

Quick Start

SHS1000 Series Handheld Digital Oscilloscope

QS03010-E02C

2015 SIGLENT TECHNOLOGIES CO., LTD

Guaranty and Declaration

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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.

General Safety Summary

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

Only qualified technician should perform service procedures

Use Proper Power Line

Use only the special power line of the instrument that approved by local state.

Ground the Instrument

The instrument grounds through the protective terra conductor of the power line. To avoid electric shock, the ground conductor must be connected to the earth. Make sure the instrument is grounded correctly before connect its input or output terminals.

Connect the Signal Wire correctly

The potential of the signal wire is equal to the earth, so do not connect the signal wire to a high voltage. Do not touch the exposed contacts or components.

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.

Not Operate with Suspected Failures

If you suspect that there is a damage of the instrument, please let a qualified service personnel check it.

Avoid Circuit or Components Exposed

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

Do not Operate in Wet/Damp Conditions

Do not Operate in an Explosive Atmosphere

Keep the Surface of the Instrument Clean and Dry

Safety Terms and Symbols

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 Ground	Warning	Earth Ground	Power Switch

General Care and Cleaning

Care:

Do not store or leave the instrument in direct sunshine for long periods of time.

Notice:

- To avoid damages to the instrument or probe, please do not leave them in fog, liquid, or solvent.

Cleaning:

Please perform the following steps to clean the instrument and probe regularly according to its operating conditions.

1. Disconnect the instrument from all power sources, and then clean it with a soft wet cloth.
2. Clean the loose dust on the outside of the instrument and probe with a soft cloth. When cleaning the LCD, take care to avoid scarifying it.

Notice:

- To avoid damages to the surface of the instrument and probe, please do not use any corrosive liquid or chemical cleanser.
- Make sure that the instrument is completely dry before restarting it to avoid short circuits or personal injuries.

Installation of Battery

The instrument is not installed with battery. To complete the installation, please operate as the following steps:

1. Remove the two screws on the battery cover using a screwdriver. As shown in figure 1.
2. Pull out the supporting leg and remove the battery cover. As shown in figure 2.
3. Put battery into the battery box and cover it tightly. As shown in figure3.
4. Tighten the screws using a screwdriver and turn on the instrument to check if it's successfully installed.

Notices:

- Connect the battery cable lightly due to its anti-reverse design.
- If the instrument fails to startup after successful installation of the battery, it is likely due to exhausting of the battery power, please charge the battery timely.
- In the case of not working, battery must be charged once every three months.

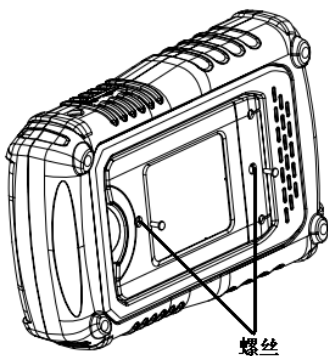


Figure 1

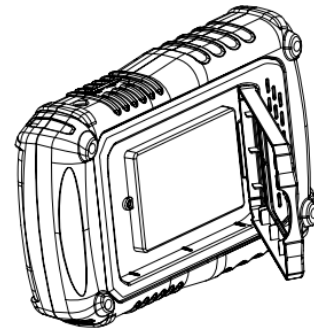


Figure 2

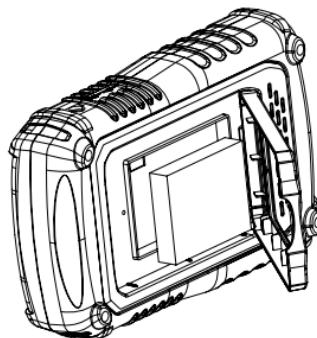


Figure 3

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Quick Start

General Inspection

1. 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** would not provide free maintenance or replacement.

