010-2-014 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 set-aside on/off switch design (START key) and various optional mechanisms for test activation (for instance, press and hold for 3 second to activate, activation by pressing display keys, etc.) are incorporated into the series to avoid accidentally reaching that results in high voltage/high current output causing damage and danger to products or users. High illumination LED light (flashing or permanently lit) and a high-volume audio indicator are included in designing the series to provide warnings of the status of the ongoing tests or judgment results from the safety analysts. On top of that, the DUT will be automatically discharged to the safe voltage (approximately 50V) after each test to prevent large test voltage from causing harm to users.

The series utilizes a 7-inch color TFT LCD and inherits 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 50V), DC withstanding voltage test (DC 50V), insulation resistance test (DC 50V~1000V), ground bond test (AC 12V), and grounding continuity test (DC 100mA fixed). The series also caters with superb output adjustment resolution, measurement resolution (for withstanding voltage, Ipk, DC withstanding voltage, G, Ipk, insulation resistance, 0.1MΩ, ground bond, 6.1mΩ, continuity test, 0.01V), controllable voltage ramp up and ramp down time settings, and upper/lower limit judgment settings, and large capacitance test capacity (up to 4.7µF) for DUT with large capacitance such as surge absorber and large capacitor on the input terminal of EMC/EMI prevention. For insulation resistance, provides 100k pre-charged current (fixed) to five rapidly-fade change the DUT's capacitive load and then to conduct test and measurement so as to avoid equipment from fluctuating high-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, judgment results are recorded after testing and the test results can be shown by bar graph on the display. Users can immediately learn the status of product tests and judgment distribution during the manufacturing process without using a PC. The other strong feature is the sweep function, which can be used for the analysis on products' weak point. Users can use the sweep menu to set the curve diagram of the test results after finishing the functional tests. Users can also select any time prioritizing the process to analyze the relation between voltage and current (when ACW or DCF is selected). The test result of the certain period of time can be swept by setting start and stop time points to analyze the relation between voltage and current under that time frame. Furthermore, the tabular continuity test function can combine 10 manual memory sets to carry out automatic tests or manual pressing users with auto connection device to connect test automatic test so as to increase the test items of the continuity test. Users can obtain various test values and judgment results without switching to a different display screen.

Other functions and features of the GPT-10000 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 imported to another GPT-10000 through USB flash drive to quick replication and expansion of production line equipment; barcode scanner can be connected to the front panel USB host of GPT-10000 for managing test condition of DUT and then be able to quick and correctly recall required test condition; rear output terminal for system integration; front-panel remote control terminal-mount-learn-panel; Signal I/O for users to externally control the analyzer's output-test level; upon the requirement, the GPT group 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 WITHSTANDING		
Output Voltage Range	0.000V~4.000V	0.000V~4.000V
Output Voltage Resolution	1V	1V
Output Voltage Accuracy	+17% of reading + 2V (no load)	+17% of reading + 2V (no load)
Maximum Rated Load	200 VA (20V/100VA)	200 VA (20V/100VA)
Maximum Rated Current	100mA (0.5VA/5V, 5V)	100mA (0.5VA/5V, 5V)
Output Voltage Waveform	100V (0.25A/5V, 5V)	100V (0.25A/5V, 5V)
Output Voltage Frequency	Line select	Line select
Voltage Regulation	±0.1% / ±0.1% selectable	±0.1% / ±0.1% selectable
Voltmeter Accuracy	±17% of reading + 1V	±17% of reading + 1V
Current Measurement Range	1µA~100.0mA	1µA~100.0mA
Current Meter Resolution	1µA / 10µA / 100µA	1µA / 10µA
Current Measurement Accuracy	±1.1% of reading + 10µA	±1.1% of reading + 10µA
Current Offset	Adjustable	Adjustable
Wireless Comparison Method	ABC Method	ABC Method
RAMP UP (Rise Time)	0.1s~999.9s	0.1s~999.9s
RAMP DOWN (Fall Time)	0.1s~999.9s	0.1s~999.9s
THRESHOLD Test Time	0.01s~999.9s	0.01s~999.9s
TEST TIME	0.01s~999.9s	0.01s~999.9s
CND	On/Off	On/Off

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

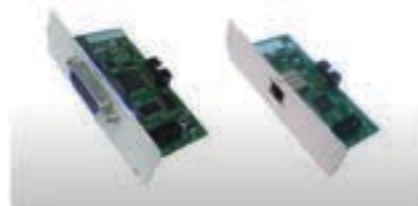
GHT-115 High Voltage/Continuity Test Lead



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

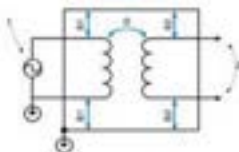
OPTION

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 61010-2-014 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-30000 Series is the world's first safety analyzer to comply with IEC 61010-2-014 (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/charging 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-30000 Series provides a withstand voltage test voltage (AC 5V/DC 6V) that can be adjusted in 1V steps with current measurement resolutions up to 1 μ A (ACR) or 0.1 μ A (DCR) to realize the small leakage current measurement for products or components. In addition, the insulation resistance test voltage can be adjusted in 30V steps from a DC output range of 30V to 1200V and the resistance measurement resolution can reach 0.1M Ω . Since most safety regulations require AC power supply for ground bond test, the

GPT-30000 Series provides 80ac (open) and 1A to 32Aac current for ground bond test with a resistance measurement resolution of 0.1 Ω . The entire series provides the continuity grounding test function with a 100mAac (fixed) test source and a measurement resolution of 0.01 Ω 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-30000 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 soon as the PASS setting is met, or; TIMER: judgment is conducted when the timer time is reached.

D. STATISTIC AND ANALYSIS

PASS, FAIL, Abnormal & NOCHA Abnormal



PASS & FAIL Abnormal Distribution in Each Test Function

Statistic



Analysis

The GPT-10000 Series provides the statistic function, which can record the test functions and judgment results in the temporary storage area (40,000 bits 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 fail 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



The values of point by cursor

Sweep Function



Display TEST results information

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 CON in the last item of the table to automatically connect the automatic measurement of the next position (such as AUTO-BIG - AUTO-G11).

F. BARCODE FUNCTION

The scanned barcode is an auto multiplier with AUTO-BIG code



Barcode Setting

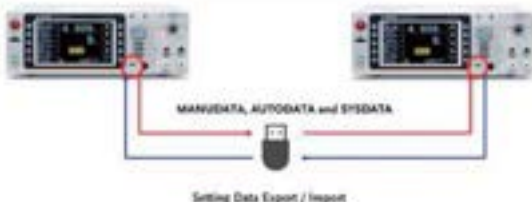


Barcode Execute

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



In order to expedite the deployment of the production line and achieve the consistency of test conditions, CPT-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 this safety test, CPT-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 turn on the internal memory storage function (up to 30,000 tests) 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 entire series is equipped with RS-232C and USB device (GPIB or LAN is optional) for easy retrieval of test data and results by connecting a PC.

I. USER DEFINED SIGNAL I/O



For interface connections, the CPT-10000 Series offers external control as a variety of sensibly 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 as per 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

- 500V and 200V AC Test Capacity
- 200 x 64 for 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: 1μA for Measuring Current, 2V 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 GPRS (Optional)

The GPT-9900 series is built upon a platform of AC 1000V, and the GPT-9800 series is built upon a platform of AC 200V maximum power output. Each series with 4 models, the GPT-9904 and GPT-9904 are a 4-in-1 model capable of performing AC withstanding, DC withstanding, insulation resistance and ground bond tests. The GPT-9903A and GPT-9800 are a 3-in-1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9903A and GPT-9800 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 designed to improve the influence from the voltage fluctuation of input AC source. Each series supports the major test 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 50V), DC withstanding (DC 60V), insulation resistance (DC 50V ~ 1000V) and ground bond (AC 12A 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 "Trace" function of the GPT-9900 series is able to display the test results point by point along the testing period to form a trace graph. This graphic display performs the characteristic verification of a DUT through observing the parameter response to the changes of the applied voltage or current or testing time.

Other significant functions and features are also incorporated with both series such as the output voltage is automatically cut off within 150μs 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 terminal on the front panel and a signal I/O port in the rear panel provided as the means for remote start/stop control of the safety tests, and RS-232C, USB and GPRS (optional) interfaces available for PC remote control and test result logging.

SPECIFICATIONS	GPT-9800 Series	GPT-9900 Series
AC WITHSTANDING		
Output Voltage Range	0.000V ~ 1.000V ac	0.000V ~ 1.000V ac
Output Voltage Resolution	20mV	20mV
Output Voltage Accuracy	±1% of setting + 1V (no load)	±1% of setting + 1V (no load)
Maximum Rated Load	200 VA (240V/0.83A)	200 VA (240V/0.83A)
Maximum Rated Current	40mA (0.30V ~ 0.5V)	100mA (0.30V ~ 0.5V)
Output Voltage Waveform	Sine wave	Sine wave
Output Voltage Frequency	50Hz/60Hz selectable	50Hz/60Hz selectable
Voltage Regulation	±1% of setg + 2V (full load = no load)	±1% of setg + 2V (full load = no load)
Voltagemeter Accuracy	±1% of setg + 2V	±1% of setg + 2V
Current Measurement Range	0.00mA ~ 40.00mA	0.00mA ~ 100.00mA
Current Resolution	0.001mA/0.01mA/0.1mA	0.001mA/0.01mA/0.1mA
AC Current Measurement Accuracy	±1.1% of setg + 0.0001mA when 10 SET ±1.11mA ±1.1% of setg + 0.0001mA when 10 SET ±1.11mA	±1.1% of setg + 0.0001mA when 10 SET ±1.11mA ±1.1% of setg + 0.0001mA when 10 SET ±1.11mA
Waveform Comparison Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP (Ramp-Up) Time	0.1s ~ 999.9s	0.1s ~ 999.9s
TIMER (Test Time)	GPT: 0.1s ~ 999.9s NOT Support	GPT: 0.1s ~ 999.9s NOT Support
Swap Function*	ON/OFF	ON/OFF
DC WITHSTANDING		
Output Voltage Range	0.000V ~ 0.000V dc	0.000V ~ 0.000V dc
Output Voltage Resolution	20mV	20mV
Output Voltage Accuracy	±1% of setting + 5V (no load)	±1% of setting + 1V (no load)
Maximum Rated Load	50W (30V/1.67A)	50W (30V/1.67A)
Maximum Rated Current	160mA (0.30V ~ 0.5V)	100mA (0.30V ~ 0.5V)
Voltage Regulation	±1% of setg + 2V (full load = no load)	±1% of setg + 2V (full load = no load)
Voltagemeter Accuracy	±1% of setg + 2V	±1% of setg + 2V
Current Measurement Range	0.00mA ~ 20.00mA	0.00mA ~ 20.00mA
Current Resolution	0.001mA/0.01mA/0.1mA	0.001mA/0.01mA/0.1mA
DC Current Measurement Accuracy	±1.1% of setg + 0.0001mA when 10 SET ±1.11mA ±1.1% of setg + 0.0001mA when 10 SET ±1.11mA	±1.1% of setg + 0.0001mA when 10 SET ±1.11mA ±1.1% of setg + 0.0001mA when 10 SET ±1.11mA
Waveform Comparison Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP (Ramp-Up) Time	0.1s ~ 999.9s	0.1s ~ 999.9s
TIMER (Test Time)	GPT: 0.1s ~ 999.9s NOT Support	GPT: 0.1s ~ 999.9s NOT Support
Swap Function*	ON/OFF	ON/OFF
GND	ON/OFF	ON/OFF

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	$\pm(1\%$ of setting +5V)[no load]		$\pm(1\%$ of setting +5V)[no load]	
Resistance Measurement Range	1M Ω ~ 9500M Ω		0.001G Ω ~ 50.00G Ω	
Test Voltage	Measurable Range	Accuracy	Measurable Range	Accuracy
50V $\leq V \leq 450V$	1 ~ 50M(Ω)	$\pm(5\%$ of rdg+1count)	0.001~0.050G Ω	$\pm(5\%$ of rdg+1count)
	51 ~ 2000M Ω	$\pm(10\%$ of rdg+1count)	0.051~2.000G Ω	$\pm(10\%$ of rdg+1count)
500V $\leq V \leq 1000V$	1 ~ 500M(Ω)	$\pm(5\%$ of rdg+1count)	0.001~0.500G Ω	$\pm(5\%$ of rdg+1count)
	501 ~ 9500M Ω	$\pm(10\%$ of rdg+1count)	0.501~9.999G Ω	$\pm(10\%$ of rdg+1count)
			10.00~50.00G Ω	$\pm(20\%$ of rdg+1count)
Window Comparator Method	Yes		Yes	
Output Impedance	600k Ω		600k Ω	
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 ^a	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 $\leq I \leq 8A$: $\pm(1\%$ of setting+0.2A), 8A $< I \leq 30A$: $\pm(1\%$ of setting+0.05A)		3A $\leq I \leq 8A$: $\pm(1\%$ of setting+0.2A), 8A $< I \leq 32A$: $\pm(1\%$ 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	10m Ω ~ 650.0m Ω		10m Ω ~ 650.0m Ω	
Resistance Measurement Resolution	0.1m Ω		0.1m Ω	
Resistance Measurement Accuracy	$\pm(1\%$ of rdg + 2m Ω)		$\pm(1\%$ of rdg + 2m Ω)	
Window Comparator Method	Yes		Yes	
TIMER (Test Time)	0.5s~999.9s		0.5s~999.9s	
Sweep Function ^a	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	
GPIO	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 $\pm 10\%$, 50/60Hz; Power Consumption: Max. 500VA		AC100V/120V/220V/230V $\pm 10\%$, 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-9904; Approx. 27kg max.	

