

# SVA1000X Series Spectrum & Vector Network Analyzer



## Quick Guide

QG0701X-E02A



# Guaranty and Declaration

## Copyright

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## Trademark Information

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## Declaration

- **SIGLENT** products are protected by patent law worldwide
- **SIGLENT** reserves the right to modify or change parts of or all the specifications or pricing policies at company's sole decision.
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- **SIGLENT** will not be responsible for losses caused by either incidental or consequential in connection with the furnishing, use or performance of this manual as well as any information contained.

## Product Certification

**SIGLENT** guarantees this product conforms to the national and industrial standards in China as well as the ISO9001: 2008 standard and the ISO14001: 2004 standard. Other international standard conformance certification is in progress.

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# General Safety Summary

Carefully read the following safety precautions to avoid any personal injury or damage to the instrument and any products connected to it. To avoid potential hazards, please use the instrument as specified.

## Use Proper AC Power Line

Only the power cord designed for the instrument and authorized by local country should be used.

## Ground the Instrument

The instrument is grounded through the protective earth conductor of the power line. To avoid electric shock, please make sure the instrument is grounded correctly before connecting its input or output terminals.

## Connect the Probe Correctly.

If a probe is used, do not connect the ground lead to high voltage since it has isobaric electric potential as the ground.

## Look Over All Terminals' Ratings

To avoid fire or electric shock, please look over all ratings and sign instruction of the instrument. Before connecting the instrument, please read the manual carefully to gain more information about the ratings.

## Use Proper Overvoltage Protection

Make sure that no overvoltage (such as that caused by a thunderstorm) can reach the product, or else the operator might be exposed to danger of electrical shock.

## Electrostatic Prevention

Operate the instrument in an electrostatic discharge protective area environment to avoid damages induced by static discharge. Always ground both the internal and external conductors of the cable to release static before connecting.

## Maintain Proper Ventilation

Inadequate ventilation may cause increasing of the instrument's temperature, which will eventually damage the instrument. So keep well ventilated and inspect the intake and fan regularly.

## Avoid Exposed Circuit or Components

Do not touch exposed contacts or components when the power is on.

## Do Not Operate Without Covers

Do not operate the instrument with covers or panels removed.

## Use proper Fuse.

Use only the specified fuse.

### Keep Product Surfaces Clean and Dry.

To avoid the influence of dust and/or moisture in the air, please keep the surface of the device clean and dry.

### Do Not Operate in Wet Conditions.

In order to avoid short circuiting to the interior of the device or electric shock, please do not operate the instrument in a humid environment.

### Do Not Operate in an Explosive Atmosphere.

In order to avoid damage to the device or personal injury, it is important to operate the device away from an explosive atmosphere.

## Safety Terms and Symbols

**Terms in this Manual.** These terms may appear in this manual:



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#### **WARNING**

Warning statements indicate the conditions or practices that could result in injury or loss of life.

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#### **CAUTION**

Caution statements indicate the conditions or practices that could result in damage to this product or other property.

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**Terms on the product.** These terms may appear on the product:

**DANGER** Indicates direct injuries or hazards that may happen.

**WARNING** Indicates potential injuries or hazards that may happen.

**CAUTION** Indicates potential damages to the instrument or other property that may happen.

**Symbols on the product.** These symbols may appear on the product:



Hazardous  
Voltage



Protective Earth  
Terminal



Warning



Test  
Ground



Power Switch

## General Inspection

### Inspect the shipping container

Keep the damaged shipping container or cushioning material until the contents of the shipment have been completely checked and the instrument has passed both electrical and mechanical tests.

The consigner or carrier will be responsible for damages to the instrument resulting from shipment.

**SIGLENT** will not provide free maintenance or replacement.

### Inspect the instrument

If the instrument is found to be damaged, defective or fails in electrical or mechanical tests, please contact SIGLENT.

### Check the accessories

Please check the accessories according to the packing list. If the accessories are incomplete or damaged, please contact your SIGLENT sales representative.

