

RIGOL

Quick Guide

English

中文

RSA3000 Series Real-time Spectrum Analyzer

Jan. 2019

RIGOL (SUZHOU) TECHNOLOGIES INC.

Guaranty and Declaration

Copyright

© 2017 **RIGOL** TECHNOLOGIES, INC. All Rights Reserved.

Trademark Information

RIGOL is a registered trademark of **RIGOL** TECHNOLOGIES, INC.

Publication Number

QGD21101-1110

Notices

- **RIGOL** products are covered by P.R.C. and foreign patents, issued and pending.
- **RIGOL** reserves the right to modify or change parts of or all the specifications and pricing policies at the company's sole decision.
- Information in this publication replaces all previously released materials.
- Information in this publication is subject to change without notice.
- **RIGOL** shall not be liable for either incidental or consequential losses in connection with the furnishing, use, or performance of this manual, as well as any information contained.
- Any part of this document is forbidden to be copied, photocopied, or rearranged without prior written approval of **RIGOL**.

Product Certification

RIGOL guarantees that this product conforms to the national and industrial standards in China as well as the ISO9001:2015 standard and the ISO14001:2015 standard. Other international standard conformance certifications are in progress.

Contact Us

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

E-mail: service@rigol.com

Website: www.rigol.com

General Safety Summary

1. Only the exclusive power cord designed for the instrument and authorized for use within the local country could be used.
2. Ensure that the instrument is safely grounded.
3. Observe all terminal ratings.
4. Use proper overvoltage protection.
5. Do not operate without covers.
6. Do not insert objects into the air outlet.
7. Use the proper fuse.
8. Avoid circuit or wire exposure.
9. Do not operate the instrument with suspected failures.
10. Provide adequate ventilation.
11. Do not operate in wet conditions.
12. Do not operate in an explosive atmosphere.
13. Keep instrument surfaces clean and dry.
14. Prevent electrostatic impact.
15. Handle with caution.

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.

Document Overview

This manual introduces some basic information that you should know when you use the RSA3000 series spectrum analyzer for the first time. It contains the following contents: out-of-box inspection method, product overview, how to connect the instrument to the AC power, turn-on checkout, and remote control overview.

Tip

For the latest version of this manual, download it from the official website of **RIGOL** (www.rigol.com).

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 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:

"→" represents 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

English

The RSA3000 series spectrum analyzer includes the following models. Unless otherwise specified, this manual takes RSA3045-TG as an example to illustrate the functions and operation methods of RSA3000 series spectrum analyzer.

Model	Frequency Range	Tracking Generator
RSA3045	9 kHz to 4.5 GHz	None
RSA3030	9 kHz to 3 GHz	None
RSA3045-TG	9 kHz to 4.5 GHz	4.5 GHz
RSA3030-TG	9 kHz to 3 GHz	3 GHz

General Inspection

1. Inspect the packaging

If the packaging has been damaged, do not dispose the damaged packaging or cushioning materials until the shipment has been checked for completeness and has passed both electrical and mechanical tests.

The consigner or carrier shall be liable for the damage to the instrument resulting from shipment. **RIGOL** would not be responsible for free maintenance/rework or replacement of the instrument.

2. Inspect the instrument

In case of any mechanical damage, missing parts, or failure in passing the electrical and mechanical tests, contact your **RIGOL** sales representative.

3. Check the accessories

Please check the accessories according to the packing lists. If the accessories are damaged or incomplete, please contact your **RIGOL** sales representative.

Product Overview

RSA3000 series is a new generation of cost-efficient real-time spectrum analyzer with high performance. With superb performance specifications, as well as the clear user interface, the RSA3000 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.

For descriptions of the front panel, refer to Figure 1; for descriptions of the rear panel, refer to Figure 2; and for descriptions of the main interface (LCD), refer to Figure 3.

