



RIGOL

PNOISE Mode

For RSA6000 Series
Spectrum Analyzer

User Guide

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Guaranty and Declaration

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1 Safety Requirement

1.1 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, it is essential to connect the earth terminal of the power cord to the Protective Earth terminal before connecting any inputs or outputs.

- **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 anything into the holes of the fan to avoid damaging 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 on.

- **Do Not Operate With Suspected Failures.**

If you suspect damage occurs 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 Instrument 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.



WARNING

Equipment meeting Class A requirements may not offer adequate protection to broadcast services within residential environment.

1.2 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 Notices 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

1.3 Measurement Category

Measurement Category

This instrument can make measurements in Measurement Category I.

**WARNING**

This instrument can only be used for measurements within its specified measurement categories.

Measurement Category Definitions

- **Measurement category I** is for measurements performed on circuits not directly connected to MAINS. Examples are measurements on circuits not derived from MAINS, and specially protected (internal) MAINS derived circuits. In the latter case, transient stresses are variable. Thus, you must know the transient withstand capability of the equipment.
- **Measurement category II** is for measurements performed on circuits directly connected to low voltage installation. Examples are measurements on household appliances, portable tools and similar equipment.

- **Measurement category III** is for measurements performed in the building installation. Examples are measurements on distribution boards, circuit-breakers, wiring (including cables, bus-bars, junction boxes, switches and socket-outlets) in the fixed installation, and equipment for industrial use and some other equipment. For example, stationary motors with permanent connection to a fixed installation.
- **Measurement category IV** is for measurements performed at the source of a low-voltage installation. Examples are electricity meters and measurements on primary overcurrent protection devices and ripple control units.

1.4 Ventilation Requirement

This instrument uses a fan to force cooling. Please make sure that the air inlet and outlet areas are free from obstructions and have free air. When using the instrument in a bench-top or rack setting, provide at least 10 cm clearance beside, above and behind the instrument for adequate ventilation.



CAUTION

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.

1.5 Working Environment

Temperature

Operating: 0°C to +50°C

Non-operating: -20°C to +70°C

Humidity

- **Operating:**
 - Below +30°C: ≤95% RH (without condensation)
 - +30°C to +40°C: ≤75% RH (without condensation)
 - +40°C to +50°C: ≤45% RH (without condensation)
- **Non-operating:**
 - Below +40°C: 5%~ 90% (without condensation)
 - ≥+40°C to <+60°C: 5%~ 80% (without condensation)
 - >+60°C to <+70°C: 5%~ 40% (without condensation)

**WARNING**

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

Altitude

Operating: below 3 km

Protection Level Against Electric Shock

- **Contact discharge:** ± 4 kV
- **Air discharge:** ± 8 kV

Installation (Overvoltage) Category

This product is powered by mains conforming to installation (overvoltage) category II.

**WARNING**

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.

Installation (Overvoltage) Category Definitions

Installation (overvoltage) category I refers to signal level which is applicable to equipment measurement terminals connected to the source circuit. Among these terminals, precautions are done to limit the transient voltage to a low level.

Installation (overvoltage) category II refers to the local power distribution level which is applicable to equipment connected to the AC line (AC power).

Pollution Degree

Pollution Degree 2

Pollution Degree Definition

- **Pollution Degree 1:** No pollution or only dry, nonconductive pollution occurs. The pollution has no effect. For example, a clean room or air-conditioned office environment.
- **Pollution Degree 2:** Normally only nonconductive pollution occurs. Temporary conductivity caused by condensation is to be expected. For example, indoor environment.
- **Pollution Degree 3:** Conductive pollution or dry nonconductive pollution that becomes conductive due to condensation occurs. For example, sheltered outdoor environment.
- **Pollution Degree 4:** The pollution generates persistent conductivity caused by conductive dust, rain, or snow. For example, outdoor areas.

Safety Class

Class 1 – Grounded Product

1.6 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. Avoid having any water or other objects into the chassis via the heat dissipation hole. 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.

1.7 Environmental Considerations

The following symbol indicates that this product complies with the WEEE Directive 2012/19/EU.



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 <https://www.rigol.com/intl/services/environmental-protection-statement.html> to download the latest version of the RoHS&WEEE certification file.

2 **RSA6000 Series Spectrum Analyzer**

RSA6000 series is RIGOL's newly launched real-time spectrum analyzer. Its excellent performance in SFDR, phase noise, amplitude accuracy and test speed makes it applicable in various test scenarios such as spectrum analysis, real-time spectrum analysis, vector signal analysis, pulse analysis. RSA6000 series real-time spectrum analyzer has a strong expansion capability, allowing you to build the test system or perform user-defined development via various digital and analog output interfaces. With its excellent performance and flexible configuration, it can meet your test demands in various application scenarios such as wireless communication, automobile electronics, Internet of Things (IoT), and etc.

3 Document Overview

This manual gives you a quick review about the front and rear panel of RSA6000 series, the user interface, and its basic operation method.



TIP

For the latest version of this manual, download it from the official website of RIGOL (<http://www.rigol.com>).

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UGD31100-1110

Software Version

00.01.01

Software upgrade might change or add product features. Please acquire the latest version of the manual from RIGOL website or contact RIGOL to upgrade the software.

Format Conventions in this Manual

1. Key

The front panel key is denoted by the menu key icon. For example, indicates the "System" key.



2. Menu

The menu item is denoted by the format of "Menu Name (Bold) + Character Shading" in the manual. For example, **Setup** indicates clicking or tapping the "Setup" sub-menu under the system menu to view the basic setting configuration items.

3. Operation Procedures

The next step of the operation is denoted by ">" in the manual. For example,



> **Save** indicates that first clicking or tapping the icon , then clicking or tapping **Save**.

4. Connector

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

Content Conventions in this Manual

The RSA6000 series spectrum analyzer includes the following models. Unless otherwise specified, this manual takes RSA6265 as an example to illustrate the functions and operation methods of the RSA6000 series.

Model	Frequency Range
RSA6265	5 kHz to 26.5 GHz
RSA6140	5 kHz to 14 GHz
RSA6085	5 kHz to 8.5 GHz

4 Quick Start

This chapter gives you a quick review about the user interface of the RSA6000 series spectrum analyzer in PNOISE mode and its mode settings. For its details about the appearance and dimensions, its front and rear panel, as well as notices during first use of the analyzer, refer to relevant chapters in RSA6000 User Guide.

4.1 User Interface



Figure 4.1 User Interface

No.	Name	Description
1	Window Display Area	Displays different views.
2	Status Display Bar	Displays the nominal frequency, noise cancel, sweep mode, trigger information, etc.
3	Quick Operation Menu	Displays the quick operation menu.

No.	Name	Description
4	Menu Operation Area	Sets the measurement menu parameters such as Meas Setup, Frequency, Sweep, Trace, Display, Marker, and etc.
5	Notification Area	Displays the USB storage device icon, LAN connection icon, sound icon, remote control icon, and system time. You can click or tap this area to enter the System menu.
6	Working Mode	Displays the currently selected working mode, such as GPSA, RTSA, VSA, EMI, ADM, PNOISE, and etc.
7	Function Navigation Icon	Click or tap the icon  to open the function navigation menu. Click or tap the specified menu icon to enter the specified function setting menu.

4.2 Mode Setting

You can press the Mode Meas key on the front panel to switch the measurement mode. Also you can click or tap the current measurement mode icon (e.g. ) shown at the bottom of the screen to switch the measurement mode.

The phase noise mode provides the measurement for the device phase noise characteristics. To use this function, you must install the phase noise measurement option (RSA6000-PNM). For details about how to install the option, refer to *To Install the Option*.

4.3 To Install the Option

This series spectrum analyzer provides many options to meet various measurement requirements. If you need any of these options, order them according to the Order No. available in "*Appendix A: Options and Accessories*", and then install the options according to this section. Besides, you can also view the options currently installed on the spectrum analyzer and activate the newly purchased option.

1. View the Installed Option

If your instrument has currently installed the option, perform the following operations to view the name of the installed option and other detailed information about the option from the option list.

- Click or tap the function navigation icon  at the lower-left corner of the screen, and then select **System** to enter the system setting menu.
- Click or tap **Options** to view the options currently installed.

2. Install the Option

The option license is a string with a fixed number of characters. Each instrument has one unique license. The license file should be in specific format, with the filename extension "*.lic". After you purchase an option, you will obtain a key (used for obtaining the license). Then, you can install the option according to the following steps.

a. Obtain an option license

- a. Log in to the **RIGOL** official website (<http://www.rigol.com>), click **SERVICE CENTER > LICENSE ACTIVATION** to enter the license activation interface.
- b. In the interface, input the correct key, serial number (click or tap the function navigation icon  at the lower-left corner of the screen, then click or tap **System > About** to obtain the serial number of the instrument), and verification code. Then click **Generate** to obtain the option license.

b. Install the Option

- a. Install the option by sending SCPI commands. For details, refer to *PNOISE Programming Guide*.
- b. After installation, a prompt message "Option activated successfully" is displayed. After the option has been installed, you are recommended to restart the instrument.

TIP

- During the installation process, you are not allowed to power off the instrument.
- To install the option, send the relevant SCPI command. Installing options by inputting the license code manually is not supported.



