SDS5000X HD
SDS5000L Series
Digital Storage Oscilloscope

Quick Start

EN01A

SIGLENT TECHNOLOGIES CO., LTD.

Copyright Information

Contents

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:

Hazardous Voltage

Warning

Protective Earth Ground

Earth Ground

Power Switch

Allgemeine Sicherheitsübersicht

Lesen Sie die folgenden Sicherheitshinweise sorgfältig durch, um Verletzungen oder Schäden am Gerät und an den daran angeschlossenen Produkten zu vermeiden. Um mögliche Gefahren zu vermeiden, verwenden Sie das Gerät bitte wie angegeben.

Verwenden Sie ein geeignetes Netzkabel

Verwenden Sie nur das für das Gerät vorgesehene und im jeweiligen Land zugelassene Netzkabel.

Erden Sie das Gerät

Das Gerät ist über den Schutzleiter der Netzleitung geerdet. Um einen elektrischen Schlag zu vermeiden, vergewissern Sie sich bitte, dass das Gerät korrekt geerdet ist, bevor Sie die Eingangs- oder Ausgangsklemmen des Geräts anschließen.

Schließen Sie das Messkabel richtig an

Die Kabelschirmung (Masse) des Messkabels ist gleich dem Potential der Erde, schließen Sie das Messkabel also nicht an eine hohe Spannung an.

Überprüfen Sie die Nennwerte aller Klemmen

Um Feuer oder einen elektrischen Schlag zu vermeiden, beachten Sie bitte alle Angaben und Hinweise auf dem Gerät. Bevor Sie das Gerät anschließen, lesen Sie bitte das Handbuch sorgfältig durch, um weitere Informationen über die Nennwerte zu erhalten.

Verwenden Sie einen ordnungsgemäßen Überspannungsschutz

Stellen Sie sicher, dass keine Überspannung (z. B. durch ein Gewitter) an das Gerät gelangen kann, da sonst die Gefahr eines elektrischen Schlages besteht.

Schutz vor Elektrostatik

Betreiben Sie das Gerät in einer Umgebung, die vor elektrostatischer Entladung geschützt ist, um Schäden durch statische Entladung zu vermeiden. Erden Sie vor dem Anschließen immer sowohl den Innen- als auch den Außenleiter des Kabels, um statische Aufladung abzubauen.

Für gute Belüftung sorgen

Eine unzureichende Belüftung kann zu einem Temperaturanstieg führen, der schließlich das Gerät beschädigt. Sorgen Sie daher für eine gute Belüftung und überprüfen Sie regelmäßig die Ansaugung und den Lüfter.

Vermeiden Sie freiliegende Schaltkreise oder Komponenten

Berühren Sie keine freiliegenden Kontakte oder Bauteile, wenn das Gerät eingeschaltet ist.

Richtige Sicherung verwenden

Verwenden Sie nur die angegebene Sicherung.

Betreiben Sie das Gerät nicht ohne Abdeckungen

Betreiben Sie das Gerät nicht, wenn Abdeckungen oder Verkleidungen entfernt sind.

Betreiben Sie das Gerät nicht bei vermuteten Defekten

Wenn Sie vermuten, dass das Gerät beschädigt ist, lassen Sie es vor dem weiteren Betrieb von qualifiziertem Servicepersonal überprüfen. Jegliche Wartung, Einstellung oder Austausch, insbesondere von Schaltkreisen oder Zubehör, muss von SIGLENT autorisiertem Personal durchgeführt werden.

Nicht in feuchter Umgebung betreiben

Um einen Kurzschluss im Geräteinneren oder einen elektrischen Schlag zu vermeiden, betreiben Sie das Gerät nicht in feuchter Umgebung.

Betreiben Sie das Gerät nicht in explosionsgefährdeten Umgebungen

Um Schäden am Gerät oder Personenschäden zu vermeiden, ist es wichtig, das Gerät nicht in explosionsgefährdeter Umgebung zu betreiben.

Halten Sie die Produktoberflächen sauber und trocken

Um den Einfluss von Staub und/oder Feuchtigkeit in der Luft zu vermeiden, halten Sie die Oberfläche des Geräts bitte sauber und trocken.

Sicherheit bei der Handhabung

Bitte behandeln Sie das Gerät während des Transports vorsichtig, um Schäden an Tasten, Drehknopfschnittstellen und anderen Teilen auf den Bedienfeldern zu vermeiden.