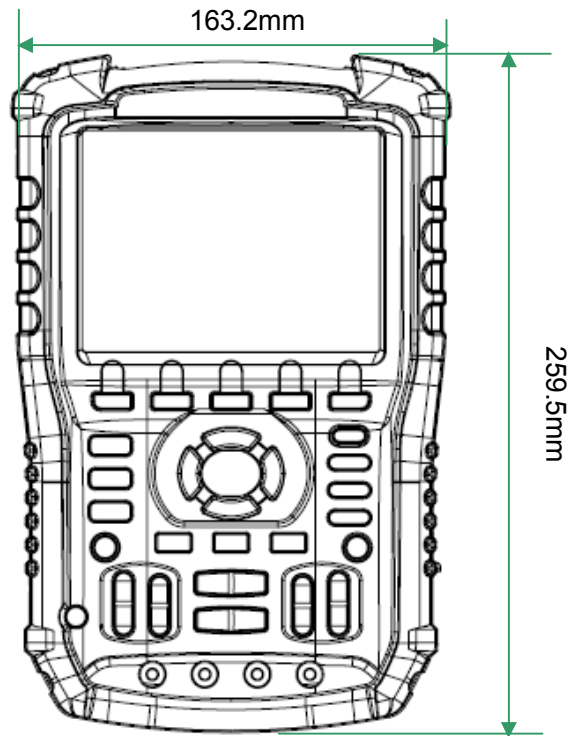
2. Inspect the instrument.

If there are instruments found damaged, defective or failure in electrical and mechanical tests, please contact **SIGLENT**.

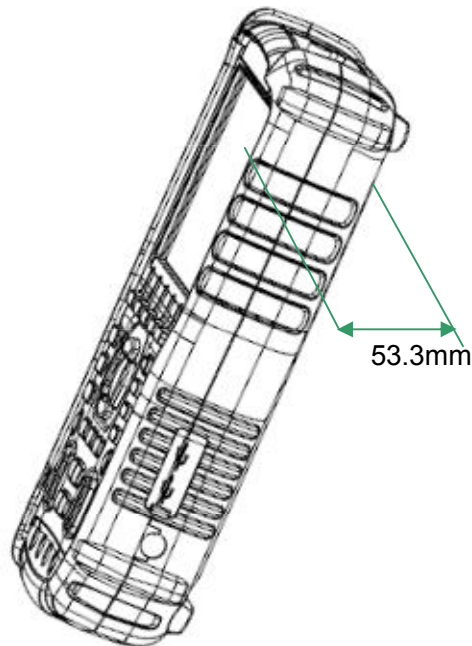
3. Check the accessories.

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

Appearance and Size



Front view



Side view

Preparation for Use

Adjusting the Supporting Leg

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



Adjust the supporting leg

Measurement Connection

Accessories of SHS1000 Handheld Digital Oscilloscope consist of a power supply adapter, a probe adapter plug, a USB cable, two multimeter probes and two oscilloscope probes. The acceptable AC power supply is: 100~240V, 45~440Hz.



1. Oscilloscope Probe

Connect the BNC end of the probe to the instrument BNC connector firstly, then connect the grounding alligator clip and probe of another end to the grounding end and signal compensation terminal of the probe adapter plug, which is connected to the BNC port of the instrument, for square waveform checking.

2. Power Adapter

Connect one end of the power adapter to power socket of the instrument and another end to AC power for charging.

3. Multimeter Pens

Before connecting the multimeter pens, please select a measurement parameter firstly, and then plug respectively the red and black pen to corresponding connector according to the graphic cues displayed on the screen.

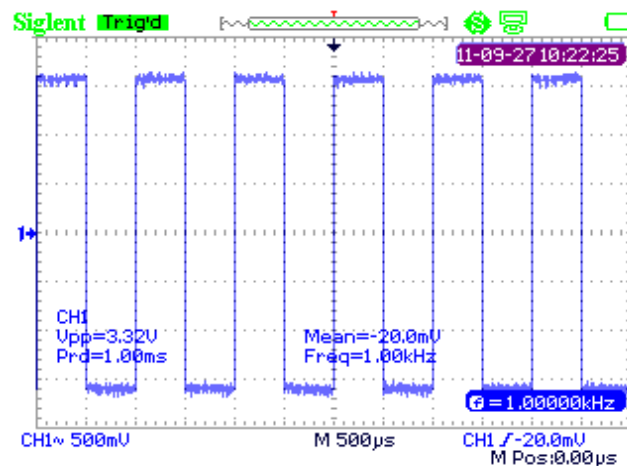
Power-on Inspection

When the handheld oscilloscope is energized, press the power button on the front panel to boot up the scope. During the start-up progress, the instrument performs a series of self-test items and you could hear the sound of relay switching. After the self-test completed, the welcome interface displays immediately.