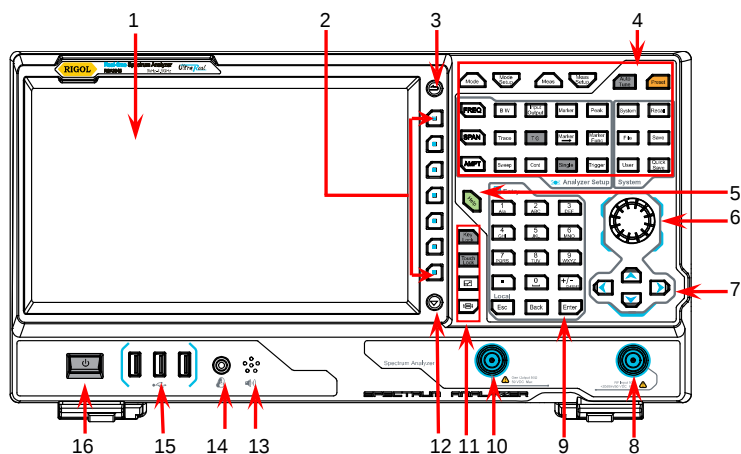


Figure 1 Front Panel

Table 1 Front Panel Description

No.	Description	No.	Description
1	LCD	9	Numeric keyboard
2	Menu softkeys	10	TG output ^[1]
3	Back to previous menu page	11	Utility function key area
4	Function key area	12	Page up/down key
5	Help key	13	Speaker
6	Knob	14	Earphone jack
7	Arrow keys	15	USB HOST
8	RF input	16	Power key

Note^[1]: This function is only available for RSA3045-TG/RSA3030-TG.

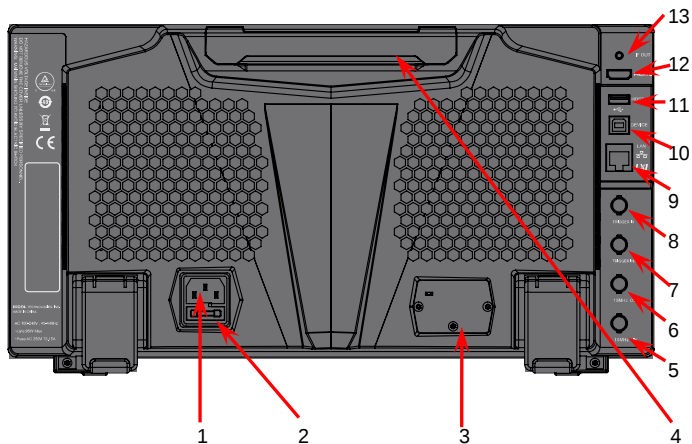


Figure 2 Rear Panel

Table 2 Rear Panel Description

No.	Description	No.	Description
1	AC power cord connector	8	TRIGGER IN
2	Fuse holder	9	LAN
3	OCXO (option)	10	USB DEVICE
4	Handle	11	USB HOST
5	10MHz IN	12	HDMI
6	10MHz OUT	13	IF OUT
7	TRIGGER IN/OUT	—	—

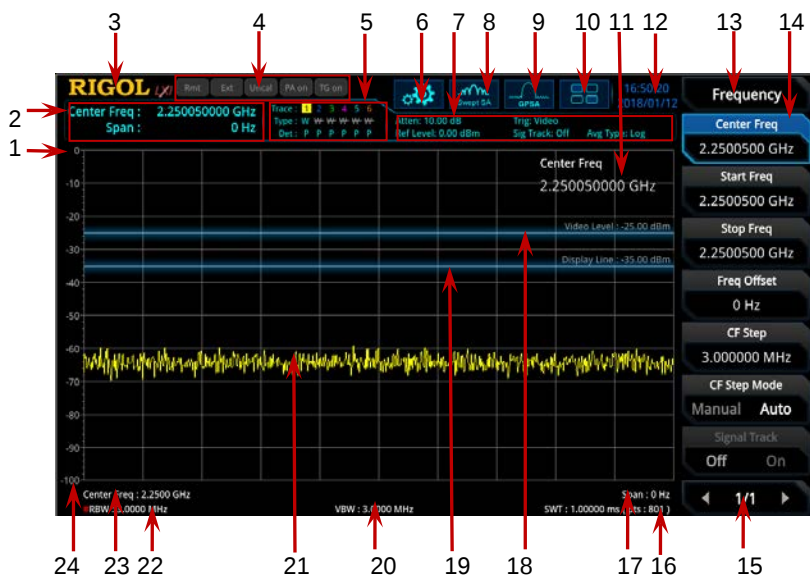


Figure 3 User Interface

Table 3 User Interface^[1] Icons

No.	Name	Description
1	Reference level	Displays the reference level value.
2	Measurement result	Displays the current measurement results for the marker (when no marker exists, the measurement results display frequency/span value).
3	RIGOL	Indicates the company logo.
4	System status	Rmt: indicates remote operation. Ext: indicates the external reference. Uncal: indicates that the measurement has not been calibrated. PA on: indicates that the preamp has been enabled. TG on: indicates that the tracking generator has been enabled.
5	Trace indicator ^[1]	Displays information about the trace and the