## Preparing for Use

### Appearance and Dimension

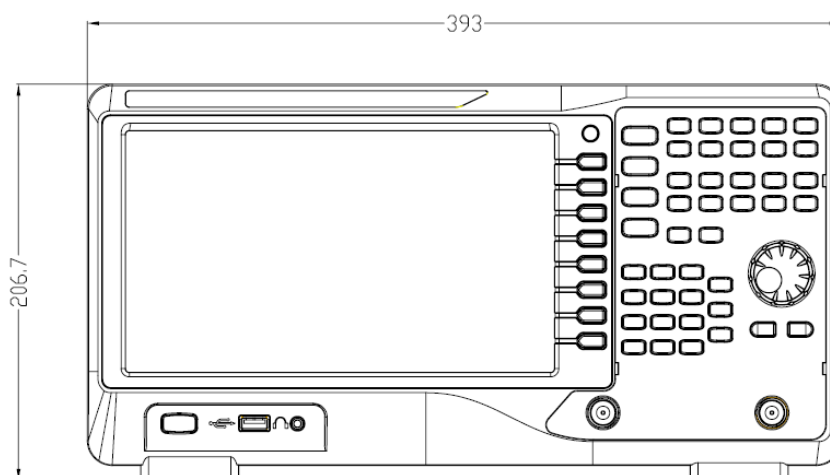


Figure 1 Front View

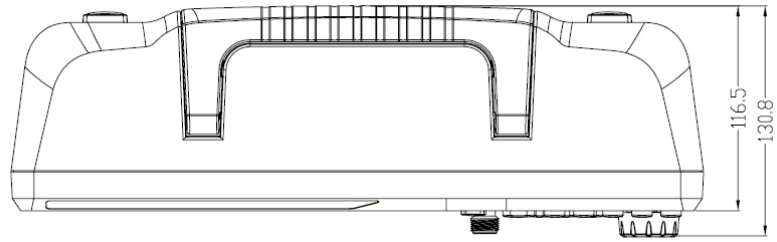


Figure 2 Top View

## Adjust the Supporting Legs

Adjust the supporting legs properly to use them as stands to tilt the analyzer upwards for stable placement as well as easier operation and observation of the instrument display.

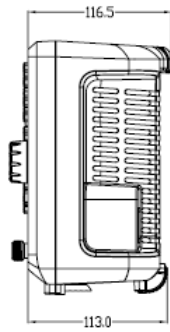


Figure 3 Before Adjusting

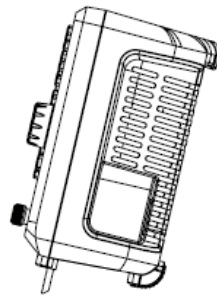


Figure 4 After Adjusting

## Connect to AC Power Supply

The analyzer accepts 100-240V, 50/60Hz or 100-120V 400Hz AC power supply. Please use the provided power cord to connect the instrument to the power source as shown in the figure below. Before powering on, make sure the analyzer is protected by a fuse.