Es dürfen nur Tastköpfe verwendet werden, die den Spezifikationen des Herstellers entsprechen

Bei Verwendung von 2X/.../10000X-Sondenbaugruppen müssen die Sondenbaugruppen durch eine doppelte oder verstärkte Isolierung von den gemessenen Stromkreisen isoliert sein.

Alle Sondenbaugruppen sollten die Anforderungen von UL 61010-031 und CAN/CSA-C22.2 Nr. 61010-031-07 erfüllen.

Das Gerät darf nicht so positioniert werden, dass es schwierig ist, die Trennvorrichtung (abnehmbarer Stecker) zu bedienen.

Wenn das Gerät auf eine Weise verwendet wird, die nicht vom Hersteller angegeben ist, kann der Schutz, den das Gerät bietet, beeinträchtigt warden.

Sicherheitsbegriffe und Symbole

Begriffe in diesem Handbuch. Diese Begriffe können in diesem Handbuch vorkommen:

WARNUNG

Warnhinweise weisen auf Bedingungen oder Praktiken hin, die zu Verletzungen oder zum Verlust des Lebens führen können.

VORSICHT

Vorsichtshinweise weisen auf Bedingungen oder Praktiken hin, die zu Schäden an diesem Produkt oder anderen Gegenständen führen können.

Begriffe auf dem Produkt. Diese Begriffe können auf dem Produkt erscheinen:

GEFAHR	Weist auf direkte Verletzungen oder Gefahren hin, die auftreten können.
WARNUNG	Weist auf mögliche Verletzungen oder Gefährdungen hin, die auftreten können.
VORSICHT	Weist auf mögliche Schäden am Gerät oder an anderen Gegenständen hin, die eintreten können.

Symbole auf dem Produkt. Diese Symbole können auf dem Produkt erscheinen:

Hazardous Voltage

Protective Earth Ground

Warning

Terminal Ground

Power Switch

Wenn Sie solche Symbole auf dem Produkt finden, ziehen Sie das Handbuch zu Rate, um die Art der potenziellen Gefahr und die zu ergreifenden Maßnahmen zu erfahren.

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

- **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.

- **Inspect the instrument**

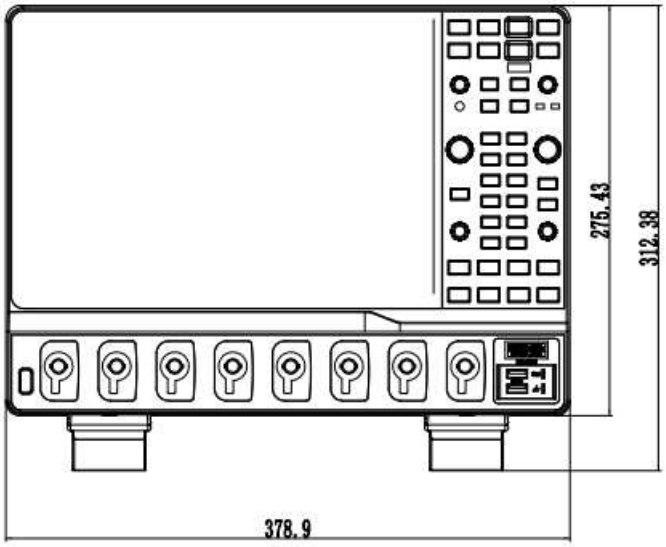
If there are instruments found damaged, defective, or have failed any electrical and / or mechanical tests, please contact SIGLENT.

- **Check the accessories**

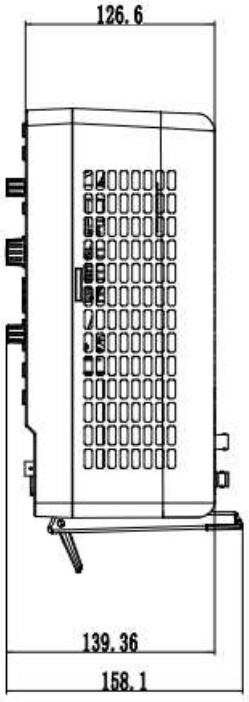
Please check the accessories according to the packing list. If the accessories are incomplete or damaged, please contact your SIGLENT sales representative.