		detector.
6	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, or set it to mute   : indicates the network settings. You can configure network parameters.  : unlocks the front panel keys;  : locks the front panel keys.  : unlocks the touch screen;  : locks the touch screen.  : indicates that no USB storage device is inserted;  : indicates that a USB storage device has been inserted.
7	Measurement bar	Displays measurement settings.
8	Measurement function	Displays the currently selected measurement function.
9	Working mode	Displays the currently selected working mode.
10	Function keypad	Clicks the keypad to display the function keypad interface.
11	Active function area	Displays the current parameter and its value.
12	Time	Displays the system time.
13	Menu title	Displays the currently selected menu name.
14	Menu item	Displays the menu item of the current function.
15	Menu page	Shows the current page and the total number of pages for the menu.
16	Sweep time and points	Indicates the sweep time and the number of sweep points in swept mode.
17	Span or stop frequency	The frequency range of the current sweep channel can be expressed by the combination of center frequency and span or the combination of start frequency and stop frequency.
18	Trigger level	Indicates video trigger level.
19	Display line	Indicates the readout reference and the threshold criteria for the peak
20	VBW	Indicates video bandwidth.

21	Spectrum line display area	Indicates the display area for the spectrum line.
22	RBW	Indicates the resolution bandwidth.
23	Center or start frequency	The frequency range of the current sweep channel can be expressed by the combination of center frequency and span or the combination of start frequency and stop frequency.
24	Y scale	Indicates the scale indication in the Y axis.

Note^[1]: For the user interface of the EMI mode, refer to *EMI User's Guide*.

Note^[2]: 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.
- The second line displays the trace type, including W (Clear/Write), A (Average), M (Maximum Hold), and m (Minimum Hold). The letters with different colors and in different forms show different meanings.
 - The letter in blue indicates that the trace is updating.
 - The letter in gray indicates that the trace is not updated.
 - The letter with strikethrough and in gray color indicates that the trace will neither be updated nor displayed.
 - The letter with strikethrough and in blue color indicates that the trace is updating but not displayed. It is useful in trace math operation.
- The third line displays the detector type of each trace, including N (Normal, only for GPSA), V (Voltage Average, only for GPSA), P (Positive Peak), p (Negative Peak), S (Sample), R (RMS Average, only for GPSA), Q (Quasi Peak, option, only for GPSA) and A (Average, only for RTSA). If it shows "f", it indicates that it is math operation trace. The letter in blue in the third line (detector type) indicates that the detector is in auto state; the letter in white indicates that it is in manual state.

To Prepare for Use

To Adjust the Supporting Legs

You can unfold the supporting legs to use them as stands to tilt the instrument upwards for easier operation and observation. You can also fold the supporting legs for easier storage or shipment when the instrument is not in use.

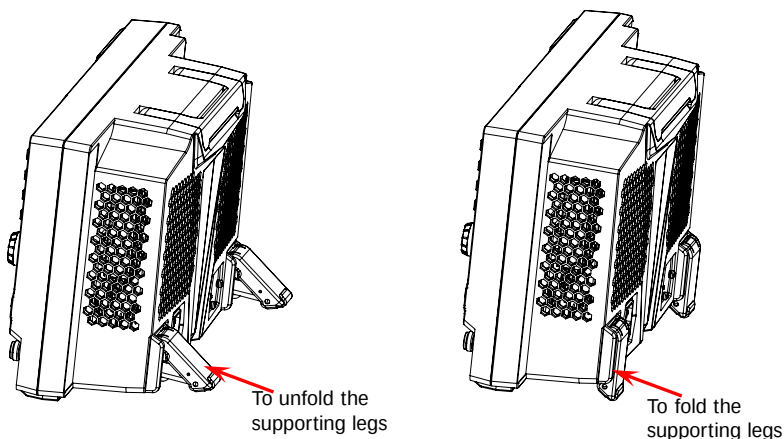
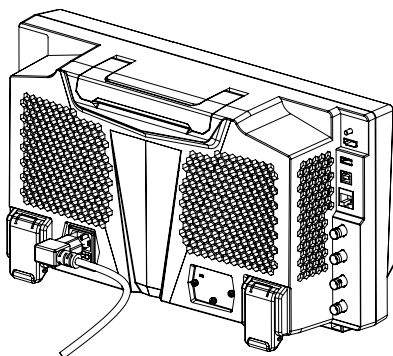


Figure 4 To Adjust the Supporting Legs

To Connect to AC Power

Please use the power cord provided in the accessories to connect the spectrum analyzer to the AC power source. The AC power supply specification of this spectrum analyzer is 100-240 V, 45-440 Hz. The power consumption of the instrument cannot exceed 95 W. When the spectrum analyzer is connected to the AC power source via the power cord, the instrument automatically adapts to the voltage range, and you do not need to select the voltage range manually.

