

SDS6000L Series

Low Profile Digital Storage Oscilloscope



Quick Start

EN01B



SIGLENT TECHNOLOGIES CO.,LTD

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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 the Proper Power Cord

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

Ground the Instrument

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

Connect the Signal Cable Correctly

The potential of the signal cable ground is equal to the earth ground. Do not connect the signal wire to a high voltage.

Look Over All Terminal Ratings

To avoid fire or electric shock, please look over all ratings and sign instructions 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 the danger of electrical shock.

Electrostatic Prevention

Operate in an electrostatic-protected area environment to avoid damages induced by static discharge. Always ground both the internal and external conductors of

the cable to release a static charge before connecting.

Maintain Adequate Ventilation

Inadequate ventilation may cause an increase in temperature, which may eventually damage the instrument. Maintain suitable ventilation and inspect the fan and intake regularly.

Avoid Exposed Circuits and Components

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

Use Only the Specified Fuse

Do Not Operate Without Covers

Do not operate the instrument with covers or panels removed.

Safety Terms and Symbols

Terms used in this product. These terms may appear in the product:

- DANGER** Indicates direct injury or hazards that may happen.
- WARNING** Indicates potential injury or hazards that may happen.
- CAUTION** Indicates potential damage to the instrument or other property that may happen.

Symbols used in this product. These symbols may appear on the product:



General Care and Cleaning

Care

Do not store or leave the instrument in direct sunshine for extended periods.

To avoid damage to the instrument or probes, please do not expose them to fog, liquid, or solvents.

Cleaning

Please perform the following steps to clean the instrument and probes.

1. Disconnect the instrument from all power sources and then clean it with a soft damp cloth.
2. Clean the loose dust on the outside of the instrument and probe with a soft cloth.

To avoid damage to the surface of the instrument and probe, please do not use any corrosive liquid or chemical cleansers.

Make sure that the instrument is completely dry before restarting it to avoid potential short circuits or personal injury.

General Inspection

1. Inspect the shipping container

Keep the original shipping container and 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 if the instrument has been damaged in shipment.

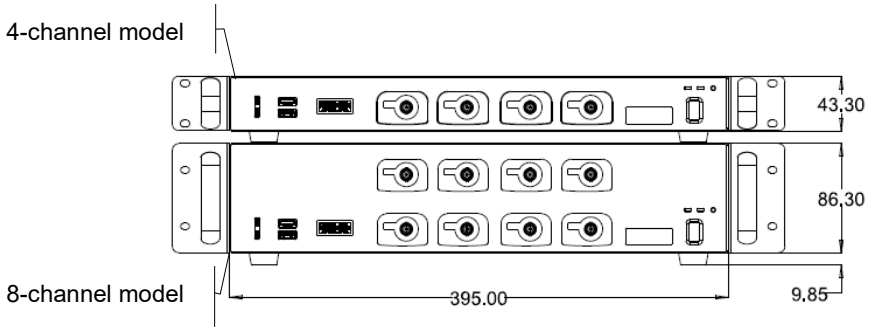
2. Inspect the instrument

If there are instruments found damaged, defective, or have failed any electrical and / or mechanical tests, please contact **SIGLENT**.