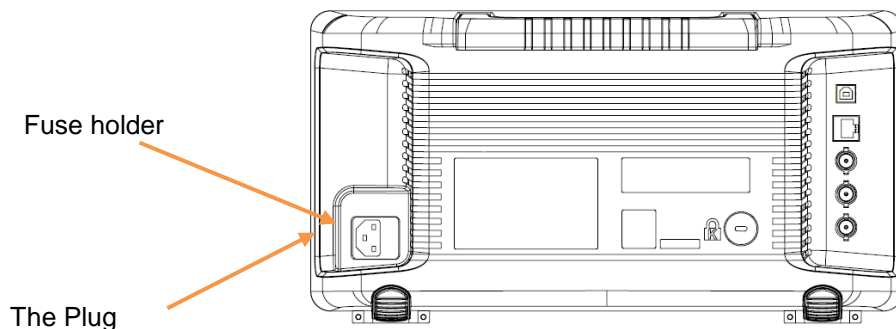


Figure 5 Power Cord Connection

# Front Panel

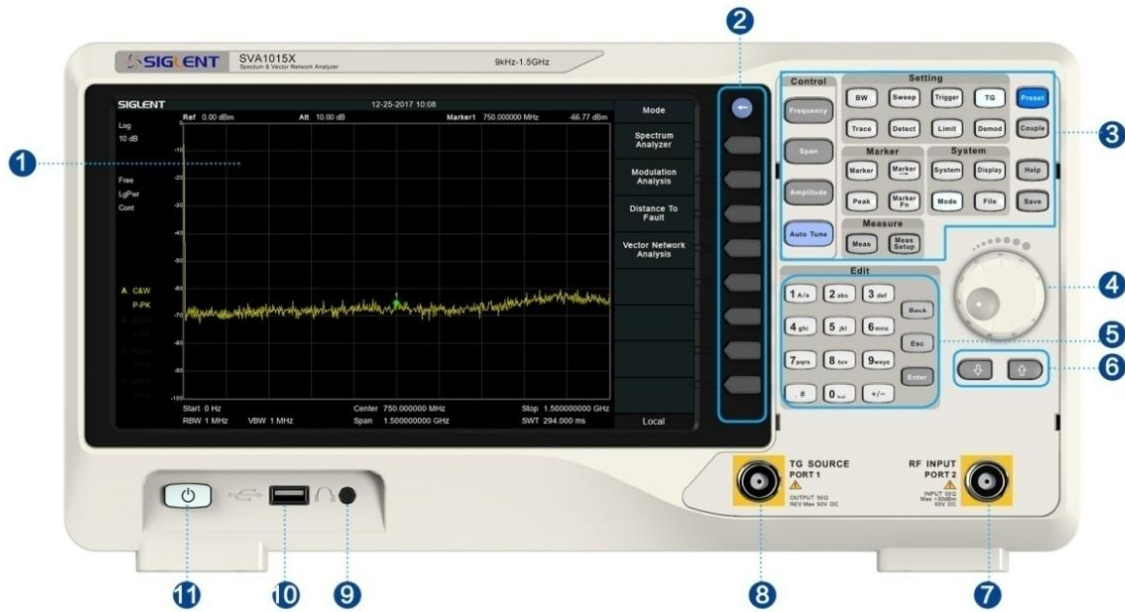


Figure 6 Front Panel

Table 1 Front Panel Description

NO.	Description	NO.	Description
1	User Graphical Interface, touch support	7	RF Input, VNA port 2
2	Menu Control Keys	8	TG Output, VNA port 1
3	Function Keys	9	3.5 mm Earphone interface
4	Knob	10	USB Host
5	Numeric / Letter Keyboard	11	Power Switch
6	Arrow Keys		

## Front Panel Function Keys

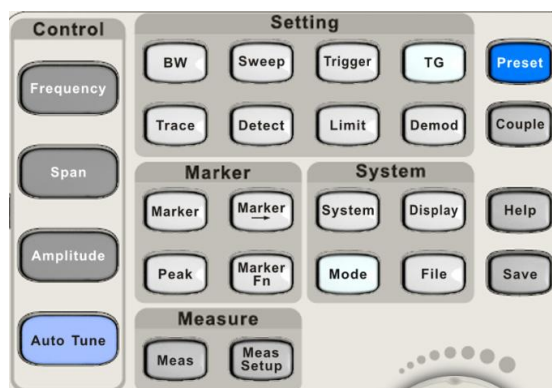


Figure 7 Function Keys area

Table 2 Function keys description (For Spectrum Analyzer Mode)

Control Keys	Description
<b>Frequency</b>	Set the parameters of frequency, and Peak→CF, CF→Step.
<b>Span</b>	Set the parameters of span, and X-scale (Log-Linear) setup.
<b>Amplitude</b>	Set the parameters of amplitude, including Ref Level, Attenuator, Preamp, etc.; and Correction setup.
<b>Auto Tune</b>	Scan the full span rapidly and move the biggest signal to center freq, and automatically sets the optimal parameters according to the signal.
Setting Keys	Description
<b>BW</b>	Set the parameters of RBW and VBW, Average Type (Log power, Power, Voltage), and Filter Type (-3 dB Gauss\ -6 dB EMI).
<b>Trace</b>	Select Trace, Trace setup and Trace math.
<b>Sweep</b>	Set the parameters of sweep, and EMI QPD Dwell Time.
<b>Detect</b>	Select the detector type for each trace independently.
<b>Trigger</b>	Select triggers in Free Trigger, Video Trigger and External Trigger.
<b>Limit</b>	Set the Pass\Fail Limit.
<b>TG</b>	Set the parameters of tracking generator. Including TG Level, TG Level offset Normalization setup. The backlight LED is on when TG source is working.
<b>Demod</b>	Set the demodulation parameters of the AM and FM for audio listening.
Marker Keys	Description
<b>Marker</b>	Set the Markers and Marker Table.
<b>Marker-&gt;</b>	Set other system parameters on the basis of the current marker value.
<b>Marker Fn</b>	Special functions of the marker such as noise marker, N dB bandwidth measurement and frequency counter.
<b>Peak</b>	Search for the peak signal, peak search configuration and peak table.
Meas Keys	Description
<b>Meas</b>	In spectrum analyzer mode, selects the Advanced Measurement function. In non-spectrum analyzer mode, select corresponding settings.
<b>Meas Setup</b>	Set the measurement parameters.
System Keys	Description
<b>System</b>	Set the system parameters.
<b>Mode</b>	Select the working mode between spectrum analyzer and other modes.
<b>Display</b>	Set the display parameters.
<b>File</b>	Use the file system and files.
Shortcut Keys	Description
<b>Preset</b>	Sets the system to certain status.
<b>Couple</b>	Set the parameters of some functions between auto and manual.
<b>Help</b>	Turn on the built-in help.
<b>Save</b>	Save Shortcut Key.



