

RIGOL

User's Guide

Vector Signal Analysis Measurement Application

Applicable to RSA5000-VSA

Jan. 2019

RIGOL (SUZHOU) TECHNOLOGIES INC.

Guaranty and Declaration

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If you have any problem or requirement when using our products or this manual, please contact **RIGOL**.

E-mail: service@rigol.com

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Safety Requirement

General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injury or damage to the instrument and any product connected to it. To prevent potential hazards, please follow the instructions specified in this manual to use the instrument properly.

Use Proper Power Cord.

Only the exclusive power cord designed for the instrument and authorized for use within the local country could be used.

Ground the Instrument.

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, connect the earth terminal of the power cord to the Protective Earth terminal before connecting any input or output terminals.

Connect the Probe Correctly.

If a probe is used, the probe ground lead must be connected to earth ground. Do not connect the ground lead to high voltage. Improper way of connection could result in dangerous voltages being present on the connectors, controls or other surfaces of the oscilloscope and probes, which will cause potential hazards for operators.

Observe All Terminal Ratings.

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting the instrument.

Use Proper Overvoltage Protection.

Ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the operator might be exposed to the danger of an electric shock.

Do Not Operate Without Covers.

Do not operate the instrument with covers or panels removed.

Do Not Insert Objects Into the Air Outlet.

Do not insert objects into the air outlet, as doing so may cause damage to the instrument.

Use Proper Fuse.

Please use the specified fuses.

Avoid Circuit or Wire Exposure.

Do not touch exposed junctions and components when the unit is powered.

Do Not Operate With Suspected Failures.

If you suspect that any damage may occur to the instrument, have it inspected by **RIGOL** authorized personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by **RIGOL** authorized personnel.

Provide Adequate Ventilation.

Inadequate ventilation may cause an increase of temperature in the instrument, which would cause damage to the instrument. So please keep the instrument well ventilated and inspect the air outlet and the fan regularly.

Do Not Operate in Wet Conditions.

To avoid short circuit inside the instrument or electric shock, never operate the instrument in a humid environment.

Do Not Operate in an Explosive Atmosphere.

To avoid personal injuries or damage to the instrument, never operate the instrument in an explosive atmosphere.

Keep Product Surfaces Clean and Dry.

To avoid dust or moisture from affecting the performance of the instrument, keep the surfaces of the instrument clean and dry.

Prevent Electrostatic Impact.

Operate the instrument in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.

Use the Battery Properly.

Do not expose the battery (if available) to high temperature or fire. Keep it out of the reach of children. Improper change of a battery (lithium battery) may cause an explosion. Use the **RIGOL** specified battery only.

Handle with Caution.

Please handle with care during transportation to avoid damage to keys, knobs, interfaces, and other parts on the panels.

Safety Notices and Symbols

Safety Notices in this Manual:



WARNING

Indicates a potentially hazardous situation or practice which, if not avoided, will result in serious injury or death.



CAUTION

Indicates a potentially hazardous situation or practice which, if not avoided, could result in damage to the product or loss of important data.

Safety Terms on the Product:

DANGER It calls attention to an operation, if not correctly performed, could result in injury or hazard immediately.

WARNING It calls attention to an operation, if not correctly performed, could result in potential injury or hazard.

CAUTION It calls attention to an operation, if not correctly performed, could result in damage to the product or other devices connected to the product.

Safety Symbols on the Product:



Hazardous Voltage



Safety Warning



Protective Earth Terminal



Chassis Ground



Test Ground

Care and Cleaning

Care

Do not store or leave the instrument where it may be exposed to direct sunlight for long periods of time.

Cleaning

Clean the instrument regularly according to its operating conditions.

1. Disconnect the instrument from all power sources.
2. Clean the external surfaces of the instrument with a soft cloth dampened with mild detergent or water. When cleaning the LCD, take care to avoid scarifying it.



CAUTION

To avoid damage to the instrument, do not expose it to caustic liquids.



WARNING

To avoid short-circuit resulting from moisture or personal injuries, ensure that the instrument is completely dry before connecting it to the power supply.

Environmental Considerations

The following symbol indicates that this product complies with the WEEE Directive 2002/96/EC.



Product End-of-Life Handling

The equipment may contain substances that could be harmful to the environment or human health. To avoid the release of such substances into the environment and avoid harm to human health, we recommend you to recycle this product appropriately to ensure that most materials are reused or recycled properly. Please contact your local authorities for disposal or recycling information.

You can click on the following link

http://www.rigol.com/Files/RIGOL_RoHS2.0&WEEE.pdf to download the latest version of the RoHS&WEEE certification file.

RSA5000 Series Overview

RSA5000 series is a new generation of cost-efficient real-time spectrum analyzer with high performance. With superb performance specifications, clear user interface, the RSA5000 series allows you to operate it through various ways, such as pressing keys on the front panel, using the touch screen, connecting the mouse and the keyboard. Remote communication interfaces are also available. The instrument can be widely used in education science, corporate R&D, industrial production, and other fields.

Document Overview

This document mainly introduces the front panel functions of the VSA mode.

Topics in this Manual:

Chapter 1 Quick Start

This chapter introduces the user interface of the spectrum analyzer in VSA mode and its mode settings.

Chapter 2 Front Panel Function Keys

This chapter gives detailed function descriptions of the VSA's front panel keys and the associated menu keys.

Chapter 3 Appendix

This chapter lists the options and accessories that can be ordered along with your analyzer as well as the service and support information.

Format Conventions in this Manual:

1. Keys:

The keys on the front panel are usually denoted by the format of "Key Name (Bold) + Text Box". For example, **FREQ** denotes the **FREQ** key.

2. Menu Keys:

The menu softkeys are usually denoted by the format of "Menu Word (Bold) + Character Shading". For example, **Center Freq** denotes the center frequency menu item under the **FREQ** function key.

3. Connectors:

The connectors on the front or rear panel are usually denoted by the format of "Connector Name (Bold) + Square Brackets (Bold)". For example, **[Gen Output 50Ω]**.

4. Operation Procedures:

→ indicates the next step of operation. For example, **FREQ** → **Center Freq** indicates pressing **FREQ** on the front panel and then pressing the menu softkey **Center Freq**.

Content Conventions in this Manual:

The RSA5000 series spectrum analyzer includes the following models. This manual takes RSA5065-TG as an example.

Model	Frequency Range	TG
RSA5065	9 kHz to 6.5 GHz	None
RSA5032	9 kHz to 3.2 GHz	None
RSA5065-TG	9 kHz to 6.5 GHz	6.5 GHz
RSA5032-TG	9 kHz to 3.2 GHz	3.2 GHz

User Manuals of this Product:

Quick Guide, User's Guide, Programming Guide, Data sheet, etc. For the desired manual, please download it from www.rigol.com.

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Chapter 1 Quick Start

This chapter gives you a quick review about the user interface of the RSA5000 series spectrum analyzer in VSA mode and its mode settings. For its details about the appearance and dimensions, its front and rear panel, as well as announcements during first use of the analyzer, refer to relevant chapters in *RSA5000 User's Guide*.

Contents in this chapter:

- User Interface
- Mode Setting
- Install the Option

User Interface

The user interface of VSA mode is shown in the following figure.

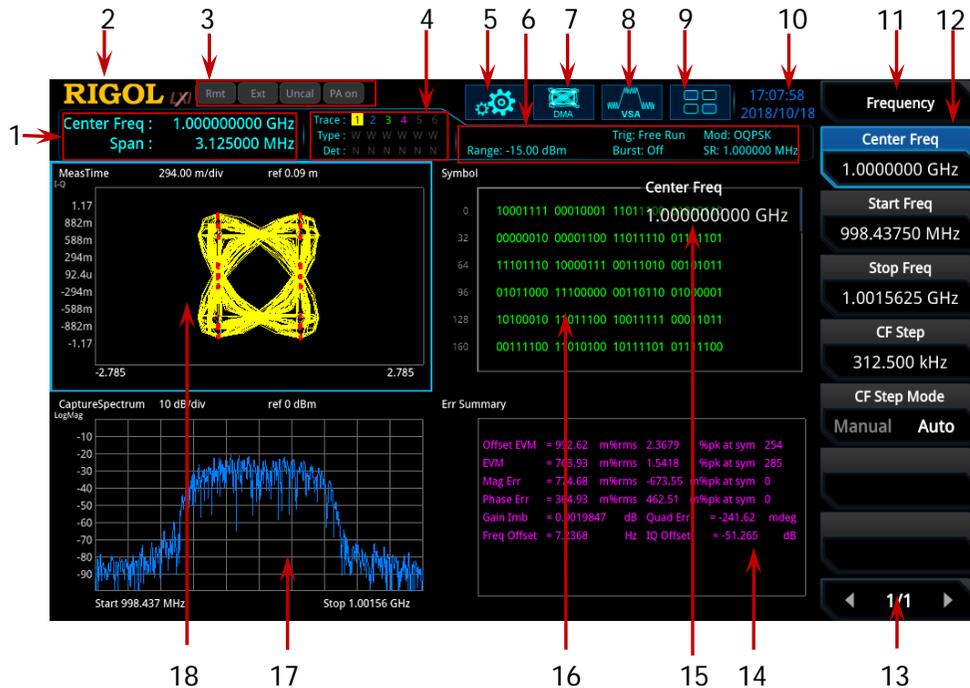


Figure 1-1 User Interface (VSA Mode)

Table 1-1 User Interface Icons

No.	Name	Description
1	Measurement result	Displays center frequency and analysis bandwidth. (when the marker is present, the current measurement results for the marker is displayed.)
2	RIGOL	Company logo.
3	System status	Rmt: indicates remote operation. Ext: indicates the external reference. Uncal: indicates that the measurement has not be calibrated. PA on: indicates that the preamp has been enabled.
4	Trace indicator ^[1]	Displays information about the trace and the RT trace detector.
5	Information setting	: indicates messages, such as the prompt messages, alarm messages, and error messages. : indicates the speaker. You can tune it up and down to increase and decrease the speaker volume,

		<p>or set it to mute .</p> <p>: indicates the network settings. You can configure network parameters.</p> <p>: unlocks the front panel keys; : locks the front panel keys.</p> <p>: unlocks the touch screen; : locks the touch screen.</p> <p>: indicates that no USB storage device is inserted;</p> <p>: indicates that a USB storage device has been inserted.</p>
6	Measurement bar	Displays measurement settings.
7	Measurement function	Displays the currently selected measurement function.
8	Working mode	Displays the currently selected working mode.
9	Function keypad icon	Clicks/Touches the icon to display the function keypad interface.
10	Time	Displays the system time.
11	Menu title	Displays the currently selected menu name.
12	Menu item	Displays the menu item of the current function.
13	Menu page number	Displays the current page and the total number of pages.
14	Trace4 window	Displays the waveforms or data of Trace4.
15	Active function area	Displays the current parameter and its value.
16	Trace3 window	Displays the waveforms or data of Trace3.
17	Trace2 window	Displays the waveforms or data of Trace2.
18	Trace1 window	Displays the waveforms or data of Trace1.

Note^[1]: The display of the trace indicator is shown in the following figure:



- The first line displays the trace number. The color of the number is the same as that of the trace. VSA mode only supports 4 traces.
- The second line displays the corresponding trace type. VSA mode is invalid.
- The third line displays the RT trace detector type of each trace. VSA mode is invalid.

Mode Setting

Mode

RSA5000 provides four working modes: GPSA, RTSA, VSA (option), and EMI (option). Press **Mode** to select the working mode.

Note: In different working modes, the functions of the keys on the front panel may be different. Press **Help** to display the help information of the current working mode. If you need help information for other modes, please exit the help interface first. Then select the desired working mode and obtain the corresponding help information.

1. GPSA

GPSA adopts two analysis methods: swept SA and FFT. It can not only carry out frequency domain analysis, but also time domain (zero span) analysis.