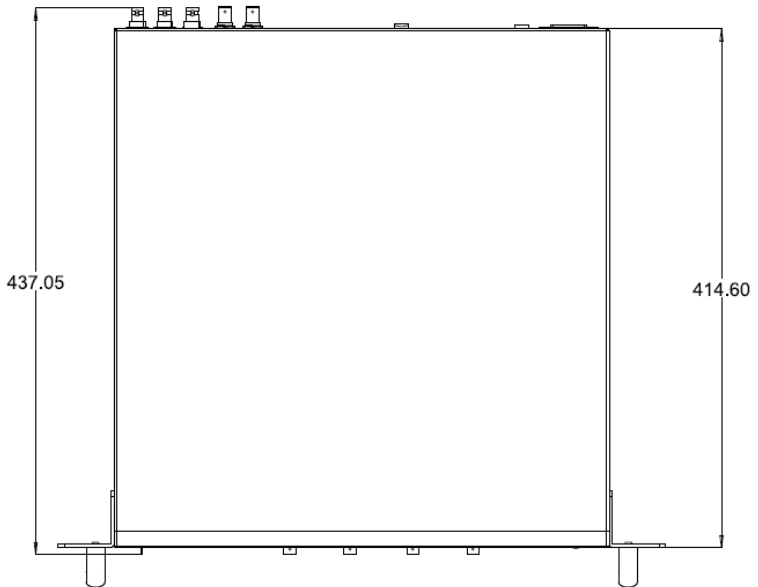
3. Check the accessories

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

Mechanical Dimensions

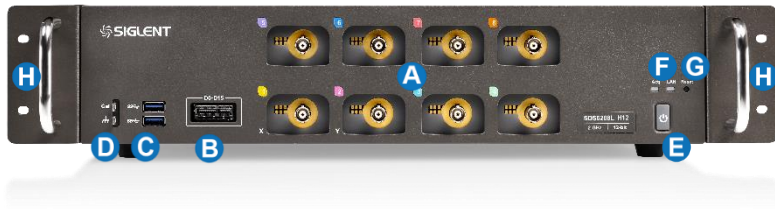


Front View



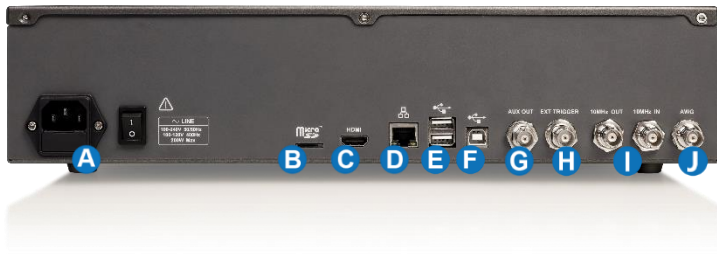
Top View

Front Panel



- A Analog Input Connectors** 1 M Ω : ≤ 400 Vpk(DC + AC), DC~10kHz;
50 Ω : ≤ 5 Vrms, ± 10 V Peak
- B Digital Input Connector**
- C USB 3.0 Host Ports** Connect to USB storage devices for data transfer or USB mouse / keyboard for control
- D Probe Compensation / Ground Terminal**
- E Power Standby Button**
- F Acquisition status and LAN status LEDs**
- G Reset for LAN**
- H Handles**


Back Panel

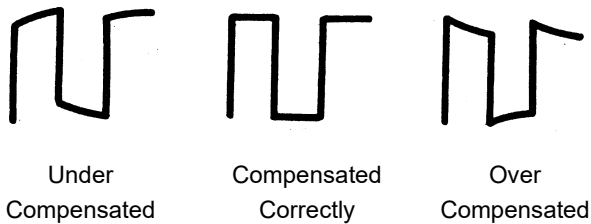


- A AC Power Input and Power Switch** **B SD Card Slot**
- C HDMI Video Output** Connect the port to an external monitor. The resolution is 1280 * 800
- D 1000M LAN Port** Connect the port to the network for remote control
- E USB 2.0 Hosts** Connect with a USB storage device or USB mouse / keyboard
- F USB 2.0 Device** Connects with a PC for remote control
- G Auxiliary Out** Outputs the trigger indicator. When Mask Test is enabled, outputs the pass / fail signal
- H Ext Trigger Input** **I 10 MHz Out and 10 MHz In**
- J Built-in AWG Output**

Probe Compensation

All oscilloscope probes should be properly compensated before their first use with the oscilloscope. A non-compensated or inadequately compensated probe may cause inaccurate measurement. The following steps illustrate the proper probe compensation procedure.

1. Use the probe to connect the CH1 Input Terminal and the Compensation Signal Output Terminal  on the front panel. Connect the ground alligator clip of the probe to the “Ground Terminal” under the compensation signal output terminal.
2. Check the displayed waveforms and compare them with the following figure.



3. Use a nonmetallic flat-head screwdriver to adjust the low-frequency compensation adjustment hole on the probe until the waveform matches the “Compensated Correctly” waveform above.

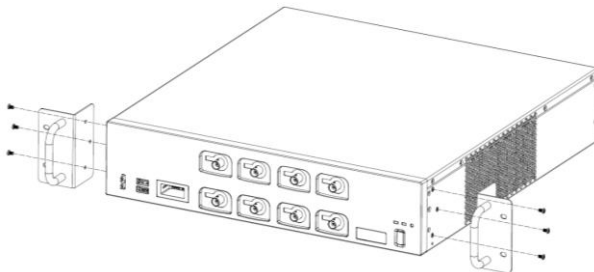
Quick Start

To Install the Rackmount Flange Kit

1. Install the handles to the left and right rack flange using four M4×8 screws.



2. Install the rack flanges to the instrument using six M3×6 screws.



Connecting to Power Supply

The standard power supply for the instrument is 100 ~ 240 V, 50 / 60 Hz, or 100 ~ 120 V, 400 Hz. Please use the power cord provided with the instrument to connect it to AC power.