## Front Panel Key Backlight

The on/off state and the color of the backlights of some keys at the front panel indicate the working state of the analyzer. The states are as listed below.

### 1. Power Switch

- ◆ Flash on and off alternatively, in a “breathing” state: indicate the unit is in stand-by.
- ◆ Constant on: indicates the instrument is in normal operating state.

### 2. Mode

When the function is **Spectrum Analyzer**, the backlight turns off. When in another mode, the backlight turns on.

### 3. TG

When the **TG** source is on, the backlight of **TG** turns on. When the TG is output is disabled the backlight is off.

## Using the Numeric Keyboard

The analyzer provides a numeric keyboard at the front panel. The numeric keyboard supports English uppercase/lowercase characters, numbers and common symbols (including decimal point, #, space and +/-) and are mainly used to edit file or folder names and set parameters.



Figure 8 Numeric Keyboards

### 1.

In the number input mode, this key sets the sign of number. In file input mode, this toggles the character type between numbers and letters.

### 2.

In the number input mode, this key enters the number “1”. In file input mode, this toggles the between upper and lowercase letters.

### 3.

In number input mode, this key enters a decimal point. In English input mode, this key enters special characters (!, -, (, etc..).

4. **Back**

In parameter editing, press this key to delete the character to the left of the cursor.

5. **Esc**

- ◆ During the parameter editing process, press this key to clear the inputs in the active function area. Press again to exit parameter input mode.
- ◆ When the instrument is in remote mode (being controlled by a computer), use this key to return to local mode. This will unlock the front panel.

6. **Enter**

In parameter editing, the system will complete the input and insert a default unit for the parameter.

## Front Panel Connectors

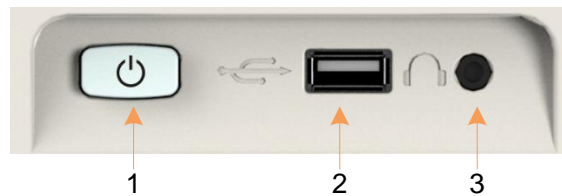


Figure 9 Front Panel Connectors (1)

### 1. Power Switch

Power on / Power down the instrument

### 2. USB Host

- ◆ The analyzer can serve as a “host” device to connect external USB devices. This interface is available for USB storage devices, the SIGLENT GPIB-USB adapter, wireless or wired mouse and keyboard, and the SIGLENT Ecal electronic calibration module for the SVA series.
- ◆ Read and write functions for an external USB storage device or store the contents currently displayed on the screen in the USB storage device in .png or .jpg or .bmp format.

### 3. Earphone Jack

The analyzer can demodulate AM and FM signals. Insert a 3.5 mm earphone into to the jack to acquire the audio output of the demodulated signal. You can turn on or off the earphone output and adjust the volume via **Demod** -> **Volume**.



#### CAUTION

Protect your hearing. Please turn the volume down to zero before using the earphone. Gradually turn the volume up to a comfortable level after putting in the earphone.

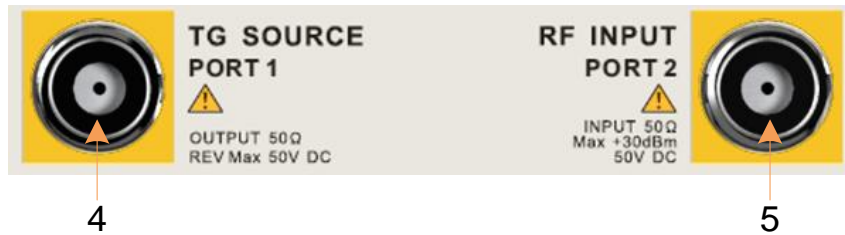


Figure 10 Front Panel Connectors (2)

#### 4. TG SOURCE, VNA PORT 1

- ◆ The **TG SOURCE** can be connected to a device-under-test (DUT) through a cable with a male N-type male connector.
- ◆ In the VNA mode, this port is used as the single port of S11 and the output port of S21.