Select GPSA. In this working mode, you can press **Meas** to select multiple measurements. For details, refer to relevant chapters in Chapter 2 of *RSA5000 User's Guide*.

2. RTSA

RTSA provides the analysis function for the real-time signal, which can capture the complex signal seamlessly.

Select RTSA. In this working mode, you can also press **Meas** to select multiple measurements. For details, refer to relevant chapters in Chapter 2 of *RSA5000 User's Guide*.

3. VSA

VSA mode provides the standard vector signal analysis measurement function. If you need this function, please purchase this option (order No. RSA5000-VSA), and install it according to instructions in **"Install the Option"**.

4. EMI

EMI mode provides the EMI precompatibility measurement function. If you need this function, please purchase this option (order No. RSA5000-EMI/RSA3000-EMI), and install it according to instructions in **"Install the Option"**.

Mode Setup

The Mode Setup menu is used to set parameters related to the working modes.

Open the global parameter setting menu for the selected working mode under **Mode**.

1. Global CF Mode

Turns on or off the global center frequency. In any working mode, if you enable the global center frequency mode, then the global center frequency will be set to the center frequency of the current mode. When a different working mode is selected, the global center frequency will be set to the center frequency of the previous working mode, that is, the one that is before switching the working mode. If you change the center frequency in any working mode, then the global center frequency will change with it.

2. Global CF

Sets the global center frequency. It is only available when you turn on the global center frequency.

3. Mode Preset

Resets the parameters of the current mode to be the factory default settings.

Install the Option

RSA5000 provides various options (for option information, refer to "**Accessories and Option List**") to expand the function of the spectrum analyzer. If you need to purchase the option, please contact **RIGOL** sales representative. After you have purchased the option successfully, perform the following operations to install the option.

1. Acquire the license of the option

- Log in to the **RIGOL** official website (www.rigol.com), click **License Activation** to enter the "Registered product license code" interface.
- Input the correct key, serial number (press **System** → **About System** → **System Info** to acquire the serial number of the instrument), and verification code. Click **Generate** to acquire the option license. In the license generation interface, click **Download** to download and save the license file to the PC.

2. Install the option

You can install the option via the following 2 methods.

- 1) Install the option by reading the license file from the USB storage device
 - Copy the saved option license file to the root directory of the USB

- storage device.
- Power on the instrument and insert the USB storage device. Press **File** to enter the file operation menu interface.
 - Press **File Explorer**, and then the file manager interface is displayed. In the interface, find the directory of the USB storage device. Then select the desired option license file (suffixed with ".lic"). Press **Import License** to import the activation code and complete the reading of the option installation file.
- 2) Install the option by sending SCPI Commands
- Log in to **RIGOL** official website (www.rigol.com) to download the software Ultra Sigma. Then install it according to the installation wizard.
 - Use the USB cable to connect the rear-panel USB DEVICE interface of RSA5000 to the USB HOST interface of the PC.
 - Run Ultra Sigma. Search the resource and right-click the resource name. In the displayed menu, select "SCPI Panel Control". Input the following option installation command in the displayed SCPI control panel: `:SYSTem:LKEY <option info>@<license info>`. Wherein, `<option info>` indicates the option order No., and `<license info>` indicates the option license code.

For example, the following command is used to install the option RSA5000-PA.

```
:SYSTem:LKEY  
RSA5000-PA@8AD12B8EBC5DF492D1D4289B7CBA5B6150BF6F5D752  
D645C36D74530B05F39B49C461B23A50D6C94A34E06782AC4380070  
B0D1A86BA84E02768391FFD70C2103
```

Chapter 2 Front Panel Function Keys

This chapter describes in detail the front-panel function keys of RSA5000 and their associated menu functions in VSA mode.

Contents in this chapter:

- Basic Settings
- Sweep and Function Settings
- Meas Setup
- Marker Measurement
- Input/Output
- Shortcut Key
- System Function

Basic Settings

FREQ

Sets the frequency parameters of the analyzer.

Center Freq

Sets the center frequency (that corresponds to the horizontal center of the graticule) of the current channel.

Remarks:

- When you modify the center frequency, the start and stop frequency will be modified automatically if the span remains to be unchanged.
- Modifying the center frequency indicates that the frequency is changed along the current channel horizontally, and the adjustable range should be within the frequency range specified in the technical specifications of the analyzer.
- You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-1 Center Frequency

Parameter	Remarks
Default	1 GHz
Range	1.562 kHz to (Fmax ^[1] – 1.562 kHz)
Unit	GHz, MHz, kHz, Hz
Knob Step	step = span/200, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	CF step

Note^[1]: The maximum measurement frequency Fmax is determined by the instrument model. For RSA5065, Fmax is 6.5 GHz; for RSA5032, Fmax is 3.2 GHz.

Start Freq

Sets the start frequency of the current frequency channel.

Remarks:

- When you modify the start frequency, the center and stop frequency will be changed if the span remains to be unchanged.
- You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-2 Start Frequency

Parameter	Remarks
Default	center frequency - span/2
Range	0 Hz to (Fmax - 3.125 kHz)
Unit	GHz, MHz, kHz, Hz
Knob Step	step = span/200, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	CF step

Stop Freq

Sets the stop frequency of the current frequency channel.

Remarks:

- When you modify the stop frequency, the center and start frequency will be changed if the span remains to be unchanged.
- You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-3 Stop Frequency

Parameter	Remarks
Default	center frequency + span/2
Range	3.125 kHz to Fmax
Unit	GHz, MHz, kHz, Hz
Knob Step	step = span/200, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	CF step

CF Step

Changes the step size for the center frequency. Changing the center frequency by a constant step-size value switches the channel to be measured continuously.

Remarks:

- Set a proper CF step value, and then select the center frequency. Use the Up/Down arrow key to switch the measurement channel at a fixed step size. Thus, the instrument can sweep the adjacent channels manually.
- You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-4 CF Step

Parameter	Remarks
Default	span/10
Range	-Fmax to Fmax
Unit	GHz, MHz, kHz, Hz
Knob Step	step = span/200, Min = 1 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-2-5 step

CF Step Mode

The CF step mode consists of "Manual" and "Auto".

Remarks:

- In Auto mode, the CF step is 1/10 of the span in non-zero span mode.
- In Manual mode, you can use the numeric keys to set the step size.

SPAN

Span

Displays the frequency range of the current channel. This menu is grayed out and disabled, and you can only view the current span.

Last Scale

Sets X Scale to the last modified X-axis reference value and X-axis width. When X Scale is set to Auto, this menu is grayed out and disabled.

X Scale

X Scale can be set to Auto or Manual.

Remarks:

- When set to Auto, the instrument adjusts the X-axis reference value and X-axis width to an optimal state. At this time, **Reference** and **Width** menus are grayed out and disabled.
- When set to Manual, you need to set the X-axis reference value and X-axis width manually.

Ref Value

Sets the X-axis reference value of the selected trace. When the time-domain data source is selected, the reference unit is symbol or s; when the frequency-domain data source is selected, the reference unit is Hz.

Table 2-5 Reference Value (Time-Domain Data)

Parameter	Remarks
Default	0 (0 μ s)
Range	(-1e+12) to (1e+12)
Unit	symbol (s, ms, μ s, ns, ps)
Knob Step	width/100
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	Width/10

Table 2-6 Reference Value (Frequency-Domain Data)

Parameter	Remarks
Default	998.4375 MHz
Range	-1THz to 1THz
Unit	GHz, MHz, kHz, Hz
Knob Step	width/100
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	Width/10

Width

Sets the X-axis width of the selected trace. When the time-domain data source is selected, the reference unit is symbol or s; when the frequency-domain data source is selected, the reference unit is Hz.

Remarks:

- For the frequency-domain trace, the X-axis width can be set to be smaller than the span, enabling you to zoom in on a portion of the measurement values.
- For the time-domain trace, the X-axis width can be set to be smaller than the time span, enabling you to zoom in on a portion of the measurement values.

Table 2-7 Width (Time-Domain Data)

Parameter	Remarks
Default	50 (38.2812 μ s)
Range	0 to (1e+12)
Unit	symbol (s, ms, μ s, ns, ps)
Knob Step	Auto width/100
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	Auto width/10

Table 2-8 Width (Frequency-Domain Data)

Parameter	Remarks
Default	3.125 MHz
Range	0 to 1THz
Unit	GHz, MHz, kHz, Hz
Knob Step	Auto width/100
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	Auto width/10

Ref Position

Sets the position of the X-axis scale reference value for the selected trace. It can be set to "Left", "Center", and "Right".

Copy X Scale

Copies the X scale of the current trace to other traces. The available ranges can be Trace1 through Trace4. The copy operation is only allowed to be carried out between the trace data with the same X-axis unit.

AMPT

Sets the amplitude parameters of the analyzer. You can modify these parameters to make the signals under test be displayed with minimal errors in the current window, easy for you to observe.

Auto Scale

Sets the Y-axis reference level and the Y-axis scale value automatically to ensure that the signal can be fully displayed for better observation of the trace.

Ref Value

Sets the Y-axis reference of the selected trace.

Remarks:

- When "Log Mag" or "Linear Mag" is selected for the trace format, the reference level is located at the top of the Y axis; for other conditions, the reference level is located in the middle of the Y axis.
- The reference level is displayed in the middle of the graticule top.

Table 2-9 Reference Level

Parameter	Remarks
Default	0
Range	(-1e+12) to (1e+12)
Unit	refer to "Y Axis Unit"
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	

Scale/Div

Sets the Y scale per division of the selected trace. The scale value is displayed at the graticule top.

Note: When you select a different trace format, the default value and unit of the Y-axis scale are different.

Range

Sets the amplitude of the largest sinusoidal input signal without being clipped by the IF ADC.

Table 2-10 Range

Parameter	Remarks
Default	20 dBm
Range	-15 dBm to 25 dBm
Unit	dBm, -dBm, V, mV, uV
Knob Step	1 dBm
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	10 dBm

Y Axis Unit

Sets the unit of the Y-axis unit to Peak, RMS, or Power.

Remarks:

- The Y-axis unit is valid when the data source is "CaptureTime" or "CaptureSpectrum". After a unit is selected, the instrument will process the signal data according to the currently selected unit. At this time, you can observe the changes of the trace in the selected trace window, but the display of the graticule scale remains unchanged.
- For other data sources, if the trace format is "Log Mag", the default unit is dB; if you select "Wrap Phase" or "Unwrap Phase", the default unit is deg. Other trace format data are normalized, so they do not have the unit.

Table 2-11 Y Axis Unit

Trace Data	Y-axis Unit	LinearMag	LogMag	I(Real)	Q(Imaginary)	WrapPhase	unWrap Phase
Capture Time	Peak	V	dBVpk	V	V	deg	deg
	RMS	Vrms	dBVrms	Vrms	Vrms	deg	deg
	Power	W	dBm	V	V	deg	deg
Capture Spectrum	Peak	Vpk	dBVpk	Vpk	Vpk	deg	deg
	RMS	Vrms	dBVrms	Vrms	Vrms	deg	deg
	Power	W	dBm	Vpk	Vpk	deg	deg

Copy Y Scale

Copies the Y scale of the current trace to other traces. The available ranges can be Trace1 through Trace4.

Note: Only when the X-axis and Y-axis units of different traces are the same, the Y-axis scale information can be copied between different traces.

Sweep and Function Settings

BW

FFT Window

Sets the type of the FFT window function.

The following 4 window functions are available: Rectangular, Hanning, Gaussian, and Flat Top.

You can select a proper filter type by referring to the following table according to the actual measurement requirements.