Connecting to a Display and Mouse

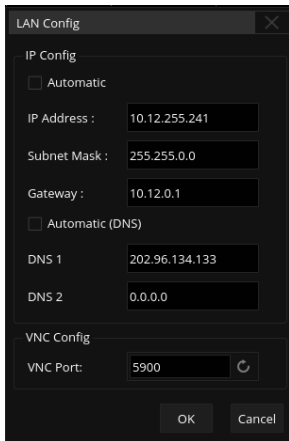
To view the displayed waveforms and interact with the oscilloscope, you can easily connect an external HDMI monitor to the HDMI output on the rear panel of the instrument using an HDMI cable. Connect a mouse to the instrument and it can then be used as a stand-alone oscilloscope.



Connecting to a LAN

Connect the 1000M LAN port to the LAN using a cable.

Perform **Utility** > **Menu** > **I/O** > **LAN Config** , or click the  icon in the lower right corner of the display to set the LAN. The LAN Config dialog box is as below.



After Connecting to the LAN successfully, the instrument can be remotely controlled by WebServer or by sending SCPI commands via NI-VISA, Telnet, or Socket.

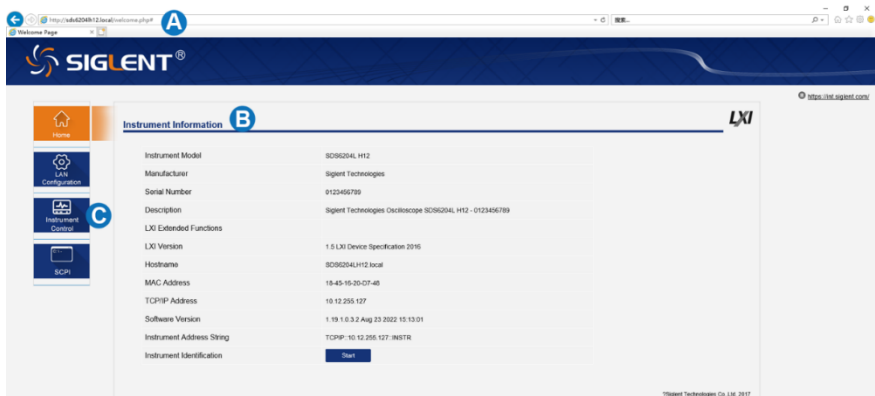
Reference Input and Output

The device can use the internal 10 MHz clock or an external 10 MHz clock from the 10 MHz In port as the reference. The reference is a square wave and can be output from the 10 MHz Out port for synchronizing other instruments. To set the reference clock by following the steps:

Utility > **Menu** > **I/O** > **Clock Source**

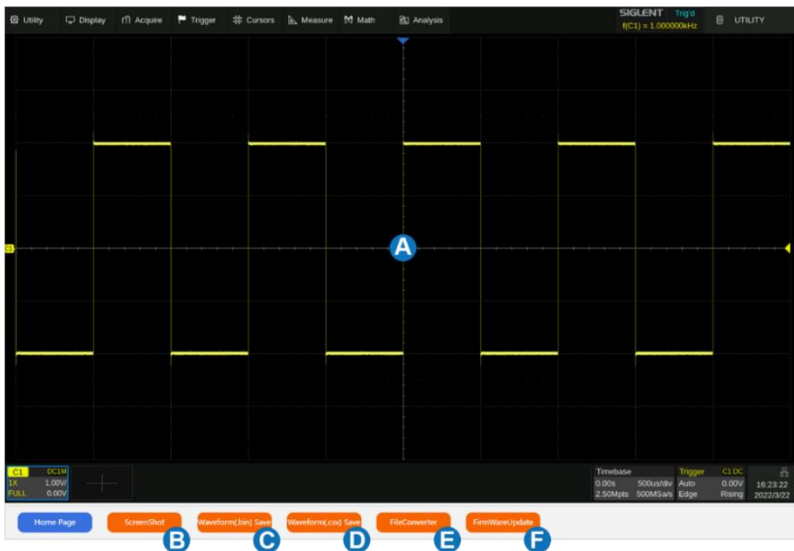
WebServer

A built-in web server provides an approach to interact with the oscilloscope by a web browser. It doesn't require any additional software to be installed on the computer. Set the IP address of the oscilloscope in the browser address bar, and then the user can browse and control the oscilloscope on the web.