**CAUTION**

To avoid electric shock, ensure that the instrument is correctly grounded.

Turn-on Checkout

After connecting the instrument to the power source properly, press the Power key  on the front panel to start the spectrum analyzer. Then, you will see an initial splash screen. Following the start-up screen which shows the start-up initialization process information, the sweep curve is displayed.

Self-calibration

After the instrument starts, execute self-calibration.

Press **System** → **Alignment** → **Align Now**, and then the instrument will perform self-calibration with the internal calibration source.

To Set the System Language

RSA3000 series spectrum analyzer supports multiple system languages. You can press **System** → **Language** to switch the system language.

Basic Operations

Mouse/Keyboard/Touch Screen Operation Rule

Mouse Operation Rule

Connect the mouse (note that only the left-click operation is supported; the scroll and right-click operations with the mouse are not supported) to the spectrum analyzer via the USB HOST interface to perform the following operations:

1. Click to select the menu and window.
2. Press and hold the left mouse button to drag the data displayed on the graticule or move the slide bar.
3. Double-click the data displayed on the graticule and then the data will be appeared at the right-corner.
4. Under the Marker function, you can only use the mouse to move a marker, but unable to add a marker with the mouse.

Keyboard Operation Rule

Connect the keyboard to the spectrum analyzer via the USB HOST interface, and then use the shortcut keys on the keyboard to perform the same function as what you do with the front panel keys.

Table 4 Matching Relations between the Front Panel Keys and the Keyboard Shortcut Keys

Front Panel Key	Keyboard Shortcut Key ^[1]
Mode	Alt + o
Mode Setup ^[2]	Shift + o
Meas	Alt + e
Meas Setup ^[2]	Shift + e
Auto Tune	Ctrl + Alt + a
Preset	Ctrl + Alt + p
FREQ ^[2]	Shift + f
SPAN ^[2]	Shift + s
AMPT ^[2]	Shift + a
BW ^[2]	Shift + b
Trace ^[2]	Shift + t
Sweep ^[2]	Shift + w

Input Output ^[2]	Shift + i
TG ^[2]	Shift + g
Cont	F11
Marker ^[2]	Shift + m
Marker -> ^[2]	Shift + k
Single	F12
Peak ^[2]	Shift + p
Marker Function ^[2]	Shift + u
Trigger ^[2]	Shift + r
System ^[2]	Shift + y
File	Ctrl + f
User	Ctrl + u
Recall	Ctrl + r
Save	Ctrl + s
Quick save	Ctrl + Alt + q
Help	Alt + F1
	Alt + F2
	Alt + F3
	Alt + F4
	Alt + F5
	Page Up
	Page Down
11 numeric keys	Numeric keys on the keyboard: 10 numeric numbers (1, 2, 3, 4, 5, 6, 7, 8, 9, 0) and a decimal point(.)
+	+
-	-
Esc	Esc
Back	Backspace
Enter	Enter
Arrow keys (Up/Down/Left/Right arrow key)	↑, ↓, ←, →
7 menu softkeys from top to bottom	F1 to F7

Note^[1]: Except the keyboard shortcut keys mentioned in the above table, all the other keys on the keyboard do not work for the menu operation.

Note^[2]: When the Caps Lock key is enabled, every letter you type would be in uppercase, even if you're not holding down the "Shift" key. If disabled, you have to press down "Shift" and the specified letter on the keyboard at the same time to input the letter in uppercase. For example, if you want to execute the Shift+f shortcut key operation, you only need to press "f" on the premise that the Caps Lock key is enabled.

Touch Screen Operation Rule

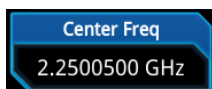
RSA3000 has a 10.1-inch capacitive multi-touch screen that supports touch gestures.