Window Function	Characteristics	Application
Rectangular	Its main lobe is relatively concentrated, but its side lobe is relatively high, with negative side lobes. This will result in high-frequency interference and leakage during transform, even worse, the negative spectrum. The frequency recognition accuracy is the highest, and the amplitude recognition accuracy is the lowest.	If you have a high requirement on the accuracy of the frequency readout of the main lobe, without needing to consider the accuracy of the amplitude, then the rectangular window is recommended.
Hanning	It is also called the cosine window. Its main lobe is widened and lowered, and its side lobe is reduced significantly. In terms of leakage reduction, the Hanning window is superior to the Rectangular window. However, the wide main lobe of the Hanning window signifies the widened analysis bandwidth and reduced frequency resolution. Compared with the Rectangular window, the leakage and fluctuation of the Hanning window are reduced, with more choices.	The Hanning window is preferred under the following conditions: the signal under test has several frequency components; the spectrum is very complex; the test aim focuses more on the frequency point rather than the energy size; the signal under test is random or unknown.
Gaussian	It is an exponential window. Its main lobe is wide and frequency resolution is low. It has no negative side lobe, and the attenuation of its first side lobe reaches -55dB. It is	For the time-varying exponential decay function, you can use the exponential window to improve the S/N ratio.

	often used to truncate some non-periodic signals, such as the exponential decay signal.	
Flat Top	The flat top window has few low pass band fluctuations in the frequency domain.	As there are minor errors in the amplitude, this window can be used in calibration.

Sweep

Sets the sweep-related parameters.

Rt Acq Time

Sets the acquisition time for producing one RT trace.

Table 2-12 Acquisition Time

Parameter	Remarks
Default	99.9946 ms
Range	99.9946 ms to 40 s
Unit	s, ms, μ s, ns, ps
Knob Step	acquisition/100, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Continue

Sets the current sweep mode to continuous.

Single

Sets the current sweep mode to single.

Remarks:

- When the current sweep mode is continuous, press this key to enter a single sweep and perform a measurement.
- When the current sweep mode is single, only when you press **Single** or tap **Single**, can you launch the sweep.

Restart

Clears the history measurements and restarts the BER test. Displays this menu only when the "BER Test" measurement function is selected.

Trigger

Selects the trigger source and sets trigger-related parameters.

Trigger Source

Sets "Free Run", "External 1", "External 2", "Power (Time)", or "FMT" to be the trigger source.

Free Run

The trigger conditions are met at any time, that is, the analyzer generates trigger signals continuously.

External 1

In this mode, an external signal is input via the **[TRIGGER IN]** connector on the rear panel. When the signal meets the set trigger conditions, trigger signals are generated.

1. Slope

Sets the trigger polarity for External Trigger 1. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

2. Delay State

Enables or disables the trigger delay function. After the trigger delay function is enabled, you can set the trigger delay time.

3. Delay Time

Sets the time interval during which the instrument waits to start the sweep operation after the trigger signal that meets the trigger conditions is generated. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-13 Trigger Delay Time

Parameter	Remarks
Default	1 μ s
Range	-16.384 s ^[1] to 500 ms
Unit	s, ms, μ s, ns, ps
Knob Step	trigger delay/100, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: A negative trigger delay time indicates a pre-trigger.

External 2

Press **Input/Output** → **Ext Trigger2** to select "In". Then, an external signal is input via the **[TRIGGER IN/OUT]** connector on the rear panel. When the signal meets the set trigger conditions, trigger signals are generated.

Note: The input signal frequency on the external trigger interface should not be greater than 1 MHz.

1. Slope

Sets the trigger polarity for External Trigger 2. It is set positive to trigger on a rising edge and negative to trigger on a falling edge.

2. Delay State

Enables or disables the trigger delay function. After the trigger delay function is enabled, you can set the trigger delay time.

3. Delay Time

Sets the time interval during which the instrument waits to start the sweep operation after the trigger signal that meets the trigger conditions is generated. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-14 Trigger Delay Time

Parameter	Remarks
Default	1 μ s
Range	-16.384 s ^[1] to 500 ms
Unit	s, ms, μ s, ns, ps
Knob Step	trigger delay/100, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: A negative trigger delay time indicates a pre-trigger.

Power (Time)

A trigger signal will be generated when the system detects that the IF signal power exceeds the set IF power.

1. Delay State

Enables or disables the trigger delay function. After the trigger delay function is enabled, you can set the trigger delay time.

2. Delay Time

Sets the time interval during which the instrument waits to start the sweep operation after the trigger signal that meets the trigger conditions is generated. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-15 Trigger Delay Time

Parameter	Remarks
Default	1 μ s
Range	-16.384 s ^[1] to 500 ms
Unit	s, ms, μ s, ns, ps
Knob Step	trigger delay/100, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: A negative trigger delay time indicates a pre-trigger.

3. Power

Sets the trigger level of the IF power trigger. When the signal meets the set trigger level value, a trigger occurs. When the data source is "CaptureTime", and the trace format is "Log Mag (dB)" or "Linear Mag", the trace window displays the trigger level line.

Table 2-16 Power

Parameter	Remarks
Default	0 dBm
Range	(-140+Level Offset) to (30+Level Offset)
Unit	dBm, -dBm, V, mV, μ V
Knob Step	1 dBm
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	5 dBm

FMT

Triggers a discrete frequency-domain event based on a flexible user-defined frequency mask.

1. Delay State

Enables or disables the trigger delay function. After the trigger delay function is enabled, you can set the trigger delay time.

2. Delay Time

Sets the time interval during which the instrument waits to start the sweep operation after the trigger signal that meets the trigger conditions is generated.

You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-17 Trigger Delay Time

Parameter	Remarks
Default	1 μ s
Range	-16.384 s ^[1] to 500 ms
Unit	s, ms, μ s, ns, ps
Knob Step	trigger delay/100, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Note^[1]: A negative trigger delay time indicates a pre-trigger.

3. FMT Setup

1) Mask Type

Determines which mask (upper or lower) is being displayed on the screen.

- Upper: only displays the upper mask.
- Lower: only displays the lower mask.
- Both: displays both the upper and lower masks.

2) Edit

Press this key to enter the FMT editing interface, and the instrument automatically switches to the real-time trace. You can use the front panel keys to set the FMT. Besides, you can also use the touch screen, the externally connected keyboard or mouse to set and edit the FMT parameters in the visual dialog box interface. In the interface, you can quickly set the common parameters. The setting methods are the same as what you do with the front panel keys.

In addition, in the visual dialog box, settings for the color style of the FMT are added. You can select the desired style from the available color template.

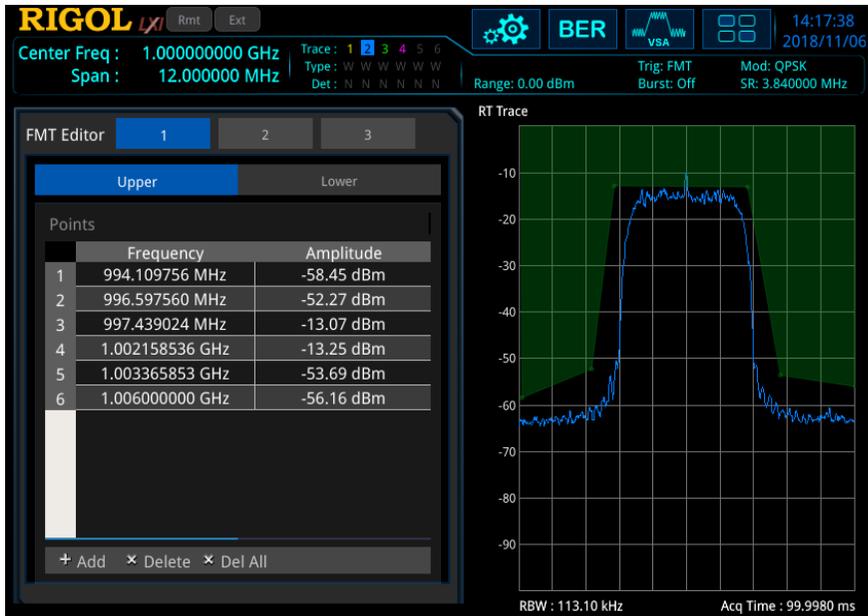


Figure 2-1 FMT Editing Interface

- **Active Mask**
Selects the mask type that needs to be activated currently. The following operations for editing and setting the mask points are only valid for the currently activated mask type.
- **Navigation**
Selects the first line of the mask editing table.
- **Frequency**
Sets the frequency of the mask point. Its range is within the frequency range supported by the analyzer.
- **Amplitude**
Sets the amplitude of the mask point. Its range is within the amplitude range supported by the analyzer.
- **Insert Point**
Adds a mask point.
- **Delete Point**
Deletes the currently selected mask point.
- **Delete Mask**
Deletes the currently activated mask.

- **Build**
Builds a mask from the RT trace. The mask points are generated based on the rough outline of the trace. You can use the X and Y offset to adjust the mask position.
- **Export**
Exports the mask to the file. You can also press **Save** → **FMT** to save the mask to the file.
- **Import**
Press this key, and then the file manager interface is displayed. You can import the mask from the file. You can also press **Recall** → **FMT** to import the mask from the file.
- **Recall**
In the file manager interface, after you select the desired file, press this key to load the corresponding mask.
- **To Mask**
Selects the FMT file and imports it to the selected mask.
- **New Mask**
Clears the currently activated mask and creates a default new mask.
- **X Offset**
Sets the offsets of all the frequency points of the currently activated mask.
- **Y Offset**
Sets the offsets of all the amplitude points of the currently activated mask.
- **Apply Offset**
Adds the X and Y offsets to each point of the current mask.
- **X Axis Type**
When "Fixed" is selected, the frequency of the current mask point will not be affected by the center frequency. When "Relative" is selected, the frequency of the current mask point is the difference between the frequency of the current mask point and the current center frequency. If you change the parameter state after completing the mask setup, the frequency of the mask should change with the state to keep the mask points to be in the same position relative to the current center frequency of the instrument.
- **Y Axis Type**
When "Fixed" is selected, the amplitude of the current editing point will not be affected by the reference level. When "Relative" is selected, the

amplitude of the current mask point is the difference between the amplitude of the current mask point and the current reference level. If you change the parameter state after completing the mask setup, the amplitude of the mask should change with the state to keep the mask points to be in the same position relative to the current reference level of the instrument.

3) Trigger Mask

Sets the currently effective trigger mask.

- Upper: only sets the upper trigger mask to be effective.
- Lower: only sets the lower trigger mask to be effective.
- Both: sets both the upper and lower trigger masks to be effective.

Note: When "Upper" is selected under **Mask Type**, the trigger mask is, by default, the upper mask; when "Lower" is selected under **Mask Type**, the trigger mask is, by default, the lower mask; when "Both" is selected under **Mask Type**, the trigger mask is, by default, the one before switching the mask type.

4) Trigger Criteria

Sets the condition that will cause the FMT trigger to occur. Both upper and lower masks use the same trigger criteria, and the trigger will occur when either mask meets the trigger criteria.

- Enter: Two states are required to initiate a trigger event. The signal must be outside the mask and then passes into the mask. The trigger event occurs when the first non-violating waveform is detected.
- Leave: Two states are required to initiate a trigger event. The signal must be inside the mask and then passes out of the mask. The trigger event occurs when the first non-violating waveform is detected.
- Inside: Only one state is required to initiate a trigger event. The signal has at least one data point inside (above) the mask. The trigger event occurs when the instrument detects the first signal with a point violating the mask.
- Outside: Only one state change is required to initiate a trigger event. The signal has all data points outside (below) the mask. The trigger event occurs when the instrument has detected the first spectral waveform that is completely outside (below) the mask.
- Enter-Leave: Three states are required to initiate a trigger event. The signal starts outside the mask and then passes into the mask. Next, the signal must pass outside the mask. The trigger event occurs at the second transition where the signal passes back out of the mask.
- Leave-Enter: Three states are required to initiate a trigger event. The signal starts inside the mask and then passes out of the mask. Next, the signal must pass into the mask. The trigger event occurs at the second transition where the signal passes back into the mask.