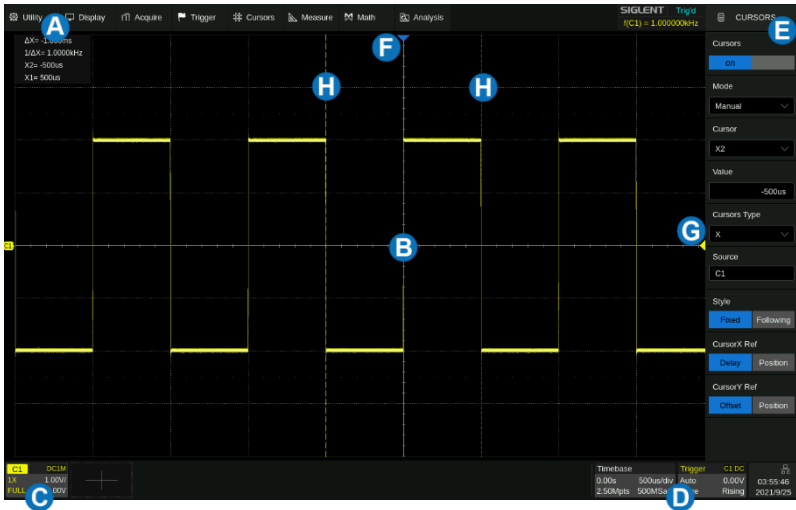
- A** Input the IP address of the instrument
- B** Instrument information
- C** Click here to recall the instrument control interface

Below is the instrument control interface over WebServer:



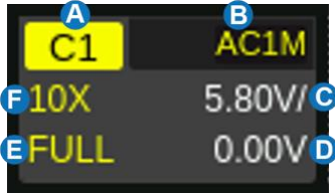
- A** Display and control area of the instrument. The display in this area is a copy of the instrument display. Using the mouse to operate in the area is equivalent to directly operating on the display of the instrument.
- B** Click here to perform a screenshot
- C** Click here to save the waveform data as a bin file and download it to the local computer
- D** Click here to save the waveform data as a CSV file and download it to the local computer
- E** Click here to download the mini-tool for converting binary files to CSV
- F** Click here to perform a firmware upgrade

User Interface



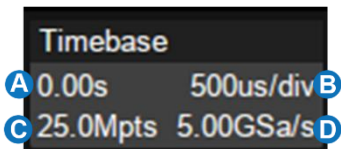
- A Menu Bar**
- B Grid Area** displays the waveform traces. Traces can be moved by dragging them
- C Channel descriptor boxes** include analog channels (C1 ~ C8) , zoom traces (Z1~Z8) , math traces (F1-F4) , Memory traces (M1~M4) , reference (RefA~RefG) and digital channels (D). They show the parameters of the corresponding traces. Clicking the boxes creates a dialog box
- D Timebase and Trigger Descriptor Boxes** show the parameters of timebase and trigger respectively. Clicking the boxes creates a dialog box
- E Dialog Box** is the main area to select the parameters for a chosen specific function
- F Trigger Delay Indicator** locates where the trigger is on the horizontal axis
- G Trigger Level Indicator** shows the level where the waveform triggers
- H Cursors** show where measurement points have been set

Channel Descriptor Box

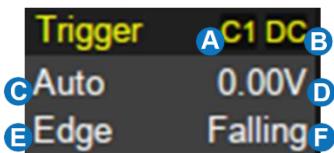


- A Channel Index
- B Coupling and Input Impedance
- C Vertical Scale
- D Vertical Offset
- E Bandwidth Information
- F Probe Attenuation Factor

Timebase and Trigger Descriptor Boxes



- A Trigger delay
- B Horizontal scale (timebase)
- C # Samples
- D Sample Rate

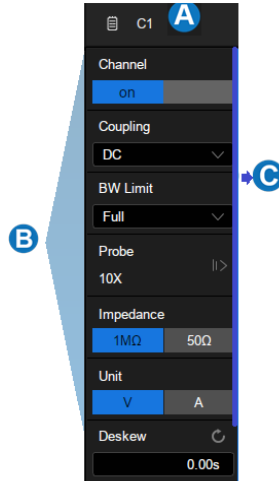


- A Trigger source
- B Trigger coupling
- C Trigger mode
- D Trigger level
- E Trigger type
- F Trigger slope

Dialog Box

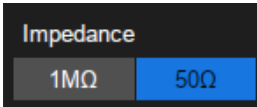
The dialog box on the right side of the screen is the main area for setting the parameters of the selected function.

- A** Title bar. Clicking the bar can hide the dialog box, and clicking again can open the dialog box
- B** Parameter setting area
- C** Scroll bar. When parameters are more than the displayed range, the blue scrollbar will be displayed. By sliding the dialog area up and down, it can scroll to the area not displayed

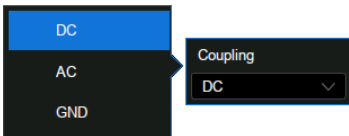


To Set Parameters

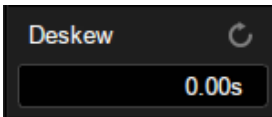
Several different ways are provided to set parameters:



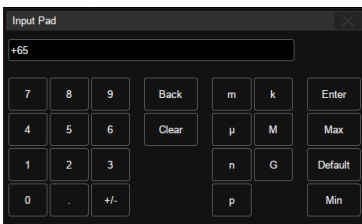
Switch – Sets parameters with two states, such as to enable or disable a function. Click the switch region to change from one state to the other.