#### CAUTION

To avoid damage to the tracking generator, the reverse DC voltage cannot exceed 50 V

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#### 5. RF INPUT, VNA PORT 2

- ◆ The **RF INPUT** can be connected to the DUT through a cable with a male N-type connector
- ◆ In the VNA mode, this port is used as the input port for S21 measurements.



#### CAUTION

To avoid damage to the instrument, the RF input signal must meet the following: The DC voltage component and the maximum continuous power of the AC (RF) signal component cannot exceed 50 V and +30 dBm respectively.

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## Rear Panel



Figure 11 Rear Panel

### 1. Handle

Pull up the handle vertically for easy carrying of the instrument. When you do not need the handle, press it down.

### 2. USB Device Interface

The analyzer can serve as a “slave” device to connect external USB devices. Through this interface, a PC can be connected to control the analyzer.

### 3. LAN Interface

Through this interface, the analyzer can be connected to your local-area-network (LAN) for remote control.

### 4. REF IN 10 MHz

The analyzer can use the internal or an external reference source.

- ◆ When a 10 MHz external clock signal is received through the **[10 MHz IN]** connector, this signal is used as the external reference source and “**Ext Ref**” is displayed in the status bar of the user interface. When the external reference is lost or not connected, the instrument switches to its internal reference source automatically and “**Ext Ref**” on the screen disappears.
- ◆ The **[10 MHz IN]** and **[10 MHz OUT]** connectors are usually used to build synchronization among multiple instruments.

## 5. REF OUT 10 MHz

The analyzer can use the internal or an external reference source.

- ◆ When an internal reference source is used, the **[10 MHz OUT]** connector can output a 10 MHz clock signal generated by the analyzer. This signal can be used to synchronize other instruments.
- ◆ The **[10 MHz OUT]** and **[10 MHz IN]** connectors are usually used to build synchronization among multiple instruments.

## 6. Trigger in

In external trigger mode, the analyzer will update the trace scan after the Trigger In connector receives an external trigger signal that meets the trigger input specifications.

## 7. Security Lock Hole

If needed, you can use a security lock(purchased separately) to lock the analyzer to a desired location.

## 8. AC Power Supply

The analyzer accepts 100-240V, 50/60Hz or 100-120V 400Hz AC power supply. Please use the power cord provided as accessories to connect the instrument.

## 9. Fuse

Before power on, make sure the analyzer is protected by the proper input fuse.