1. When operating on the menus other than the Marker menu:
 - Tap the trace window, then slide left and right to modify the center frequency; slide up and down to modify the reference level.
 - Stretch two fingers horizontally in the trace window to decrease the span, and pinch the fingers horizontally to increase the span. Stretch two fingers in the vertical direction to decrease the Y-axis scale, and pinch the fingers vertically to increase the Y-axis scale.
2. When operating on the Marker menu:
 - In the empty space of the screen trace region, press and hold the region to add one new marker.
 - Tap and hold one marker to drag the marker.

Menu Operation

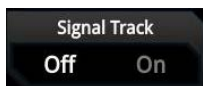
There are 6 types of menus according to their operation modes. Each type of menu and its operation method are introduced below.

1. Parameter Input



Select the menu and use the numeric keys to modify the value directly. For example, to modify center frequency, first select **Center Freq**, and then input the desired value. Then, press **Enter** to complete parameter input.

2. State Switching



Press the corresponding menu key to switch between the sub-options. For example, press **Signal Track**, and then you can switch between "On" and "Off" to enable or disable the signal tracking function.

3. Enter Lower-level Menu (with parameter)



Press the corresponding menu key to enter the lower-level menu and change the currently selected option. The parameter type in the upper-level menu will be changed when you return to the upper-level menu again. For example, press **Y Axis Unit** to enter the lower-level menu. Select **dBm** and then automatically return to the previous menu. Then, the unit of Y axis will be changed to dBm.

4. Enter Lower-level Menu (without parameter)



Press the corresponding menu key to enter the lower-level menu. For example, press **Peak Config** to enter the lower-level menu directly.

5. Direct Execution



Press the key to execute the corresponding function.

For example, press **Mkr->CF** to set the center frequency of the analyzer to the frequency of the current marker.

6. State Selection



Press the corresponding menu key and modify the parameters, and then go back to the previous menu.

For example, press **Source** → **Free Run** to select free trigger. The analyzer is in Free Run state at present.

Tip:

The above menu operations can be executed by touch gestures or clicking with the externally connected mouse. Also, you can connect to the keyboard and use the shortcut keys to perform the above menu operations. For the matching relations between the front panel keys and the keyboard shortcut keys, refer to Table 4.

Parameter Setting

You can enter the desired parameter values by using the numeric keys, the knob, or arrow keys on the front panel. Also, you can set the parameters by using the touch screen, the keyboard or the mouse. This section takes an example (set the center frequency to 800 MHz) to describe six methods of parameter setting.

1. Use the numeric keys

- 1) Press **FREQ** → **Center Freq**;
- 2) Input 800 using the numeric keys;
- 3) Select the desired unit (MHz) from the pop-up menu.

2. Use the knob

When the parameter is editable, turn the knob clockwise to increase or counterclockwise to decrease the parameter value at the specified step.

- 1) Press **FREQ** → **Center Freq**;
- 2) Rotate the knob until the parameter is set to the desired value (800 MHz).

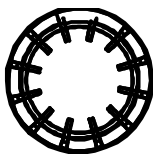


Figure 5 Knob

3. Use the arrow keys

When the parameter is editable, use the arrow keys to increase or decrease the parameter value at the specific step. Note that the step sizes for the Up/Down arrow key and the Left/Right arrow key are different.

- 1) Press **FREQ** → **Center Freq**;
- 2) Press the Up/Down arrow key or the Left/Right arrow key until the parameter is set to the desired value (800 MHz).



Figure 6 Arrow Keys

4. Use the touch screen

- 1) Touch the screen to select the function keypad icon  at the upper-right corner. Then, the function keypad is displayed. Touch "FREQ";
- 2) Click **Center Freq**;
- 3) Then the numeric keypad is displayed. Input 800, and select the desired unit "MHz".

5. Use the keyboard

- 1) Press "Shift + f" to open the Frequency menu;
- 2) Press "F1" to select **Center Freq**;
- 3) Input 800 by using the numeric keys;
- 4) Press "F2" to select the desired unit (MHz) from the pop-up menu.

For the matching relations between the front panel keys and the keyboard shortcut keys, refer to Table 4.

6. Use the mouse

- 1) Click with the mouse to select the function keypad icon  at the upper-right corner of the screen. Then, the function keypad is displayed. Click "FREQ";
- 2) Click **Center Freq**;
- 3) Then the numeric keypad is displayed. Input 800, and select the desired unit "MHz".