Hold-off State

Turns on or off the trigger hold-off function.

Hold-off Time

Sets the hold-off time between trigger signals. You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

When the trigger conditions are met, the trigger occurs. Then, the delay begins, and the hold-off time begins. During the hold-off time, new trigger signals will be ignored. For a free-running trigger, the hold-off value is the minimum time between two trigger signals.

Table 2-18 Trigger Hold-off Time

Parameter	Remarks
Default	100 ms
Range	0 μ s to 500 ms
Unit	s, ms, μ s, ns, ps
Knob Step	sync hold-off time/100, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

Auto Trig State

Enables or disables the auto trigger function.

Auto Trig

Sets the time that the instrument will wait for the trigger conditions to be met. When the set waiting time times out, the instrument will not wait and start to initiate the sweep measurement.

Table 2-19 Auto Trigger Time

Parameter	Remarks
Default	100 ms
Range	1 ms to 100 s
Unit	s, ms, μ s, ns, ps
Knob Step	auto trigger time/100, Min = 1 μ s
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	at 1-1.5-2-3-5-7.5 step

The relationship of the trigger parameters is shown in the following figure.

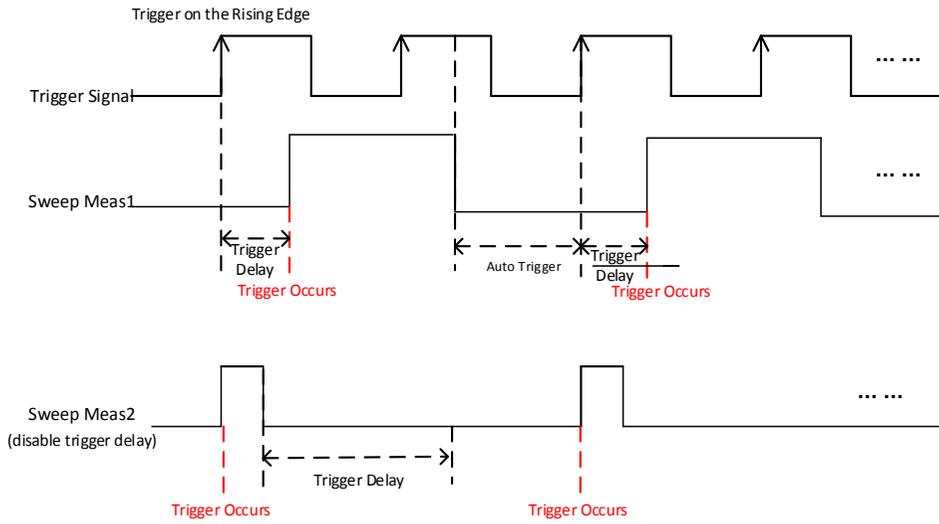


Figure 2-2 Relationship of Trigger Parameters

Trace

Press **Trace** to set the parameters of various traces in VSA measurement.

Selected Trace

RSA5000 series spectrum analyzer can display at most 4 traces synchronously (when you select a different Window Layout, the trace order is displayed differently). The selected trace window is highlighted, as shown in the following figure.

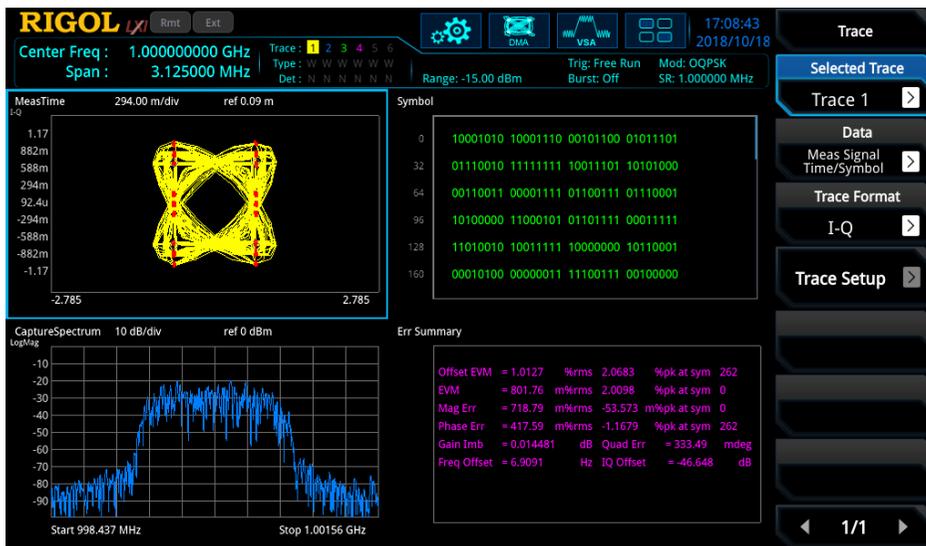


Figure 2-3 Trace Display

After activating the **Selected Trace** menu, select the corresponding trace number to set the relevant parameters for the specified trace.

Note: The trace currently displayed on the screen can be saved to the internal or external memory. If needed, you can recall it at any time. Press **Save** to save it according to descriptions in "Save".

Data

Sets the data source of the selected trace.

1. Capture Data

Sets the displayed pre-demodulation data of the selected trace to time domain or frequency domain.

When this data source is selected, I-Q, Q-Eye, I-Eye, and Constellation under the trace format are grayed out.

2. Meas Signal

Sets the displayed demodulation data of the selected trace to time domain or frequency domain.

When frequency-domain data are selected, I-Q, Q-Eye, I-Eye, and Constellation under the trace format are grayed out.

3. Ref Signal

Sets the displayed reference signal data of the selected trace to time domain or frequency domain.

When frequency-domain data are selected, I-Q, Q-Eye, I-Eye, and Constellation under the trace format are grayed out.

4. Demod Error

Sets the demodulation error measurement results of the selected trace.

1) Error Vector Time

Displays the vector difference between the IQ measurement time and IQ reference time at each time point.

When this data source is selected, I-Q, Q-Eye, I-Eye, and Constellation under the trace format are grayed out.

2) Error Vector Spectrum

Displays the FFT operation results of the vector difference between the IQ measurement time and IQ reference time at each time point.

When this data source is selected, I-Q, Q-Eye, I-Eye, and Constellation under the trace format are grayed out.

3) IQ Mag Error

Displays the amplitude difference between the IQ measurement signal and the reference signal at each time point.

When this data source is selected, only Log Mag(dB) can be displayed.

4) IQ Phase Error

Displays the phase difference between the IQ measurement signal and the reference signal at each time point.

When this data source is selected, only Linear Mag can be displayed.

5. Symbol

Press or tap the **Symbol** menu, and the symbols recovered after digital demodulation is displayed in the selected trace window of the user interface. At this time, the spectrum analyzer selects the symbols as the trace data. When this data source is selected, the **Trace Format** menu is grayed out and disabled.

6. Errs Summary

Press or tap the **Errs Summary** menu, and the corresponding errors summary is displayed in the selected trace window of the user interface. If you select a different demodulation type, the displayed error results are different. When this data source is selected, the **Trace Format** menu is grayed out and disabled.

7. RT Trace

Press or tap the **RT Trace** menu, and the real-time trace of the signal is displayed in the selected trace window of the user interface. When this data source is selected, the **Trace Format** menu is grayed out and disabled.

Trace Format

Sets the display format of the selected trace.

1. Log Mag (dB)
The signal amplitude is converted to be displayed in decibel unit.
2. Linear Mag
The signal amplitude is displayed in linear unit.
3. Real (I)
Displays the real part of the signal.
4. Imaginary (Q)
Displays the imaginary part of the signal.
5. Wrap Phase
Displays the phase of the data on the Y-axis. It is limited to $[-180^\circ, 180^\circ]$.
6. Unwrap Phase
Displays the phase of complex data without discontinuities, and the phase is not limited to $[-180^\circ, 180^\circ]$.
7. I-Q
Displays the real part of data in the horizontal axis, and displays the imaginary

part of data in the vertical axis.

8. Constellation
Same as I-Q, the difference is that only symbol points are displayed with no connecting lines.
9. Q-Eye
Indicates the eye diagram for quadrature signal.
10. I-Eye
Indicates the eye diagram for in-phase signal.

Trace Setup

Sets the display of the digital demodulation trace data.

1. Eye Length
Sets the width of the eye diagram, and which is displayed in the symbol period.
Note: This menu is only valid when the trace format is "Q-Eye" or "I-Eye".

Table 2-20 Eye Length

Parameter	Remarks
Default	2
Range	1 ~ 40
Unit	None
Knob Step	1
Left/Right Arrow Key Step	1
Up/Down Arrow Key Step	1

2. Symbol Format
Sets the display format of the symbol data. You can select "Hex" or "Binary".
Note: The menu is valid when the data source is "Symbol".
3. Trace Det
Sets the detector for the current trace when the "RT Trace" data source is selected. The available trace detectors include Pos Peak, Neg Peak, Average, and Sample.

Meas Setup

Meas

Provides the digital demodulation measurement function.

Digital Demod

The digital demodulation measurement can be widely used to analyze and measure various vector modulation formats in frequency domain, time domain and modulation domain. You can view the pre-demod time and spectrum display, demodulated signal, reconstructed reference signal, recovered symbols, and various error traces and summaries. After selecting **Digital Demod**, press **Meas Setup** to set the corresponding parameters of the digital demodulation.

BER Test

Press this key to enable the bit error rate test function. The instrument compares the current measurement signal with the already known reference signal to obtain the bit error rate. The measurement results are displayed in the user interface, as shown in the figure below.



Figure 2-4 BER Measurement Results

Note: Before performing the BER test, load the BER test file (.xml) first. For how to load the file, refer to "**Known Data**" section.

Meas Setup

Open the parameter setting menu of the selected digital demodulation function in the **Meas** menu.

Mod Format

1. QAM Format

The available QAM formats include 16QAM, 32QAM, and 64QAM.

2. PSK Format

The available PSK formats include BPSK, QPSK, OQPSK, DQPSK, 8PSK, pi/4-DQPSK, pi/8-D8PSK, and D8PSK.

3. FSK Format

The available FSK formats include 2FSK, 4FSK, 8FSK, and MSK.

4. ASK

The available ASK formats include 2ASK and 4ASK.

Ref Deviation Mode

Sets the reference frequency offset mode in the FSK modulation to "Auto" or "Manual".

Remarks:

- When you select "Auto", the frequency offset is calculated automatically after vector modulation analysis.
- When you select "Manual", you can set the frequency offset by the **Ref Deviation** menu manually.
- This menu is only displayed when you select FSK as the modulation format.

Ref Deviation

Sets the reference frequency offset in the FSK modulation. This menu is only displayed when you select FSK as the modulation format and the Ref Dev Mode is set to "Manual".

Diff Encoding

Enables and disables MSK differential encoding. This menu is only displayed when you select MSK as the modulation format.

Meas Interval

Sets the number of symbols for analysis in digital demodulation.

Table 2-21 Meas Interval

Parameter	Remarks
Default	50
Range	10 to MI _{max} ^[1]
Unit	none
Knob Step	1
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	10

Note^[1]: The maximum measure interval MI_{max} is determined by Points/Symbol. When setting Points/Symbol to 4, MI_{max} is 4096; when setting Points/Symbol to 8, MI_{max} is 2048; when setting Points/Symbol to 16, MI_{max} is 1024.

Points/Symbol

Sets the number of sampling points for each symbol in the demodulation data within the displayed time. The available values are 4, 8, and 16.

Symbol Rate

Sets the symbol rate for the analyzer's digital demodulator to match the symbol rate of the system.

In the digital demodulation, the symbol rate determines how often the symbols occur. The number of bits represented by each symbol is determined by the current modulation format. For example, in a BPSK system, each symbol represents 1 bit; in a QPSK system, each symbol represents 2 bits.