List – Sets parameters with more than two options, such as the coupling mode of channels. Click the parameter region, and then select the expected option from the pop-up list.



Virtual Keypad – Sets parameters with a numerical value. Click the parameter region, and the parameter can be adjusted by rolling the mouse wheel; click the region again, then the virtual keypad appears;



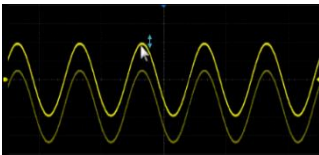
To use the operation of setting “deskew” of the channel as an example: If the expected value is 65 ns, input “65” on the virtual keypad, and then choose the unit **n** to complete the operation. On the virtual keypad, clicking the button **Max** , **Min** , and **Default** quickly sets the parameter to its maximum, minimum and default values.

Mouse Control

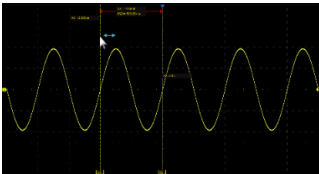
Waveforms, cursors, and trigger levels can be adjusted by the mouse quickly.



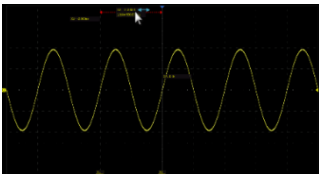
Drag the waveform left and right to move it on the horizontal axis



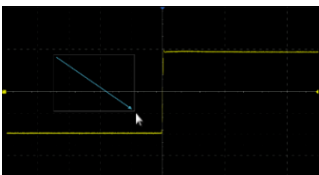
Drag the waveform up and down to move it on the vertical axis



Click and drag the cursor to move it



Click and drag the cursor information region to move the pair of cursors simultaneously



Draw a rectangular box to create a zone or a histogram region. At the beginning of the gesture keep the angle close to 45° so it can be recognized as the drawing box gesture

Choosing the Language

Utility > Menu > System settings > Language

Basic Operations

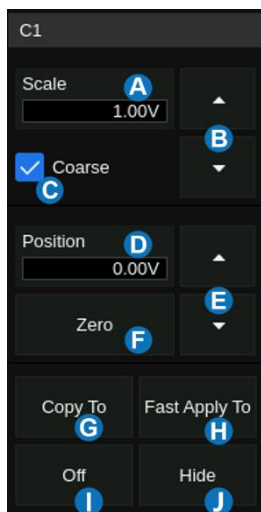
Turn On / Disable a Channel

Click the **+** button and then select the expected channel to turn it on, and its channel descriptor box and the dialog box will appear on the display. Click the channel descriptor box and then click the **Off** button to disable it.

Vertical System

Channel Setup

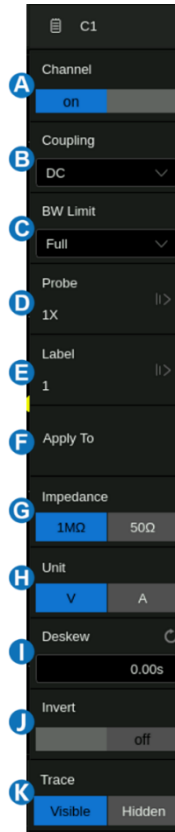
Click the channel descriptor box, a quick dialog will pop up. Vertical scale and offset can also be set from this dialog box.



- A** Click the region to set the vertical scale with the mouse wheel or virtual keypad
- B** ▲ to increase the vertical scale and ▼ to decrease
- C** Check to coarsely adjust the vertical scale and uncheck to enable fine adjustment
- D** Click the region to set the offset with the mouse wheel or virtual keypad
- E** ▲ to increase the offset and ▼ to decrease
- F** Set the offset to zero
- G** Copy the setting of the current channel to another channel
- H** Quickly select the current channel as the source of a specified operation (Trigger, FFT, Measure, Cursor, Search, DVM, and Counter)
- I** Disable the channel
- J** Hide the trace

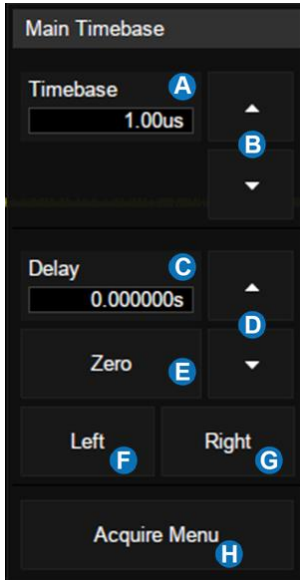
Activating a channel in the quick dialog of the channel recalls the channel dialog box, displaying more parameters:

- A** Turn channel on/off
- B** Coupling (DC, AC, or GND)
- C** Bandwidth limit (Full, 200 MHz, or 20 MHz)
- D** Probe attenuation (1X, 10X, 100X or custom)
- E** Set the label text. Click to recall the label setting. Users can customize the text and display of the label
- F** Quickly apply a specified operation (Cursor, Measure, FFT, Search, DVM, Histogram, and Mask Test) to the current channel
- G** Impedance
- H** Units for the channel
- I** Deskew
- J** Enable/disable invert
- K** Trace visible/hidden



Horizontal System

Click the timebase descriptor box to display a quick dialog box. Timebase and Trigger Delay can also be set in this dialog box.



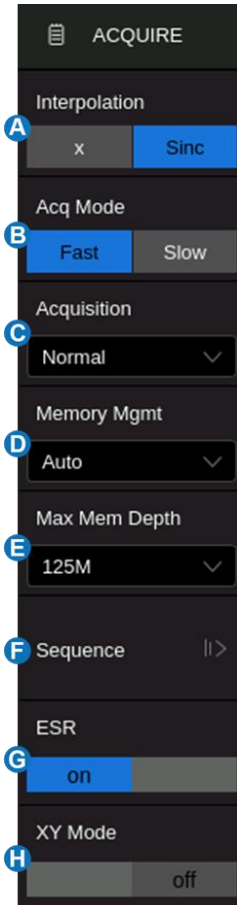
- A** Set the horizontal scale (timebase) by the virtual keypad
- B** ▲ to increase and ▼ to decrease the horizontal scale
- C** Set the trigger delay by the virtual keypad
- D** ▲ to increase and ▼ to decrease the trigger delay
- E** Set the trigger delay to zero
- F** Set the trigger point to the left part of the screen
- G** Set the trigger point to the right part of the screen
- H** Open the Acquire dialog box

Acquisition System

Click **H** on the quick menu of the timebase settings, or click the menu bar

Acquire > **Menu** to recall the Acquire dialog box on the right side.

- A** Select the interpolation mode
- B** Select the Acq mode
- C** Select the acquisition mode (Normal / Peak / Average / Hi-Res)
- D** Select the Memory Management mode (Auto, Fixed Sample Rate, and Fixed Memory)
- E** Select the maximum memory depth
- F** Enter the sequence menu
- G** ESR mode on/off
- H** XY mode on/off



Zoom

Zoom mode can be enabled by **Acquire** > **Zoom** , or by adding a Zx trace as an active channel.

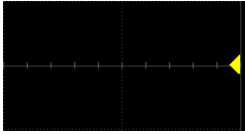
In Zoom mode the grid area is divided into two areas. The main window appears on the top and the zoom window on the bottom. The region without the gray background in the main window is the portion of the trace that is magnified in the zoom window. The horizontal and vertical scale of a zoom trace can be set in its descriptor box at the bottom.



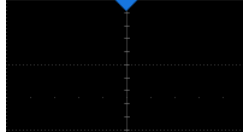
Trigger

The trigger system supports multiple powerful triggering modes including serial bus triggering. Refer to the User Manual for more details.