Function Inspection

To check if the oscilloscope function system of the instrument works normally, please perform the following function inspection steps:

1. Press the Power button to turn on the instrument and it switches to scope function automatically after the power-on self test.
2. Connect the probe adapter plug to the USB port of the instrument.
3. Connect the BNC end of the probe to the BNC connector the instrument.
4. Connect the alligator clip and probe of another end respectively to the grounding end and compensation signal output terminal of the adapter plug.
5. Press AUTO to display square waveforms with 1KHz frequency and about 3V peak value in normal conditions as shown below:

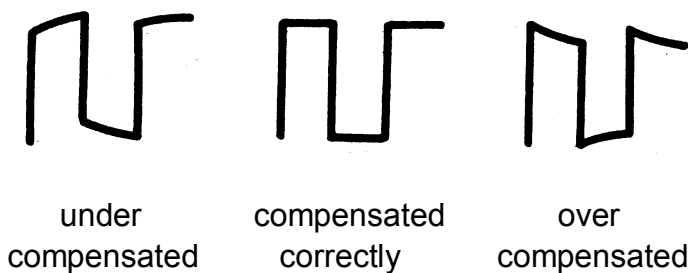


6. Test channel 2 in the same method. If waveforms displayed do not like waveforms above, please perform the “Probe Compensation”.

Probe Compensation

It is necessary to properly compensate the probe at first use of it. Non-compensated or inadequate compensated probe may cause inaccurate measurement. The following steps are about probe compensation:

1. Perform step 1, 2, 3 and 4 of “Function Inspection”.
2. Check the displayed waveforms and compare them with figure below.



3. Use a nonmetallic driver to adjust the low-frequency compensation adjustment hole on the probe until the waveforms change to be correct as the figure “compensated correctly”.

Front Panel Introduction



Number	Instruction	Number	Instruction
1	LCD	11	Horizontal position/ Base scale control
2	Menu control keys	12	Trigger menu
3	Menu display key	13	Power key
4	Auto set	14	Channel 1 system
5	Trigger level zero key	15	User system
6	Run/Stop control	16	Recorder system
7	Cursor measurement	17	Multimeter system
8	Save/Recall system	18	Horizontal position zero key
9	Vertical position/ Voltage scale control	19	Oscilloscope system
10	Multimeter inputs	20	Trigger level position

Side Panel Introduction



1. USB Device

This instrument can be connected to a printer for a print map of the current screen, or a PC for remote control via this port.

2. USB Host

Files including setup file, waveform file, BMP file and CSV file can be saved to removable storage device via this port.