5 Basic Settings

5.1 Freq

Frequency setting is one of the core functions of the phase noise measurement. You can set the nominal frequency and frequency offset range to define the measurement parameters.

In the frequency setting menu, you can set the nominal frequency, start frequency offset, and stop frequency offset, enable or disable the signal track function.

5.1.1 Nominal Frequency

Used to set the nominal frequency of the carrier waveform. 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.

NOTE

- In the phase noise measurement, it can be considered as the reference value of the carrier frequency. The actual carrier frequency can be adjusted based on the actual measurement results.
- When signal tracking function is enabled, the instrument starts to search for the current signal and find the max. peak, and make the frequency of the peak to be the nominal frequency.

Parameter	Description
Default	1 GHz
Range	5 kHz to Fmax ^[1]
Unit	GHz, MHz, kHz, Hz, mHz
Knob Step	Current value/100
Left/Right Arrow Key Step	1-2-5
Accuracy	1
Saved in instrument state	Yes

NOTE

[1]: The maximum measurement frequency Fmax is determined by the instrument model.

5.1.2 Start Offset

Sets the start frequency offset for the log plot graph. It refers to the offset from the nominal frequency.

Key Points:

- The max. start frequency offset is (max. stop frequency offset/10). If the start frequency offset is greater than the stop frequency offset, then the stop frequency offset is automatically set to (start frequency offset x 10).
- The frequency offset value must be an integer number of decades apart. If the value is an integer number of decades, it will be automatically adjusted to the effective value that is closest to the proper value.
- 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.

Parameter	Description
Default	100 Hz
Range	10 Hz to (max. stop frequency offset/10)
Unit	GHz, MHz, kHz, Hz, mHz
Knob Step	1-10-100
Left/ Right Arrow Key Step	1-10-100
Accuracy	10^n (n is a positive integer)
Saved in instrument state	Yes

5.1.3 Stop Offset

Sets the stop frequency offset for the log plot graph. It refers to the offset from the nominal frequency.

Key Points:

- The max. stop frequency offset is (max. start frequency offset x 10). If the stop frequency offset is smaller than the start frequency offset, then the stop frequency offset is automatically set to (start frequency offset/10).

- The frequency offset value must be an integer number of decades apart. If the value is an integer number of decades, it will be automatically adjusted to the effective value that is closest to the proper value.
- 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.

Parameter	Description
Default	1 MHz
Range	Right sideband: stop frequency offset < Fmax - nominal frequency Left sideband: stop frequency offset < nominal frequency - 5 kHz
Unit	GHz, MHz, kHz, Hz, mHz
Knob Step	1-10-100
Left/ Right Arrow Key Step	1-10-100
Accuracy	10^n (n is a positive integer)
Saved in instrument state	Yes

5.1.4 Signal Track

Enables or disables the signal tracking function. This function is used to track and measure the signal whose frequency is unstable and whose transient variation in amplitude is less than 3 dB. By default, it is OFF.

Key Points:

- The signal track function is invalid when the trace is not updated.
- When signal tracking is enabled, the instrument starts to search for the current signal and find the max. peak, and make the frequency of the peak to be the nominal frequency.
- When the signal track is disabled again, the parameters such as center frequency are not modified.
- In the current sweep range, signal track works for the signal whose amplitude variation is less than 3 dB; signal track fails for the signal whose amplitude

variation is greater than 3 dB. The signal track will also fail when the signal is not within the current sweep range.

5.2 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.

5.2.1 Ref Value

Sets the value for the absolute power reference. It can be set to the max. value that can be displayed on the screen.

Key Points:

- After the reference value is modified, the max. Y-axis value in the grid in the log plot graph will be changed accordingly.
- When the reference value is modified, if hardware link is not affected, the system will not make a re-measurement. The trace results will be updated accordingly.
- 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.

Parameter	Description
Default	-70 dBc/Hz
Range	-200 dBc/Hz to 200 dBc/Hz
Unit	dBc/Hz
Knob Step	Step = (Scale/Div)/10
Left/Right Arrow Key Step	0.1
Accuracy	0.01
Saved in instrument state	Yes

5.2.2 Attenuation

Sets the RF front-end attenuator to allow high-level signals to pass through the mixer with low distortion, and low-level signals to pass through the mixer with low noise.

Remarks:

- When you input the attenuation value, **Attenuation Mode** menu is automatically switched to Manual state.
- The attenuator consists of fixed attenuator and variable attenuator. The attenuation of the fixed attenuator is 10 dB, and the attenuation range of the variable attenuator is from 0 dB to 30 dB. Therefore, the input attenuation ranges from 0 dB to 40 dB.
- When the set attenuation amount is greater than 10 dB, fixed attenuator is preferred to be used by default.
- 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.

Parameter	Description
Default	10 dB
Range	0 dB to 40 dB
Unit	dB
Knob Step	2 dB
Left/Right Arrow Key Step	4 dB
Accuracy	2 dB
Saved in instrument state	Yes

5.2.3 Attenuation Mode

Selects "Manual" or "Auto" to be the current attenuation mode.

Remarks:

- If you select "Manual" to be the attenuation mode, set the attenuation value under the "Attenuation" menu, and the attenuation mode will be automatically switched to "Manual".
- When you select "Auto" to be the attenuation mode, the attenuator will automatically adjust the attenuation value to meet the current amplitude setting.

5.2.4 Preamplifier

Sets the RF front-end preamplifier to be on or off. When the signal under test is a low-level signal, turning on the preamplifier can reduce the displayed average noise level, so that you can distinguish low-level signals from the noise. By default, the preamp gain is 20 dB.

5.2.5 Scale/Div

Sets the Y scale per division.

Key Points:

- The amplitude range to be displayed can be adjusted by setting the scale.
- The currently displayed range of the signal amplitude is as follows:
Min. value: reference value – 10 x current scale value;
Max. Value: reference value
- 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.

Parameter	Remarks
Default	10 dB
Range	0.1 dB to 20 dB
Unit	dB
Knob Step	Scale/Div $\geq$ 1: step = 1 dB Scale/Div < 1: step = 0.1 dB
Left/ Right Arrow Key Step	at 1-2-5 step
Accuracy	0.01 dB
Saved in instrument state	Yes

5.2.6 Auto Scale

Sets whether to adjust the Y-axis reference value and the Y-axis scale value automatically to ensure that the signal can be fully displayed for better observation of the trace. When Auto Scale is enabled, the Ref Value and Scale/Div values will be adjusted automatically.

5.2.7 Max Mixer Level

Sets the maximum input level of the mixer according to the amplitude of the signal.

Remarks:

- For the high-level input signal, select a smaller maximum mixer level to increase the input attenuation and reduce the distortion of the signal; for the low-level input signal, select a larger maximum mixer level to reduce the input attenuation and noise.
- 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.

Parameter	Remarks
Default	-10 dBm
Range	-50 dBm to -10 dBm
Unit	dBm, -dBm, mV, μ V
Knob Step	1 dBm
Left/Right Arrow Key Step	5 dBm
Accuracy	1 dBm
Saved in instrument state	Yes

5.3 Sweep

Sets the sweep-related parameters.

5.3.1 Sweep Mode

RSA6000 series spectrum analyzer supports two sweep modes: Single sweep and Continuous sweep.

Continuous Sweep

- If the current system is in single sweep mode and no measurement is performed, click or tap **Sweep** > **Sweep Mode** > **Cont** to enter continuous sweep mode. In this case, if the trigger conditions are met, the system will sweep continuously.

- If the current system is in single sweep mode and is performing the specified measurement, click or tap **Sweep** > **Sweep Mode** > **Cont** to enter continuous sweep mode. In this case, if the trigger conditions are met, the system will perform measurements continuously.
- In continuous sweep mode, the system will send a trigger initialization signal automatically and enter the trigger condition judgment directly after each sweep is completed.

Single Sweep

- If the current system is in continuous sweep mode and no measurement is performed, selecting this menu to enter the single sweep mode. In this case, if the trigger conditions are met, the system performs one sweep
- If the current system is in continuous sweep mode and is performing the specified measurement, selecting this menu to set the measurement mode to "Single". In this case, if the trigger conditions are met, the system will execute the specified number of measurements.
- If the system is already in single sweep mode, press this key and then the system will execute the specified number of sweeps (or measurements) once the trigger conditions are met.
- In single sweep mode, trigger initialization (click or tap **Sweep** > **Sweep Mode** > **Cont** or send the SCPI command through the remote interface) should be executed before judging the trigger conditions.



NOTE

Switching between Single and Continuous sweep mode will result in restarting the sweep.

5.3.2 Restart

Click or tap **Restart**, the current sweep will be suspended. All the previously measured data will be remeasured, and the trigger restores to the not-triggered state.

5.4 Measurement Settings

5.4.1 Setting

1. Avg Number

Specifies the number of times for averaging the measurement results. The average value is displayed in a real-time manner for each measurement. When performing the single measurement, the instrument stops sweeping after the sweep count has reached N. The status display bar displays the number of averaging times that has been currently performed and the set average count if average state is enabled.

Parameter	Description
Default	10
Range	1 to 1,000
Unit	N/A
Knob Step	1
Left/Right Arrow Key Step	1
Accuracy	1
Saved in instrument state	Yes

2. Avg State

Enables or disables the average state. When enabled, the instrument performs the averaging operation on the measurement values based on the currently set average count.