## User Interface

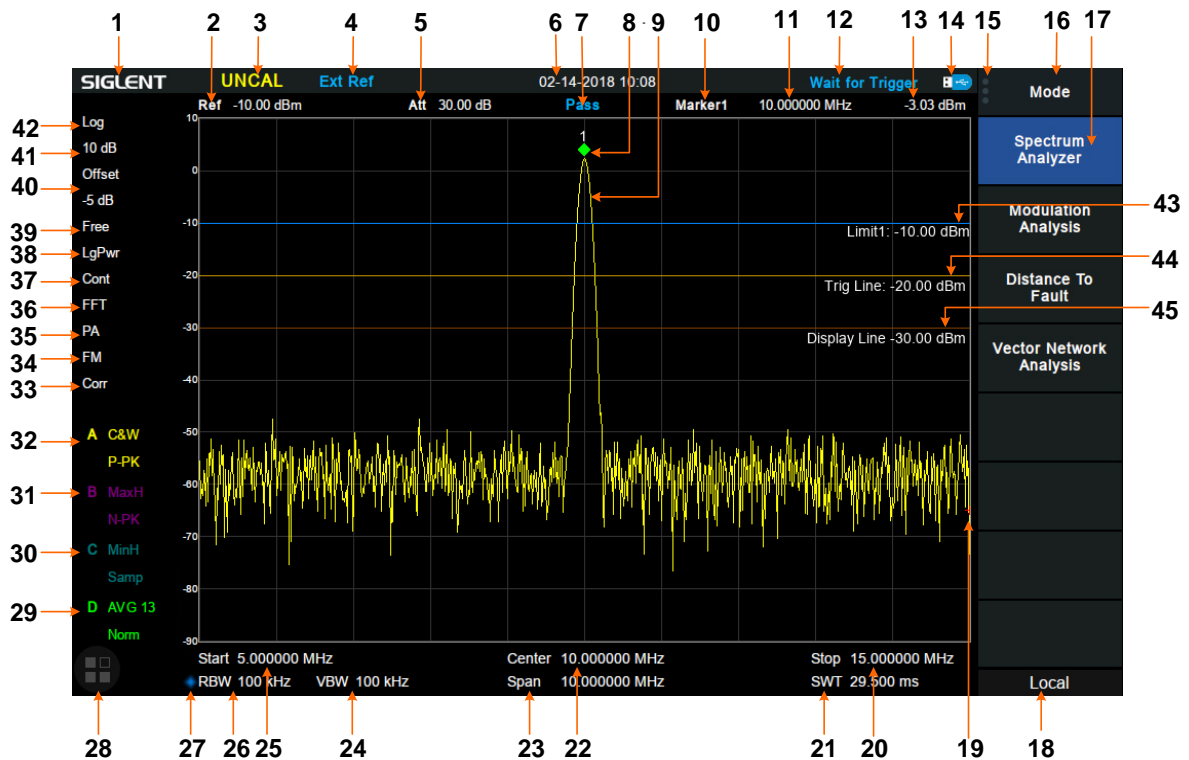


Figure 12 User Interface

Table 3 User Interface labels

NO.	Name	Description
1	SIGLENT	SIGLENT logo
2	Ref	Reference level
3	UNCAL	When the sweep time is less than the auto couple time, the measure result may have decreased accuracy, The display will indicate uncalibrated using the letters "UNCAL"
4	EXT REF	Valid Ext 10 MHz reference clock detected indicator
5	Att	Attenuator Value
6	Day and time	System time
7	Pass/Fail status	Limit Pass/Fail status
8	Marker	Current active marker
9	Trace	Active trace
10	Marker instruction	current marker, touch to open a new marker
11	Marker x value	Unit: frequency, frequency delta or time
12	State indication	Auto Tune: Automatically sets the optimal parameters according to the characteristics of the signal Waiting for Trigger: waiting for trigger
13	Marker y value	Amplitude value or amplitude delta value

14	USB identification	Displayed when a USB flash drive is inserted	
15	Menu touch logo	Clicking this button will bring up or to the main menu	
16	Menu title	Function of the current menu.	
17	Menu items	Menu items of the current function	
18	Operation status	Local is local mode, Remote is remote mode, Upgrade means the instrument is upgrading	
19	Sweep progress	Indicates the currently scanned frequency position	
20	Stop frequency	Stop frequency value	
21	Sweep time	Time duration of a single sweep	
22	Center frequency	Center frequency value	
23	Span	Span value	
24	VBW	Video bandwidth	
25	Start frequency	The first frequency of a sweep	
26	RBW	Resolution bandwidth	
27	Manually instructions	When it appears, this parameter is not automatically coupled but manually configured	
28	Touch assistant	Click to open the commonly used functions for measurement, such as peak search.	
29	Trace A\B\C\D status	Trace type:	Detect type:
30		C&W: Clear Write	P-PK: Positive peak
31		MaxH: Max Hold	N-PK: Positive peak
32		MinH: Min Hold	Samp: Sample
		View: View	Norm: Normal
		AVG: Video average and times.	AVG: average
			Q-PK: Quasi-peak
33	Correction	When present, indicates that there is a user-configured amplitude correction table being mathematically applied to the displayed trace data	
34	AM or FM	AM or FM demodulation activated	
35	PA	Enable or disable the Preamplifier	
36	FFT	Sweep mode is FFT	
37	Single or Continue	Sweep mode single or continuous	
38	Average type	Log power\Power\Voltage power	
39	Trigger type	Free\Video\External trigger	
40	Ref offset	34: Ref offset identification; 35: Ref offset value	
41	Scale/Div	Scale value	
42	Scale type	Logarithm or linearity	
43	Limit line	Limit Pass/Fail level	
44	Trigger level	Video trigger level	
45	Display line	Reference display line	

## Firmware Operation

### Check System Information

Users can get the system information by press **System**->“**System Info**”, including

- ◆ Product Model, Serial and Host ID
- ◆ Software Version and hardware Version
- ◆ Option Information

### Load Option

Refer to the procedures below to activate the options you have purchased.