Mechanical Dimensions

SDS5000X HD

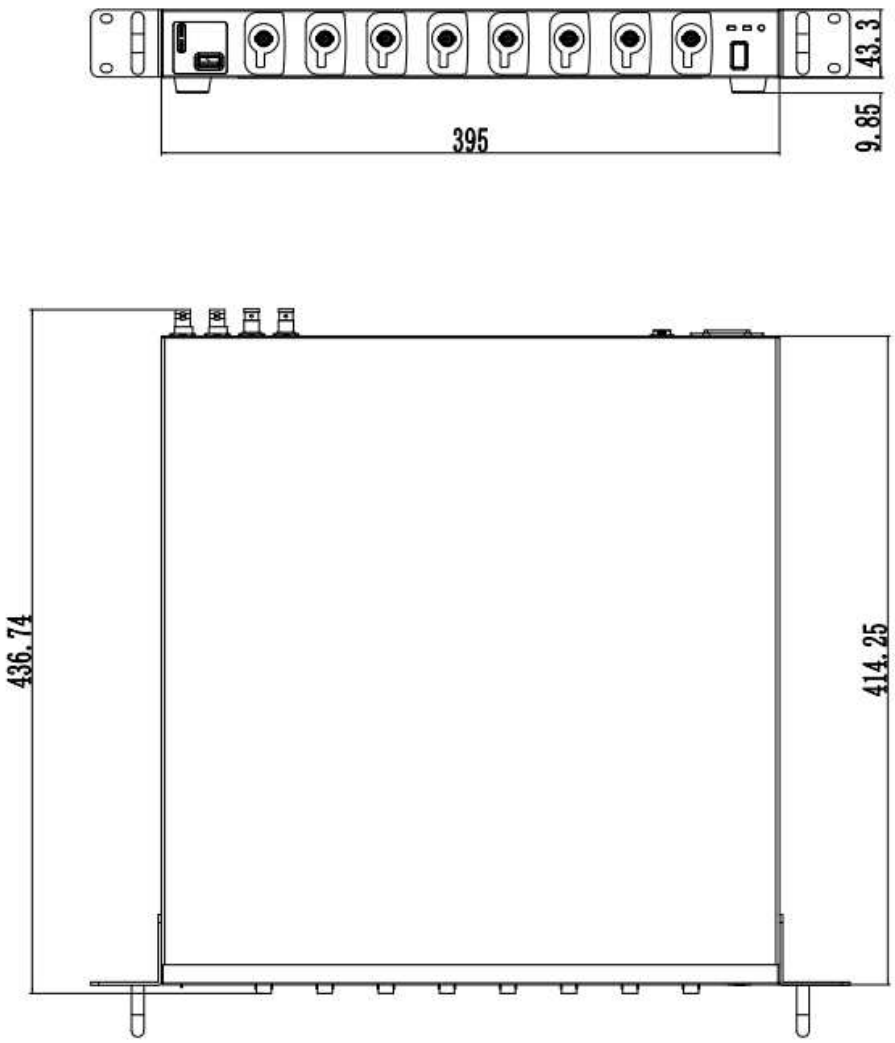


SDS5000X HD Front View



SDS5000X HD Side View

SDS5000L



SDS5000L Front View& Top View

Panel Introduction

SDS5000X HD

Front Panel

1. Analog Input Connectors
2. Digital Input Connector
3. USB 3.0 Host Ports. Connect to USB storage devices for data transfer or USB mouse / keyboard for control
4. Probe Compensation / Ground Terminals
5. Touch Screen Display
6. Front Panel. Includes knobs and buttons
7. Power Switch
8. Supporting Legs

Back Panel

1. AC Power Input
2. USB 2.0 Host Ports. Connect to USB storage devices for data transfer or USB mouse / keyboard for control
3. USB 3.0 Device. Connect with a PC for remote control
4. 1000M LAN Port. Connect the port to the network for remote control
5. HDMI Video Output. Connect the port to an external monitor. The resolution is 1280 * 800
6. Auxiliary Out. Outputs the trigger indicator. When Mask Test is enabled, outputs the pass / fail signal
7. Ext Trigger Input
8. 10 MHz In
9. 10 MHz Out
10. Handle

SDS5000L

Front Panel

1. Analog Input Connectors
2. Acquisition status and LAN status LEDs
3. Reset for LAN
4. USB 3.0 Host Port. Connects to USB storage devices for data transfer or USB mouse / keyboard for control
5. Probe Compensation / Ground Terminals
6. Power Switch
7. Handles

Back Panel

1. AC Power Input and Power Switch
2. HDMI Video Output. Connect the port to an external monitor. The resolution is 1280 * 800
3. 1000M LAN Port. Connect the port to the network for remote control
4. USB 3.0 Device. Connect with a PC for remote control
5. USB 2.0 Host Ports. Connect to USB storage devices for data transfer or USB mouse / keyboard for control
6. Ext Trigger Input
7. Auxiliary Out. Outputs the trigger indicator. When Mask Test is enabled, outputs the pass / fail signal
8. 10 MHz In
9. 10 MHz Out