3. Avg Mode

Sets the average mode adopted for the data acquired after a specified number of acquisition times (average count). The available average modes include Repeat and Exponential. By default, it is Exponential.

- When set to Exponential, the measurement averaging continues using the specified number of averaging times to compute each exponentially-weighted averaged value.
- When set to Repeat, the measurement resets the average count each time the specified number of averaging times is reached.

4. Detector Type

Sets the detector type. The available detector types include Sample detector, voltage average detector, and RMS average detector.

- **Sample**

For each trace point, Sample detector displays the transient level corresponding to the central time point of the corresponding time interval. This detector type is applicable to noise or noise-like signal.

- **Average (Voltage)**

For each data point, average (see equation below) all the sampled data within the corresponding time interval and display the result.

$$V_{AV} = \frac{1}{N} \times \sum_{i=1}^N v_i$$

Wherein, V_{AV} is the average of voltage in V; N is the number of sampled values for each point displayed; v_i is the envelope of the sampled value in V.

- **RMS Average**

RMS (Root Mean Square) averaging is a processing method used to smooth spectral data and accurately reflect the average power of the signal.

For each data point, perform mean square root operation (see equation below) of the sampled data within the corresponding time interval and display the result. RMS average only refers to the RMS data in the Gaussian filter.

$$V_{RMS} = \sqrt{\frac{1}{N} \times \sum_{i=1}^N v_i^2}$$

Wherein, V_{RMS} is the root mean square value of voltage, expressed in V; N is the number of sampled values for each point displayed; v_i is the envelope of the sampled value, expressed in V. Reference impedance R can be used to

calculate power based on the formula: $P = \frac{V_{RMS}^2}{R}$.

5. Smoothing

It is also called smoothing aperture. It is expressed as a percentage of the total sweep span (or the total number of sweep points). After completing the measurement, you can set the smoothing parameter to smooth the current measurement results. Modifying the smoothing trace will cause the smoothed trace to be recalculated based on the raw trace.

Parameter	Description
Default	2%
Range	1% to 50%

Parameter	Description
Unit	%
Knob Step	1
Left/Right Arrow Key Step	5
Accuracy	1
Saved in instrument state	Yes

6. Auto Couple

When you enable "Auto Couple" function, all the manual/auto settings in the current measurement mode will be set to "Auto". This operation does not affect other measurement modes.

In auto state, the auto coupled parameters are changed with their coupled parameters. The auto coupling operation will ensure the optimal performance of the instrument. After the operation, all the auto coupled parameters will immediately be automatically reset based on the coupled parameters.

5.4.2 Signal Verify

Signal verification determines whether to proceed with sweeping based on the signal judgment. It supports frequency verification and level verification for the signal. Once the signal verification passes, launch the sweep. Once the signal verification fails, you can select whether to stop sweeping or restart sweeping.

To ensure that the signal under verification is valid, set the verification range for the signal. You can enable the frequency verification and level verification functions to filter out the effective signal to be processed. For the frequency verification, you can set the nominal frequency, absolute frequency tolerance, and relative frequency tolerance values. For the level verification, you can set the nominal level and the absolute level tolerance values.

Key Points:

- When both frequency verification and level verification are enabled, you need to ensure that both of them pass the signal verification. Otherwise, it is considered as failed.

5.4.2.1 Nominal Frequency

Sets the nominal frequency in the signal verification. For details, refer to descriptions about *Nominal Frequency* in *Freq.*

5.4.2.2 Frequency Verification

Enables or disables the frequency verification. By default, it is enabled. When it is enabled, you set the absolute frequency tolerance and relative frequency tolerance.

The range of the frequency verification is the max. values of the absolute frequency tolerance and relative frequency tolerance.

If the difference between the carrier frequency and the nominal frequency is greater than the set max. value, then the verification fails. Therefore, you must perform the frequency verification before starting the measurement. If failed, measurement will not be launched.

5.4.2.3 Absolute Frequency Tolerance

When the frequency verification is enabled, the max. values of the absolute frequency tolerance and relative frequency tolerance can be considered as the judgment condition. The absolute frequency tolerance is the absolute delta between the nominal frequency and the carrier frequency.

Parameter	Description
Default	1 kHz
Range	1 Hz to 1 GHz
Unit	GHz, MHz, kHz, Hz, mHz
Knob Step	Current value/100
Left/ Right Arrow Key Step	1-2-5
Accuracy	1
Saved in instrument state	Yes

5.4.2.4 Relative Frequency Tolerance

When the frequency verification is enabled, the max. values of the absolute frequency tolerance and relative frequency tolerance can be considered as the judgment condition.

Parameter	Description
Default	10%
Range	1% to 100%
Unit	%

Parameter	Description
Knob Step	1
Left/Right Arrow Key Step	5
Accuracy	1
Saved in instrument state	Yes

5.4.2.5 Nominal Level

Indicates the expected signal level. You can set the parameter manually. It is the key parameter in signal verification.

Parameter	Description
Default	0 dBm
Range	-200 dBm to 200 dBm
Unit	dBm
Knob Step	Step = (Scale/Div)/10
Left/Right Arrow Key Step	0.1
Accuracy	0.01
Saved in instrument state	Yes

5.4.2.6 Level Verification

Enables or disables the level verification. By default, it is enabled. After enabling the level verification, you need to perform the level verification before starting the measurement. The criteria for level verification is as follows:

- If the difference between the carrier power and the nominal level is greater than the absolute level tolerance, then the verification fails.

5.4.2.7 Absolute Level Tolerance

When the level verification is enabled, the absolute level tolerance can be considered as the judgment condition.

Parameter	Description
Default	10 dB

Parameter	Description
Range	0.1 dB to 100 dB
Unit	dB
Knob Step	1
Left/Right Arrow Key Step	5
Accuracy	0.01
Saved in instrument state	Yes

5.4.2.8 On Verification Failure

Sets the action taken when the signal verification fails. You can select to stop or restart the signal verification. By default, Restart is selected.

- Stop: stops the measurement immediately.
- Restart: restarts the measurement.

5.4.3 Noise Cancel

In the Noise Cancel menu, set the related parameters. The applications and notices in using this feature are as follows:

- Before the noise cancellation is used, ensure that the DANL of the instrument have been measured and stored in a reference trace.
- This feature allows a previously made measurement of the instrument's DANL noise floor to be automatically subtracted from the current measurement.
- This feature allows the phase noise of some other signal to be subtracted from the current measurement. This other signal might be a CW signal from a source that has lower phase noise than the analyzer.

5.4.3.1 Enable or Disable Noise Cancellation

Sets the on/off state of the noise cancellation feature. This function is only valid when the DANL noise data exist.

5.4.3.2 Reference Trace

Sets the trace that is used as a reference DANL floor trace for the noise cancellation feature. The available reference traces include Trace 1, Trace 2, and Trace 3. By default, it is Trace 3.

5.4.3.3 Threshold

Sets the minimum delta between the reference trace and pre-cancellation trace that must exist before any cancellation is performed. The delta is evaluated on a tracepoint per tracepoint basis.

Parameter	Description
Default	0.01 dB
Range	0.001 dB to 5 dB
Unit	dB
Knob Step	0.1 dB
Left/Right Arrow Key Step	1 dB
Accuracy	0.001 dB
Saved in instrument state	Yes

5.4.4 Limit

Sets the parameters of limit lines. After pressing , the limit line measurement function is disabled, but the data of the limit lines will be reserved. The limit line data will only be deleted when the loading mode is Default. When you exit the measurement mode, the limit line data will not be deleted.

1. Test Limits

Selects whether the displayed traces are tested against the displayed limit lines. For each displayed trace, the corresponding limit line is turned on, and a message will be displayed at the upper-left corner of the trace to indicate whether the test passes or fails.

2. Select Limit

Selects the current limit line. By default, it is Limit1.

3. Limit State

Enables or disables the display of the limit line. When the limit line is on, the measurement interface displays the limit line, and the corresponding traces are tested based on the current limit lines.

4. Edit Limit

When "Limit State" is set to "ON", this menu is valid. Click or tap this menu to enter the editing sub-menu, and the limit line editing window is displayed.

- **Select Limit:** selects the current limit line. By default, it is Limit1.
- **Append Point:** Inserts an edit point.
- **X Offset:** Sets the frequency offset of the current limit line.
- **Y Offset:** Sets the amplitude offset of the current limit line.
- **Apply Offset:** Adds the X and Y offsets to each point of the current mask.
- **Y to RF:** 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 editing point is the difference between the amplitude of the point and that of the current reference level. At this time, if the reference level changes, then the position of the current editing point changes along with the reference level.
- **Build From:** Sets a trace for building the limit line. The range is from Trace1 to Trace3.
- **Copy From:** Copies from the selected limit line to the current limit line. The range is from Limit1 to Limit6.
- **Del Point:** Deletes the point that you are editing.
- **Delete Limit:** Deletes the limit line you are editing.

5. Set the Limit Line

Click or tap **Settings** to enter the limit line setting menu.

- **Type:** Selects the type of the current limit line to be the upper limit line or lower limit line.
- **Limit Test Trace:** Sets the trace for the current limit line test. The range is from Trace1 to Trace3.