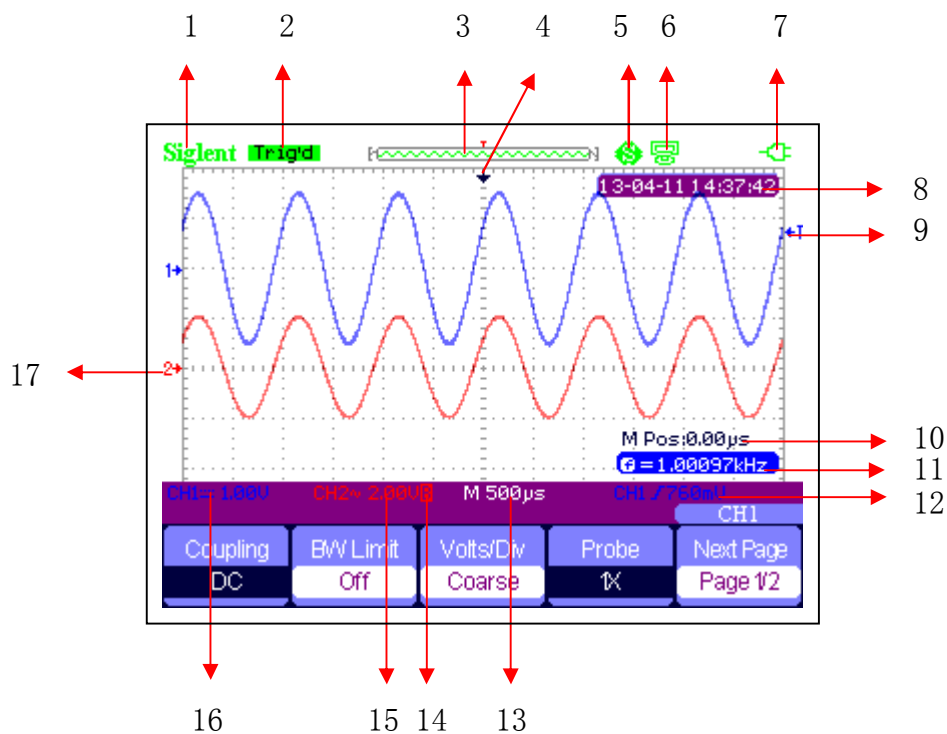
3. Power Supply Socket

The instrument can be connected to AC power supply via this port. The acceptable AC power supply is: 100 ~240V, 50/60HZ.

Oscilloscope Function Summary

The default system of the instrument is oscilloscope function system on startup, or you could press **Scope** to switch to oscilloscope function system. The User interface of the oscilloscope function system is shown below.

User Interface



1. Logo

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2. Working State

Available working states of the instrument are: Ready, Auto, Trig'd, Scan and Stop.

3. Waveform Memory

Display position of the current waveforms in the oscilloscope memory.

Waveforms displayed on the screen



4. Trigger Position

Display trigger position of waveforms both in the memory and on the screen.

5. Print

Display the current option of “Print Key” under the “Print Setup” menu.

P: “Print Key” option set to “Print Picture”;

S: “Print Key” option set to “Save Picture”.

6. USB Device

Display the current option of “USB Device”.

 “USB Device” option set to “Computer”;

 “USB Device” option set to “Printer”.

7. State of Charge

Display the state of charge of the handheld oscilloscope.

Mark  indicates the battery is full;

Mark  indicates the battery is charging.

The mark switching constantly between the two icons indicates the instrument has not been installed battery.

8. Time

Display correct time of the current operation.

9. Trigger Level

Display the vertical position of the trigger level.

10. Trigger Position

Display the horizontal trigger position of current waveforms. Use horizontal displacement control key to modify the parameter. Press right/left arrow key to make the arrowhead move right/left and the trigger displacement decreases/increases. By pressing the horizontal displacement zero key, you can quickly reset the parameter to zero as well as make the arrowhead return to center of the screen.

11. Frequency

Display frequency of the current waveforms. Set the **Counter** to “On” under the “User” menu to make the frequency displayed, or nothing will display.

12. Trigger Setting

- **Trigger Level.** Display vertical position of the current trigger level, for example: **CH1 /760mV**.
- **Trigger Type.** Display the current trigger type and trigger condition. Different trigger type has different mark, for example: **7** means triggered on Slope side in edge trigger.

13. Horizontal Time Base

Represent time of each grid on the horizontal axis of the screen. Use the time base control key to modify the parameter, which is adjustable from 1nS to 50S.

14. BW limit

If the current “BW Limit” is “On”, then the mark **B** displayed at

the lower left corner of the screen, or nothing displayed. When the vertical scale changes to 2mV/div, the “BW Limit” is automatically turned on.

15. Voltage Scale

Represent the voltage value of each grid on the vertical axis of the screen. Use the voltage scale control key to modify the parameter, which is adjustable from 2mV to 5V.

16. Coupling Mode

Display coupling mode of the current waveforms. Available coupling modes are DC, AC and GND, each of them has unique mark displayed on the screen.

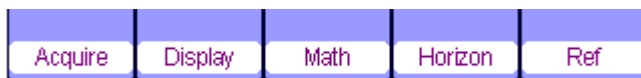
17. Current Channel

Display the current channel waveforms. Two channels can display at the same time.