To Use the Built-in Help System

The built-in help system provides information about every function key on the front panel and every menu softkey.

1. Get the built-in help information

Press **Help** and a prompt message about how to obtain help information will be shown on the screen. Then, press the key that you want to know about its usage, and then the relevant help information for the key will be shown on the screen.

2. Page up/down operation

If the help information is displayed in several pages, you can press the arrow keys or use the knob to page up and down the help information.

3. Close the current help information

When the help information is displayed on the screen, perform any one of the following operations to close the currently displayed help information dialog box:

- press **Esc**;
- press the **Help** key again;
- click "Ok" in the displayed help information dialog box.

4. Get the help information of the menu key

Press **Help**, and the help information display window is displayed on the screen. Then, press the menu key and the help information of the corresponding menu item is displayed.

5. Get the help information of any function key

Press **Help**, and the help information display window is displayed on the screen. Then, press any function key and the corresponding function help information is displayed.

Fuse Replacement

If you need to replace the fuse, use only the specified fuse (AC 250 V, T3.15 A) and perform the following operations:

1. Turn off the instrument, cut off the power, and remove the power cord.
2. Use a small straight slotted screwdriver to pry out the fuse holder.
3. Take out the fuse.
4. Replace the old fuse with a specified fuse.
5. Install the fuse holder.

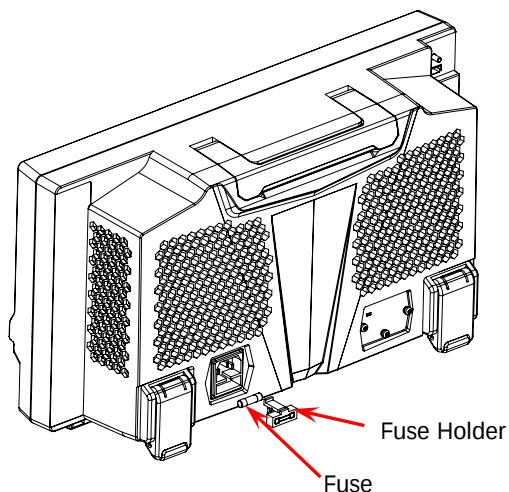


Figure 8 Fuse Replacement



WARNING

To avoid electric shock, please ensure that the instrument has been turned off, the power source has been cut off, and the fuse to be used conforms to the fuse rating.

Working Mode Setting

RSA3000 provides three working modes: GPSA, RTSA, 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, 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 and FFT. GPSA 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..

2. RTSA

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

Select RTSA. In this working mode, you can also press **Meas** to select multiple measurements.

3. EMI

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

You can also press **Mode Setup** to open the global parameter setting menu for the selected working mode under **Mode**.

Install the Option

RSA3000 provides various options 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, you will get the corresponding key. Then 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 RSA3000 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 RSA3000-PA.

`:SYSTem:LKEY`

`RSA3000-PA@8AD12B8EBC5DF492D1D4289B7CBA5B6150BF6
F5D752D645C36D74530B05F39B49C461B23A50D6C94A34E0
6782AC4380070B0D1A86BA84E02768391FFD70C2103`

Remote Control

RSA3000 can be connected to the PC via the USB or LAN interface to set up communication and realize remote control through the PC. The remote control can be realized by using SCPI (Standard Commands for Programmable Instruments) commands. The RSA3000 series spectrum analyzer supports two ways of remote control: user-defined programming and PC software (e.g.

RIGOL Ultra Sigma).

When the instrument is in remote control, the keys (except the Power key  and **Esc**) on the front panel are locked. At this time, you can press **Esc** to exit the remote mode.

More Product Information

Obtain the device information

Press **System** → **About System** to view the device information and the installation status of all the options.

For more information about this instrument, refer to the relevant manuals by logging in to the official website of **RIGOL** (www.rigol.com) to download them.

RSA3000 User's Guide: introduces the functions of the instrument and the operation methods in GPSA and RTSA modes, remote control methods, possible failures and solutions in using the instrument, and order information.

RSA3000 Programming Guide: provides detailed descriptions of SCPI commands in GPSA and RTSA modes and programming instances of the instrument.

RSA3000 Datasheet: provides the main features and technical specifications of the instrument.

EMI User's Guide: introduces the functions of the instrument and the operation methods in EMI mode, and order information.

EMI Programming Guide: provides detailed descriptions of SCPI commands in EMI mode.