^a 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, CDx1 (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-9KG1	GPIO card	GSB-02	Multiplex Scanner Box(6CH H.V./2CH G.B.)
GSB-01	Multiplex Scanner Box(8CH H.V.)		

OPTIONAL ACCESSORIES

GHT-113	High Voltage Test Pistol	GTL-247	USB Cable, A-A type, approx. 1.5m
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	GPIO 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

SL204000201.0



GSB-01/02



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 CPT-9800/9900/9900A Series
- * A Maximum of 4 Scanner Boxes (32 CH) can be Connected to One CPT-9800/9900/9900A Series

The GSB-01/GSB-02, multiplex scanner box, is a dedicated option for CPT-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 handles withstanding voltage 5kVac / 6kVdc and insulation resistance 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 HI, 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 CPT-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.

SPECIFICATION		
	GSB-01	GSB-02
HIGH VOLTAGE RATING	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 100-240V ±10%, 50/60Hz; Power Consumption : Max. 50VA	
DIMENSIONS & WEIGHT	GSB-01 : 330(W) x 105(H) x 599(D) mm GSB-02 : 330(W) x 105(H) x 473(D) mm Approx. 5.5kg	

ORDERING INFORMATION

GSB-01 Multiplex Scanner Box - 8CH H.V.

GSB-02 Multiplex Scanner Box - 6CH 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 CUL-219 x 1
- Test Lead for GSB-01 : GHT-116R x 8, GHT-116B x 1
- Test Lead for GSB-02 : GHT-116R x 6, GHT-116B x 1, CUL-116R x 2, CUL-116B x 1

OPTIONAL ACCESSORIES

- CRA-438 Rack Mount Kit

GTL-219 Communication Cable

Approx. 750mm





GSB-01



GSB-02

GSB-01 Rear Panel



GSB-02 Rear Panel



GHT-108 H.V. Wiring Lead

Approx. 500mm



GHT-109 C.B. Wiring Lead

Approx. 400mm



GTL-116R Test Lead

Approx. 1500mm



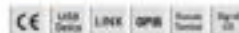
GTL-116B Test Lead

Approx. 1500mm





GCT-9040



FEATURES

- AC 40A Ground Bond Tester
- Measuring Resistance from 1mΩ-400mΩ
- Connect with the GPT-9800/9900 Series to Become a Sequential Test or Simultaneous Test System
- 200kbit/s 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)

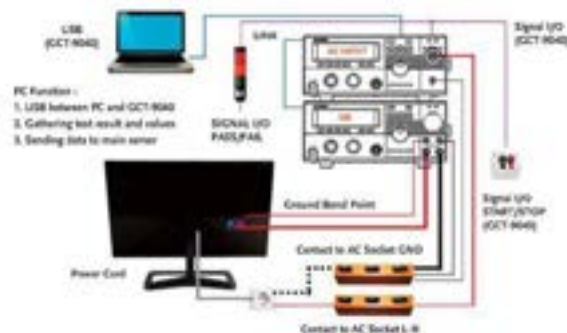
GW Instek rolls out 40A AC ground bond tester - GCT-9040 to augment the existing safety tester product line and to replace the legacy model GCT-630. GCT-9040 provides the maximum AC test current of 40A and adopts the PWM design the same as other models to ensure test efficiency and reliability. Furthermore, large LCD display, 100 memory blocks from setting criteria, and programmable communications interface together deliver users with higher readability and convenience.

In addition to the standalone ground bond test operator, 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-9800 (AC/DC withstanding tester), via external connection, can be expanded to a safety tester system with three testing functionalities.

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, final 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)





CCT-9040

Rear Panel



SPECIFICATIONS

GROUND BOND

Output Current	01.00A - 40.00A ac
Output Current Resolution	0.01A
Output Current Accuracy	1A > $\pm 0.5\%$ ($\pm 1\%$ of setting + 0.2A) 8A < $\pm 0.4\%$ ($\pm 1\%$ of setting + 0.05A) 8A < max (open circuit)
Test Voltage	50Hz/60Hz selectable
Test Voltage Frequency	1.0mHz - 100.0mHz
Resistance Measurement Range	0.1mΩ - 100.0mΩ
Resistance Measurement Resolution	0.1mΩ
Resistance Measurement Accuracy	$\pm 1\%$ of reading + 2mΩ
Window Comparator Method	Yes
TIMER (Test Time)	0.5s-999.9s
CND	OFF (fix)
Test Method	Four Terminal

MEMORY

Single Step Memory	MANU / 100-steps
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INTERFACE

LINK	For system connection
USB	Standard
CPIS	Option
Remote Terminal (Front)	Standard
Signal I/O	Standard
Display	240 x 64 Ice Blue Dot matrix LCD

POWER SOURCE & CONSUMPTION

Source	AC 120 V / 120 V / 220 V / 230 V $\pm 10\%$, 10/50Hz
Consumption	Max. 700W

DIMENSIONS & WEIGHT

130(W) x 148(H) x 460(D) mm; Approx. 17kg max.
--

ORDERING INFORMATION

CCT-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 x 1 (complete user manual)

OPTIONAL:

CPT-9041 CPIS card

OPTIONAL ACCESSORIES

GTL-248	CPIS Cable, approx. 3m
CRA-457	Back 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

- 1000A AC Test Capacity
- 240 x 48 Ice Blue Dot Matrix LCD
- RMS 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 World-wide Input Voltage
- Light Design and Easy to Operation

CIR Inc. launches their 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, GB, JIS and other safety regulations.

The GPT-9600 Series is built upon a platform of 1000A AC maximum power output. The GPT-9600 is a 3-in-1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9602 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 design to impede 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 CIR Inc. Safety Testers, indicates the expected output voltage before high voltage tests are applied. Furthermore, an AUTO mode, including test sequence selections of withstanding then insulation or insulation then 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 terminal 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	1000A/50V/10mA	
Maximum Rated Current	20mA (0.50V~V _{DS} 5V); 1mA (0.10V~V _{DS} 0.50V)	
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 Read Resolution	0.01mA/0.1mA	
Current Measurement Accuracy	± (2.0% of rdg + 10 counts) when HI SET < 1.00mA ; ± (2.0% of rdg + 1 counts) when HI SET ≥ 1.00mA	
Current Judgment Accuracy	± (3.0% of setting + 10 counts) when HI SET < 1.00mA ; ± (3.0% of setting + 1 counts) when HI SET ≥ 1.00mA	
Window Comparator Method	Yes	
ARC Detect	Yes	
RAMP (Ramp-Up Time)	C 1s, fixed	
TIMER (Test Time)	OFF, 1s~180s	
CND	ON	
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	250V/50V/5mA	
Maximum Rated Current	6mA (0.50V~V _{DS} 6V); 2mA (0.10V~V _{DS} 0.50V)	
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 Read Resolution	0.01mA	
Current Measurement Accuracy	± (2.0% of rdg + 10 counts) when HI SET < 1.00mA ; ± (2.0% of rdg + 1 counts) when HI SET ≥ 1.00mA	
Current Judgment Accuracy	± (3.0% of setting + 10 counts) when HI SET < 1.00mA ; ± (3.0% of setting + 1 counts) when HI SET ≥ 1.00mA	
Window Comparator Method	Yes	
ARC Detect	Yes	
RAMP (Ramp-Up Time)	C 1s, fixed	
TIMER (Test Time)	OFF, 1s~180s	
CND	ON	
INSULATION RESISTANCE		
Output Voltage	50V/100V/250V/500V/1000V dc	
Output Voltage Accuracy	± (3.0% of setting + 1 count) [no load]	
Resistance Measurement Range	1MΩ ~ 2000MΩ	
Test Voltage	Measurable Range	Accuracy
50V/100V/250V	1 ~ 30MΩ	± (5% of rdg + 2MΩ)
	11 ~ 2000MΩ	± (10% of rdg + 2MΩ)
500V/1000V	1 ~ 300MΩ	± (5% of rdg + 2MΩ)
	101 ~ 2000MΩ	± (10% of rdg + 2MΩ)



CPT-9600 Series

SPECIFICATIONS	
Window Comparator Method	Yes
Output Impedance	600Ω
RAMP (Ramp-Up Time)	0.1s (fixed)
TIMER (Test Time)	0.1s-180s
CARD	OFF (fix)
TEST MODE *	
Single	AC10, DC0, 10
Auto	AC10, 10AC, DC10, 10DC
INTERFACE	
Remote Terminal (Front)	Standard
Signal I/O	Standard
DISPLAY	
	340 x 48 mm Blue Dot matrix LCD
POWER SOURCE	
	AC100V-120V/220V-240V±10%, 50/60Hz
POWER CONSUMPTION	
	400VA Max
DIMENSIONS & WEIGHT	
	330(80) x 140(35) x 115(25)mm, Approx. 3kg (max)

* The available "Test Mode" depends on selected model.