Function Introduction

Function Menu

Scope Press the key to enter oscilloscope function system, as shown below:



Acquire Press the corresponding menu key to enter Acquire system, under which there are three selectable waveform acquisition modes: Sampling, Peak Detect and Average.

Display Press the corresponding menu key to enter Display system, under which functions like display type, persist time, wave intensity and brightness are easy to set.

Math Press the corresponding menu key to enter Math system, under which “+”, “-”, “×”, “÷” operations are available.

Horizon Press the corresponding menu key to enter Horizon system, under which the delayed scan can be turned on or off.

Reference Press the corresponding menu key to enter waveform reference system, under which the current waveforms can be compared with waveforms saved previously to help determine circuit failure.

Trigger setting

Trigger Press the button to enter trigger system, under which five types of trigger including edge, pulse, video, slope and alternative are available, and each of them can be set in auto, normal or single mode.

System setting

User Press the button to enter user system, under which the system status and auxiliary functionalities like buzzer, language and print setup are accessible to view or set. In addition, some advanced functions like self calibration, updating firmware and waveform recording are also supported.

Storage setting

Save Recall Press the button to enter Save/Recall system, under which four types of file including setups, waveforms, picture and CSV are accessible to save or recall, as well as recalling of the factory settings.

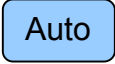
Cursor measurement

Cursor Press the button to enter cursor measurement system, under which three measurement types including voltage, time and delay are selectable, and each parameter can be measured in manual, track or auto mode.


Run setting

Run/Stop Press the button to set the state of the instrument to “Run” or “Stop”. In “Stop” state, the logo at the upper left corner of the screen turns red.

Auto setting

 Press the button to enable the waveform auto setting function. The instrument will automatically adjust its horizontal time base, vertical scale and trigger mode according to the input signal to make the waveforms displayed in a perfect state.

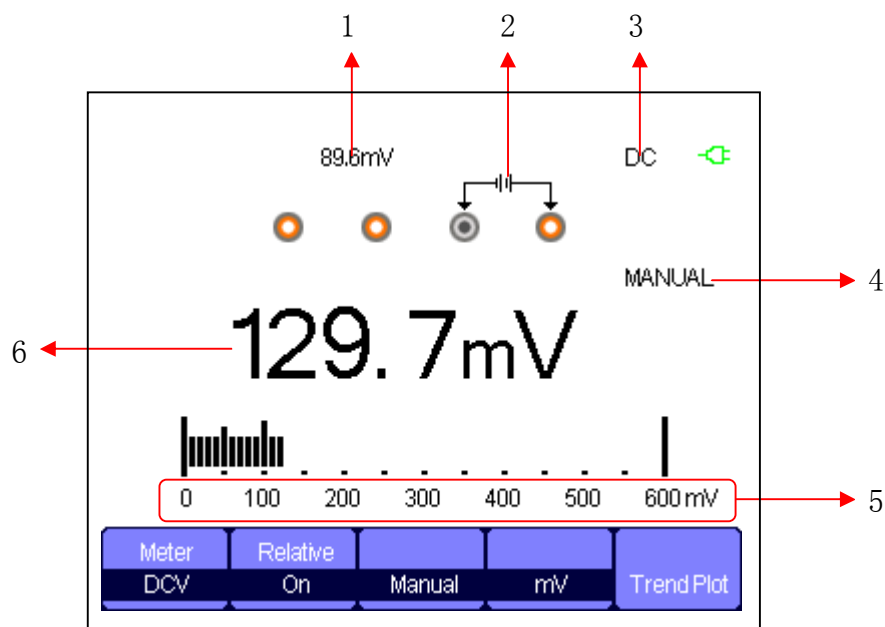
Menu setting

 Press the button to make the current menu displayed or disappeared on the screen.

Multimeter Function Summary

User Interface

Meter Press the button to enter multimeter function system, under which 8 types of parameters including DC voltage, AC voltage, resistor, diode, continuity, capacitance, DC current and AC current are selectable to measure.