Table 2-22 Symbol Rate

Parameter	Remarks
Default	1 MHz
Range	1 Hz to SRmax ^[1]
Unit	GHz、MHz、kHz、Hz
Knob Step	100 Hz
Left/Right Arrow Key Step	
Up/Down Arrow Key Step	1 kHz

Note^[1]: The maximum symbol rate $SR_{max} = SP_{max} \times 1.28 / (\text{Points/Symbol})$. Wherein, SP_{max} is the maximum span. If the option RSA5000-B40 is not installed, SP_{max} is 25 MHz. If the option RSA5000-B40 is installed, SP_{max} is 40 MHz.

Meas Filter

Sets the type of the measurement filter, that is, the matching filter required for vector modulation signal demodulation. The available choices include "No Filter", "RRC" (Root Raised Cosine), "Gaussian", "Rectangular", and "User Defined" (Data1 to Data6).

Remarks:

- You can modify alpha (cosine filter) or BT (Gaussian filter) to define the shape and width of the cosine filter and Gaussian filter.
- You can send the SCPI command
`[[:SENSe]:DDEMod:FILTer:MEASurement:USER<n>[:DATA] <ampl>{,<ampl>}]`
to self-define 6 measurement filters. After selecting one of Data1 to Data6 in the "User Defined" filter, you can view the current data in the pop-up User Define Filter window. Clicks the "Apply" button or the **Apply** menu to select the user filter; Clicks the "Cancel" button or **Cancel** menu to deselect the user filter.

Ref Filter

Sets the type of the reference filter, that is, the filter for constructing reference digital modulation signal. The available choices include "Raised Cosine", "RRC" (Root Raised Cosine), "Gaussian", "Rectangular", "Half Sine", and "User Defined" (Data1 to Data6).

You can send the SCPI command

`[[:SENSe]:DDEMod:FILTer:REfERENCE:USER<n>[:DATA] <ampl>{,<ampl>}]` to self-define 6 reference filters. After selecting one of Data1 to Data6 in the "User Defined" filter, you can view the current data in the pop-up User Define Filter window. Clicks the "Apply" button or the **Apply** menu to select the user filter; Clicks the "Cancel" button or **Cancel** menu to deselect the user filter.

Preset To Standard

Selects the preset digital demodulation setup parameters and span to measure a variety of standard digital communications formats. The following standard presets are available:

- Cellular: GSM, NADC, WCDMA, PDC, and PHP.
- Wireless networking: Bluetooth, WLAN, ZigBee 868, ZigBee 915, and ZigBee 2450.
- Other: TETRA, DECT, and APCO-25.

Alpha/BT

This parameter determines the characteristics of the Raised Cosine, Root Raised Cosine, and Gaussian filters used by the analyzer's digital demodulator. These characteristics apply to the measurement filter and the reference filter. The available range is from 0.05 to 100.

Burst/Sync Search

Selects the search parameters for the current measurement.

1. Burst Search Length

Sets the length of time for the burst search. This menu is available only when the burst search function is enabled.

2. Burst Search Run-In

Sets the length of the interference signal that needs to be removed after searching the pulse rising edge. The unit is symbol. This menu is available only when the burst search function is enabled.

3. Burst Search

Enables or disables the burst search function.

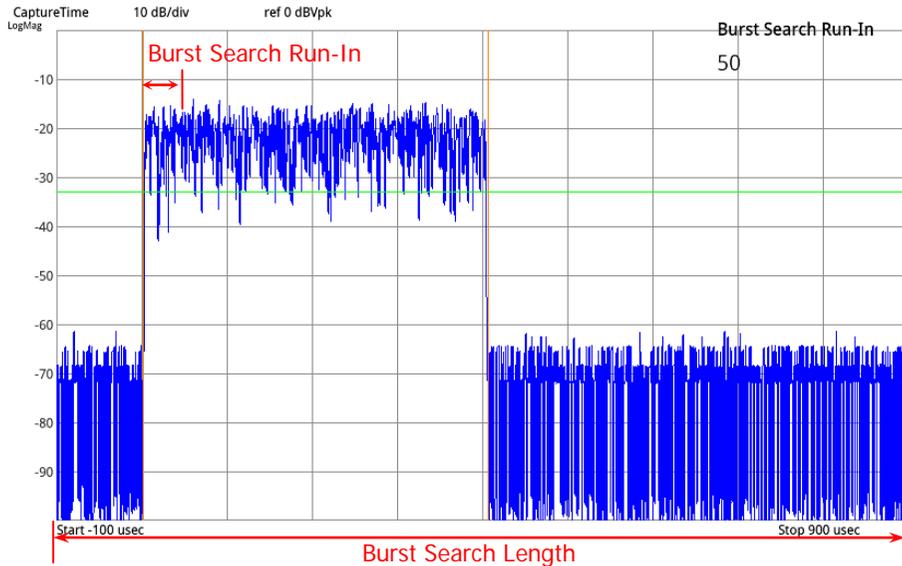


Figure 2-5 Relationship of Burst Search Parameters

4. Sync Analyze Length

Sets the number of symbols analyzed during the sync search. This menu is available only when the sync search function is enabled and the burst search is disabled.

5. Sync Search

Enables or disables the sync search function.

6. Sync Pattern

Sets the bit pattern for the sync search. Press or tap the **Sync Pattern** menu to pop up Sync Pattern window as shown in Figure 2-6.

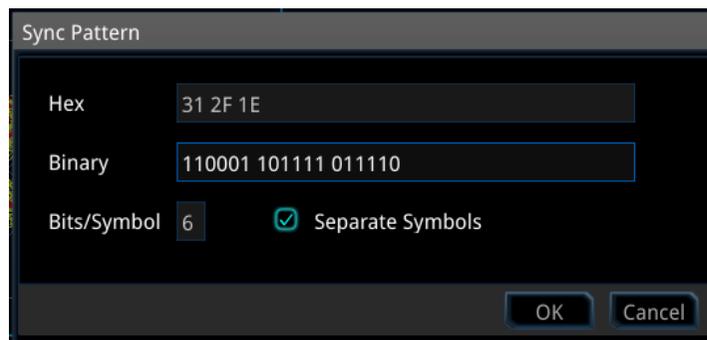


Figure 2-6 Sync Pattern

Enters the binary number 1 or 0 in the "Binary" text box, and displays the corresponding hexadecimal number in the "Hex" text box. The number of Bits per Symbol in the currently selected modulation format is displayed in the

"Bits/Symbol" text box. When the box "Separate Symbol" is checked, Binary and hexadecimal data are separated by Spaces. When the box "Separate Symbol" is unchecked, binary and hexadecimal data are not separated. Click "OK" button or **OK** menu to complete the settings. Click "Cancel" button or **Cancel** menu to cancel the settings.

7. Sync Offset

Sets the time between the start of the measurement data and the start of the sync word. If positive, the sync word starts after the start of the measurement data; if negative, the sync word starts before the start of the measurement data.

Known Data

Press or tap the **Known Data** menu to load the BER test file (.xml).

Press **File Explorer** to enter the file manager interface. Select a file and then press **Recall** to import the file.

The XML file should comply with the the following format requirements.

Syntax	Value Range	Description
<RIGOL_VSA_KNOWN_DATA_FILE Version="01.00">	--	File header
<Comment></Comment>	Optional modulation mode	--
<Base></Base>	2 16	The base used to specify the <Data> values (binary or hexadecimal). For <ModulationOrder>≥32, use binary (2).
<ModulationOrder></Modulation-Order>	2 4 8 16 32 64 128 256	The number of the different symbols that can be transmitted in the selected modulation. (order of modulation), e.g. 8 for 8-PSK. For <ModulationOrder>≥32, <Base> = 2.
<ResultLength></ResultLength>	1 to 2000 ^[1]	Number of symbols in each <Data> element.
<Data></Data>	One character per symbol in the sequence. Possible characters are: 0 to n-1, where n is the	One possible sequence of symbols that can be demodulated from the input signal. Up to 6000 ^[1] different

	<ModulationOrder>. Spaces, tabs and line breaks are ignored.	sequences, i.e. <Data>-elements, can be defined in total.
</RIGOL_VSA_KNOWN_ DATA_FILE>	--	File end

Note^[1]: the exact number depends on available memory space.

The sample XML file for BER test is as follows.

```
<RIGOL_VSA_KNOWN_DATA_FILE Version="01.00">

<Comment> Standard 8PSK </Comment>
<Base> 16 </Base>
<ModulationOrder> 8 </ModulationOrder>
<ResultLength> 148 </ResultLength>

<Data> 777 511 727 242 206 341 366 632 073 607
770 173 705 631 011 235 507 476 330 522
177 177 171 117 777 177 717 717 111 615
527 046 104 004 106 047 125 415 723 344
241 264 773 111 337 446 514 600 677 7 </Data>
</RIGOL_VSA_KNOWN_DATA_FILE>
```

Window Layout

1. Single Window

The user interface displays the waveform of the currently selected trace in one single window.

2. LR Window

The user interface displays the trace waveform or data in two windows.

- If trace 1 or trace 2 is selected before setting the window layout, the left window displays trace 1 and the right window displays trace 2.
- If trace 3 or trace 4 is selected before setting the window layout, the left window displays trace 3 and the right window displays trace 4.

3. UD Window

The user interface displays the trace waveform or data in two windows.

- If trace 1 or trace 2 is selected before setting the window layout, the upper window displays trace 1 and the bottom window displays trace 2.
- If trace 3 or trace 4 is selected before setting the window layout, the upper window displays trace 3 and the bottom window displays trace 4.

4. LRD Window

The user interface displays the trace waveform or data in three windows.

- If trace 1, trace 2, or trace 3 is selected before setting the window layout, the upper-left window displays trace 1, the bottom window displays trace 2, and the upper-right window displays trace 3.
- If trace 4 is selected before setting the window layout, the upper-left window displays trace 2, the bottom window displays trace 3, and the upper-right window displays trace 4.

5. UDR Window

The user interface displays the trace waveform or data in three windows.

- If trace 1, trace 2, or trace 3 is selected before setting the window layout, the upper-left window displays trace 1, the lower-left window displays trace 2, and the right window displays trace 3.
- If trace 4 is selected before setting the window layout, the upper-left window displays trace 2, the lower-left window displays trace 3, and the right window displays trace 4.

6. Four Window

The user interface displays Trace1 (upper-left window), Trace2 (lower-left window), Trace3 (upper-right window), and Trace4 (lower-right window) in four windows.

Marker Measurement

Marker

Marker is a triangle sign (as shown in the following figure), which is used for marking the point on the trace. Reads the amplitude and frequency of a certain point on the trace via marker.

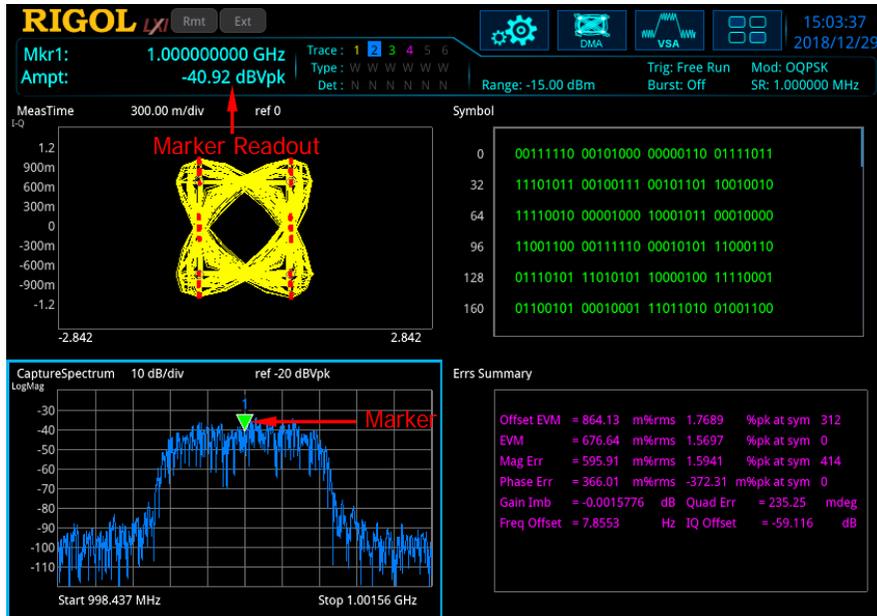


Figure 2-7 Marker

Remarks:

- RSA5000 offers 8 markers in VSA mode, and only a single marker or one pair of markers can be turned on each time.
- In the Marker menu, you can use the numeric keys, the knob, or the arrow keys to modify frequency; to view the readout of different points on the trace. You can also use the touch screen to do the above things.