ORDERING INFORMATION

CPT-9603 AC 100V AC/DC Withstanding Voltage/Insulation Resistance Tester
 CPT-9612 AC 100V AC Withstanding Voltage/Insulation Resistance Tester
 CPT-9602 AC 100V AC/DC Withstanding Voltage Tester
 CPT-9601 AC 100V AC Withstanding Voltage Tester

ACCESSORIES

Quick Start Guide x 1, Power cord x 1, CD x 1 (please refer manual), Interlock Key x 1,
 Remote Cable GHT-119 x 1, Test lead GHT-114 x 1

OPTIONAL ACCESSORIES

GHT-113 High Voltage Test Lead
 GHT-117/GHT-117(EU) High Voltage Adapter Box
 GHT-205 High Voltage Test Probe
 CRA-457 Rack Mount Kit

Rear Panel



Interlock Key



GHT-119 Remote Cable

Approx. 500mm



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

- 1000V 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

CIF Inven introduces a new multi-channel withstanding voltage tester: the GPT-9500 series. This series has 2 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 main 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 (50V max.), DC withstanding voltage (50V max.) and insulation resistance (1000V max.). The design of the series conforms to the latest IEC 61010-2-034 standard requirements and it is built on the output platform of AC 100V. The status of the 8 channels of GPT-9513 can be set to H, L or X according to the test requirements, especially suitable for winding components such as transformers to perform mutual testing of multiple points of single components. The status of the 8 channels of GPT-9500 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 x 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 no need to switch the screen to see all the test results. At the same time, the series provides the statistical counting function. Users can quickly obtain the total number of tests and the number of NO-GO's without connecting an external counter. All scanning channels are all configured on the rear panel of the tester. Other than being relatively aesthetic 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 direction function is provided for the series to avoid the misalignment 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 protective 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-9500
Channel	8 CH	8 CH
Channel Status	H, L or X	H or X

SPECIFICATIONS	
AC WITHSTANDING	
Output Voltage Range	0.000V ~ 1.000kV
Output Voltage Resolution	1V
Output Voltage Accuracy	±1% of setting + 5V (no load)
Maximum Rated Load	100 VA (50V/50mA)
Maximum Rated Current	10mA @ 0.01V ~ 10mA @ 0.01V ~ 0.5V; 0.005A ~ 10mA @ 0.5V ~ 1V; 0V
Output Voltage Waveform	Sine wave
Voltage Regulation	±1% of setting + 0V
Output Voltage Frequency	50 Hz / 60 Hz selectable
Voltage Accuracy	±1% of reading + 0V
Current Measurement Range	0.001mA ~ 10.00mA
Current Test Resolution	1 μA @ 0.001mA ~ 0.000mA; 10 μA @ 0.00mA ~ 10.00mA
Current Measurement Accuracy	±1.2% of reading + 0.02 μA
Current Offset	80 μA maximum
ARC Detect	Yes
ARC TIME (Arc Time)	0.1s ~ 999.9s
FAIL Time	0.1T ~ 999.9s
WAIT Time	0.1T ~ 999.9s
TRIPER (Trap Time)	CONVY, 0.1s ~ 999.9s
TRIPER Accuracy	±1% (50μs ~ 20ms)
CNO	ON/OFF
DC WITHSTANDING	
Output Voltage Range	0.000V ~ 1.000kV
Output Voltage Resolution	1V
Output Voltage Accuracy	±1% of setting + 5V (no load)
Maximum Rated Load	100 VA (50V/50mA)
Maximum Rated Current	10mA @ 0.01V ~ 10mA @ 0.01V ~ 0.5V; 0.005A ~ 10mA @ 0.5V ~ 1V; 0V
Voltage Regulation	±1% of setting + 0V
Voltage Accuracy	±1% of reading + 0V
Current Measurement Range	0.001mA ~ 10.00mA
Current Test Resolution	0.1 μA @ 0.1 μA ~ 999.9 μA; 1 μA @ 1 μA ~ 9.999mA; 10 μA @ 0.00mA
Current Measurement Accuracy	±1% of reading + 1 μA when I reading < 1mA; ±1% of reading + 10 μA when I reading ≥ 1mA
Current Offset	1 μA maximum
ARC Detect	Yes
ARC TIME (Arc Time)	0.1s ~ 999.9s
FAIL Time	0.1T ~ 999.9s
WAIT Time	0.1T ~ 999.9s
TRIPER (Trap Time)	CONVY, 0.1s ~ 999.9s
TRIPER Accuracy	±1% (50μs ~ 20ms)
CNO	ON/OFF



GPT-9500 Series

SPECIFICATIONS

OUTPUT CHARACTERISTICS

Output Voltage	0.000V-1.000V ac
Output Voltage Resolution	1V
Output Voltage Accuracy	$\pm (1\% \text{ of setting} + 1V) (\text{no load})$
Resistance Measurement	0.1M Ω -10G Ω
Test Voltage	Measurement Range / Accuracy
500V/1000V	0.1M Ω -10M Ω : $\pm 1\%$ of reading $\pm 1\%$ for
	10.1M Ω -100M Ω : $\pm 0.5\%$ of reading $\pm 1\%$ for
	10.1M Ω -100M Ω : $\pm 0.5\%$ of reading $\pm 1\%$ for
	0.1M Ω -10M Ω : $\pm 1\%$ of reading $\pm 1\%$ for
	10.1M Ω -100M Ω : $\pm 0.5\%$ of reading $\pm 1\%$ for
	10.1M Ω -100M Ω : $\pm 0.5\%$ of reading $\pm 1\%$ for
	$\pm (1\% + 1V)$ (maximum rated load = no load)
Voltage Regulation	$\pm 0.5\%$ of reading $\pm 1V$
Voltage Accuracy	100k max.
Short Circuit Current	3A
Output Impedance	0.1 Ω -100k Ω
RAMP TIME (Rise Time)	0.1V-100V
FALL TIME	0.1V-100V
WAVE TIME	0.1V-100V
TRIGGER (Rise Time)	0.1V-100V
TRIGGER Accuracy	$\pm (10\mu\text{m} + 20\text{ms})$
CNS	DA/CPT

CONTINUITY TEST

Output Current	100mA ac
On-resistance Measurement	$\pm (1\% \text{ of reading} + 1\Omega)$ ON/OFF
Accuracy	

INTERFACE

Signal I/O	Standard
RS-232C	Standard
USB (Serial)	Standard
USB (Parallel)	Standard (for Parameter/LED Hardware)
Rear Output	Scanner

DISPLAY

	4.3" Color LCD
--	----------------

POWER SOURCE

	AC 100V-240V $\pm 10\%$ 50/60Hz
--	---------------------------------

POWER CONSUMPTION

	400W Max.
--	-----------

DIMENSIONS & WEIGHT

	220(W) x 130(H) x 410(D) mm Approx. 11kg
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*The specifications apply when the GPT-9500 is powered on for at least 10 minutes under $\pm 1\%$ $\pm 1\%$ $\pm 1\%$.

ORDERING INFORMATION

GPT-9513 AC/DC Multi-Channel Hi-pot Tester

GPT-9503 AC/DC Multi-Channel Hi-pot 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-116B x 1

OPTIONAL ACCESSORIES

CTL-236 RS-232C Cable, Approx 1.5m, Approx. 1.2m

CTL-236 USB Cable, A-B type, Approx. 1.2m

Rear Panel



GTL-236 RS-232C Cable



GHT-115 High Voltage/Continuity Test Lead



GHT-116B Test Lead

Approx. 1500mm

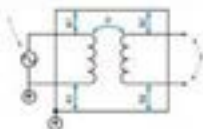


GHT-116B Test Lead

Approx. 1500mm



A. MEETS IEC 61010-2-014 DESIGN REQUIREMENTS



Meets IEC 61010-2-014 Design Requirements

CPT-6000 is the world's first multi-channel hipot tester to comply with IEC 61010-2-014 (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. FRIENDLY USER INTERFACE



4.3 Color LCD, High-brightness Indicator and Function Keys

Operation design in 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 operation; 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

The larger-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 FAIL) can be



AUTO Mode Listed Result

displayed simultaneously. Hence, users can easily obtain complete information without switching the screen or connecting an external counter. In addition, AUTO mode also supports tabular testing, which greatly improves the convenience of observation.



Export/Import of Setting Parameters

The GPT-9580 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.

E SETTING DATA EXPORT / IMPORT MECHANISM



Channels Configured on the Rear Panel

The channel outputs of the GPT-9580 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



FEATURES

- Suitable for Medical Electrical & General Electrical of Leakage Current Measurement
- 7" Touch Panel with Color LCD
- 11 Different Measurement Network to Simulate the Resistance of Human Body (Including IEC 60601-1:2020 3.2nd)
- 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 μ A	$\pm(2\%rdg+6dgt)$		
5.000mA	0.400mA~5.000mA	1 μ A	$\pm(2\%rdg+6dgt)$		
500.0 μ A	40.0 μ A~500.0 μ A	0.1 μ A	$\pm(2\%rdg+6dgt)$		
50.00 μ A	4.00 μ A~50.00 μ A	0.01 μ A	$\pm 2.0\%fs$		
AC / AC+DC					
			0.1Hz $\leq f\leq 15$ Hz	15Hz $< f\leq 100$ kHz	100kHz $< f\leq 1$ MHz
50.00mA	4.00mA~50.00mA	10 μ A	$\pm(4.0\%rdg+10dgt)$	$\pm(2.0\%rdg+6dgt)$	$\pm(2.0\%rdg+10dgt)$
5.000mA	0.400mA~5.000mA	1 μ A	$\pm(4.0\%rdg+10dgt)$	$\pm(2.0\%rdg+6dgt)$	$\pm(2.0\%rdg+10dgt)$
500.0 μ A	40.0 μ A~500.0 μ A	0.1 μ A	$\pm(4.0\%rdg+10dgt)$	$\pm(2.0\%rdg+6dgt)$	$\pm(2.0\%rdg+10dgt)$
50.00 μ A	4.00 μ A~50.00 μ A	0.01 μ A	$\pm 4.0\%fs$	$\pm 2.0\%fs$	$\pm 2.0\%fs$
AC PEAK					
			15Hz $\leq f\leq 10$ kHz	10kHz $< f\leq 100$ kHz	100kHz $< f\leq 1$ MHz
75.0mA	5.0mA~75.0mA	100 μ A	$\pm(2.0\%rdg+6dgt)$	$\pm 5.0\%fs$	$\pm 15\%fs$
7.500mA	0.500mA~7.500mA	1 μ A	$\pm 2.5\%fs$	$\pm 5.0\%fs$	$\pm 15\%fs$
750.0 μ A	40.0 μ A~750.0 μ A	0.1 μ A	$\pm 4\%fs$	$\pm 5.0\%fs$	$\pm 20\%fs$
EUT Voltage/Current Monitor					
300V	85V~300V	0.1V	$\pm(5\%rdg+10dgt)$		
20A	0.5A~20A	0.1A	$\pm(2\%rdg+5dgt)$		
POWER SUPPLY					
For GLC-10000	AC 100V~240V $\pm 10\%$, 50/60Hz ; Power consumption : Max. 50VA				
For EUT IN	AC 100V~240V $\pm 10\%$, 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					

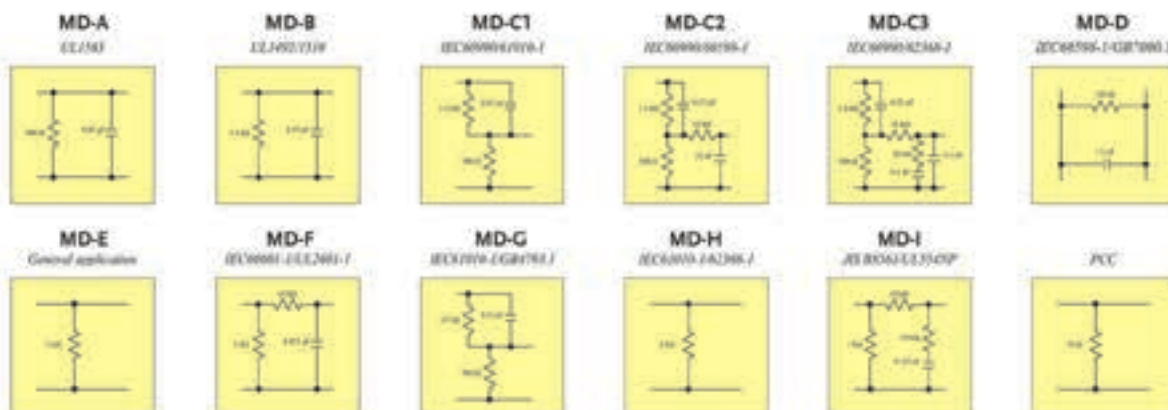


GLC-10000

Rear Panel



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



Leakage Current Tester



CLC-9000



FEATURES

- Suitable for General Electrical of Leakage Current Measurement
- Touch Panel with Color LCD Display
- 9 Different Measurement Networks to Simulate the Resistance of Human Body
- 50 Sets Preset Test Conditions Conform to the IEC 60950 : 30 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/AC+DC/AC Peak
- Various Standard Interfaces : RS-232/ GPIB/USB Host & Device/EXT I/O

CTL-307A Test Lead
Approx. 0.8m



CLC-01 Alligator Clips



CLC-02 Foil Probe



The CLC-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 whilst the EUT (equipment under test) is taking a leakage current testing, in compliance with the specific standards or regulations such as IEC, UL, JIS, etc..