Multimeter Interface

1. Relative Value

To save a relative value, please firstly touch positive probe and negative probe of the multimeter directly to create a short circuit, and then turn on the **Relative** until the displayed value gets stable. Diode and continuity are not designed with the relative function. (Notes: after saving a relative value of any parameter, it's later measured value equals to the displayed value, and will not be affected by the previously saved value)

2. Connection Diagram

Displayed on the screen based on the parameter you select to show you correct connecting method.



3. DC/AC Mark

If a DC parameter (DC voltage or DC current) is selected, the mark “DC” displayed at the upper right corner of the screen; If a AC parameter (AC voltage or AC current) is selected, the mark “AC” displayed at the upper right corner of the screen.

4. Operation Mode

The selectable operation type is Auto or Manual. Diode, continuity and capacitance are not designed with the operation mode.

5. Measurement Range

Range that suits to the current measured value. In auto mode, the instrument will automatically select appropriate range based on the measured value; In manual mode, if the current measured value exceeds the current range, an alarm sounds will remind you to change to proper range.

6. Parameter Value

The current measured value. Whether the **Relative** set to On or Off, the actual measured value equals to the displayed value, and will not be affected by relative value saved previously.

Measurement Parameters

There are 8 measurement parameters under multimeter function system. Read the following table carefully to know clearly about these parameters.

Parameter	The maximal range	Relative	Operation	Unit
DC voltage	0~1000V	On/Off	Manual/Auto	V/mV
AC voltage	0~750V	On/Off	Manual/Auto	V/mV
Resistor	0~60MΩ	On/Off	Manual/Auto	
Diode	0~2.0V			
Continuity	0~600Ω			
Capacitance	0~40nF	On/Off		
DC current	0~10A	On/Off	Manual/Auto	A/mA
AC current	0~10A	On/Off	Manual/Auto	A/mA

Recorder Function Summary

The recorder function of the instrument includes Scope Trend Plot, Scope Recorder and Meter Trend Plot. Here are description for Trend Plot and Scope Recorder:

- **Trend Plot** Curve of measured value change with time. Observing the trend plot will make you a better prediction of change trend of the current parameter.
- **Recorder** A continuous real-time recording of waveforms. All captured wave data will be saved and then played back. The maximal record length of the internal memory is 7Mpts.

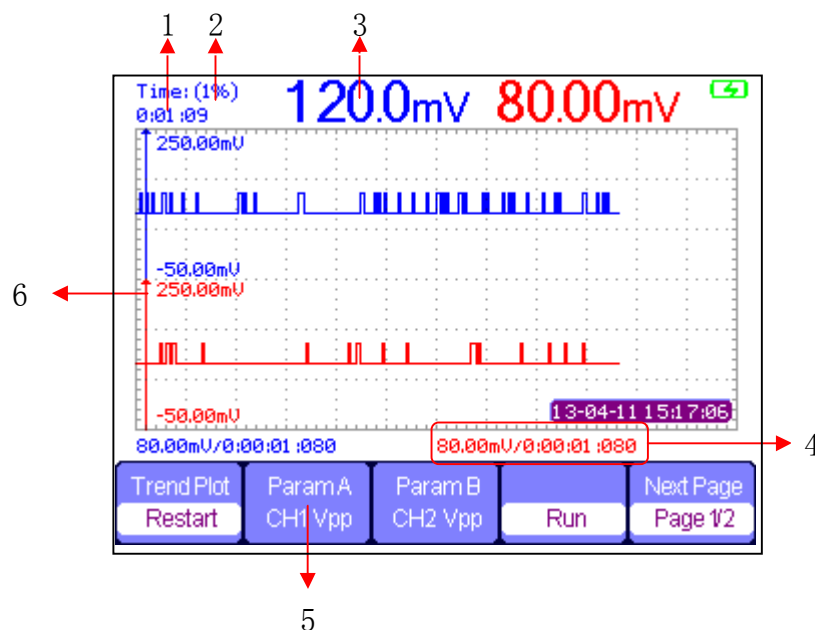
Recorder

Press the button to enter recorder function system:



Press any menu corresponding key to set the trend plot or recorder.

Scope Trend Plot



Press **Recorder** → **Scope Trend Plot** to enter the interface shown above, under which you could set the wanted parameter.