Quick Start

Connecting to Power Supply

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

Connecting to an External Display

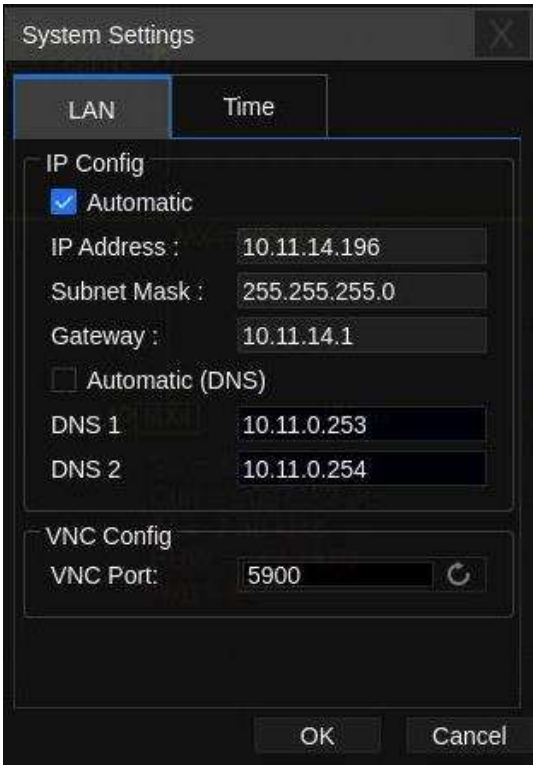
The SDS5000X HD comes with a capacitive touch display screen with a resolution of 1280x800, and also supports external displays. Use a video cable to connect the HDMI interface between the external monitor and the device's rear panel. Similar to computers, there are two multi-display modes: Duplicate or Extend. When the display mode is " Duplicate", the external monitor displays the same content as the oscilloscope. When the display mode is "Extend", the external monitor acts as an extension of the oscilloscope's main display and a window in the main display can be dragged to the external monitor. Multi-monitor settings are set in the following steps:

Dispalys > Multiple Displays

The SDS5000L has no display screen, only supports external displays. 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 shown on the left.

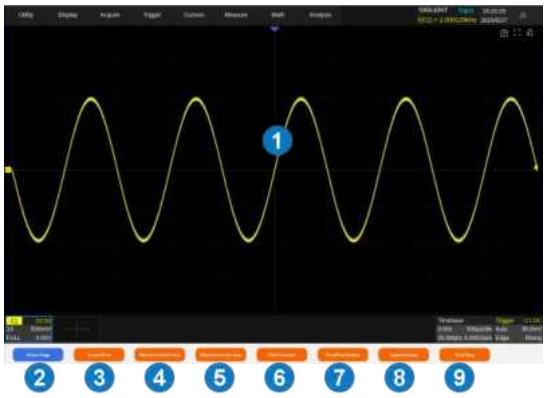
After connecting to the LAN successfully, the instrument can be remotely controlled by WebServer, by SigScopeLab or by sending SCPI commands

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.

1. Input the IP address of the instrument
2. Instrument information
3. Click here to recall the instrument control interface

Below is the instrument control interface over WebServer:



1. 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
2. Click here to return to the homepage
3. Click here to perform a screenshot
4. Click here to save the waveform data as a bin file and download it to the local computer
5. Click here to save the waveform data as a CSV file and download it to the local computer
6. Click here to download the mini-tool for converting binary files to CSV
7. Click here to perform a firmware upgrade
8. Click to take a screenshot of the current screen, right-click the image to copy to clipboard or save
9. Start/stop acquisition, same as Run Stop on the front panel

Probe Compensation

All oscilloscope passive 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.

Under Compensated	Compensated Correctly	Over Compensated

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.