In order to provide a simple operation environment, the CLC-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, 30 sets of empty memory are available for user defined.

A Meter mode is also available for the CLC-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.

SPECIFICATIONS			
	Ranges	Range	Resolution Accuracy
DC			
	25.00mA	3.00mA ~ 25.00mA	10 μ A 1(0.2%/rdg+1dgt)
	5.000mA	0.500mA ~ 5.000mA	1 μ A 0(0.2%/rdg+1dgt)
	500.0 μ A	50.0 μ A ~ 500.0 μ A	0.1 μ A $\pm$ 1.0%
	10.00 μ A	4.00 μ A ~ 10.00 μ A	0.01 μ A $\pm$ 1.0%
AC or AC+DC			
	25.00mA	3.00mA ~ 25.00mA	10Hz to 400Hz: 100Hz to 51MHz: 5(1.0%/rdg+1dgt) $\pm$ 2.0%/rdg+10dgt
	5.000mA	0.500mA ~ 5.000mA	5(1.0%/rdg+1dgt) $\pm$ 2.0%/rdg+10dgt
	500.0 μ A	50.0 μ A ~ 500.0 μ A	0.1 μ A 0(1.0%/rdg+1dgt) $\pm$ 2.0%/rdg+10dgt
	10.00 μ A	4.00 μ A ~ 10.00 μ A	0.01 μ A $\pm$ 2.0%
AC PEAK			
	75.0mA	10.0mA ~ 75.0mA	20Hz to 51MHz: 100Hz to 51MHz: 5(1.0%/rdg+1dgt) $\pm$ 5.0%/rdg+10dgt
	10.00mA	1.00mA ~ 10.00mA	5(1.0%/rdg+1dgt) $\pm$ 5.0%/rdg+10dgt
	1.000mA	500 μ A ~ 1.000mA	52.5Hz $\pm$ 1.0%
	500.0 μ A	40.0 μ A ~ 500.0 μ A	0.1 μ A $\pm$ 2.0%
EUT (V/CHOK)			
Voltage	300V	85V ~ 300V	0.1V 0(2%/rdg+10dgt)
Current	15A	0.5A ~ 15A	0.1A 0(2%/rdg+5dgt)
METER MODE			
AC/DC	10.0 ~ 300.0V	0.1V	0(2%/rdg+2V)
AC+DC	10.0 ~ 300.0V	0.1V	0(2%/rdg+2V)
AC Peak	15.0 ~ 400.0V	0.1V	0(2%/rdg+2V)
INTERFACE			
RS-232C, GPIB, USB Host & Device, EXT I/O			
POWER SOURCE			
For CLC-9000: AC 100V/120V/230V/250V/210V, 50/60Hz, Power Consumption: Max. 10VA			
For EUT: AC 85V ~ 250V, 50/60Hz (264V Max.)			
DIMENSIONS & WEIGHT			
310 (W) x 110 (H) x 30 (D) mm, Approx. 50g			

ORDERING INFORMATION

CLC-9000 Leakage Current Tester

ACCESSORIES:

User manual x 1, Power cord x 1, Test lead(CTL-307A) x 1, CD+1(Complete user manual), Alligator clips(CL-01) x 4(Red x2, Black x2), Foil probe(CL-02) x 1,

OPTIONAL ACCESSORIES

- CTL-232 RS-232C Cable
- CTL-240 USB Cable, USB 2.0 A-B Type (L Type), 1200mm
- CTL-246 USB Cable, USB 2.0 A-B TYPE CABLE, 4P
- CTL-248 GPIB Cable (2.0m)



GLC-9000

Rear Panel



MEASUREMENT NETWORK (MD)

MD-A



MD-B



MD-C



MD-D



MD-E



MD-F



MD-G



MD-H



MD-I



A. SIMPLE AND INTUITIVE SYSTEM



The color TFT touch screen makes operation intuitive and simple, whilst making it easier to observe test results.

B. VARIOUS MEASUREMENT NETWORK



Nine Measurement Networks 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 COM 800 Series D.C. milli-ohm meter is your ideal tool. As for audio signals related measurement, GW Instek provides CAD-301G automatic distortion meter and GVT-4278/H17B A.C. millivolt-meters. We also supply two models of the CBM 3000 Series battery meters with ranges of 300V 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 | • Automatic Distortion Meter |
| • Battery Meter | • AC Millivolt Meter |
| • Digital Power Meter | • Precision Current Shunt Meter |

COMPONENTS TESTING INSTRUMENT

MODEL	Description / Main Functions	Page
COM-881	DC Milli-Ohm Meter (mΩ) – 5mΩ	ESF-39
COM-884	DC Milli-Ohm Meter (mΩ) – 5mΩ	

BATTERY METER

MODEL	Description / Main Functions	Page
CSM-1310	300V Battery Meter (including RS-232C/USB device/host and VMM2000 interface)	ESD-62
CSM-3080	80V Battery Meter (including RS-232C/USB device/host and VMM2000 interface)	

POWER RELATED INSTRUMENT

MODEL	Description / Main Functions	Page
CPM-8519	DC and 0.5Hz–330kHz, Max. Direct Input of up to 600V and 30A, 1" TFT LCD Total 30 Parameters Display, Waveform Display for V / I / P, Harmonic Measurement & Analysis	ESG-48
CPM-8219	DC and 45Hz–40kHz, Max. Direct Input of up to 600V and 30A, 4" TFT LCD Total 8 Parameters Display	ESG-70

AUDIO RELATED INSTRUMENT

MODEL	Description / Main Functions	Page
GAD-201C	20Hz – 20kHz Automatic Distortion Meter	ESJ
CYT-4276/v17B	AC Millivolt Meter (THD/THN)	ESJ

PRECISION CURRENT SHUNT METER

MODEL	Description / Main Functions	Page
PCS-1000	Max. Voltage, AC 600V/DC 3000V; Max. Current, AC 300A/DC 300A	ESJ-76

D.C. Milli-Ohm Meter



COM-804/805



FEATURES

- 50,000 Counts Display
- 3.5" (30 × 30) TFT LCD Display
- High Accuracy of 0.01% Precision
- 10µA Test Current, 0.1µΩ Resolution
- Fast Measurement of 60 Readings Per Second
- Four wire Resistance Measurement
- Temperature Compensation Measurement Function
- Delayed Measurement
- 25 sets of Panel Setting Memory
- Dry Circuit (COM-805 Only)
- Drive Modes:
COM-804-DC+, DC-, Pulsed, PWM, 2-wire, Standby
COM-804-DC+, Standby
- Interface: USB Device, RS-232C, Handler/Scan/EXT I/O, and GPIB (Option)

COM-804/805 feature 3.5-inch TFT display, maximum 50,000 counts measurement display, the rapid sampling rate of 60 readings per second, optimum 0.01% 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 COM-805 also includes various drive modes and Dry circuit for contact resistance measurement applications. More features, including 25 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 COM-804/805 milliohm meter's convenience on practical applications.

COM-804/805 adopt 3.5-inch color LCD to enhance the clarity of measurement results and to provide display for related setting criteria that immediately brings up the completeness of test information. Additionally, COM-804/805, with the optimum 0.01% precision, suppresses 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 functionality keys and direction keys together increase the operational convenience which allows users to complete their measurement tests with intuitive convenience and speed.

COM-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 interacting 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 them also. 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 stability 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, COM-804/805 provide a D-sub 25-pin combined interface to operate, according to the functionalities, 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, COM-804/805 also provide various interface selections such as RS-232C, USB, and GPIB (COM-804 (option)/COM-805 (standard) interface). Furthermore, the control commands are compatible to that of COM-800 that saves time in adjusting programs while switching from the old model to the new model.

To sum up, COM-804 evolves from COM-800 platform with more advanced functionalities and specifications, including display digits, measurement speed and standard interface (RS-232C/USB). With all the capabilities of COM-804, COM-805 supplements itself with new measurement abilities (Dry circuit and various drive modes) to meet the requirements of broader low resistance measurement applications.

SPECIFICATIONS				
		COM-804		COM-805
DISPLAY		50,000 counts		
SAMPLING RATE		60 readings / s		
Slow		10 readings / s		
Fast		60 readings / s		
RESISTANCE MEASUREMENT				
Range	Resolution	Test Current	Accuracy	
1mΩ	0.1μΩ	1A	±(0.1% reading + 0.2% of range)	
10mΩ	1μΩ	1A	±(0.1% reading + 0.03% of range)	
100mΩ	10μΩ	100mA	±(0.05% reading + 0.02% of range)	
1Ω	100μΩ	100mA	±(0.05% reading + 0.02% of range)	
10Ω	1mΩ	10mA	±(0.05% reading + 0.02% of range)	
100Ω	10mΩ	1mA	±(0.05% reading + 0.008% of range)	
1kΩ	100mΩ	100μA	±(0.05% reading + 0.008% of range)	
10kΩ	1Ω	100μA	±(0.05% reading + 0.008% of range)	
100kΩ	10Ω	10μA	±(0.05% reading + 0.008% of range)	
1MΩ (COM-804)	100Ω	1μA	±(0.2% reading + 0.008% of range)	
1MΩ (COM-805)	100Ω	1μA	±(0.5% reading + 0.008% of range)	
TEMPERATURE				
Range	50°C - 199.9°C			
Accuracy	10°C - 40°C: ±0.1%±0.1°C; Other: ±0.1%±1.0°C			
Resolution	0.1°C			
DRY CIRCUIT		Open circuit less than 20mV; For 500mΩ, 1Ω, 10Ω range only		



COM-804/805

Rear Panel



SPECIFICATIONS		
	COM-804	COM-805
DRIVE MODE		
DC+ / DC-	DC+ Only	Yes
Pulsed	—	Yes
PRM	—	Yes
Zero	—	Yes
Standby[*]	Yes	Yes
OTHER FUNCTIONS		
	Trigger: Internal, Manual, External; Math: ABS, RSL, %, 1/C; Average: 2 ~ 10 times; Measurement Delay: TC for Transformer; Compare: On/Off; Continuity Beep; Buzzer (COM-801 only)	
INTERFACE		
USB	Standard	Standard
RS-232C	Standard	Standard
HANDLER/SCAN/EXT I/O	Standard	Standard
CPH	Option (factory installed)	Standard
DISPLAY		
	3.3" (320 x 240) TFT LCD	
MEMORY		
	28 sets for power setting	
POWER SOURCE		
	AC 100 ~ 240 V, 50/60Hz	
CONSUMPTION		
	21VA (max.)	
DIMENSIONS & WEIGHT		
	225(W) x 182(H) x 283(D) mm : Approx. 31g	

Note: yThe Needle function must be confirmed with the user PCB hardware. It is not applicable to sub-instruments.

ORDERING INFORMATION

COM-801	D.C. Multimeter (Handler/RS-232C/USB Device/CPH)
COM-804 w/o CPH	D.C. Multimeter (Handler/RS-232C/USB Device/Opt. 01 CPH)
COM-804	D.C. Multimeter (Handler/RS-232C/USB Device)

ACCESSORIES

Quick Start Guide x 1, Power cord x 1, Test lead CTL-388 x 1, CD x 1 (complete user manual)

OPTION

COM-801G1 CPH 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. 2000mm
CTL-246	USB cable, A-B type, approx. 1200mm
CTL-248	CPH cable approx. 2000mm
CTL-329	Test lead, approx. 3m

FREE DOWNLOAD

Driver Laptop Driver

GTL-308 Test lead

Approx. 1.2m



GTL-309 Test lead

Approx. 3m



PT-100 Temperature Probe

Approx. 1.2m



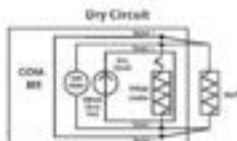
D.C. Milli-Ohm Meter

A. TOTALLY REPLACING THE EXISTING MODELS



In terms of the basic functionalities and specifications, COM-804/805 can absolutely replace the existing model COM-802. All COM-802 functionalities can be found from COM-804/805, including resistance 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 COM-802. To simply put it, the brand new COM-804/805 not only provide better display interface, first measurement (80 readings per second), but also cooperate 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.