1. Record Time

The time from the beginning of drawing the scope trend plot to now.

2. Data Percentage

The percentage of the recorded data occupied the total storage data.

3. Measured Value

The current measured value of channel 1 parameter.

4. Data/Time

Reflect the relationship between the measured value and the record time, which is defined as time of the intersection of the vertical scale and the scope trend curve.

5. Measurement Parameter

Press the corresponding menu key to make the wanted parameter trend curve. Three types of parameters including voltage, time and delay are accessible to select.

6. Vertical Scale

Value of the current selected parameter displayed at the vertical scale.

Scope Recorder

Press **Recorder** → **Scope Recorder** to enter the interface shown below:

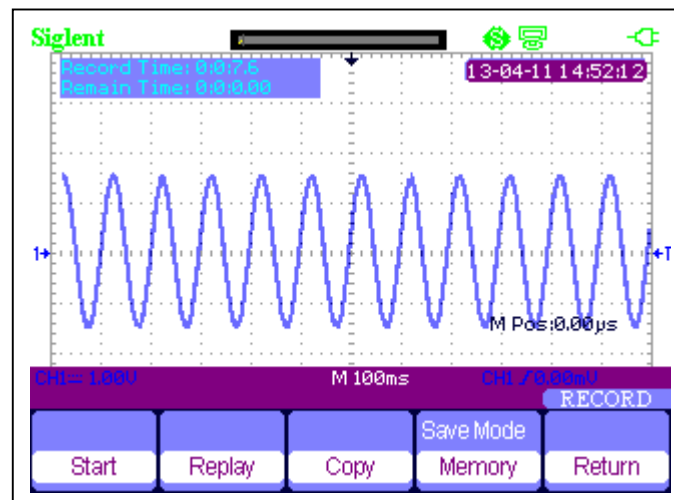


Under the menu of **Option**, you could set the Viewer, Record and Replay shown below.



Submenu	Option	Instruction
Viewer	Split	Waveforms of channel1/2 displayed on the upper/lower half screen.
	Full Screen	Waveforms displayed in full screen.
Record	Continuous	Record data continuously, the current data will be covered by later data if the storage is full.
	Single	Recording stops if the storage is full.
Replay	By point	When being replayed, the waveforms are updated by points.
	By frame	When being replayed, the waveforms are updated by a full screen of data.

Press **Record** → **Start** to enter the waveforms record interface shown below, the total recording time is 4 minutes and 11 seconds. Recorded waveforms can be saved in “Memory” or “USB Key” under the **Save Mode** menu.



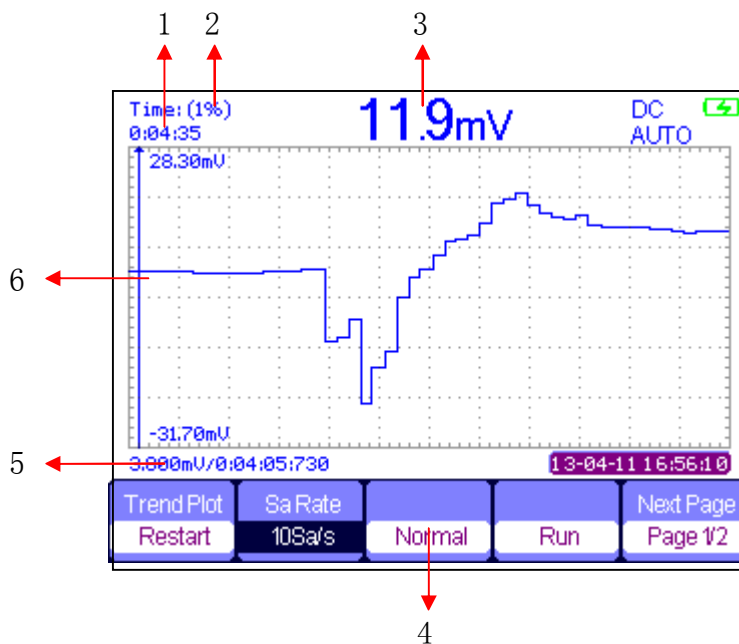
Record Time: time from the beginning of recording waveforms to now.