1. Press **System**->“**System Info**”->“**Load Option**”
2. Enter the license key in the onscreen window. Press **Enter** to confirm your input and terminate the license key input. Or
3. Load the .lic file provided by pressing **File** ->“**Load**” from internal memory or USB stick.

The option will be enabled after rebooting.

### Firmware Upgrade

Follow this procedure to update the instrument firmware:

1. Download the firmware package from an official SIGLENT website. [www.siglentamerica.com](http://www.siglentamerica.com), <http://www.siglent.com/ens>, <https://www.siglenteu.com>
2. Extract and copy the .ADS file into the root directory of an USB stick.
3. Plug the USB stick into the USB Host connector. Press **System**->“**System Info**”-> “**Firmware Update**”; find the .ADS file in USB stick.
4. Press the ‘**Load**’, the analyzer will perform the update process automatically.

The upgrade procedure will take several minutes. Once the upgrade is completed, please follow the instruction to reboot.

Any interruption during the update process will result in update failure and system data loss.

This is **not covered under the warranty** and the user will bear repair costs and shipping.

Do not remove the USB storage device until the update is finished.

### Touch Operation

The analyzer has a 10.1 inch multi-touch screen and supports various gesture operations. Including:

- ◆ Press or click on the upper-right-corner of the screen to enter the main menu
- ◆ Swipe up and down or left and right in the waveform area to change the X-axis center coordinate or Y-axis reference level



- ◆ Perform two-points scaling in the waveform area to change the X-axis span
- ◆ Click on a screen parameter or menu for parameter selection or editing;
- ◆ Open and drag the marker;
- ◆ Use auxiliary shortcuts to perform common operations.

You can turn the touch screen function on and off via **Display**->'Touch Settings'.

## Remote Control

The analyzer supports communication with computers via USB, LAN, and GPIB-USB interfaces. By using these interfaces, in combination with programming languages and/or NI-VISA software, users can remotely control the analyzer based on a SCPI (Standard Commands for Programmable Instruments) compliant command set, Labview and IVI (Interchangeable Virtual Instrument), to interoperate with other programmable instruments.

You can also remote monitor and control the analyzer in Web Browser or EasySpectrum.

For more details, refer to the 'Programming Guide' or contact your nearest SIGLENT office.

## Using Built-in Help

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

- ◆ Press **Help** and the embedded help would show up.
- ◆ Click on the items in the contents tree on the left to navigate to any topics interested.
- ◆ Click the green back or forward arrow to go back or forward to the contents just read.
- ◆ Click the close sign button in the top right corner or press the Esc front-panel key to quit the help system.

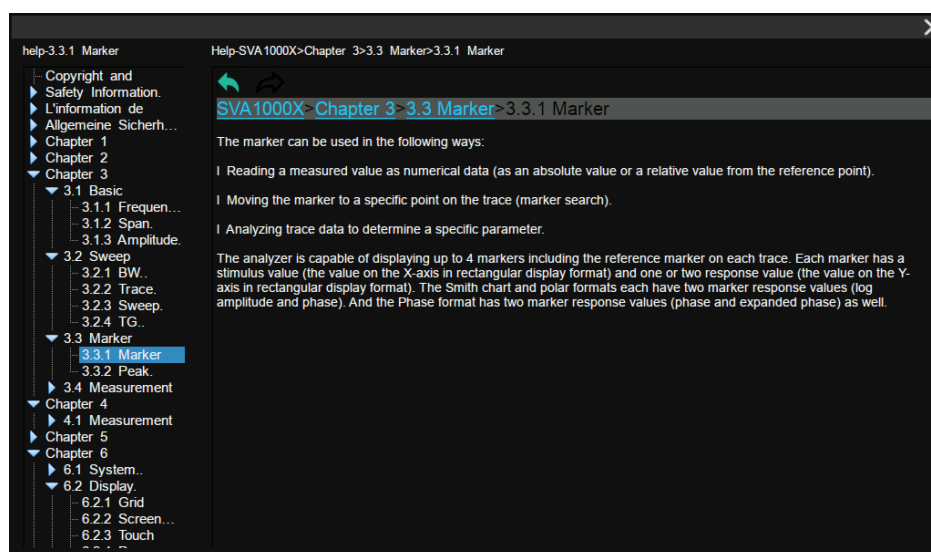


Figure 错误！ 文档中没有指定样式的文字。 -13 help information

## Using the Security Lock

If needed, you can use the security lock (please buy it yourself) to lock the Spectrum Analyzer to a fixed location. The method is as follows, align the lock with the lock hole and plug it into the lock hole vertically, turn the key clockwise to lock the Spectrum Analyzer and then pull the key out.