- **Freq Interpolation:** Sets the frequency interpolation for the current limit line to "Linear" or "Log".
- **Ampt Interpolation:** Sets the amplitude interpolation for the current limit line to "Linear" or "Log".
- **Margin State:** Enables or disables the display of the margin. When you enable the display of the margin, the measurement interface displays the margin lines; when you disable the display of the margin, the margin is invalid.
- **Margin:** Sets the margin for the current limit line.
- **Description:** Adds the descriptions for the limit line.
- **Comment:** Adds the comments for the limit line.

6. Import Limit

Click or tap **Import Limit**, then the file management interface is displayed. You can select the desired file to be imported.

7. Export Limit

Click or tap **Export Limit**, then the file management interface is displayed. You can select the desired file to be exported. Click or tap **Export** to export the selected file.

8. Delete All Limits

Deletes all limit lines. After you click or tap this menu, the data of all the limit lines will be cleared and they will be restored to factory defaults.

5.4.5 Advanced Setup

Used to set the parameters of advanced functions, such as Min. carrier level, offset side, carrier measurement display state.

5.4.5.1 Min Carrier Level

Sets the min. carrier power level which is used by the carrier search algorithm. Only the carrier that is greater than the set min. carrier level value can be searched.

Table 5.15 Min Carrier Level

Parameter	Description
Default	-50 dBm

Parameter	Description
Range	-200 dBm to 30 dBm
Unit	dBm
Knob Step	Step = (Scale/Div)/10
Left/Right Arrow Key Step	0.1 dBm
Accuracy	0.01 dBm
Saved in instrument state	Yes

5.4.5.2 Offset Side

Sets the side of SSB phase noise to be measured. It can be set to Upper Sideband or Lower Sideband. By default, Upper Sideband is selected.

5.4.5.3 Carrier Measure Display

Enables or disables the display of the carrier wave measurement results. By default, it is enabled.

When enabled, the measurement results of the carrier waveform are displayed at the upper-right corner of the log plot graph.

5.5 Trace

Sets the Trace-related parameters.

5.5.1 Selected Trace

At most 3 traces can be displayed synchronously in the PNOISE mode. Select the corresponding trace to set the relevant parameters for the specified trace. By default, Trace2 is selected and enabled.



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. For details about saving the file, refer to descriptions in [Save](#).

5.5.2 Next Trace

Click or tap **Next Trace** to select the next trace to be displayed.

5.5.3 Trace Type

Sets the type of the currently selected trace. The available trace types include Raw, Smoothed, View, and Blank.

1. Raw

Displays the raw trace. The raw trace presents the directly acquired measurement data, without any smoothing applied. You can observe its actual noise from the trace.

2. Smoothed

Displays the smoothed trace, with the spurious removed. The smoothed trace presents the phase noise values under the specified frequency offsets in a more stable and accurate manner.

3. View

Only displays the trace and not updates the trace.

4. Blank

The trace is not displayed. When you enable multiple traces (Trace1, Trace2, and Trace3) at the same time, you can set the unwanted traces to Blank.

Key Points:

- The trace that is set to "View" type will not be updated, and once the trace is loaded, its trace type is automatically set to "View".
- The default trace type for Trace 1 is Raw; the default trace type for Trace 2 is Smoothed; and the default trace type for Trace 3 is Blank.

5.5.4 Trace Hold

Sets the trace hold type. It can be set to OFF, Max Hold, and Min Hold. By default, it is OFF.

1. OFF

Disables the trace hold function. The trace restores to the updated state.

2. Max Hold

Maintains and displays a max hold trace, which represents the maximum data value on a point-by-point basis. When a new maximum value is generated, data will be updated, and the newly updated maximum value prevails.

3. Min Hold

Maintains and displays a min hold trace, which represents the minimum data value on a point-by-point basis. When a new minimum value is generated, data will be updated, and the newly updated minimum value prevails.

5.6 Marker Measurement

5.6.1 Marker Setting

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.

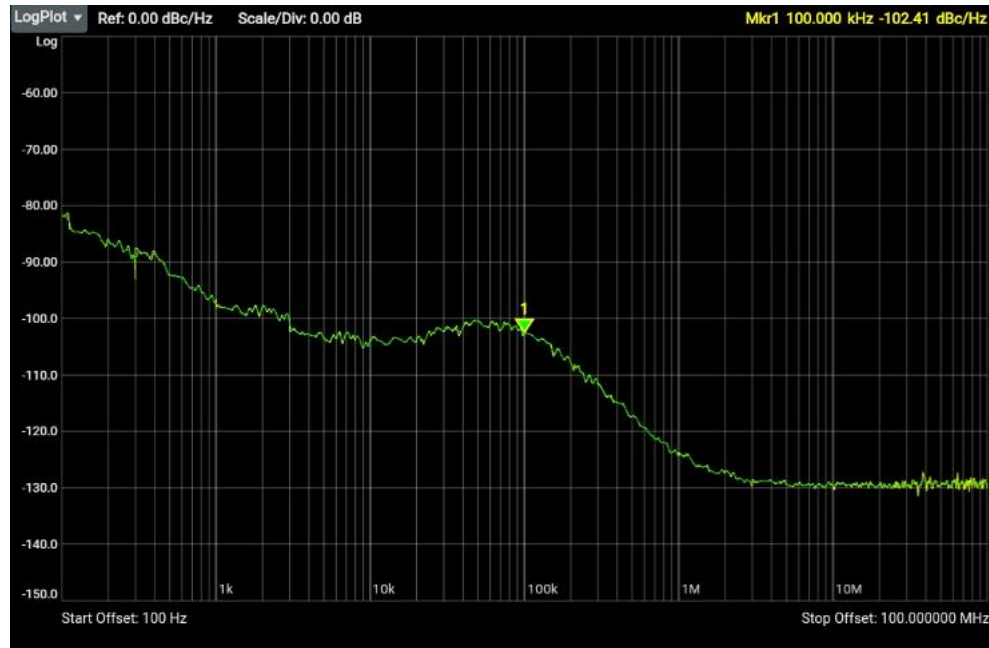


Figure 5.1 Marker

Selected Marker

There are 8 markers available to choose. By default, Marker 1 is selected. 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 at the upper-right corner of the window.

Next Marker

Click or tap **Next Marker** to select the next activated marker.

Marker Mode

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

1. Position

It is used to measure the X (Frequency or distance) and Y (Amplitude) values of a certain point on the trace. When "Position" is selected, a marker indicated by a number (e.g., "1") appears on the trace. If no active marker exists currently, a marker will be enabled in the center of the X-axis of the current trace.

2. Delta

It is used to measure the difference between "reference point" and "certain point on the trace": X (frequency or distance) and Y (amplitude) value.

Key Points:

- When "Delta" is selected, a pair of markers appears on the trace: Reference Marker and the Delta Marker.
- 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 center frequency.
- When you change the position of the Delta marker, the position of the reference marker remains unchanged, but the frequency (or distance) between the two markers will change along with it.
- The frequency (or distance) difference between the two markers and the amplitude difference between them are displayed in the measurement result bar at the upper-right corner of the screen.
- The measurement result of the Delta marker: difference between the current marker and the absolute measurement value of the reference marker.
- When the reference marker is disabled, the Delta marker is changed to Position marker.
- When the Delta marker is enabled, if its reference marker is disabled, then the reference marker will be enabled and stays on the same trace with the Delta marker. The marker taken as the reference marker is by default a Position one. Its readout is the same as the current marker.

Application of the "Delta" Marker:

It is used to measure the S/N ratio of the single spectrum signal.

Move the reference marker to the location where the signal resides, and move the Delta marker to the location where the noise resides. The amplitude displayed in the measurement results is S/N ratio.

3. 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. The marker function is also disabled.

Reference Marker

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

Key Points:

- 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 Trace 1, Trace 2, and Trace3. One marker can only mark one trace. The selected trace determines the position of the marker and the final readout results.

Marker X Value

Sets the X-axis value of the marker to change the position of the marker on the trace. When the marker is enabled for the first time, by default, it is in the center of the X-axis (frequency).

Table 5.16 Marker X Value

Parameter	Description
Unit	GHz, MHz, kHz, Hz, mHz
Knob Step	Marker X Value/100
Left/ Right Arrow Key Step	Marker X Value/100
Accuracy	1
Saved in instrument state	Yes

Line State

Enables or disables the marker line. By default, it is OFF.

Key Points:

- When you enable the marker line, a cross line is displayed at the amplitude point where the marker resides. The width of the horizontal line and the height of the vertical line are consistent with the length and height of the graticule in the waveform display area.
- You can enable marker line for multiple markers at the same time.
- When the marker is not within the screen, no marker line is plotted on the screen.
- The marker line is updated with the change of the marker position.

Couple Markers

Enables or disables the marker coupling function. By default, it is OFF.

Key Points:

- When this function is enabled, moving any marker will enable other markers (except the Off marker) to move with it.
- In the coupling state, when moving the marker causes the other marker to move outside of the trace area, the marker measurement result in the non-trace area shows "--".
- In the coupling state, moving the marker will cause the Delta marker and reference marker to change accordingly. You need to ensure the Y-axis values that correspond to the X values of two markers are valid, otherwise, the Delta measurement result shows "--".