Selected Marker

RSA5000 provides 8 markers. By default, Marker1 is selected under "Selected Marker". After you select a marker, you can set parameters such as the marker mode and the marker trace. The currently enabled marker will be marked on the trace selected under **Marker Trace**. The readout of the currently activated marker at the marker point will be displayed in the measurement result bar at the upper-left corner of the screen.

Marker Mode

Sets the type of the marker. The available marker modes include Position, Delta, Fixed, and Off.

1. Position

It is used to measure the X (Frequency or Time) and Y (Amplitude) values of a certain point on the trace. When "Position" is selected, a marker indicated by a number ("1") appears on the trace.

Remarks:

- If no active marker exists currently, a marker will be enabled at the X-axis reference value of the current trace.
- The readout resolution of the X-axis is related to the currently set X-axis width. To obtain a higher readout resolution, reduce the width.

2. Delta

It is used to measure the difference between "reference point" and "certain point on the trace": X (frequency or time) and Y (amplitude) value. When "Delta" is selected, a pair of markers appears on the trace: Reference Marker (marked by "X") and the Delta Marker (marked by "Δ").

Remarks:

- If an active marker exists currently, then activate a reference marker at the current marker; otherwise activate both the reference marker and Delta marker at the same time at the X-axis reference value.
- When you change the position of the Delta marker, the position of the reference marker remains unchanged, but the frequency (or time) difference between the two markers will change along with it.
- The frequency (or time) difference between the two markers and the amplitude difference between them are displayed in the measurement result bar at the upper-left corner of the screen.

3. Fixed

When you select "Fixed" marker, you can directly or indirectly set the X-axis and Y-axis values for the marker. Once specified, its position remains unchanged,

and its Y-axis value does not change along with the trace. The fixed marker is generally used as the reference marker for the Delta marker. It is indicated by the sign "X".

4. Off

Turns off the marker currently selected. Then, the marker information displayed on the screen and the functions concerning the marker will also be disabled.

Reference Marker

Sets the reference marker for the current marker. By default, the reference marker is the marker next to it.

Remarks:

- Each marker can have another marker to be its reference marker.
- If the current marker is a Delta marker, the measurement result of the marker will be determined by the reference marker.
- Any marker cannot take itself to be the reference marker.

Marker Trace

Selects the trace that the current marker marks. It can be Trace1, Trace2, Trace3, and Trace4. One marker can only mark one trace.

Marker X

Sets the frequency (when frequency-domain data source is selected) or time (when time data source is selected) of the marker to change the position of the marker on the trace. Press this key to modify the value to change the position of the marker.

Remarks:

- If the marker mode of the specified marker is Position or Fixed, set the X value of the marker.
- If the specified marker mode is Delta, set the X value of the delta marker relative to the reference marker.
- When "Fixed" is selected for the marker mode and "I-Q" or "Constellation" is selected for the trace format, Marker X is used to determine the data points.

Marker Y

When the marker type is set to "Fixed", you can press this key to set the Y value of the current marker.

Note: When "Fixed" is selected for the marker mode and "Constellation" is selected for the trace format, Marker Y is used to set the marker's in-phase component (real part) of the Y value.

Marker Y Imag

When "Fixed" is selected for the marker mode and "I-Q" or "Constellation" is selected for the trace format, Marker Y is used to set the marker's quadrature component (imaginary part) of the Y value.

Couple Markers

Enables or disables the couple marker function.

Remarks:

- When this function is enabled, moving any marker will enable other markers (except the Fixed or Off marker) to move with it.
- The fixed marker does not move along with other marker, but if the fixed marker moves, other non-fixed markers will move with it.

Marker Table

Enables or disables the marker table.

When it is set to "On", the lower section of the split screen displays all the enabled markers in the form of lists, as shown in the figure below. Through this table, you can view the measurement values of multiple points.

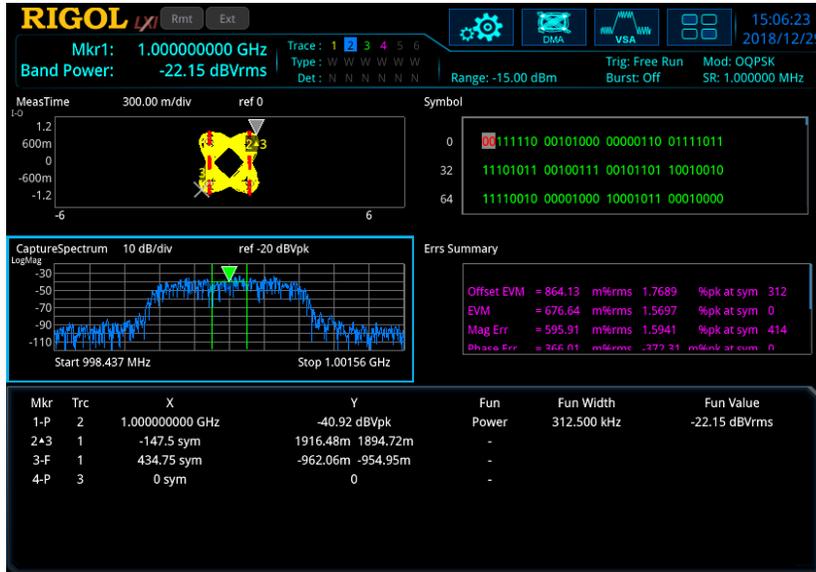


Figure 2-8 Marker Table

All Markers Off

Turns off all the enabled markers and their related functions.

Marker->

Sets the other system parameters (such as center frequency and reference level) by using the current marker values. Press any key under **Marker->** to activate a marker automatically if no marker is currently enabled.

Mkr->CF

Sets the center frequency of the analyzer to the frequency of the current marker.

- If Position marker is selected, the center frequency will be set to the frequency of the current marker.
- If Delta marker is selected, the center frequency will be set to the frequency of the Delta marker.

Mkr->CF Step

Sets the center frequency step of the analyzer to the frequency of the current marker.

- If Position marker is selected, the center frequency step will be set to the frequency of the current marker.
- If Delta marker is selected, the center frequency step will be set to the frequency difference between the Delta marker and the reference marker.

Mkr->Start

Sets the start frequency of the analyzer to the frequency of the current marker.

- If Position marker is selected, the start frequency will be set to the frequency of the current marker.
- If Delta marker is selected, the start frequency will be set to the frequency of the Delta marker.

Mkr->Stop

Sets the stop frequency of the analyzer to the frequency of the current marker.

- If Position marker is selected, the stop frequency will be set to the frequency of the current marker.
- If Delta marker is selected, the stop frequency will be set to the frequency of the Delta marker.

Mkr->Ref

Sets the reference level of the analyzer to the amplitude of the current marker.

- If Position marker is selected, the reference level will be set to the amplitude of the current marker.
- Given a Delta marker, if the current marker is the reference marker, then the reference level is set to the amplitude of the reference marker; if the current marker is the Delta marker, then the reference level is set to the amplitude of the Delta marker.

Mkr Δ ->CF

Sets the center frequency of the analyzer to the center frequency point of the frequency at delta marker and its reference marker.

This function is only valid when the Delta marker is selected.

Marker Func

Band Function

The band function defines the corresponding parameters for a frequency band measurement signal at the marker point.

1. **Band Power**
Calculates the total power within a certain band.
2. **Off**
Disables the band function. Disabling the band function will neither affect the frequency band parameters nor disable the marker.

Band Adjust

Adjusts the bandwidth parameter for the band function.

1. **Band Span**
Sets the bandwidth of the signal involved in the calculation for the band function.
2. **Band Left**
Sets the left edge frequency of the signal involved in the calculation for the band function.
3. **Band Right**
Sets the right edge frequency of the signal involved in the calculation for the band function.

Note: The above menus are valid for the frequency domain data.

Peak

The peak search function enables the marker to move to the specific signal peak point, and then in combination with the function of Delta marker, it can provide a powerful analysis capability.

Peak Search

Performs the peak search function. Searches for the maximum value on the trace and marks it with a marker.

Next Peak

Searches for and marks the peak whose amplitude on the trace is next lower than that of the current peak.

Next Higher

Searches for and marks the peak whose amplitude on the trace is next higher than that of the current peak.

Next Peak Right

Searches for and marks the peak closest to the right side of the current peak.

Next Peak Left

Searches for and marks the peak closest to the left side of the current peak.

Minimum Search

Searches for and marks the peak with the minimum amplitude on the trace.

Cont Peak

Enables or disables continuous peak search. By default, it is Off. When it is enabled, after finishing each sweep, the analyzer will automatically execute one peak search operation to track the measurement signal.

Input/Output

Sets the input/output interface.

Input Z

Sets the input impedance for voltage-to-power conversions. The default input impedance is 50 Ω . To measure a 75 Ω device, you should use a 75 Ω to 50 Ω adapter (option) supplied by **RIGOL** to connect the analyzer with the system under test, and then set the input impedance to 75 Ω .

Ext Gain

Compensates for gain or loss in the measurement system outside the instrument.

Remarks:

- The value does not affect the trace position, but will modify the parameters such as reference level readout and the marker amplitude readout.
- You can use the numeric keys, the knob, or arrow keys to modify this parameter; you can also use the touch screen to modify the parameter.

Table 2-23 External Gain

Parameter	Remarks
Default	0 dB
Range	-120 dB to 120 dB
Unit	dB
Knob Step	1 dB
Left/Right Arrow Key Step	1 dB
Up/Down Arrow Key Step	5 dB

Ext Trigger 2

Sets the external trigger 2 [**TRIGGER IN/OUT**] to be the "input" or "output" interface.

Shortcut Key

Auto Tune

In VSA mode, the Auto Tune function is disabled.

Preset

Recalls the preset setting and restores the system settings of the analyzer to a specified status.

Remarks:

- To set the preset type, press **System** → **Preset** → **Preset Type**. The available types include "Factory" or any one of items from "User1" to "User6".
- Press **Preset** to recall the factory settings listed in the following table (except items specified in Note **[1]**) or user-defined settings.