C. DRY CIRCUIT TEST FOR COM-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-1544 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 components. The over voltage will damage the oxide coating and the thin layer of contact surface, as a result, the reliability of measurement will then be raised. COM-805 provides three levels (30mV/100mA/100mA/100mA/100mA) to limit open circuit voltage at 20mV to ensure Dry circuit tests.

F. STANDARD INTERFACE FOR CONTROL AND COMMUNICATION



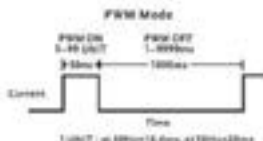
With respect to connecting the external control, COM-804/805 provide a 25-pin composite interface to execute, according to the functionalities. Besides, users can EXT IO for connecting to a wiring machine connecting to an external on/off switch, and directly conducting external trigger control respectively. For remote control and measurement result retrieval requirements, COM-804/805 also provide various interface

E. FASTER MEASUREMENT WITHOUT SACRIFICING RESOLUTION



COM-804/805 has two measurement speed selections, which are Fast reaching 80 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 resolution. COM-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.

D. VARIOUS DRIVE MODES FOR COM-805 ONLY



COM-805 provides various current output drive modes to satisfy diversified and accurate low resistance measurement applications. For instance, for interacting conduction 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 on large current measurement in a long period of time. The DC+ and DC- output modes are best for the measurement requirements of inductive components.

selections such as RS-232C, USB, and GPIB. COM-804/805 (optional) COM-805 (standard) interface. The commands of COM-804/805 are compatible to that of COM-802 that allows users to switch equipment with simple settings. There is no test in adjusting existing programs and production delay will not be happening while switching from the old model to the new model.



GBM-3300/3080



FEATURES

- 3.5" TFT LCD (320x240)
- Measurement Items: DC Voltage and AC Resistance
- Voltage Measurement: 600V (Auto Range) (GBM-3080)
- Resistance Measurement: 200Ω (max.)
- Best Accuracy For Voltage Measurement: 0.01%
- Best Accuracy For Resistance Measurement: 0.1%
- Measurement Resolution up to 0.1μΩ and 10μΩ Suitable For Single cell Measurement
- Independent Co/NoGo Determination Function For Voltage and Resistance Respectively
- The Judgment Mechanism of Test Lead/Probe Disconnect/Contact Failure to Ensure The Measurement Reliability
- Standard Interface: USB Host/Device, RS-232C and Handler

GBI Intron launches a new series of desktop battery meters: the GBM-3000 Series, which uses AC 1kHz as the test signal and measures battery's voltage and internal resistance to 200V (GBM-3080) and 80V (GBM-3080). The series features 3.5" TFT LCD, 4-wire measurement method, high resolution (8-digit voltage/5-digit resistance) measurement display capability, and independent Co/NoGo determination of voltage and resistance, various communications interfaces, etc. to meet various types of battery measurements, ranging from single cell, battery unit, to the end product (battery), etc. so as to facilitate users in achieving accurate measurements at all stages of production.

The GBM-3000 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 a (0.01% reading + 1 digit), and measurement resolution is up to 10μV (at 8V). 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-3000 Series features HI/LO determination respectively based on voltage and resistance, and can be switched to the simple (big 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-3000 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-3000 Series provides two data storage methods (up to 16,000 lots of measurement values). "General storage" only stores the measured voltage and resistance values; "Statistical storage" has the related parameters (Cp/Cy/Min/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-3000 Series provides RS-232C/USB device (serial COM) for writing programs and retrieval. The handler interface is provided for external trigger control via PUL. All interfaces are standard equipped that not only save the cost of instruments, but also meet the requirement of using different automated measurement systems.

SPECIFICATIONS						
DISPLAY						
Screen	3.5" (320×240) TFT LCD					
Resistance	5 digits					
Voltage	4 digits					
TEST SPEED						
Slow	1 time/second					
Medium	14 times/second					
Fast	25 times/second					
Ex. Fast	45 times/second					
RESISTANCE MEASUREMENT						
Test Frequency	1kHz (±0.5%) Fixed					
Input Impedance	1mΩ ~ 300mΩ 996Ω 3Ω ~ 1kΩ 2MΩ					
Range	Range No.	Range	Max. scale	Resolution	Test Current	Open-circuit Voltage/mVmax
	0	1mΩ	9.999mΩ	0.1 μΩ	100mA	0V
	1	30mΩ	99.999mΩ	1 μΩ	100mA	0V
	2	300mΩ	999.999mΩ	10 μΩ	10mA	0V
	3	3Ω	9.999Ω	100 μΩ	1mA	0V
	4	30Ω	99.999Ω	1mΩ	100 μA	0V
	5	300Ω	999.999Ω	10mΩ	10 μA	0.5V
	6	3kΩ	9999.99Ω	100mΩ	10 μA	1.5V
Accuracy	Range No.	Speed	Accuracy		Temperature Coefficient	
	0	Slow Medium Fast OK, Fast	±0.01% ± 1digit ±0.01% ± 1digit ±0.01% ± 2digit ±0.01% ± 4digit		(±0.01% ± 1digit)/°C	
	1-6	Slow Medium Fast OK, Fast	±0.01% ± 1digit ±0.01% ± 1digit ±0.01% ± 1digit ±0.01% ± 1digit		(±0.01% ± 0.5digit)/°C	

Battery Meter

Rear Panel



GBM-3300/3080

GBM-01 4 Wire (4-wire clip) test lead, 90V(max.)

Approx. 1.5m



GBM-02 4 Wire (single pin) test probe, 80V(max.)

Approx. 1.5m



GBM-03 4 Wire (single pin) test probe, 100V(max.)

Approx. 1.5m



GBM-S1 Short Bar



Specifications

VOLTAJE MEASUREMENT

Range	Range No.	Range	Max. Value	Resolution
	0	8V	± 0.0001	10 μ V
	1	80V	± 0.0001	100 μ V
	2	100V (for GBM-100 only)	± 0.0001	1mV

Accuracy	Range No.	Speed	Accuracy	Temperature Coefficient
	0-2	Slow	$\pm 0.01\%$ Only $\pm 3\text{dgt}$	$\pm 0.001\%$ Only $\pm 0.3\text{dgt}/^{\circ}\text{C}$
		Medium	$\pm 0.01\%$ Only $\pm 3\text{dgt}$	
		Fast	$\pm 0.01\%$ Only $\pm 3\text{dgt}$	
		EX. Fast	$\pm 0.10\%$ Only $\pm 3\text{dgt}$	

OTHER FUNCTIONS

Range Selection	Auto range, Hold range, Norm range
Comparator	ABS, PER or SEQ
Contact Detection	OPEN & SHORT
Buzzer	OFF, Pass, Fail
Trigger	INT, EXT

INTERFACE

Interface	USB Host/USB Device/RS-232C/Handler
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POWER SOURCE

Power Source	AC 100-240V, 50-60Hz, Consumption: 10W
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DIMENSIONS & WEIGHT

Dimensions	254(W) x 107(H) x 30(D) mm, Approx. 2.8kg
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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 x 1, Power cord x 1, GBM-01 x 1 + 4 Wire (4-wire clip) test lead, 90V(max.), approx. 1.500mm, CD x 1 (including complete user manual and USB driver)

OPTIONAL ACCESSORIES

GBM-02 4 Wire (single pin) test probe, 80V (max.), approx. 1.500mm

GBM-03 4 Wire (single pin) test probe, 100V (max.), approx. 1.600mm

GBM-S1 Short Bar (for GBM-02/GBM-03)

CTL-232 RS-232C cable, 9-pin female to 9-pin, full modem for computer, Approx. 2000mm

CTL-246 USB cable, A-B type, approx. 1.200mm

CRA-422 Rack Mount kit

CRA-436 Rack Mount Kit, 1U 2U size for two sets

A. TWO DISPLAY MODES



Standard Mode

(Setting conditions and R-V measurement parameters)

The CBM-3000 series offers two display modes to facilitate 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 certification. 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 HI/LO DETERMINATION



Independent HI/LO Setting

The CBM-3000 series provides independent HI/LO determination settings for both voltage and resistance and can be set according to the required mode, such as 3EQ, PER or ABS. 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 CBM-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 lots of measurement data and has the statistical calculation function to allow



Statistical Function

the status of the production process to be clearly observed and retained 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 CBM-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 calibrating with system integration for external trigger measurement through PLC.

Digital Power Meter



CPM-8310

NEW



FEATURES

- 3" TFT LCD
- 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 in a Defined Wave with CF of 1, and the Half range CF can Reach 6 or 6A
- Meeting the IEC 61000-4-7 Harmonics Measurement Requirements (50/60Hz)
- 10th Order of Harmonic Measurement and Analysis (value and bar graph)
- Integration Function Supports Automatic Peak-charging
- External Current Sensor Input Terminals (EXT1/EXT2)
- Standard Interfaces: RS-232C, USB Device/Host, LAN, GPIB
- Optional Interface: Digital I/O (DAI) (must be installed before leaving the factory)
- Optional Accessory: CPM-001

CPM-8310 is a digital power meter for single phase (1P/2P) AC power measurement. Features include DC, 0.1Hz~100kHz test bandwidth, 10bits A/D, and 100kHz sampling rate. It displays 3" TFT LCD screen with a two-digit measurement display and provides 25 power measurement 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 61000-4-7 Harmonics measurement requirements at 50/60Hz), internal sensor input terminals, and various communication interface, etc., to help users achieve fast, convenient and accurate power measurements. This power meter is a most cost-effective power meter with most complete functionalities among the products of the same category.

The rated direct input voltage of CPM-8310 is 600V and the input current is 20A. The minimum current level is 1mA (precision up to 0.1uA) and the power measurement resolution is 1uW. The crest factor can reach 3 (peak measurement range can reach 6 or 6A), and the voltage/current/power measurement capability can reach (all RMS, reading at 1% level). Different measurement modes can be selected according to (AC/DC/AC/DC/V/AMM), providing up to 25 relevant parameters for power measurement, including voltage (Vrms/Vpk/Vavg/Vmin/Vmax/Vavg), current (Irms/Ipk/Iavg/Imin/Imax/Iavg), frequency (fHz/fHz), power (P/Vrms/Wpk/Wavg), crest factor (CF/VCF), apparent power (SVA), reactive power (SAR), power factor (PF), phase angle (SACS), total harmonic distortion rate (THD/THDR), maximum current ratio (MCR), and the 100Hz 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.

CPM-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 (2 main measurements + 8 measuring measurements), and the simple mode can display four measurement parameters. These displayed parameters can be arbitrarily selected from 25 power parameters according to the needs of users. In terms of graphic display, a simple oscilloscope mode is provided to display waveforms for 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 CPM-8310 in auxiliary measurement function/function is also comprehensive. For the application of measuring large voltage, the VT rate 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 linked to the rear panel of the instrument and connected with the CT rate 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 CPM-8310. Automatic peak-charging can be used to save measurement data according to the update rate set by CPM-8310 or a user-defined time interval for subsequent analysis.