Remain Time: the remaining recordable time.

Notes: the recorder function is available only in scan time base (no less than 100ms).

Meter Trend Plot

Press **Recorder** → **Meter Trend Plot** to enter the meter trend plot interface for corresponding setting. Or you can also press **Meter** to enter meter function interface, and select the wanted parameter for a corresponding curve by press the **Trend Plot**.



1. Record Time

The time from the beginning of drawing the scope trend plot to now.

2. Data Percentage

The percentage of the recorded data occupied the total storage data.

3. Measured Value

The current measured value of channel 1 parameter.

4. Display Mode

The trend graph is displayed in normal mode or full screen mode.

In normal mode, the latest generated graph is always displayed on the screen. In full screen mode, all generated graph from beginning are displayed.

5. Data/Time

Reflect the relationship between the measured value and the record time, which is defined as time of the intersection of the vertical scale and the scope trend curve.

7. Vertical Scale

Value of the current selected parameter displayed at the vertical scale.

Troubleshooting

General failures and consequential solutions are listed in this chapter. When you encounter these troubles, please deal with them in the following corresponding ways. If the problem proves to be unsolvable on yourself, please contact **SIGLENT** as soon as possible.

1. The screen remains dark after power on:

- (1) Check if the power plug is correctly inserted.
- (2) Check if the power switch is faulted.
- (3) Check if the battery is electronic.
- (4) Restart the instrument after completing inspections above.
- (5) If it still does not work normally, please contact SIGLENT.

2. After the signal is sampled, there is no corresponding waveform displaying:

- (1) Check if the probe is correctly connected to the signal connecting cord.
- (2) Check if the signal connecting cord is correctly connected to BNC.
- (3) Check if the probe is correctly connected to the item under test.
- (4) Check if there are signal generated from the item under test (you can connect the probe compensation signal to the problematic channel to determine the reason to the problem)
- (5) Resample the signal.

3. The voltage amplitude measured is higher or lower than the actual value (the error usually occurs in use of the probe):

Check if the attenuation coefficient of the current channel


matches with the attenuation ratio of the probe.

4. There is waveform displaying but not stable:

- (1) Check the trigger source: check whether the “Source” in menu of “TRIG” is the actual operating channel.
- (2) Check if the waveform is wrong: it is easy for us to regard the wrong waveform as the real when a high frequency signal is connected to the instrument. You’d better make sure that the current time base is correct.
- (3) Check the trigger type: “Edge” trigger suits to general signal and “Video” trigger suits to video signal. Only in correct trigger type can the waveforms stably displayed.
- (4) Change the setting of trigger holdoff.

5. No display after pressing :

Check whether the trigger Mode is “Normal” or “Single”, and if the trigger level exceeds the waveform range. If yes, set the trigger level to the middle or change the trigger Mode to “Auto”.

Note: press  could automatically replace the above setting.

6. The waveform displays like ladder:

- (1) The horizontal time base may be too low, you can increase it to improve the horizontal resolution so as to make a good waveform displaying.
- (2) The lines between the sample points may also cause ladder-like displaying if the “Type” in menu of “DISPLAY” is “Vectors”. Please turn the “Type” to “Dots” to solve the problem.

7. Measured multimeter parameter proves to be inaccurate:

- (1) Check if the current measurement range is appropriate for the measured value;
- (2) Check if the instrument exceeds its calibration period, and contact SIGLENT for new calibration if necessary. Data measured beyond the calibration period are inaccurate.
- (3) If the instrument can not work normally either, please contact SIGLENT.

Teléfonos / Phone number

Mex: +52 (33)-3854-5975
+52 (33)-3823-4349
USA: +1 (619) 619-7350

Página Web / Website

tienda.logicbus.com.mx
logicbus.com


Correo electrónico / E-mail

ventas@logicbus.com
sales@logicbus.com



Dirección / Address



Av. Fray Antonio Alcalde 1822
Miraflores, 44270
Guadalajara, Jal 

8280 Clairemont Mesa Blvd
Suite 122
San Diego, CA 92111 