Marker Table

Enables or disables the marker table. By default, it is OFF.

The marker table includes marker number, marker trace, marker type, marker X value, amplitude, etc. Through this table, you can view the measurement values of multiple points.



Figure 5.2 Marker Table

**NOTE**

The marker table currently opened can be saved to the internal or external memory. Press **Save** to save it according to descriptions in "Save".

All Marker Off

Turns off all the enabled markers and their related functions.

5.6.2 Marker Function

5.6.2.1 Marker Function

Sets the marker function type. It includes Residual PM(deg), Residual PM(rad), Residual PM(dBc), Jitter, Residual FM, Avg Noise Density, and OFF. When the marker function is enabled, if the currently selected marker is disabled, then it will be automatically enabled and set to Position marker. The marker function type can be set for each marker independently.

- Residual PM(deg)**

Sets, calculates and displays the rms degree result. It is generally calculated over a specific frequency range. The formula is as follows:

$$\text{RMS } residualPM[\text{deg}] = \frac{180}{\pi} \text{RMS } residualPM[\text{rad}]$$

- Residual PM(rad)**

Sets, calculates and displays the rms rad result. The formula is as follows:

$$\text{RMS } residualPM[\text{rad}] = \sqrt{2 \int_{f_1}^{f_2} 10^{\frac{L(f)}{10}} df}$$

- **Residual PM(dBc)**

Calculates the total power in a specified marker band span, expressed in dBc. The formula is as follows:

$$\text{RMS } residualPM[\text{dBc,SSB}] = 10 \log \left(\frac{(\text{RMS } residualPM[\text{rad}])^2}{2} \right)$$

- **Jitter**

Provides the RMS Jitter result calculated from the carrier frequency and the RMS Degree (or Radian) result. The formula is as follows:

$$\text{RMS } PeriodicJitter[\text{sec}] = \frac{1}{2\pi f_c} \text{RMS } residualPM[\text{rad}]$$

- **Residual FM**

Sets, calculates and displays the residual FM result. This is generally calculated over a specific frequency range. The formula is as follows:

$$\text{RMS } residualFM[\text{Hz}] = \sqrt{2 \int_{f_1}^{f_2} f^2 \times 10^{\frac{L(f)}{10}} df}$$

- **Avg Noise Density**

Provides an averaged noise density in a specified marker band span (SSB). The formula is as follows:

$$\text{RMS } noiseDensity[\text{dBc/Hz}] = 10 \log \left(\frac{10^{\frac{\text{RMS } residualPM[\text{dBc,SSB}]}{10}}}{f_2 - f_1} \right)$$



NOTE

SSB PSD $L(f)$ from the LogPlot spectrum trace is:

$$L(f) [\text{dBc/Hz}] = P_n(f) [\text{dBm/Hz}] - P_s [\text{dBm}]$$

Where, $P_n(f)$ indicates the noise power in a 1 Hz bandwidth; P_s indicates the carrier signal power at the carrier frequency.

- **OFF**

Disables the marker function type. No marker function type is selected.

5.6.2.2 **Band Span**

Sets the bandwidth of the signal involved in the calculation for the band function.

5.6.2.3 **Band Left**

Sets the left edge frequency of the signal involved in the calculation for the band function.

5.6.2.4 **Band Right**

Sets the right edge frequency of the signal involved in the calculation for the band function.

5.6.3 **Spurious**

Used to search for the spurious on the current trace.

5.6.3.1 **Peak Search**

Performs the peak search function.

Key Points:

- Searches for the maximum value on the trace and marks it with a marker.
- When the peak that is compliant with the condition is not found, a prompt message "no spurious found" is displayed on the screen.

5.6.3.2 **Next Spurious**

Searches for and marks the spurious whose amplitude on the trace is next to that of the current peak and which meets the peak search condition.

If no spurious that meets the condition is found, a prompt message "no spurious found" is displayed.

5.6.3.3 **Right Spurious**

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



NOTE

This function is only valid when the selected marker is on the "Raw" trace and spurious signals exist.

5.6.3.4 Left Spurious

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



NOTE

This function is only valid when the selected marker is on the "Raw" trace and spurious signals exist.

5.6.3.5 Spurious Table Sort

Sets the sorting rule of data in the spurious table. It can be set to Freq or Ampt. By default, it is sorted by amplitude.

5.6.3.6 Spurious Offset

Sets the offset of the spurious amplitude. Spur offset defines the minimum threshold above the smoothed trace for a signal to be recognized as a spur.

Parameter	Description
Default	10 dB
Range	0 dB to 50 dB
Unit	dB
Knob Step	1 dB
Left/Right Arrow Key Step	5 dB
Accuracy	0.01
Saved in instrument state	Yes

5.6.3.7 Spurious Table

The spurious table lists the spurious points that meets the requirement based on the spurious offset.

You can enable or disable the display of the spurious table. By default, it is OFF. When it is enabled, the spurious table is displayed, displaying a list of spurs. When it is enabled, the spurious table is displayed, showing the spurs that meet the search parameter settings. X-axis indicates the offset frequency, and Y-axis indicates the amplitude.

The spurious table currently displayed on the screen can be saved to the internal or external memory. If needed, you can recall it at any time. For details about saving the file, refer to descriptions in [Save](#).

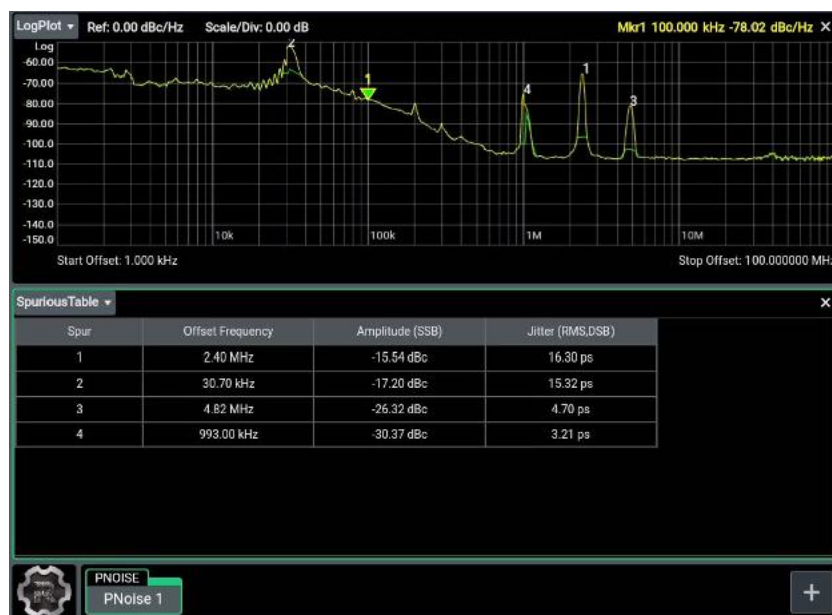


Figure 5.3 Spurious Table

5.7 Display

5.7.1 Display View

Allows you to set the view types displayed on the current screen. You can set the combination view and restore the view. By default, "Normal" is selected for the Combination View.

Combination View

In the combination view, the available views to select include Normal, Decade, and Spurious.

- Normal: If Normal is selected, the log plot graph view is displayed. It displays the current noise measurement trace.
- Decade: If Decade is selected, both log plot graph view and decade table view are displayed. It displays the measured values for each plot at every point where the trace(s) cross(es) a decade line on the screen.

- Spurious: If Spurious is selected, both log plot graph view and spurious table view are displayed. The spurious table shows a list of spurs, with offset frequency, amplitude in dBc, and jitter values displayed.

Key Points:

- You can modify, add, or delete the specified view to adjust the view layout display.
- You can click or tap the multi-pane windowing table at the upper-right corner of the screen on the quick operation toolbar to add the specified view.

Restore View

Restores the combination view that you select under **Comb View**.

5.8 Input/Output

Sets the input/output interface.

5.8.1 Input Impedance

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 .

5.8.2 Ext Gain

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

Key Points:

- This value can change the trace position, but will not change the Y-axis reference value and scale.
- 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.

Parameter	Remarks
Default	0 dB
Range	-120 dB to 120 dB
Unit	dB

Parameter	Remarks
Knob Step	1 dB
Left/Right Arrow Key Step	1 dB

5.8.3 Amplitude Correction

The amplitude correction is an important tool for improving the measurement accuracy. It can compensate the amplitude errors caused by the device gain and loss during transmission to ensure the accuracy and consistency of the measurement results. The available amplitude corrections of the RSA6000 series spectrum analyzer include "Antenna", "Cable", "User", and "Other".

When the amplitude correction is enabled, you can enable the correction, apply all the corrections, delete all the amplitude corrections, edit the correction, import and export the correction files.

Select the Amplitude Correction Type

The available amplitude correction types include Antenna, Cable, Other, and User.

Correction Switch

Click or tap the ON/OFF tab for **Enable** to enable or disable the correction.

Edit

- Append Point: Appends one correction data point.
- Delete Point: Deletes one correction data point.
- Delete: Deletes all the added amplitude correction points.
- Freq Interpolation: Sets the frequency interpolation for the Amplitude Correction to "Lin" or "Log".
- Description: Adds the descriptions for the amplitude correction.
- Comment: Adds the comments for the amplitude correction.