In terms of data retrieval and storage, CPM-8310 provides a variety of communication interfaces including RS-232C/USB device (serial 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 CPM-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, CPM-8310 also provides an optional Digital I/O (DAI) 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	Specifications
Input Type	Floating input through reactive voltage divider Floating input through shunt
Measure Range	Voltage: 10V, 30V, 60V, 150V, 300V, 600V Current: 1mA, 10mA, 20mA, 50mA, 100mA, 200mA, 50A, 1A, 2A, 5A, 10A, 20A Direct input: 1.5 A, 1.5 V, 1 V Sensor input: 0.1 ~ 30 mV, 100 mV, 200 mV, 500 mV, 1 V, 1 V
Input Impedance	Voltage: input resistance approach 2 MΩ Current: input resistance approach 100 mΩ Direct input range 1mA ~ 200mA: input resistance approach 1 mΩ Direct input range 5A ~ 25A: input resistance approach 1 mΩ Sensor input: input resistance approach 100kΩ Input range 15V ~ 50V (EXT1): input resistance approach 20kΩ Input range 50mV ~ 2V (EXT2): input resistance approach 20kΩ
Continuous Maximum Allowable Input	Voltage: peak value of 1.50V or 80V value of 10V, whichever is less Current: peak value of 30 A or 100V value of 20A, whichever is less Direct input range 1mA ~ 200mA: peak value of 100A or 100V value of 20A, whichever is less Direct input range 5A ~ 25A: peak value of 100A or 100V value of 20A, whichever is less Sensor input: peak value less than or equal to 5 times of the rated range DC, 0.1 Hz ~ 100kHz AC, 0.1 Hz ~ 100kHz
Input Bandwidth	400 Hz, CAT II
Continuous Maximum Current-measure Voltage	auto OFF or ON (just off frequency of 100 Hz)
Cross Filter	auto OFF or ON (just off frequency of 100 Hz)
Frequency Filter	Simultaneous conversion voltage and current inputs
A/D Converter	Resolution 10bits Maximum conversion rate Approx. 1000pts



CPM-8310

[illegible]

Dear Panel



CPM-001 Test Fixture/Ten Fixture(DJ)



GTL-209 Test Lead



CTL-210 Test Lead



GTL-212 Test Lead



CTL-218 Test Lead



SPECIFICATIONS

VOLTAGE, CURRENT AND ACTIVE POWER MEASUREMENTS

Item	Specifications
Measurement Method	Digital sampling method
Crest Factor	3 or 8 (SA)
Wiring System	Single phase, two-wire (1 PT 0)
Range Select	Select manual or auto-ranging
Auto Range	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. U _{pk} , I _{pk} value of the input signal exceeds 300% of the currently set measurement range. Crest factor 8 Urms or Irms exceeds 130% of the currently set measurement range. U _{pk} , I _{pk} value of the input signal exceeds 600% of the currently set measurement range. Crest factor 8A Urms or Irms exceeds 260% of the currently set measurement range. U _{pk} , I _{pk} value of the input signal exceeds 600% of the currently set measurement range. Auto-range decline The range is downed 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 120% of the next lower measurement range. U _{pk} , I _{pk} value of the input signal exceeds 300% of the currently set measurement range. Crest factor 8 or 8A Urms or Irms is less than or equal to 10% of the measurement range. Urms or Irms is less than or equal to 120% of the next lower measurement range. U _{pk} , I _{pk} 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 Update Rate, select the voltage or current from the equipped element.
Line Filter	Select OFF or ON (cutoff frequency at 300 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 Parameter(s)	Voltage Current Active Power Apparent Power Reactive power Power Factor Crest Factor Phase Angle Frequency Voltage Peak Current Peak Active Power Peak Total Harmonic Distortion Maximum Current Ratio Vrms, Vrms, Vrms, Vrms Irms, I, I, I, I P VA VAR PF CFL, CFV DEG Hz and kHz V _{pk} and V _{pk} I _{pk} and I _{pk} Peak and Peak THD and THD MCR

FREQUENCY MEASUREMENT

Item	Specifications
Measurement Item	Voltage and current
Measurement Frequency Range	Update interval 0.1 s 0.2 s 0.3 s 1 s 2 s 3 s 10 s 30 s Auto (s) Measurement Frequency Range 20 Hz ~ 100 kHz 10 Hz ~ 100 kHz 5 Hz ~ 100 kHz 2.0 Hz ~ 100 kHz 1.0 Hz ~ 100 kHz 0.3 Hz ~ 100 kHz 0.2 Hz ~ 100 kHz 0.1 Hz ~ 100 kHz 0.1 Hz ~ 100 kHz (*) Limit of the measurement lower limit frequency by the Timeout setting Timeout 1 s 5 s 10 s 30 s Auto switching among six types: 100~Hz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, and 100 kHz.
Measurement Range	
Frequency Filter	Select OFF or ON (cut off frequency of 100 Hz)
Accuracy	Requirements When the input signal level is 50% or more of the measurement range if the crest factor is set to 3. (50% or more if the crest factor is set to 8 or 8A) + frequency filter is ON when measuring voltage or current of 300 Hz or less. ± (0.06% of reading)

SPECIFICATIONS

INTEGRATION

Item	Specifications
Mode	Select manual integration mode, standard integration mode, or repetitive integration mode. Automatically stop integration by setting a timer.
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 (Read range)
Range Setting	Auto range or Read range is available for integration
Timer Accuracy	±0.02%
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
Sample Rate, Window Width, and Upper Limit of Analysis Order ¹⁾	4096 (Auto switch when both 50Hz/60Hz and update rate = 6.1s conditions are met) Fundamental Frequency Sample rate Window Width upper limit of Analysis order 10 Hz to 44 Hz Fx 1024 5 50 40 Hz to 51 Hz Fx 512 10 50 54 Hz to 60Hz Fx 512 12 50 67 Hz to 100 Hz Fx 512 2 50 150 Hz to 300 Hz Fx 256 4 16 300 Hz to 600 Hz Fx 128 8 8 600 Hz to 1.2 kHz Fx 64 14 4
Accuracy	Voltage Current Power 10 Hz to 40 Hz 0.15% of reading ± 0.15% of range 0.15% of reading ± 0.15% of range 0.15% of reading ± 0.15% of range 40 Hz to 440 Hz 0.15% of reading ± 0.15% of range 0.15% of reading ± 0.15% of range 0.15% of reading ± 0.15% of range 440 Hz to 1.2 kHz 0.20% of reading ± 0.20% of range 0.20% of reading ± 0.20% of range 0.40% of reading ± 0.20% of range

* 100V/50Hz Compliant IEC61000-4-7

DATA OUTPUT OPTIONS

Item	Specifications
Output Voltage	±1 V FS (approach ±7.5 V maximum) against each rated value.
Number Of Output Channels	4
Output Items	Set for each channel: V, I, P, W, VAR, PF, DCS, V-HZ, I-HZ, Vpk, Ipk, Wp, Wq, Ws, q, pf, CFF
Accuracy	±Accuracy of each measurement item ± 0.2% of FS (FS ± 3 V)
D/A Conversion Resolution	18 bits
Minimum Load	100 Ω
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 (OPTIONAL)

Item	Specifications
Remote Control Input Signal	EXT HOLD, EXT TRIG, EXT START, EXT STOP, EXT RESET
Remote Control Output Signal	RS-485 BUSY
I/O Level	TTL
I/O Logic Format	Negative logic, falling edge

DIGITAL I/O SIGNAL (OPTIONAL)

Item	Specifications
I/O Control Output Signal	OUT1, OUT3, OUT5, OUTN
I/O Level	TTL
I/O Sink Current	less 150mA (per I/O)

* 1) I/O1, I/O2, I/O3, I/O4, I/O5 and I/O6 are assigned from the measured values including voltage, current and power power which go through integration process.
* Input or output signal is available for I/O1 and I/O2. * I/O3 will be assigned for I and W when other common is voltage is less than 8 V of the rated range (less than is assigned in the value when I/O3 is not I/O).

GENERAL

 Note	The below are the basic conditions required to operate the CPM-ET2 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: 18 °C ± 5 °C Humidity: <80%RH (non-condensing)
Operation Condition	Temperature 0°C ~ 40°C • 20 ~ 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 ~ 70°C Humidity: < 90%RH (non-condensing)
Power Source	AC 100-240V 50-60Hz - Consumption Max. 50W
Dimensions	248(W) × 107(H) × 57(D) mm (not bumpers)
Weight	Approx. 2 kg

ORDERING INFORMATION

CPM-8310	Digital Power Meter with RS-232C/USB device & host/LAN/CPH
CPM-8310 with DA4	Digital Power Meter with RS-232C/USB device & host/LAN/CPH and opt. DA4

ACCESSORIES

Safety instruction: Step 1, Power cord(s), Test lead CTS-200 x 1, Test lead CTS-210 x 1, (2) x 1 (including complete user manual and USB driver) DA4 cable CTS-214 (available for CPM-8310 with DA4 only)

OPTIONAL

CPM-DA4 DA4 Interface (including cable, CTS-214)

Note: Optional DA4 interface module installed in factory

OPTIONAL ACCESSORIES

CPM-801	Test fixture (including CTS-210 x 1, CTS-211 x 1)	CTS-200	CPH Cable, Approx. 200mm
CPM-801(A)	Test fixture (including CTS-210 x 2, CTS-211 x 1)	GM-422	Peak Mount kit, 1/2" JG, 200mm
CTS-200	Test lead, Terminal to bare wire, Approx. 1000mm		
CTS-210	Test lead, Banana to Banana, Approx. 1000mm		
CTS-211	Test lead, O-type to Bare wire, Approx. 1000mm		
CTS-212	Test lead, O-type to Banana, Approx. 1000mm		
CTS-213	Test lead, O-type to Banana, Approx. 1000mm		
CTS-214	DA4 Cable, Approx. 1000mm		
CTS-215	RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000mm		
CTS-216	USB Cable, 9-9 type, Approx. 1000mm		

VARIOUS DISPLAY MODES



Numerical (General) Mode



Numerical (Simple) Mode



Waveform Mode



Harmonic (Bar Graph) Measurement



Harmonic (Table Column) Measurement

CPM-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 16 measurement parameters (2 main measurements and 8 secondary measurements). The simple mode displays only 4 measurement parameter results. 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 25us/div to 1s/div) according to the set data update rate, and 8 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.

RICH MEASUREMENT PARAMETERS

Measurement Items	Symbols
Voltage	Vrms, Vpk, Vavg, Veff, Veff, Veff, Veff
Current	Irms, Ipk, Iavg, Ieff, Ieff, Ieff, Ieff
Power	P, Pavg, Ppk, PA, PAF
Power Factor	PF
Cross Factor	CF, CF
Phase Angle	PA, PA
Frequency	fHz, Hz
Total Harmonic Distortion	THD, THD
Maximum Current Ratio	MCR
Integration	Int, Int, Int, Int, Int, Int, Int, Int

Note: "Int" Only applicable in specific measurement modes for selection



CPM-8310 provides a variety of measurement items and functions, including voltage, current, frequency, effective power, apparent power, reactive power, power factor, cross factor, total harmonic distortion, and can also measure the maximum current ratio. CPM-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

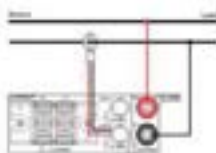
integrative at the set time period, and then divide by the time to obtain the average power of the DUT. In addition, when performing integration measurement, CPM-8310 supports automatic level changing function for the power change of the DUT at different times in order to obtain the most complete integration result within the set time.

C SUPER MEASUREMENT ASSISTANCE



Ratio Configuration

With respect to the support of measurement assistance, the performance of CPM-8110 is outstanding. First of all, for the measurement of high voltage/high power, the setting of voltage ratio/power ratio is provided to reduce the attenuated ratio to a true value. For the measurement of large current, other than the setting of current ratio, external current sensor type hook (EXT/EXT2) can be utilized to connect with a voltage output type current transformer, making large current measurement more



External Current Sensor Input

convenient. In addition, CPM-8110 provides 4 sets of panel settings for storage/recall and memory for storing 10,000 lots of measurement values. The measurement storage can log 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-8110 firmware update.

D FLEXIBLE LEVEL-CHANGING MECHANISM



Automatic level-changing under the integration function

CPM-8110 provides the measurement of the integration function under the automatic level-changing mode to allow users to fully calculate the total value of the power consumption of the DUT from the beginning to the end of the integration function. In addition, CPM-8110 also supports



Self-defined automatic level-changing mechanism

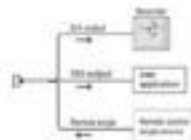
self-defined setting mechanism for level-changing. Users can select the required level to be changed to save time on level-changing and expedite the test.