Parameter Name	VSA Parameter Value
FREQ	
Center Freq	1 GHz
Start Freq	998.4375 MHz
Stop Freq	1.0015625 GHz
CF Step	Auto, 312.5 kHz
SPAN	
X Scale	Auto
Ref Value	19.1406 us
Width	38.2812 us
AMPT	
Ref Value	0
Scale/Div	300m
Range	20 dBm
BW	
FFT Window	Rectangular
Trigger	
Source	Free Run
Slope	Positive
Delay	Off, 1 us
Power	0 dBm
Hold-off	Off, 100 ms
Auto Trig	Off, 100 ms
Mask Type	Upper
Trigger Mask	Upper

Trigger Criteria	Enter
Active Mask	Upper
Frequency	0 Hz
Amplitude	0 dB
X Offset	0 Hz
Y Offset	0 dB
X Axis Type	Relative
Y Axis Type	Relative
Trace	
Selected Trace	Trace1
Data	Measure Data Time/Symbol
Trace Format	I-Q
Eye Length	2
Symbol Format	Binary
Trace Det	Pos Peak
Mode Setup	
Global CF States	Off, 1 GHz
Meas	
Measurement Function	Digital Demod
Meas Setup	
Mod Format	QPSK
Ref Deviation Mode	Auto
Ref Deviation	1 kHz
Diff Encoding	On
Meas Interval	50
Points/Symbol	4
Symbol Rate	1 MHz
Meas Filter	None
Ref Filter	RRC
Alpha/BT	0.22
Burst Search Length	50 us
Burst Search Run-In	0
Burst Search	Off
Sync Analyze Length	50
Sync Search	Off
Sync Offset	0
Window Layout	Four Window
Marker	
Selected Marker	Marker1
Marker Mode	Position
Reference Marker	Marker2
Marker Trace	Trace1
Couple Markers	Off

Marker Table	Off
Marker X	25 symbol
Peak	
Cont Peak	Off
Marker Func	
Band Function	Off
Band Span	312.5 kHz
System^[1]	
Power On	Preset
Preset Type	Default
Align Auto	On
LAN Setting Mode	DHCP
Graticule	On
HDMI	On
HDMI Resolution	1280*720 60Hz
LCD	On
LCD Backlight	100%
Power Switch	Default
Beep Switch	Off
SCPI Display	On
User Key	Off
Language	English

Note^[1]: Not affected by Preset settings.

User

User-defined shortcut key. For some hard-to-find but commonly used function menu, you can define it as shortcut key (for the defining method, refer to the introduction in "**User Key**"). After that, press the shortcut key under any operation interface to quickly open and set the desired menu or function.

Note: You can use the **User** key to define all the keys on the front panel and the sub-menus of these keys (except **Save**).

Quick Save

Repeats the most recent save that was performed from the **Save** menu. Its save location is the currently defined "Quick Save Path". The register storage does not support Quick Save.

Cont

Press this key to perform the continuous sweep operation.

Single

Press this key to perform the single sweep operation. Selects "Single", and then the **Single** key on the front panel is illuminated.

In single sweep mode, press **Single** under Sweep menu to perform one measurement.

System Function

System

Sets the system parameters.

Preset

Functions include: select the instrument settings to be recalled after the analyzer is powered on ("Last" or "Preset"); set the preset type ("Default" or one of the items from "User1" to "User6"); save user settings.

1. Power On

Sets the power on setting to "Last" or "Preset".

- When "Last" is selected, the last system settings before power-off would be recalled automatically at power-on.
- When "Preset" is selected, settings defined in **Preset Type** would be recalled automatically at power-on.

2. Preset Type

Sets the preset type to "Default" (by default) or any one of the items from "User1" to "User6".

- When Power On is set to "Preset", the specified preset type will be recalled at power-on.
- After the instrument starts, press **Preset** on the front panel in any operation interface will recall the specified preset type.

3. Save User Preset

Saves the current system setting as user-defined settings to the internal non-volatile memory. You can store up to 6 system states (correspond to "User1" to "User6" in the preset type) and name each state file.

When one of the items from "User1" to "User6" is selected under **Preset Type**, press **Save User Preset**, and the instrument automatically completes the saving operation.

Alignment

1. Align Now

Press this key and the analyzer will use the internal calibration source to perform a self-calibration immediately.

2. Align Auto

Enables or disables auto self-calibration. If auto self-calibration is enabled, the

analyzer will perform one self-calibration after being started.

Interface

The analyzer supports the LAN or USB communication interface.

1. Network Interface

Sets the LAN parameters. Use the touch screen or the externally connected mouse to tap or click the setting information icon  at the top of the user interface. Then tap or click the network setting information icon . The LAN parameter setting interface is displayed, as shown in the following figure.



Figure 2-9 LAN Parameter Setting

The following items can be set through the front panel keys, shortcut keys on the keyboard, externally connected mouse, touch screen, or remote interface.

1) Mode

Sets the mode of obtaining the IP address.

- DHCP: When DHCP is selected, the DHCP server assigns network parameters (such as the IP address, subnet mask, and gateway) to the analyzer based on the current network configuration.
- Auto: When "Auto" is selected, the instrument will acquire the IP address ranging from "169.254.0.1" to "169.254.255.254" and the subnet mask (255.255.0.0) automatically based on the current network configuration.
- Manual: When "Manual" is selected, you can self-define a desired IP address for the analyzer.

Note: The analyzer attempts to acquire the IP address configuration according to the sequence of DHCP, Auto IP, and Manual IP. These three methods cannot be disabled at the same time.

2) IP

Press **IP** and use the numeric keys to input the desired IP address.

The format of the IP address is "nnn.nnn.nnn.nnn". The range for the first segment (nnn) of the address is from 1 to 223 (except 127); and the range for the other three segments is from 0 to 255. You are recommended to ask your network administrator for an IP address available.

3) Subnet Mask

Press **Subnet mask** and use the numeric keys to input the desired subnet mask.

The format of the subnet mask is nnn.nnn.nnn.nnn; wherein, the range of "nnn" is from 0 to 255. You are recommended to ask your network administrator for a subnet mask available.

4) Gateway

Press **Gateway** and use the numeric keys to input the desired gate address.

The format of the default gateway is "nnn.nnn.nnn.nnn". The range for the first segment (nnn) is from 1 to 223 (except 127); and the range for the other three segments is from 0 to 255. You are recommended to ask your network administrator for a gate address available.

5) DNS

- mDNS: enables or disables the sending of the network informamtion (including IP address, host name, etc.).
- DNS Mode: Sets the mode of obtaining the DNS address to be "Manual" or "Auto".
- Preferred DNS: Sets the preferred address for the DNS.
- Backup DNS: Sets the backup address for the DNS.

The format of the DNS address is "nnn.nnn.nnn.nnn". The range for the first segment (nnn) of the address is from 1 to 223 (except 127); and the range for the other three segments is from 0 to 255. You are recommended to ask your network administrator for an address available.

6) Apply

After the LAN interface configuration is finished, press this key to apply the current configuration to the instrument.

7) Reset

Turns on DHCP and Auto-IP; turns Manual-IP off. Clears the set network password and restores it to the factory defaults.

2. USB

RSA5000 provides a USB DEVICE interface on the rear panel. The analyzer may serve as a "slave" device to be connected to the PC via this interface.

Display

Controls the screen display. You can set the current mode, the current measurement interface or window, and other display-related parameters.

1. Graticule

Enables or disables the display of the graticule.

2. HDMI

Enables or disables HDMI.

3. HDMI Resolution

The resolution supported by HDMI interface is "1280*720 60Hz", "640*480 60Hz", or "720*480 60Hz".

4. LCD

Enables or disables LCD.

Remarks:

- If you are not updating data, turning off LCD can improve the measurement speed.
- To reduce the electromagnetic radiation of some circuit component, turn off the LCD.
- To avoid misoperation, turn off the LCD.

5. LCD Backlight

Sets the brightness of the LCD backlight.

The brightness is expressed in percentage. When it is 100, it indicates that the backlight is the brightest; when it is 1, the backlight is the darkest.

About System

Displays the system information or the option information.

1. System Info

- Model
- Serial Number
- Hardware Version Number
- Firmware Version Number
- Software Version

2. Option Info

Displays the option information.

RSA5000 provides many kinds of options to meet various measurement

requirements. To purchase the corresponding option, please contact **RIGOL**.

3. Self Test

- **Screen**

Tests whether the screen has a dot defect by using six colors: blue, red, green, gray, white, and black. Press any key to switch the screen color and exit the test.

- **Multi-point Touch**

Enters the multi-point touch test interface. Use multiple fingers to make pinch or stretch gestures on the screen, and observe the size of the characters. If they do not change along with your gestures, it indicates that problems occurred to the multi-point touch function. To exit the test, press **Esc** for three consecutive times.

- **Single-point Touch**

Enters the single-point touch test interface. Touch or use the mouse to make stretch or strike gestures on the screen, if the corresponding traces are displayed, then it indicates that the point on the touchscreen is valid. To exit the test, press **Esc** for three consecutive times.

- **Keyboard**

Enter the keyboard test interface. Press the function keys on the front panel one by one and observe whether the corresponding key is illuminated. If not, an error may have occurred to that key. To exit the test, press **Esc** for three consecutive times.

Note: For the transparent keys on the front panel, they will be also illuminated during the test.

4. License Info

Displays the license registration information about the components such as Linux and QT.

5. Online Update

Connect the analyzer to the external network by using the network cable. If you do not have the right to access the Internet, please ask the administrators to grant your right to access the external Internet first. Then, press this key to update the software.

Date/Time

Sets the system date and time.

1. Set Time

Sets the displayed system time of the analyzer. Press the **Hour**, **Minute**, and **Second** softkeys respectively to set the time.

2. Set Date

Sets the displayed system date of the analyzer. Press the **Year**, **Month**, and **Day** softkeys respectively to set the date. You can also press **Date Format** to select whether the date is displayed in "YMD" or "MDY" form.

Security Clear

Press this key to perform the security clear function. This function includes the following operations:

- Deletes all the files that users have saved, such as the state files (state), trace state files (trace state), screen files (screen), and measdata files (measdata) saved by users in all modes.
- Executes the factory resetting operation.

Language

RSA5000 supports multi-language menu, Chinese and English built-in help and pop-up messages.

Press this key to select the desired display language.

Settings

1. Power Switch

Sets whether the power switch on the front panel is effective or not.

- Default: When the analyzer is powered on, press the power switch on the front panel to start up the analyzer.
- Always: When the analyzer is powered on, it starts automatically.

2. Beep Switch

Turns on or off the beeper.

3. Volume

After you turn on the beeper, you can press this key to adjust the volume of the beeper.

4. User Key

Defines an associated function for the **User** key on the front panel. The definition method is as described below. After that, pressing **User** in any operation interface can quickly enable the defined function.

- Press **User Key** to select "On";
- Open the function menu that needs to be defined. For example, press **System** → **Display** → **Display Line**;

- Press **User** and the definition is finished. At this time, **User Key** turns off automatically.

5. SCPI Display

When you use the SCPI commands to control the instrument remotely, turning on the SCPI Display will go to the specified menu of the corresponding command; turning off the SCPI Display will not go to the specified menu.

Messages

Press this key, and then a prompt message dialog box will be displayed. You can press the corresponding front-panel softkey to select to view all the messages, the messages that have been read or not read. You can also use the touch screen or the externally connected mouse to tap or click the specified icon in the prompt message dialog box.

1. Select All

Selects all the displayed messages.

2. Select Read

Only selects the messages that have been read.

3. Select Unread

Only selects the messages that have not been read.

4. Delete

Deletes the selected messages.

5. Query All

Views all the displayed messages.

6. Query Read

Only views the messages that have been read.

7. Query Unread

Only views the messages that have not been read.

File

RSA5000 allows you to save various types of files to the internal or external memory, and recall them when necessary.

Press **File** on the front panel to enter the file operation menu interface.

File Explorer

Press the key to enter the file manager interface. You can touch the screen or use the mouse to click on the screen to select the corresponding file or folder. Displays all the files with the specified file types. When you select a file, you can press the **Copy**, **Paste**, or **Delete** softkeys to copy, paste, or delete the specified file.