User Interface

1. Menu Bar
2. Grid Area displays the waveform traces. Traces can be moved by dragging them
3. Channel Descriptor Boxes include analog channels (C1~C8), zoom traces (Z1~Z8), math traces (F1-F8), Memory traces (M1~M4) and digital channels (D) (Only SDS5000X HD). They show the parameters of the corresponding traces. Clicking the boxes creates a dialog box
4. Timebase and Trigger Descriptor Boxes show the parameters of timebase and trigger respectively. Clicking the boxes creates a dialog box
5. Measurement parameter display area
6. Dialog Box is the main area to select the parameters for a chosen specific function. Its transparency can be set in the Display dialog box
7. Trigger Delay Indicator locates where the trigger is on the horizontal axis
8. Trigger Level Indicator locates where the trigger is on the vertical axis
9. Cursors show where measurement points have been set

Channel Descriptor Box

1. Channel Index
2. Coupling and Input Impedance
3. Vertical Scale
4. Vertical Offset
5. Bandwidth Information
6. Probe Attenuation Factor

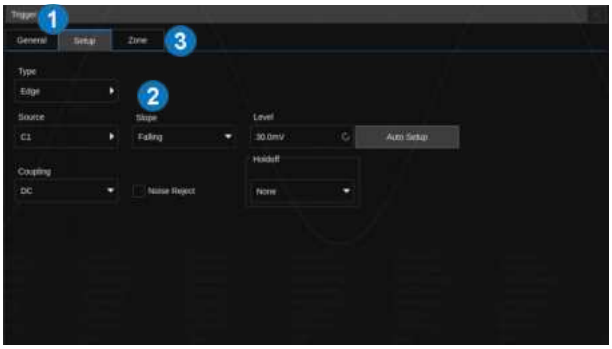
Timebase and Trigger Descriptor Boxes

1. Trigger delay
2. Horizontal scale (timebase)
3. # Samples
4. Sample Rate

1. Trigger source
2. coupling
3. Trigger mode
4. Trigger level
5. Trigger type
6. Trigger slope

Dialog Box

The dialog box is the main area for setting parameters for the selected function, and selecting the corresponding function will pop up.



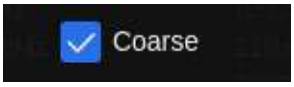
1. Title bar. The title of the dialog box varies depending on the selected function
2. Parameter setting area
3. Tabs

To Set Parameters

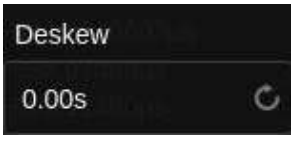
Several different ways are provided to set parameters.

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.



Check Box -- Switches between two optional parameters, such as enabling and disabling a specified function.

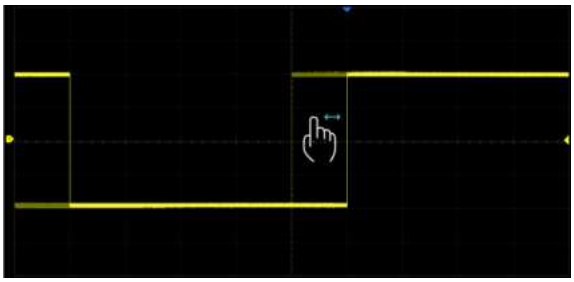


Virtual Keypad -- Sets parameters with a numerical value. Click the parameter region, and the parameter can be adjusted by rolling the mouse wheel; click the region again, then the virtual keypad appears.

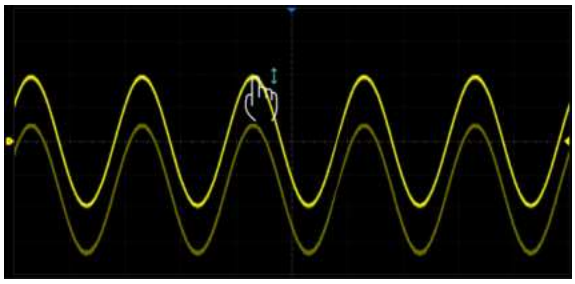
To use the operation of setting "deskew" of the channel as an example: If the expected value is 65 ns, input "65" on the virtual keypad, and then choose the unit n to complete the operation. On the virtual keypad, clicking the button Max , Min , and Default quickly sets the parameter to its maximum,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

Touch Gestures and Mouse Control

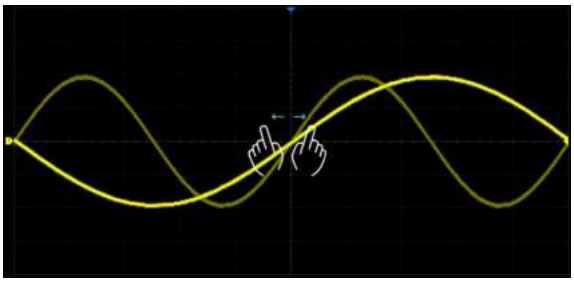
Waveforms, cursors, and trigger levels can be adjusted by touch gestures or the mouse quickly.