E CONVENIENT AND PRACTICAL INTERFACE



Practical Interface

CPM-8110 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



DAI Interface Mechanism

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 $\times 5V$) or a manual level (full scale $\times 1V$) and receive results by collocating 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



GPM-8213



FEATURES

- 4" TFT LCD
- Basic Accuracy: $\pm 0.1\%$ of reading $\pm 0.1\%$ of range
- Two Data Display Modes
 - Standard Display: Displaying Two Major Measurement Items + Six Minor Measurement Items
 - Simple Display: Displaying Test Data of Four Different Measurement Items
- Meet the Requirement of IEC 42001 Power Measurement
 - Voltage/Current Test Frequency Bandwidth: DC ~ 60Hz
 - Watt Resolution: 1mW
 - Current Resolution: 5mA
 - Current/Voltage Measurements Reach CF-4 for Distorted Wave and CF-4 for Half Range
 - With Power vs Time/VA vs Time Integration Function
 - Total Harmonic Distortion Measurement
- Front Panel Test Terminal
- Standard Interfaces: RS-232C, USB Device, LAN
- Optional Test Fixture: GPM-861

GPM-8213 power meter is designed specifically for single-phase (1P/2W) AC power supply's power measurements. Powerful features, including 4" TFT LCD, five-digit measurement display, 18 power measurement parameters, integral measurement function, high-accuracy voltage/current/power measurement capabilities, front/rear panel input terminals, and various communication 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/Vpk/Vpk-pk), current(Irms/Ipk/Ipk-pk), frequency(VHz/VHz), power(P/P-pk/P-avg), crest factor(CF/Pk/Cr), apparent power(S), reactive power(Q), power factor(PF), phase angle(PhA), total harmonic distortion(THD/VTHD), high-accuracy voltage/current/power measurement capabilities (reading: 10.1% level $\pm 0.1\%$). 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 18 measurement parameters (2 major measurements + 6 monitor measurements) to satisfy the various measurement application requirements of R&D, design, and quality verification.

For DUT requiring IEC 42001/EN 10044 standby power consumption test, GPM-8213 provides the optimal measurement supports, including test frequency bandwidth of DC-60Hz, the minimum current level of 1mA (resolution: 0.1mA), power measurement resolutions (1/10 for minimum current and voltage levels; 1mW for maximum current and voltage levels), crest factor reaching 1 (full range reading 5), and measurement of total harmonic distortion (at least 13th order power harmonic). For large voltage/large current measurement applications of general power measurement, GPM-8213 provides PT/CT test function to collaborate 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.

SPECIFICATIONS		
INPUT		
ITEM		Range
RATING VOLTAGE	Voltage Current Current	400 Vrms
RATING CURRENT		20 Arms
IMPEDANCE (50/60Hz)		2.4 M Ω
MAXIMUM VOLTAGE	Voltage Current Current	1kV AC
MAXIMUM CURRENT		50 Arms
MAXIMUM COMMON MODE VOLTAGE		100 Vrms
LOW PASS FILTER	Cutoff frequency	100 Hz
PARAMETERS		
ITEM		Symbol
MEASUREMENT	Voltage Current Power Crest Factor Power Factor Frequency Angle Total Harmonic Distortion Integration	Vpk, Vrms, Vpk-pk, Vpk DC Arms, Ipk, Ipk-pk P, P-avg, P-avg, VA, Var CF, CF PF PhA, PhA Dist THD, THD
DISPLAY DIGITS		5 digits
FREQUENCY BANDWIDTH		DC 40Hz-60Hz
AVERAGE		1, 3, 4, 8, 16, 32, 64
PT RATE		1 ~ 9999 999
CT RATE		1 ~ 9999 999
DISPLAY MODE	Standard Simple	2 measurement item 4 measurement item
VOLTAGE		
ITEM		Range
RANGE	CF-3 CF-4	15V, 30V, 60V, 150V, 300V, 600V 7.5V, 15V, 30V, 75V, 150V, 300V
CREST FACTOR		1 or 5 (selectable)
ACCURACY	Effective Range	1% ~ 100% of range
	DC	$\pm 0.2\%$ of reading $\pm 0.2\%$ of range
	40Hz $\leq f \leq 60$ Hz	$\pm 0.1\%$ of reading $\pm 0.1\%$ of range
	60Hz $\leq f \leq 10$ kHz	$\pm 0.1\%$ of reading $\pm 0.2\%$ of range
	10Hz $\leq f \leq 10$ kHz	$\pm 1\%$ of reading
	Filter(OFF)	Adm 0.1% of reading $\pm 0.1\%$ - 60Hz
TEMPERATURE EFFECT	1.1E C / 20-40 C	Adm 0.01% of reading / C
RESIDUAL NOISE		0.1% of range



CPM-8213

CURRENT		
ITEM MEASUREMENT	CF-3 CF-6	Range 5mA, 10mA, 20mA, 50mA, 100mA, 200mA, 8.1A, 1A, 2A, 3A, 10A, 20A 2.5mA, 5mA, 10mA, 25mA, 50mA, 100mA, 200mA, 0.5A, 1A, 2A, 3A, 10A 3 or 6 (selectable)
CREST FACTOR ACCURACY	Effective Range DC $50\text{Hz} \leq f \leq 60\text{Hz}$ $60\text{Hz} < f \leq 10\text{kHz}$ $10\text{kHz} < f \leq 60\text{kHz}$ Filter(OFF) 1.1E C/20-4F C	1% - 105% of range ±0.2% of reading ±0.2% of range ±0.1% of reading ±0.1% of range ±0.1% of reading ±0.2% of range ±5% of reading Add 0.2% of reading @ 45Hz ~ 60Hz Add 0.03% of reading / °C 0.5% of range
TEMPERATURE EFFECT RESIDUAL NOISE	1.1E C/20-4F C	0.5% of range
POWER		
ITEM MEASUREMENT	Effective Range DC $50\text{Hz} \leq f \leq 60\text{Hz}$ $60\text{Hz} < f \leq 10\text{kHz}$ $10\text{kHz} < f \leq 60\text{kHz}$ Filter(OFF) 1.1E C/20-4F C	Range 1% - 110% of range ±0.2% of reading ±0.2% of range ±0.1% of reading ±0.1% of range ±0.1% of reading ±0.2% of range ±5% of reading Add 0.2% of reading @ 45Hz ~ 60Hz Add 0.03% of reading / °C
TEMPERATURE EFFECT	1.1E C/20-4F C	Add 0.03% of reading / °C
FREQUENCY		
ITEM MEASUREMENT	Filter(OFF) Filter(OFF)	Range 30.00 Hz ~ 499.99 Hz 30.00 Hz ~ 9.999 kHz Voltage, Current
PARAMETER EFFECTIVE RANGE		10% - 101% of voltage input
ACCURACY		±0.06% of reading
INTEGRATION		
ITEM INTERGRATION TIME	Accuracy Range Accuracy	Range (voltage is current accuracy ±0.1% of reading) 0 hour 30 min ~ 9999 hour 59 min ±0.0% (1 second)
DISPLAY		
4" TFT LCD		
POWER CONSUMPTION		
Max. 25W		
INTERFACE		
RS-232C, USB device, LAN		
POWER SOURCE		
AC 100-240 V, 50-60Hz		
DIMENSIONS & WEIGHT		
270(W) x 110(H) x 50(D) mm, Approx. 2.5kg		

ENGINE INFORMATION

CPM-E111 with ONE. (Visit www.amsce.com for more information.)

CPM-8711 Digital Power Meter (95-200, 1/100, 1000 Watts/100V)

ALZANTER, J. 1990. *Journal of Fish Biology* 37: 1-10.

^a In Italy Group = 1, France Group = 1, West Island CFS, 20% + 3, CFS = 9, other countries (JRS) group.

067005-1

CPM-4001. CPM card factory supplied.

OPTIONAL ACTIVITIES

CDM001 Set Square Includes CTS 312 x 1 CTS 311 x 1 CTS 306 1/28 Cutout 4-8 mm. Adjust 1/80mm.

One-Pot: New Future: Including CTL-210 & CTL-211 & C

676-389 Best Lead Source to Grow Your Agency. **1000000**

C75-278 The Lead, Barium in Barium. Approx. 1000ms

GTN-212	Thin Lead, 17 Pairs to Base wire, Approx. 1000mm
GTN-213	Thin Lead, 17 Pairs to Base wire, Approx. 1000mm

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FTI-304, 1000 Fyfe, A. B. Inc., Albany, NY 12212.

CTL-248 Cables Cables, Assemblies, 248mm

[illegible]

CBA-606: Four Shams 82, 10" 201 (see further on)



CPM-001 Test Fixture/Ten Fixture(DJ)



GTL-209 Test Lead



CTL210 Test Lead



GTL-212 Test Lead



GTL-213 Test Lead



Automatic Distortion Meter



The CAD-201G distortion meter is aimed at total harmonic distortion (THD) and AC voltage measurement at audio frequency range, from 20 ~ 20kHz. 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 (X) and harmonic distortion (Y) to an external monitoring device. Residual distortion, including hum and noise, is kept to a maximum level of 0.01%, making CAD-201G ideal for high-end audio applications.

CAD-201G

FEATURES

- Automatic Level & Distortion Measurements
- Auto or Hold Function Can be Selectable
- 0.1% ~ 100% in 7 Distortion Measuring Ranges
- 20Hz ~ 20kHz in 3 Continuous Ranges
- 400Hz, 1kHz, 10kHz 3 Spot Frequency
- 1mVrms ~ 300Vrms in 12 ACV Measuring Ranges

Specifications	
DISTORTION MEASUREMENT	
Range	0.1% ~ 100% full scale in 7 ranges by auto-ranging
Fundamental Frequency Range	20Hz ~ 20kHz in 3 continuous ranges with fine adjustment tuning and 3 spots for 400Hz, 1kHz and 10kHz using 100Hz/div ~ 100Vrms
Input Level	11.5dB
Automatic Level Control Range	\$20\mu\text{V}\$ or above
Fundamental Regulation	90ppm / 1dB at a basic frequency of 20Hz ~ 20kHz
Second Harmonic Accuracy	(including hum and noise) less than 0.01%
AC VOLTAGE MEASUREMENT	
Range	1mVrms to 300Vrms full scale in 12 ranges by auto-ranging
Frequency Response	20Hz ~ 20kHz $\pm 1\text{dB}$
Input Impedance	100k Ω / 10M Ω , 75 Ω or less (unbalanced)
Accuracy	90ppm (2% of full scale at 1kHz)
Residual Noise	less than 10ppm (input short circuited)
Output Level	6 ~ 110mV, V / 100ppm in meter full scale
Output Impedance	Approx. 600 Ω
POWER SOURCE	
AC 100V/120V/220V/240V/110V, 50/60Hz; Power Consumption: Max. 15W	
DIMENSIONS & WEIGHT	
116(W) x 162(D) x 300(H)mm, Approx. 4.6 kg	

GTL-103 Test Lead

Reverse Migration Leads
Approx. 1.2m



ORDERING INFORMATION

CAD-201G Automatic Distortion Meter

AC2200A003

User manual v 1, Power cord v 1

Test lead GTL-103 v 1

A.C. Millivolt Meter



GVT-427B (2CH)
GVT-417B (1CH)



The GVT-417B/417B Series is a compact analog AC millivoltmeter ideal for low level voltage measurements with a remarkable 500 μ V 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 (50Hz – 10kHz) and voltage (75mV – +400V), provides ample headroom for most applications.