Apply all the Amplitude Correction

Click or tap the ON/OFF tab for **Apply All** to enable or disable applying all the amplitude corrections. When enabling the "Apply All" function, all the currently enabled correction data will all apply to the trace. At this time, the data shown on the screen are those that have undergone amplitude correction.

Delete All Amplitude Correction

Click or tap **Delete All** to delete all the amplitude correction data and parameters. Then the amplitude correction is disabled automatically.

Import

Click or tap **Import**, and then file management interface is displayed. Select a file, and then click or tap **Import** to import the file.

Export

Click or tap **Export**, and then file management interface is displayed. Select a file, and then click or tap **Export** to export the file.

5.9 Save

RSA6000 allows you to save various types of files to the internal or external memory.

Click or tap  > **Save** to enter the file management interface. The available file types to be saved include: State, Preset, Trace+State, Measurement Data, Limit, Correction, and Screen.

5.9.1 State

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

1. Save to File

Click or tap **Save to File** to save the current state in the default filename or user-defined filename.

2. 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.

5.9.2 Preset

1. Select Preset

Click or tap **Select Preset** to select the desired preset settings. The available choices include "Default", "User1", "User2", "User3", "User4", "User5", and "User6".

2. 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.

5.9.3 Trace & State

Click or tap **Trace & State** to enter the trace & state saving menu. The state of the instrument and the selected trace can be saved to the register or the file.

1. Save to File

Click or tap this menu to save the current state and trace in the default filename or user-defined filename.

2. Select Trace

Selects the trace to be saved. You can select any single trace from Trace1 to Trace3.

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 loading instrument state. The register menu displays the time for saving the instrument state.

5.9.4 Measurement Data

Click or tap **Meas Data** to enter the measurement data saving menu. The selected measurement 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 analyze the data in software like Excel.

1. Save to File

Click or tap this menu to save the currently selected type of measurement data in the default filename or user-defined filename.

2. Measure Type

Selects the measurement data type to be saved. The measurement data types include Trace, Marker Table, and Spurious Table.

3. Select Trace

After selecting "Trace" as the measurement type, click or tap this menu to select the desired trace to be saved.

5.9.5 Limit

Click or tap **Limit** to enter the limit line saving menu. The selected limit line is saved to the file.

1. Save to File

Click or tap **Save to File** to save the currently selected limit line in the default filename or user-defined filename.

2. Select Limit

Selects the limit line to be saved. You can select any one of the limit lines (from Limit1 to Limit6).

5.9.6 Amplitude Correction

Click or tap **Correction** to enter the amplitude correction saving menu. Select the specified amplitude correction type (Antenna, Cable, Other, and User) to save to the specified path. The data will be saved in .csv format. They are separated with a comma, and this is convenient for you to analyze the data in software like Excel.

5.9.7 Screenshot

Click or tap **Screen** to enter the screenshot saving interface.

1. Save to File

Click or tap this menu to save the current screenshot in the default filename or user-defined filename.

2. Format

Click or tap **Format** to select the file format of the current screen image to be "*.png", "*.bmp", or "*.jpg".

3. Invert

Enables or disables the invert function.

4. Screenshot Path

Selects the location where to save the screenshot. You can save the screenshot to the local path or the external storage device.

5.10 Recall

RSA6000 allows you to recall various types of files from the internal or external storage memory.

Click or tap  > **Recall** to enter the file recalling menu. The available file types include: State, Trace+State, Measurement Data, Limit, and Correction.

5.10.1 State

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

1. Load from File

Click or tap **Load from File** to enter the file management interface. Select a file and then click or tap **Recall** to recall the specified 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.

5.10.2 Trace & State

Click or tap **Trace & State** to enter the trace & state recalling menu. The state of the instrument and the selected trace can be recalled from the register or the file.

1. Load from File

Click or tap **Load from File** to enter the file management interface. Select a file to be loaded, and then click or tap **Recall** to recall the file.

2. Select Trace

When any one of the items from Trace1 to Trace3 is selected, the specified trace is recalled.

3. Register1 through Register16

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

5.10.3 Measurement Data

Click or tap **Meas Data** to enter the measurement data recalling menu.

1. Load from File

Click or tap **Load from File** to enter the file management interface. Select a file to be loaded, and then click or tap **Recall** to recall the file.

2. Select Trace

Selects the trace to be loaded. The available traces include Trace 1, Trace 2, and Trace 3.

5.10.4 Limit

Click or tap **Limit** to enter the limit line recalling menu.

1. Load from File

Click or tap **Load from File** to enter the file management interface. Select a file and then click or tap **Recall** to recall the specified file.

2. Select Limit

When any one of the items from Limit1 to Limit6 is selected, the specified limit line is recalled.

5.10.5 Amplitude Correction

Click or tap **Correction** to enter the amplitude correction recalling menu. Select the amplitude correction type (Antenna, Cable, Other, and User) to load it from the specified path. The data will be loaded in .csv format. They are separated with a comma, and this is convenient for you to analyze the data in software like Excel.

6 Shortcut Key

6.1 Preset

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

Press  on the front panel to restore the instrument to its factory default settings.

You can also click or tap  at the upper-right corner of the screen to recall the factory settings. The following table lists the factory default settings (except items specified in Note [1]) or user-defined settings.

Parameter Name	PNOISE Parameter Value
Frequency	
Nominal Frequency	1 GHz
Start Offset	100 Hz
Stop Offset	1 MHz
Signal Track	OFF
Amplitude	
Ref Value	-70 dBc/Hz
Input Attenuation	10 dB
Attenuation Mode	Auto
Preamplifier (PA)	OFF
Scale/Div	10 dB
Auto Scale	OFF
Max Mixer Level	-10 dBm
Sweep	
Sweep Mode	Continuous
Meas Setup	

Parameter Name	PNOISE Parameter Value
Setting	
Avg Number	10
Avg State	OFF
Avg Mode	Exponential
Detector Type	Voltage Average
Smoothing	2%
Signal Verify	
Nominal Frequency	1 GHz
Frequency Verification	ON
Absolute Frequency Tolerance	1 kHz
Relative Frequency Tolerance	10%
Nominal Level	0 dBm
Level Verification	ON
Absolute Level Tolerance	10 dB
On Verification Failure	Restart
Noise Cancel	
Noise Cancel	OFF
Reference Trace	Trace 3
Threshold	0.01 dB
Limit	
Test Limits	OFF
Select Limit	Limit1

Parameter Name	PNOISE Parameter Value
Limit State	OFF
Test Trace	Trace 1
X Offset	0 Hz
Y Offset	0 dB
Y Axis Type	Fixed
Build From Trace	Trace 1
Copy from Limit	Limit1
Type	Upper
Limit Test Trace	Trace 1
Freq Interpolation	Lin
Amplitude Interpolation	Log
Margin	Off, 0 dB
Advanced	
Min Carrier Level	-50 dBm
Offset Side	Upper Sideband
Carrier Measure Display	ON
Trace	
Selected Trace	Trace 2
Trace Type	Smoothed
Trace Hold	OFF
Marker	
Marker Setup	
Selected Marker	Marker1
Marker Mode	Position

Parameter Name	PNOISE Parameter Value
Reference Marker	Marker2
Marker Trace	Trace 1
Marker X Value	Center of the X-axis (Frequency)
Line State	OFF
Couple Markers	OFF
Marker Table	Off
Marker Function	
Marker Function	OFF
Band Span	(Stop Offset - Start Offset) x 5%
Band Left	Marker Frequency - (Stop Frequency - Cutoff Frequency) x 5%/2
Band Right	Marker Frequency + (Stop Frequency - Cutoff Frequency) x 5%/2
Spurious	
Spurious Table Sort	Amplitude
Spurious Offset	10 dB
Spurious Table	OFF
Display	
Combination View	Normal
Input/Output	
Input Impedance	50 Ω
Ext Gain	0 dB
Correction	
Select	Antenna
Enable Correction	OFF

Parameter Name	PNOISE Parameter Value
Apply All the Amplitude Correction	OFF
System^[1]	
Power On	Preset
Power Switch	OFF
Beeper	OFF
Screen Brightness	80%
Fan Speed	49%
HDMI Resolution	1920x1080_60
Display Time	ON
Calibrate Auto	OFF
Language	English

**NOTE**

[1]: Not affected by Preset settings.

6.2 Single/Continue

Press **Single/Continue** to set the sweep mode to Single or Continuous. For detailed setting methods, refer to the descriptions in *Sweep Mode*.

6.3 Restart

Press **Restart** to restart sweeping. After performing this operation, the sweep or measurement is restarted. All the previously measured data will be remeasured.

7 System Function

7.1 System

Sets the system parameters.

7.1.1 I/O Setting

The analyzer supports the LAN or USB communication interface. In the **System** menu, click or tap **I/O** to enter the I/O setting menu to configure the following parameters.

Network Status

Different prompts will be displayed according to the current network connection status.

- DISCONNECTED!
- CONNECTED

MAC Address

The MAC address of each oscilloscope is unique. MAC is used to identify the instrument when you assign the IP address to the instrument.

VISA Address

Displays the VISA address currently used by the the instrument.