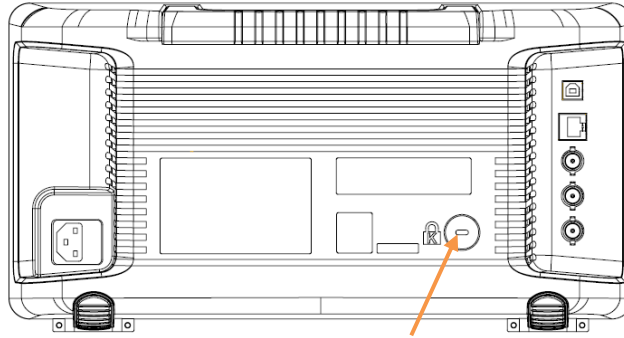


Figure 错误! 文档中没有指定样式的文字。 -14 Security Lock

## Mode

The analyzer offers a variety of operating modes that can be purchased separately. They can be selected via the **Mode** key:

- ◆ Spectrum Analyzer
- ◆ Vector Network Analyzer
- ◆ Distance-To-Fault
- ◆ Modulation Analyzer

Front panel key menus may be different in different modes. Different modes have their own Preset function.

# Service and Support

## Service Summary

**SIGLENT** warrants that the products that it manufactures and sells will be free from defects in materials and workmanship for a period of three years (accessories for a period of one year) from the date of shipment from an authorized Siglent distributor. If the product proves defective within the respective period, **SIGLENT** will provide repair or replacement as described in the complete warranty statement.

To arrange for service or obtain a copy of the complete warranty statement, please contact your nearest Siglent sales and service office. Except as provided in this summary or the applicable warranty statement, **SIGLENT** makes no warranty of any kind, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. In no event shall **SIGLENT** be liable for indirect, special or consequential damages.

## Troubleshooting

Before calling **SIGLENT**, or returning an analyzer for service, perform the quick checks listed below. This check may eliminate the problem.

If the problem remains still, please contact **SIGLENT** and provide your device information in the back of the analyzer.

### 1. The Power Switch is still dark after power on:

- (1) Check that the power is correct / working.
- (2) Check the power cord has been connected correctly
- (3) Check the power fuse. If a new fuse needs to be installed, please use a specified fuse.

### 2. The analyzer's screen is still dark (no display) after power on:

- (1) Check whether the fan is running while the screen is dark, maybe the LCD cable is loose?
- (2) Check whether the fan is not running while screen is dark, maybe it has failed to start up?

Do not disassemble the instrument by yourself and contact **SIGLENT**.

### 3. The key is unresponsive or gives a wrong response:

- (1) Press all the keys at the front panel to check if all of them are normal after power on.
- (2) Press **System** ->**Self Test** ->**Key Test** to check if all the keys are working properly.
- (3) If a key is not working, the numeric keyboard connection might be loose or the numeric keyboard is

broken.

Do not disassemble the instrument by yourself and contact **SIGLENT**.

#### 4. The spectrum lines on the screen do not update for a long period of time:

- (1) Check whether the screen is locked; if so, press **Esc** to unlock it.
- (2) Verify whether all the trigger conditions have been met and whether there is a valid trigger signal inputting.
- (3) Check whether the analyzer is in single sweep.
- (4) Check whether the current sweep time is too long.

#### 5. Wrong measurement results or poor precision:

To calculate the system errors and check the measurement results and precision, refer to the introductions in “**Specifications**”. To reach these specifications, please:

- (1) Check whether all the external devices are successfully connected and are working normally.
- (2) Get some knowledge of the signal under measurement and set appropriate instrument parameters.
- (3) Make measurements under proper conditions; for example, warm-up the instrument appropriately and operate the instrument under the specified environment temperature.
- (4) Calibrate the instrument regularly to reduce or avoid errors that might occur over time.

If you need a specific calibration after the stated calibration period, contact **SIGLENT** or get paid service from authorized measurement agencies.

#### 6. System Message:

The instrument may display prompt messages, error messages or state messages according to the current working status. These messages are displayed to help you to use the instrument correctly and are not instrument failures.

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