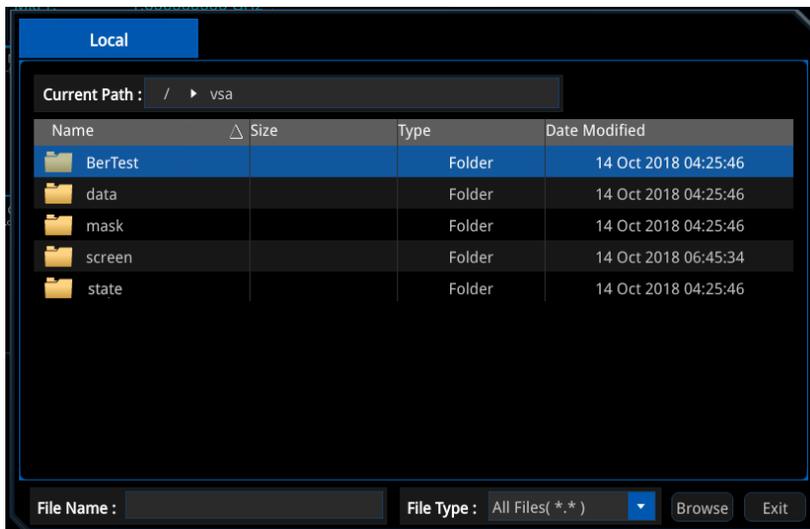


Figure 2-10 File Manager

The available file types include: State, Measurement Data, Screen Image, FMT, Ber Test and All (all the above file types). The descriptions for various file types are shown in the following table.

Table 2-24 Descriptions of File Type

File Type	Format	Suffix Name
State	BIN	.sta
Data	CSV	.csv
Screen Image	IMAGE	.jpg/bmp/png
FMT	CSV	.csv
Ber Test	XML	.xml

Note: RSA5000 can only recognize files whose filenames consist of Chinese characters, English letters, or numbers. If the filename or folder name contains other characters, the file or the folder might not be displayed normally in the file manager interface.

Copy

Copies the currently selected file or folder.

Paste

Pastes the file or folder.

When the current path has contained a file or folder whose name is the same as the one that you want to paste, after you perform the paste operation, the original file or folder will be overwritten.

Rename

Renames a file that has been stored. After you select a file, press this key to input a new filename.

Delete

Deletes the selected file.

New Folder

Creates a folder. Press this key to create a new empty folder under the current directory, and the file is named with a default filename. To modify this filename, press **Rename** to rename the file.

Quick Print

If the printer has been successfully installed, press this key to quickly print the currently displayed screen image.

Print

Prints the current screen according to print parameter settings when the printer has been successfully installed and is in idle state.

Printer Setup

1. Printer Parameters

1) Page Size

Sets the page size for printing. When "Default" is selected, the page size depends on the printer currently connected.

2) Quality

Sets the print quality.

3) Color

Sets the print color to Color, Mono, Inverse, or Inverse-Mono.

4) Orientation

Sets the print orientation to "Landscape" or "Portrait".

5) Adjust

Sets the print border to Adaptive, Non-Adpt, and Hold Min.

6) Counts

Sets the print copies and the default is 1. The range available is from 1 to 99.

7) Border

Turns on or off the border.

In addition, you can preview the print page, and set to print the image or the text in All page, 1/2, 1/4, or 1/9 page.

2. Add Device

Queries and adds a printer. Inputs the IP address of the printer, the manufacturer of the printer, the printer model, and printer drive. Then, the

printer is added.

3. **Select Device**

Selects the desired printer.

Import License

In the file manager interface, select a file to be imported and then press **Import License** to import the file.

System Update

Press this key to update the analyzer software after selecting the update file in the USB storage device.

Recall

RSA5000 allows you to recall various types of files saved to the internal or external storage memory.

Press **Recall** on the front panel to enter the file recalling menu. The available file types include: State, Measurement Data, FMT and License.

State

Press **State** to enter the state recalling menu. The state can be recalled from the register or the file.

1. Import

Press **File Explorer** to enter the file manager interface. Select a file and then press **Recall** to import the file.

2. Register1 through Register16

When any one of the items from Register1 to Register16 is selected, the state of the specified register will be recalled.

Data

Press **Data** to enter the measurement data recalling menu.

1. Import

Press **File Explorer** to enter the file manager interface. Select a file and then press **Recall** to import the file.

2. To Trace

Selects the measurement data file and recalls it to the selected trace.

FMT

Press **FMT** to enter the FMT recalling menu.

1. Import

Press **File Explorer** to enter the file manager interface. Select a file and then press **Recall** to import the file.

2. To Mask

Selects the FMT file and imports it to the selected mask.

Save

RSA5000 allows you to save various types of files to the internal or external memory.

Press **Save** on the front panel to enter the file saving menu. The available file types include: State, Measurement Data, FMT and Screen Image.

State

Press **State** to enter the state saving menu. The state can be saved to the register or the file.

1. Save

Press this key to save the current state in the default filename or user-defined filename.

The default state filename is determined by the following methods:

- If you haven't input a filename by pressing the **Save As** key, its default filename is state<n>.sta. Wherein, n refers to the file number of the filenames that are named based on the naming mode in the current file directory. The value of <n> is the existing maximum file number plus 1. For example, if 3 files (state1.sta、state2.sta、state5.sta) exist in the current directory, then the new filename for the file that you want to save should be state6.sta by default.
- If you have pressed the **Save As** key to input the filename abc, then the file is saved to be "abc.sta". After that, press the **Save** key again, another file is saved automatically with the filename "abc1.sta".

2. Save As

Press this key and then use the numeric keypad on the front panel to input the filename. Then, press **Save** to save the corresponding state file.

You can also touch the screen or use the mouse to tap or click the **Save As** menu, and then input the filename with the keypad.

3. Register1 through Register16

When any one of the items from Register1 to Register16 is selected, the current state of the instrument will be saved to the corresponding register. The register supports quick save and recalling instrument state. The register menu displays the time for saving the instrument state.

Data

Press **Data** to enter the measurement data saving menu. The selected trace data can be saved to the specified file. The data will be saved in .csv format. They are separated with a comma, and this is convenient for you to use the Excel to analyze the data.

1. Save

Press this key to save the currently selected trace data in the default filename or user-defined filename.

The default filename is determined by the following methods:

- If you haven't input a filename by pressing the **Save As** key, its default filename is data<n>.csv. Wherein, n refers to the file number of the filenames that are named based on the naming mode in the current file directory. The value of <n> is the existing maximum file number plus 1.
- If you have pressed the **Save As** key to input the filename abc, then the file is saved to be "abc.csv". After that, press the **Save** key again, another file is saved automatically with the filename "abc1.csv".

2. Save As

Press this key and then use the numeric keypad on the front panel to input the filename. Then, press **Save** to save the corresponding Measurement Data file.

You can also touch the screen or use the mouse to tap or click the **Save As** menu, and then input the filename with the keypad.

3. Save From Trace

Select the trace to be saved. You can select any single trace from Trace1 to Trace4.

FMT

Press **FMT** to enter the FMT file saving menu. Save the selected FMT file to the file.

1. Save

Press this key to save the currently selected FMT file in the default filename or user-defined filename.

The default filename is determined by the following methods:

- If you haven't input a filename by pressing the **Save As** key, its default filename is FMT<n>.csv. Wherein, n refers to the file number of the filenames that are named based on the naming mode in the current file directory. The value of <n> is the existing maximum file number plus 1.

- If you have pressed the **Save As** key to input the filename abc, then the file is saved to be "abc.csv". After that, press the **Save** key again, another file is saved automatically with the filename "abc1.csv".

2. Save As

Press this key and then use the numeric keypad on the front panel to input the filename. Then, press **Save** to save the corresponding FMT file.

You can also touch the screen or use the mouse to tap or click the **Save As** menu, and then input the filename with the keypad.

3. Select FMT

Selects the FMT to be saved.

Save Image

Press **Screen Image** to enter the screen saving menu.

1. Save

Press this key to save the current screen image in the default filename or user-defined filename.

The default filename is determined by the following methods:

- If you haven't input a filename by pressing the **Save As** key, its default filename is screen<n>.jpg. Wherein, n refers to the file number of the filenames that are named based on the naming mode in the current file directory. The value of <n> is the existing maximum file number plus 1.
- If you have pressed the **Save As** key to input the filename abc, then the file is saved to be "abc.jpg". After that, press the **Save** key again, another file is saved automatically with the filename "abc1.jpg".

2. Save As

Press this key and then use the numeric keypad on the front panel to input the filename. Then, press **Save** to save the corresponding Screen Image file.

You can also touch the screen or use the mouse to tap or click the **Save As** menu, and then input the filename with the keypad.

3. Screenshot Info

1) Format

Press this key to select the file format of the current screen image to be "JPEG", "BMP", or "PNG".

- 2) Color Type
Press this key to select the color of the current screen image to be "Normal" or "Inverted".

Quick Save Path

Press the **Quicksave Path** softkey to enter the quick save path setting menu.

1. Set the Path

Press this key to open the file explorer interface and select the corresponding path. Then press **OK** to set the current path to the quick save path.

2. View the Path

Press this key, and then the quick save path information is displayed in the user interface.

Chapter 3 Appendix

Appendix A: RSA5000 Accessories and Option List

	Remarks	Order No.
Model	Real-time Spectrum Analyzer, 9 kHz to 3.2 GHz	RSA5032
	Real-time Spectrum Analyzer, 9 kHz to 6.5 GHz	RSA5065
	Real-time Spectrum Analyzer, 9 kHz to 3.2 GHz (with tracking generator, factory installed)	RSA5032-TG
	Real-time Spectrum Analyzer, 9 kHz to 6.5 GHz (with tracking generator, factory installed)	RSA5065-TG
Standard Accessories	Quick Guide (hard copy)	-
	Power Cord	-
Option	Preamplifier (PA)	RSA5000-PA
	Highly Stable Clock	OCXO-C08
	Real-time Analysis Bandwidth 40 MHz	RSA5000-B40
	Advanced Measurement Kit	RSA5000-AMK
	EMI Measurement Application	RSA5000-EMI
	Vector Signal Analysis Measurement Application	RSA5000-VSA
	Spectrum Analyzer PC Software	Ultra Spectrum
Optional Accessories	EMI Pre-compliance Test Software	S1210 EMI Pre-compliance Software
	Include: N-SMA cable, BNC-BNC cable, N-BNC adaptor, N-SMA adaptor, 75 Ω -50 Ω adaptor, 900 MHz/1.8 GHz antenna (2pcs), 2.4 GHz antenna (2pcs)	DSA Utility Kit
	Include: N(F)-N(F) adaptor (1pcs), N(M)-N(M) adaptor (1pcs), N(M)-SMA(F) adaptor (2pcs), N(M)-BNC(F) adaptor (2pcs), SMA(F)-SMA(F) adaptor (1pcs), SMA(M)-SMA(M) adaptor (1pcs), BNC T type adaptor (1pcs), 50 Ω SMA load (1pcs), 50 Ω BNC impedance adaptor (1pcs)	RF Adaptor Kit
	Include: 50 Ω to 75 Ω adaptor (2pcs)	RF CATV Kit
	Include: 6 dB attenuator (1pcs), 10 dB attenuator (2pcs)	RF Attenuator Kit
	30 dB high-power attenuator, with the max power of 100 W	ATT03301H
	N Male-N Male RF Cable	CB-NM-NM-75-L-12G
	N Male-SMA Male RF Cable	CB-NM-SMAM-75-L-12G
	VSWR Bridge, 1 MHz to 3.2 GHz	VB1032
	VSWR Bridge, 2 GHz to 8 GHz	VB1080
Near-field Probe	NFP-3	
Rack Mount Kit	RM6041	
USB Cable	CB-USBA-USBB-FF-150	

Note: For more details about the accessories and the options, please contact RIGOL sales representatives or the local distributors.

Appendix B: Warranty

RIGOL (SUZHOU) TECHNOLOGIES INC. (hereinafter referred to as **RIGOL**) warrants that the product will be free from defects in materials and workmanship within the warranty period. If a product proves defective within the warranty period, **RIGOL** guarantees free replacement or repair for the defective product.

To get repair service, please contact with your nearest **RIGOL** sales or service office.

There is no other warranty, expressed or implied, except such as is expressly set forth herein or other applicable warranty card. There is no implied warranty of merchantability or fitness for a particular purpose. Under no circumstances shall **RIGOL** be liable for any consequential, indirect, ensuing, or special damages for any breach of warranty in any case.

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