IP Configuration Type

The configuration type of the IP address can be DHCP, Auto IP, or Static IP. In different IP configuration types, the configurations for IP address and other network parameters are different.

- **DHCP**
If "DHCP" is selected, the DHCP server in the current network will assign the network parameters (e.g. IP address, Subnet, Gateway, and DNS) for the the instrument.
- **Auto IP**
When "Auto IP" 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. The "Auto IP" works only when "DHCP" is not selected or connection is failed.
- **Static IP**

If "Static IP" is selected, the instrument is configured with static IP. In this case, you need to disable DHCP and Auto IP manually. At this time, you need to set the IP address, Subnet, Gateway, and DNS manually. At this time, you can self-define the network parameters (e.g. IP address) of the instrument.

- **Set the IP address**

The format of the IP address is nnn.nnn.nnn.nnn. The range of the first segment (nnn) of the address is from 0 to 255 (except 127); wherein, the valid range is from 0 to 223. 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.

This setting will be saved to the non-volatile memory; if "Power On" is set to "Last", then DHCP and Auto IP are disabled at the next power-on. The instrument will load the preset IP address automatically.

- **Set the 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.

This setting will be saved in the non-volatile memory; if "Power On" is set to "Last", then DHCP and Auto IP are disabled at the next power-on. The instrument will load the preset subnet mask automatically.

- **Set the default gateway**

You can set this parameter in Static IP mode. The format of the gateway is nnn.nnn.nnn.nnn. The range of the first segment (nnn) is from 0 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.

This setting will be saved to the non-volatile memory; if "Power On" is set to "Last", then DHCP and Auto IP are disabled at the next power-on. The instrument will load the preset gateway automatically.

- **Set the DNS address**

You can set this parameter in Static IP mode. The format of the DNS address is "nnn.nnn.nnn.nnn". The range for the first segment (nnn) of the address is from 0 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.

Generally, you do not need to set the DNS, therefore this parameter setting can be ignored.

**TIP**

- When the three IP configuration types are all turned on, the priority of the parameter configuration from high to low is "DHCP", "Auto IP", and "Static IP".
- The three IP configuration types cannot be all turned off at the same time.

mDNS

Click or tap the ON/OFF tab for mDNS to enable or disable the multicast Domain Name System (mDNS). This system is used to provide the function of DNS server for service discovery in a small network without a DNS server.

Host Name

If mDNS is enabled, you need to configure the mDNS host name, supporting inputting a maximum of 26-byte strings.

GPIB

Sets the GPIB address. Its settable range is from 1 to 30. By default, it is 1. When controlling the instrument via the GPIB, first use the USB-GPIB module to extend a GPIB interface, then use the GPIB cable to connect it to the PC.

Apply the Network Parameter Setting

Click or tap **Apply** to validate the current network parameter setting.

Reset the Communication Interface

Click or tap **Reset**, then the prompt message "Are you sure to reset interface settings" is displayed. Click or tap **Confirm** to confirm resetting interface settings.

7.1.2 Basic Settings

In the **System** menu, click or tap **Setup** to enter the basic setting menu.

Language

This product supports menus in multiple languages. Both Chinese and English are available for the display of the help information, prompt messages, and interface. Click or tap the drop-down button of **Language** to select the specified system language from the drop-down list.

Power On

You can set the system configuration to be recalled when the oscilloscope is powered on again after power-off. Click or tap "Preset" or "Last" for **Power On**.

- Last: returns to the setting of the system at last power-off.
- Preset: restores the system to its factory setting.

Power Switch

- **OFF:** After the analyzer is connected to power, you need to press the Power key on the front panel to power on the instrument.
- **ON:** After the analyzer is connected to power, it will be powered on automatically.

Beeper

Click or tap the ON/OFF tab for **Beeper** to enable or disable the beeper. When the beeper is enabled, you can hear the sound of the beeper when you perform the following operations:

- Press a key or a menu key on the front panel
- Enable the touch screen
- When a prompt message is displayed

Screen Brightness

Drag the slide bar of **Screen Brightness** to set the screen brightness. Its settable range is from 0% to 100%.

Fan Speed

Click or tap the slide bar at the right side of **Fan Speed** to set the fan speed of the instrument. Its settable range is from 0% to 100%.

Display Time

Click or tap the ON/OFF tab for **Display Time** to enable or disable the display of the system time.

The system time (date and time) is displayed in the Notification Area at the lower-right corner of the screen. The date is displayed in "yyyy/mm/dd" format, and the time is displayed in "hh:mm:ss" format. When you save the waveform, the output file will contain the time information. Users can set the system time.

- **Date:** Click or tap the "Date" area, then the date setting interface is displayed. Select a proper date, then click or tap **Confirm** to confirm the date modification.
- **Time:** Click or tap the "Time" area, then the time setting interface is displayed.
 - Click or tap the Hour/Minute number and then drag the hour/minute hand to modify the time.
 - After setting, click or tap **Confirm** to confirm the setting.

7.1.3 About this Spectrum

In the **System** menu, click or tap **About**, and then you can view the model, version, and other information about this spectrum analyzer in **About** menu.

- **Model**
Indicates the product model.
- **Serial number**
Indicates the serial number of the product, the unique identification for the product.
- **Firmware**
Indicates the firmware version number of the product.
- **Hardware**
Indicates the hardware version number of the product.
- **Build**
Indicates the creation time for the software version.
- **Android.Build**
Indicates the creation time of the Android operating system.
- **Android.Version**
Indicates the version number of the Android operating system. For example, 7.1.0.
- **Launcher**
Indicates the desktop UI version number of the Android operating system.
- **WebControl**
Indicates the version number of browser remote control module.
- **Upgrade**
Click or tap **Upgrade**, and the file management interface is displayed. Select the desired upgrade file to upgrade the system. For detailed operations, refer to *Update*.

7.1.4 Options

In the "System" menu, click or tap **Options**, then all the options that have currently been installed can be displayed. For the procedures of installing the option, refer to descriptions in *To Install the Option*.

7.1.5 Calibration

1. Calibrate Now

Click or tap this menu, and the analyzer will use the internal calibration source to perform the self-calibration immediately.

2. Auto Calibrate

Enables or disables auto self-calibration. If auto self-calibration is enabled, the analyzer will perform one self-calibration after it is launched.

7.1.6 Update

This instrument supports local upgrade.

1. Click or tap  > **Update**, then the file management interface is displayed. Select the desired upgrade file from the specified path.
2. Click or tap **Confirm** to complete the local upgrade.

7.1.7 Help Menu

The built-in help file provides information about the functions and menu

introductions of the instrument. Click or tap  > **Help** to enter the help system.

You can get its help information by clicking on the link for the introduction of the specified function.

7.1.8 Shutdown

- Click or tap the function navigation icon  at the lower-left corner of the screen to enter the function navigation. Click or tap **Shutdown** to shut down the instrument. Then, a prompt message "Are you sure to shutdown?" is displayed. Click or tap **Confirm** to confirming shutting down the instrument.
- Press down the power key , then a prompt message "Are you sure to shutdown?" is displayed. Click or tap **Confirm** to confirming shutting down the instrument.
- Press the power key  continuously for two times to turn off the instrument.
- Long press the power key  for three seconds to turn off the instrument.

7.1.9 Restart

Click or tap the function navigation icon  at the lower-left corner of the screen to enter the function navigation. Click or tap **Restart** to restart the instrument. Then, a prompt message "Are you sure to restart?" is displayed. Click or tap **Confirm** to restart the instrument.

7.1.10 Auto

Auto function is disabled in PNOISE mode.

7.2 File

RSA6000 series spectrum analyzer allows you to save various types of files to the internal or external memory, and recall them when necessary.

Click or tap  > **File** to enter the file management interface.

7.2.1 File Management

Click or tap **File**, then the file management interface is displayed. You can select the desired file or folder. You can also use the touch screen or externally connected mouse to operate on the screen. Displays all the files with the specified file types. When you select a file or folder, you can click or tap **Rename**, **Cut**, **Copy**, **Paste**, **Cancel**, **Delete**, or **Security Clear** to perform the specified operation.

The available file types include: State, Preset, Trace+State, Measurement Data, Limit, Screen, and Correction. The descriptions for various file types are shown in the following table.

File Type	Format	Suffix Name
State	BIN	.sta
Preset	JSON	.sta
Trace+State	BIN	.trs
Measurement Data	CSV	.csv
Limit	CSV	.csv
Amplitude Correction	CSV	.csv
Screenshot	IMAGE	.jpg/bmp/png

**NOTE**

RSA6000 can only recognize files whose filenames consist of Chinese characters, English letters, or numbers. If the filename or folder name contains strings other than the above mentioned characters, the file or the folder might not be displayed normally in the file manager interface.

7.2.2 Copy

Copies the currently selected file or folder.

7.2.3 Cut

Cuts the currently selected file or folder from the specified path.

7.2.4 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.

7.2.5 Rename

Renames a file that has been stored. After you select a file, click or tap this menu name to input a new filename.

7.2.6 Delete

Deletes the selected file.

7.2.7 New Folder

Creates a folder under the current directory, and the file is named with a default filename. To modify this filename, click or tap **Rename** to rename the file.