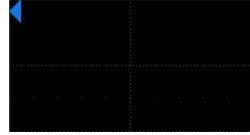
Indicators Relative to Trigger



Trigger level Indicator

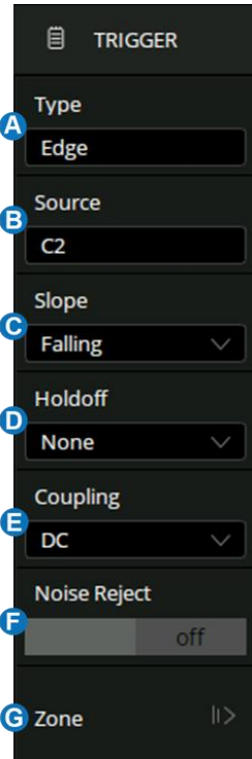


Horizontal 0 position Indicator

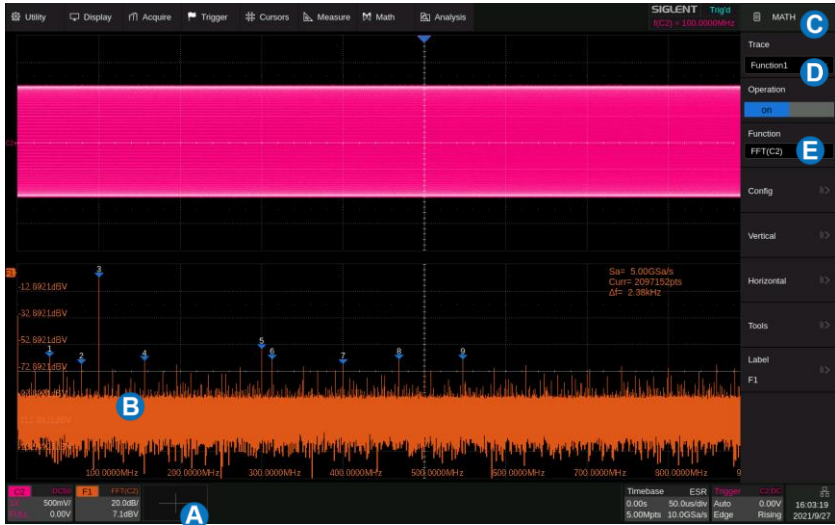


Horizontal position (offscreen) Indicator

- A** Select trigger type
- B** Select the trigger source
- C** Select the trigger slope (When the trigger type is "Edge", "Slope" and other specific types)
- D** Set holdoff (None / Time / Events)
- E** Set trigger coupling mode (DC / AC / LF Reject / HF Reject)
- F** Enable / disable Noise Rejection. When Noise Reject is on, the trigger hysteresis is increased, so the noise immunity of the trigger circuit is better. As a compromise, the trigger sensitivity degrades
- G** Set the Zone Trigger



Math



- A** Click **+** > **Math** > **Fx** to create a math trace and open math setup dialog box **C**
- B** Math trace
- C** Math setup dialog box
- D** Selects the trace (F1 ~ F4)
- E** Selects the operator and source (C1~C8, Z1~Z8, F1~F4, M1~M4)

Measure & Statistics

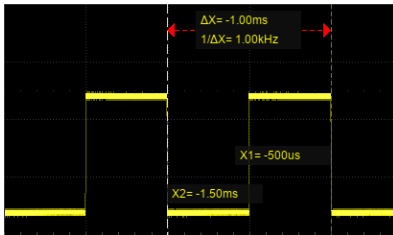


- A** Click **Measure** > **Menu** to open the measure setup dialog box
- B** Measurement parameters and statistics display area. If select the mode as “Simple”, the “Simple” parameter area is displayed. Click the icon in the lower-right corner of this area to reset the statistics
- C** Measure dialog box

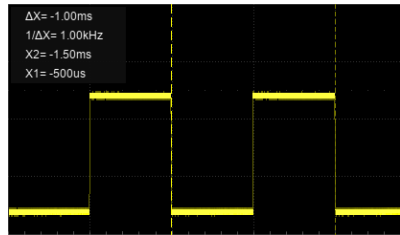
Cursors

Cursors set measurement points on the Vertical or Horizontal axis of a trace (or both). For more information please refer to the User Manual.

The display mode of cursors



Following mode

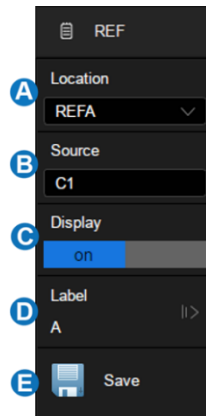


Fixed mode

Reference Waveforms

Reference waveforms (REFA ~ REFH) are displayed data stored in the non-volatile memory. They can be recalled to the display for comparison with other traces. Perform **+** > **Ref** > **REFx** to open or set a reference waveform.

- A** Select the location of the reference (REFA ~ REFH)
- B** Select the source (C1~C8, F1~F4)
- C** Enable / disable Display of the reference waveform
- D** Set the label text of the reference trace
- E** Save the waveform specified in **B** to the specified location in **A**

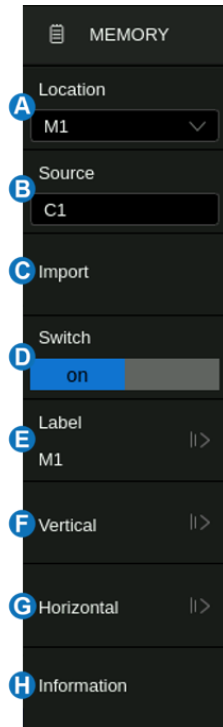


The reference waveforms (.ref) can be saved to an external storage device. See “ Save / Recall ” for details.