FEATURES

- 500 μ V Full Scale Sensitivity
- Measures Frequency from 50Hz – 10kHz
- Measures from 75mV – +400V in 12 Ranges
- Dual Channel (GVT-427B)

CTL-101 Test Lead

BNC Alligator Heads
Approx. 1.2m



SPECIFICATIONS

INPUT	
Voltage Range	500 μ V – 100V of Full Scale in 12 ranges
Divider Range	75mV – +400V in 12 ranges
Accuracy	±3% of full scale
Operating Mode	GVT-427B : Ch1 and Ch2 separately or simultaneously at Ch1 GVT-417B : one Ch1 only
Frequency Response	50Hz – 200kHz (50, 100V – 1 kHz) (100V reference 1 kHz)
Impedance	1M Ω , approx. 40pF
OUTPUT	
Level	Approx. 0.10mV at full scale
Distortion	Less Than 2%
POWER SOURCE	
AC 115V/230V $\pm$ 10% 50/60Hz Power Consumption : Max. 500mW	
DIMENSIONS & WEIGHT	
130mm x 210mm x 200 (Depth) Approx. 1.8 kg	

ORDERING INFORMATION

GVT-427B : 2 Channels AC Millivolt Meter
GVT-417B : 1 Channel AC Millivolt Meter

ACCESSORIES

User manual x 1, Power cord x 1
Test Lead CTL-101 x 3 for GVT-427B
Test Lead CTL-101 x 1 for GVT-417B

Note : GVT-427B without CE Approval

Isolated Output High Precision Current Shunt Meter



PCS-1000i



FEATURES

- 4 1/2 Digit Voltage and Current Measurement Resolution
- Simultaneous Current and Voltage Measurement
- Five Current Measurement Levels (AC & DC): 30mA/100mA/3A/10A/100A
- AC Voltage Measurement Levels: 200mV/2V/20V/200V/600V
- DC Voltage Measurement Levels: 200mV/2V/20V/200V/1000V
- Standard: USB Device & GPIB
- CE Verification

CW Instek 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 adds five sets of independent shunt resistors to provide five current measurement levels, including 30mA, 10A, 100mA, and 100A 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 improve 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 shorted at a common point, therefore, the output load will likely result in measurement errors. PCS-1000i's 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 ± 0.0005
20.00000 V	0.0010 ± 0.0010	0.0005 ± 0.0005
200.0000 V	0.0010 ± 0.0010	0.0005 ± 0.0005
1000.000 V	0.0010 ± 0.0020	0.0005 ± 0.0005

Accuracy specification: ± (% of reading + % of range) voltage input impedance: 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 ± 0.001
300.0000 mA	< 0.3 V	0.01 ± 0.005	0.001 ± 0.001
3.000000 A	< 0.8 V	0.01 ± 0.005	0.001 ± 0.001
30.0000 A	< 0.8 V	0.01 ± 0.005	0.001 ± 0.001
300.000 A	< 0.8 V	0.01 ± 0.005	0.001 ± 0.001

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	0.1 ± 0.05	0.001
300.000 A	0.1 ± 0.05	0.001

Accuracy specification: ± (% of output + % of full scale) monitor output voltage for the full scale current ± 2V

AC CHARACTERISTICS

True RMS AC Voltage

Range	Frequency	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
200.0000 mV			0.005 ± 0.005
2.000000 V	45Hz~1kHz	0.1 ± 0.05	0.005 ± 0.005
20.00000 V	20Hz~10kHz	1.0 ± 0.05	0.005 ± 0.005
200.0000 V	50Hz~20kHz	3.0 ± 0.10	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	45Hz~20kHz	0.3 ± 0.05	0.03 ± 0.006
300.0000 mA	20Hz~10kHz	1.0 ± 0.05	0.03 ± 0.006
3.000000 A			0.03 ± 0.006
30.00000 A	45Hz~400Hz	0.3 ± 0.05	0.03 ± 0.006
300.000 A			0.03 ± 0.006

Accuracy specification: ± (% of reading + % of range)



PCS-1000I

SPECIFICATIONS

Isolated AC Current Monitor Accuracy

Range	Frequency	Half Year 23°C±5°C AC Accuracy	Temperature Coefficient/°C
10.00000 mA	45Hz~25Hz	0.2 ± 0.05	0.001
100.0000 mA	25Hz~150Hz	0.3 ± 0.05	0.001
1.000000 A			0.001
10.00000 A/1	45Hz~400Hz	0.5 ± 0.05	0.001
100.0000 A/1			0.001

Accuracy specification: ±0.5% of output + 1% 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 370W
Dimensions/Weight	210(W) × 80(H) × 190(D)mm; Approx. 5 kg

(The specifications apply when the PCS-1000I is powered on for at least 10 minutes to warm up to a temperature of 18°C ~ 28°C, unless specified otherwise.)

(Note 1) The accuracy for 100/200A basic meter is increased by a power factor of 0.9 percent.

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)

GTL-105A Alligator Clip Test Lead (1A Max)

GTL-301A Banana Plug Test Lead

CTL-340 USB Cable

PCS-001 Basic Accessory Kit

OPTIONAL ACCESSORIES

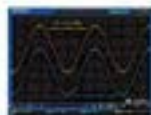
CRA-419-I Rack Mount Kit (ITS)

CRA-419-E Rack Mount Kit (EIA)

Rear Panel



PCS-001 Basic Accessory Kit



PCS-1000I
VS. Current Probe for
Measurement



The Measurement Issue
for Non-Isolated Shunt Meter

A SIMULTANEOUS VOLTAGE AND CURRENT MEASUREMENT



PCS-10001 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-10001 is simple in connection and there is no requirement of any additional instrument.

B FIVE SETS OF SHUNT RESISTORS TO SWITCH MEASUREMENT

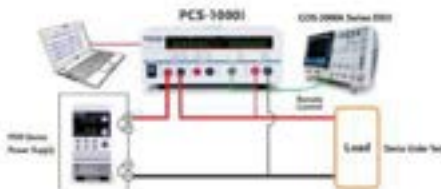


The switching measurement of five independent shunt resistors provides excellent resolution than that of a single shunt resistor.



Under 20mA range, the resolution is 0.01uA, which is ideal for very small current measurement.

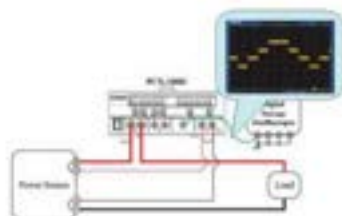
C REMOTE CONTROL APPLICATION



PCS-10001 is not only a high precision AC/DC shunt meter but also provides users with USB and COM communications interface so as to remotely control operational sequence. The SCPI commands of PCS-10001 allow users to read back measurement value via a computer remotely controlling PCS-10001. As shown on the above diagram, the series connection between

PCS-10001 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-10001 can be remotely controlled by operating the notebook computer and adding sequence.

D. ISOLATED OUTPUT CURRENT OUTPUT DESIGN



PCS-1000i adopts isolated current output design. Its BMC output can directly connect with an oscilloscope to avoid measurement errors resulted from the common ground of oscilloscope's analog input measurement.

E. AUTOMATIC RANGE-SWITCHING MEASUREMENT FUNCTION

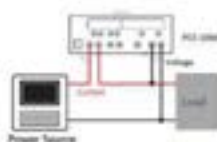


Press and hold Auto key, PCS-1000i will automatically select the maximum measurement resolution for users to save time in manual selection.

F. CONNECTION COMPARISON

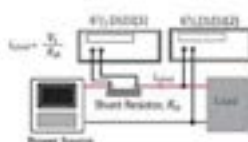
PCS-1000i can simultaneously measure current and voltage with $6\frac{1}{2}$ measurement resolution. The left diagram shows the connection method of simultaneous measurement. Compared with the test of conventional meters from other brands, PCS-1000i is simple in connection and there is no requirement of any additional instrument.

PCS-1000i Conducts Simultaneous Voltage and Current Measurement



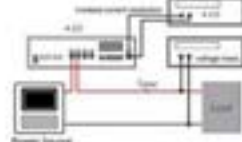
1. Only one PCS-1000i is needed to measure voltage and current
2. Easy connection
3. USB and GPIB communications on the rear panel can be used for data communication while connecting with a PC

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

[illegible]

CBM-01 	CBM-02 	CBM-03 
CBM-51 	CDM-01 	CDM-SC1A 
CDM-TL31 	CHT-108 	CHT-109 
CHT-112 	CHT-114 	CHT-115 
CHT-116 	CHT-116R 	CHT-117 / CHT-117 (EU) 
CHT-118 	CHT-118 (EU) 	CHT-119 
CHT-120 	GLC-01 	GLC-02 

CPM-001 	CPM-001 (3U) 	CSC-016 
CTL-100 	CTL-100 	CTL-100A 
CTL-106A 	CTL-110 	CTL-116B 
CTL-118B 	CTL-117 	CTL-112 
CTL-205A 	CTL-200A 	CTL-200 
CTL-210 	CTL-212 	CTL-210 
CTL-214 	CTL-215 	CTL-217 

CTL-008		CTL-109		CTL-232	
CTL-234		CTL-235		CTL-236	
CTL-240		CTL-246		CTL-247	
CTL-248		CTL-250		CTL-253	
LCR-081		PT-100		CDM-80C1	
CDM-82L1		CDM-90C1		CPT-98C1	
CPT-106C1		CPT-106L1		CTL-264	

FEATURE MODEL	DESCRIPTION	CONNECTION	OUT PACKAGE	APPLICATION
LCR-05 	Test Fixture for measuring axial and radial lead components Frequency: DC to 1MHz Max. Voltage: ± 1 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 35MHz Max. Voltage: ± 1 45V (including 5000V for and STD LOAD)	4 Wire	Axial & radial lead components	Suitable for axial & radial lead type L, C, R
LCR-06B 	Radial clip test lead Frequency: DC to 10MHz Max. Voltage: ± 1 45V	4 Wire (Radial clip)	Odd shaped components	Suitable for low R or high C
LCR-07 	Test leads for conventional component measurement Frequency: DC to 1MHz Max. Voltage: ± 1 35V	2 Wire (Wiggle clip)	Conventional components for in-circuit, board mounted components	Suitable for low C or high R
LCR-08 	SMD/Chip Sockets Frequency: DC to 1MHz Max. Voltage: ± 1 35V	4 Wire (SMD/Chip sockets)	SMD components	Suitable for SMD type L, C, R
LCR-10A 	Test Fixture for bottom surface components Frequency: DC to 35MHz Max. Voltage: ± 1 45V	4 Wire (SMD/Chip sockets)	SMD/Chip components	Range 0002 to 9999 including 5000V for and STD LOAD
LCR-12 	Radial clip test lead Frequency: DC to 10MHz Max. Voltage: ± 1 37V Approx. 50mm	Radial clip test lead		
LCR-15 	SMD/Chip test Fixture Frequency: DC to 10MHz Max. Voltage: ± 1 45V	4 Wire (SMD/Chip test fixture)	SMD/Chip components	Suitable for SMD Range 0001 to 9999
LCR-15A 	Test Fixture for SMD/Chip components Frequency: DC - 35MHz Max. Voltage: ± 1 45V	4 Wire (SMD/Chip test fixture)	SMD/Chip components	Range 0001 to 9999 (including STD LOAD)
LCR-16 	External DC Bias voltage box Frequency: 40Hz to 100Hz Max. Voltage: ± 1 45V			
LCR-17 	External DC Bias Current Box Frequency: 40Hz to 100Hz Max. Current: ± 1 2.5A			

CRA-417 Rack Mount Kit

For: CPT 9000A, 9000B, 9000C Series, CPT 9000



CRA-431 Rack Mount Kit

For: C20-41-02



CRA-422 Rack Mount Kit

For: C20A-000A Series, C20A-000A-001A, C20A-000A-002A Series
C20-000F Series, C20A Series, CPT-01-00001



CRA-433 Rack Mount Kit

For: CPT-0000



CRA-419 EIA Rack Mount Kit

For: C21-1000



CRA-419 JIS Rack Mount Kit

For: C21-1000



CRA-436 Rack Mount Kit

For: C20A-000A Series, C20A-001A, C20A-002A
C20-000F Series, C20A-000F Series, CPT-01-00001



CRA-440 Rack Mount Kit

For: CPT-10000 Series



CRA-445 Rack Mount Kit

For: C20-0000F Series



NOTE

WINS TAIWAN EXCELLENCE AWARD



台灣精品
TAIWAN EXCELLENCE



GW INSTEK
Simply Reliable



Your Most Trustworthy Partner

For more information, please visit our website: <http://www.gwinstek.com>

DISTRIBUTOR:

Specifications subject to change without notice.

2020CCTO, 2020 BT, 2020

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