7.2.8 Security Clear

Click or tap **SecurityClear**, then a prompt message "Confirm SecurityClear?" is displayed. Click or tap **Confirm** to clear all the saved files from the internal memory. Click or tap **Cancel** to cancel security clear operation.

8 Remote Control

This instrument supports Web Control remote operation. Web Control is Web-based remote control operation. With Web control, you can access and operate the LAN-connected instrument via the web page on any smart terminals such as PC, mobile, and iPad, without needing to install any software. The operation procedures are as follows:

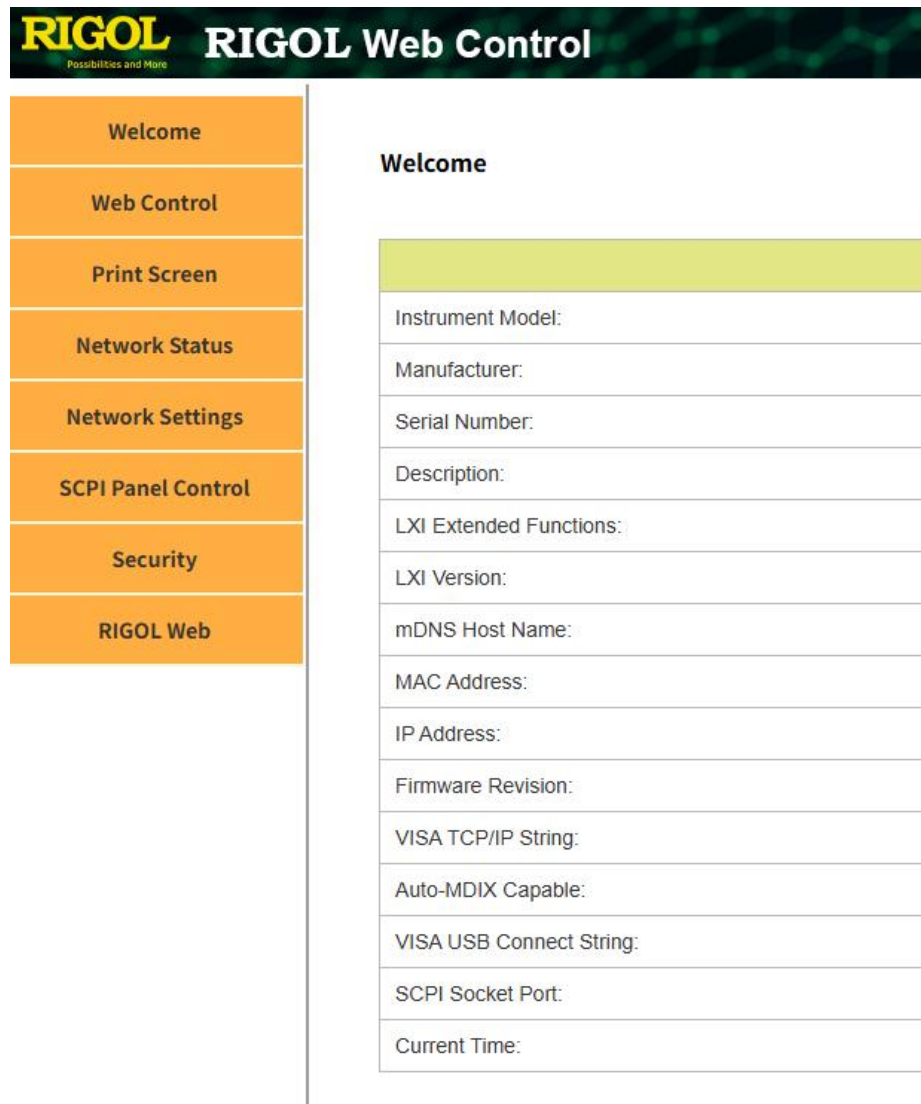
1. Connect the instrument to the network

Ensure that the rear-panel LAN interface is connected to the network. Note that the instrument must be connected to the network where the control terminal is located. Then you can operate the instrument in remote way by accessing the network.

2. Obtain the IP address

In the **System** menu, click or tap **IO** to view the IP address of the instrument.

3. Input the IP address of the instrument into the browser address bar, then press Enter to access the web page, as shown in the following figure.



- Click **Web Control** on the left side of the screen to enter the instrument remote control interface. You can use the mouse to remotely control the instrument in real time, with the same effect as operating the instrument directly.
- Click **Print Screen**, and you can select "Take Screenshot" or "Record Screen" to capture the current screen shot.
- Click **Network Settings** to configure the network. Note that login is required when changing the network configuration. When you first log in to the Web Control, use the user name "admin" and the password "rigol"..
- The SCPI Panel Control function allows the user to send SCPI commands through the web interface for remote programming control of the instrument. Click **SCPI Panel Control** to enter the commands into the SCPI Command input field. After inputting the commands, click the **Send&Read** button to send the command and read the returned value.

You can program and control the instrument by using the SCPI (Standard Commands for Programmable Instruments) commands. For details about the SCPI

commands and programming, refer to *Programming Guide* of this series of product.

8. Close the browser to exit the instrument remote control interface.

Only one user can access the instrument IP address for remote control operation at a time. First come, first served. Concurrent logins are not allowed. If the connection is interrupted, you can refresh the browser to load the page.



CAUTION

Before setting up communication, please turn off the instrument to avoid causing damage to the communication interfaces.

9 Troubleshooting

1. When I power on the instrument, the instrument stays black and does not display anything.

- a. Check whether the power is correctly connected.
- b. Check whether the power key is really pressed.
- c. Check whether the fuse is blown. If you need to replace the fuse, use only the specified fuse that conforms to the product.
- d. Restart the instrument after finishing the above inspections.
- e. If the problem still persists, please contact RIGOL.

2. The USB storage device cannot be recognized.

- a. Check whether the USB storage device can work normally when connected to other instruments or PC.
- b. Make sure that the USB storage device is FAT32 format and flash type. The instrument doesn't support hardware USB storage device.
- c. After restarting the instrument, insert the USB storage device again to check whether it can work normally.
- d. If the USB storage device still cannot work normally, please contact RIGOL.

3. The touch functions cannot be used normally.

- a. Check whether you have locked the touch screen. If yes, unlock the touch screen.
- b. Check whether the screen or your finger is stained with oil or sweat. If yes, please clean the screen or dry your hands.
- c. Check whether there is a strong magnetic field around the instrument. If the instrument is close to the strong magnetic field (e.g. a magnet), please move the instrument away from the magnet field.
- d. If the problem still persists, please contact RIGOL.

10 Appendix

10.1 Appendix A: Options and Accessories

	Description	Order No.
Model	Real-time Spectrum Analyzer, 5 kHz to 8.5 GHz	RSA6085
	Real-time Spectrum Analyzer, 5 kHz to 14 GHz	RSA6140
	Real-time Spectrum Analyzer, 5 kHz to 26.5 GHz	RSA6265
Standard Accessory	Power Cord	-
Options	Vector Signal Analysis Application Software	RSA6000-VSA
	EMI Measurement Application Software	RSA6000-EMI
	Analog Demodulation Application Software	RSA6000-ADM
	Phase Noise Measurement Application Software	RSA6000-PNM
	Preamplifier (PA), 8.5 GHz	RSA6000-P08
	Preamplifier (PA), 14 GHz	RSA6000-P14
	Preamplifier (PA), 26.5 GHz	RSA6000-P26
	200 MHz Analysis Bandwidth	RSA6000-B200
	200 MHz Real-time Bandwidth	RSA6000-RB200
	Advanced Measurement Kit	RSA6000-AMK
	8.5 GHz Tracking Generator Output	RSA6000-T08
Optional Accessories	DSA utility kit. Refer to Note[1] for details.	DSA Utility Kit
	RF adaptor kit. Refer to Note[2] for details.	RF Adaptor Kit
	Includes: 50 Ω to 75 Ω adaptor (2pcs)	RF CATV Kit
	Includes: 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(M)-N(M) RF Cable	CB-NM-NM-75-L-12G
	N(M)-SMA(M) RF Cable	CB-NM-SMAM-75-L-12G
	Near-field Probe	NFP-3
	USB Cable x1	CB-USBA-USBB-FF-150

**NOTE**

- For all the mainframes, accessories, and options, please contact the local office of RIGOL.
- [1]: Includes 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)
- [2]: Includes: 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)

10.2 Appendix B: Warranty

RIGOL TECHNOLOGIES CO., LTD. (hereinafter referred to as RIGOL) warrants that the product mainframe and product accessories 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 your nearest RIGOL sales or service office.

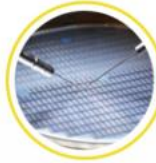
There is no other warranty, expressed or implied, except such as is expressly set forth herein or other applicable warranty card. There is no implied warranty of merchantability or fitness for a particular purpose. Under no circumstances shall RIGOL be liable for any consequential, indirect, ensuing,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

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Communication

System Integration



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- UWB/RFID/ ZIGBEE
- Digital Bus/Ethernet
- Optical Communication

- Digital/Analog/RF Chip
- Memory and MCU Chip
- Third-Generation Semiconductor
- Solar Photovoltaic Cells

- New Energy Automobile
- PV/Inverter
- Power Test
- Automotive Electronics

*Provide Testing and Measuring Products
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