Memory Traces

Analog channels, zoom, math, memory waveforms, and waveforms in files can be imported to available memory waveforms (M1 / M2 / M3 / M4) and displayed on the screen for comparison with the current waveforms. Differing from reference traces which are displayed data, the memory traces are in the format of raw data, which can be used as the source of Math and Decoding functions and can provide more accurate measurements than a reference waveform. Touch **+** at the bottom and select **M1 ~ M4** to set a memory trace.

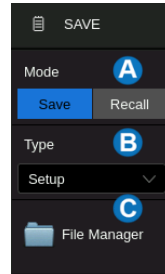
- A** Select the location of the memory (M1 ~ M4)
- B** Select the source (Channel / Zoom / Math / Memory / File)
- C** Import the trace of the selected source in **B** to the memory location set in **A**
- D** Turn on or off the Memory
- E** Set the label text of the memory trace
- F** Set the vertical parameters of the memory trace
- G** Set the horizontal parameters of the memory trace
- H** Display the memory information, including source, vertical and horizontal parameters, sampling rate, and length



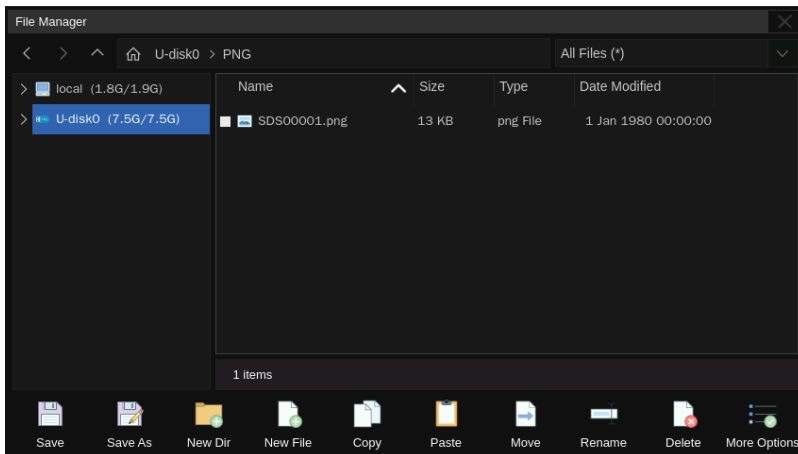
Save/Recall

Click **Utility** > **Save / Recall** to save / recall a setup, picture, waveform data or reference waveform.

- A** Choose Save or Recall operation
- B** Select the object type
- C** Recall the File Manager for further operations



File Manager



Quick Screenshot

Utility > **Print**

Calibration

The oscilloscope is calibrated at the factory before being shipped. The calibration is run at 23°C ($\pm 2^\circ\text{C}$) and is valid for temperatures $23 \pm 5^\circ\text{C}$. Within this temperature range, the oscilloscope will meet all specifications once warmed up.

Warm up the oscilloscope for at least 20 minutes before each use or before performing self-calibration. Specifications are not guaranteed during the warm-up period.

Whenever the oscilloscope is used in an environment outside $23 \pm 5^\circ\text{C}$, or when it has been more than one month since the previous self-calibration, manual calibration is recommended. To perform a self-calibration :

Click **Utility** > **Menu** > **Maintenance** > **Self Calibration**

Software Option

Installing a Software Option

Follow the steps below to install a software option (see the datasheet for details) after purchasing it and obtaining the Option Key:

1. **Utility** > **Menu** > **Software Options**
2. Select the correct Option Type
3. Input the option key in the text box
4. Click **Install** and then restart the oscilloscope

About SIGLENT

SIGLENT is an international high-tech company, concentrating on R&D, sales, production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, isolated handheld oscilloscopes, function/arbitrary waveform generators, RF/MW signal generators, spectrum analyzers, vector network analyzers, digital multimeters, DC power supplies, electronic loads and other general purpose test instrumentation. Since its first oscilloscope was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

Headquarters:

SIGLENT Technologies Co., Ltd
Add: Bldg No.4 & No.5, Antongda
Industrial Zone, 3rd Liuxian Road, Bao'an
District, Shenzhen, 518101, China
Tel: + 86 755 3688 7876
Fax: + 86 755 3359 1582
Email: sales@siglent.com
Website: int.siglent.com

North America:

SIGLENT Technologies America, Inc
6557 Cochran Rd Solon, Ohio 44139
Tel: 440-398-5800
Toll Free: 877-515-5551
Fax: 440-399-1211
Email: info@siglentna.com
Website: www.siglentna.com

Europe:

SIGLENT Technologies Germany GmbH
Add: Staetzlinger Str. 70
86165 Augsburg, Germany
Tel: +49(0)-821-666 0 111 0
Fax: +49(0)-821-666 0 111 22
Email: info-eu@siglent.com
Website: www.siglenteu.com

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