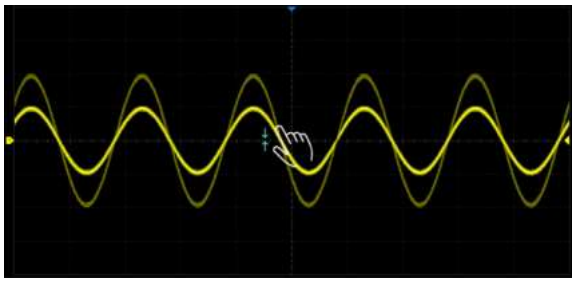
Drag the waveform left and right to move it on the horizontal axis



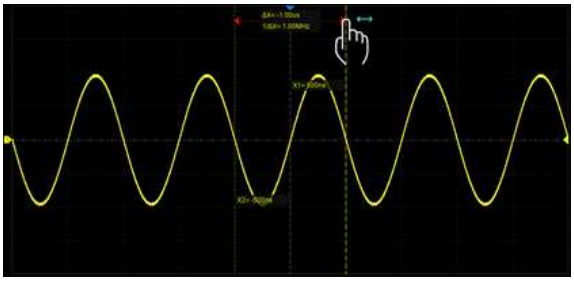
Drag the waveform up and down to move it on the vertical axis



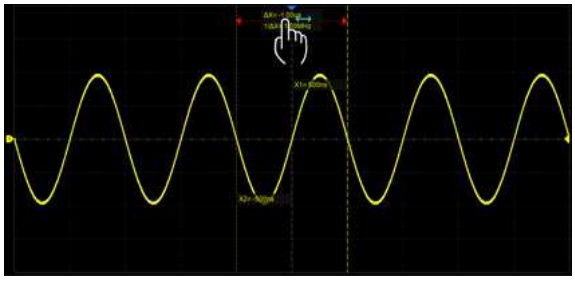
Pinch and spread the waveform horizontally to re-scale the timebase



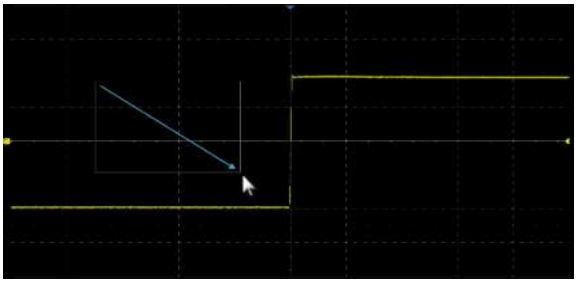
Pinch and spread the waveform vertically to re-scale the vertical gain



Click and drag the cursor to move it



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



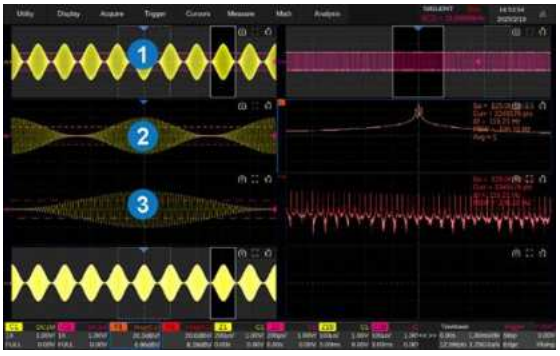
Draw a rectangular box to create a zone or a histogram region. At the beginning of the gesture keep the angle close to 45° so it can be recognized as the drawing box gesture

Setting Multi-Window

This instrument supports display up to 9 windows at once. The window layouts include: Auto, 2x1, 3x1, 4x1, 1x2, 2x2, 4x2 and 3x3. Follow the one of the set of steps below to set Multi-Window:

1. Display Persist > Windows Layout .
2. Right-click mouse on the display, and then select the layout on the pop-up dialog box.

Window 1 is always the main window in the multi-window matrix. The fast traces with high waveform update rate can only be displayed in the main window. The other traces except for Zoom traces can also be displayed in the main window. Window 2 will be used to display Zoom traces. Window 3 will be used to display ZoomB traces. The Zoomed fast traces can only be displayed in this window. The other Zoom traces (ZF1~ZF8 , ZM1~ZM4) can also be displayed in it.



The instrument is able to automatically allocate a trace to a window according to the window layout and traces activated. If the user want to adjust the mapping relationship between a trace and a window, simply drag the Channel Descriptor Box of the trace to the destination window, as the right figure above shown. In this figure F2 is originally shown in window (4,1), to drag its channel descriptor box to window (4,2) will have the trace shown in window (4,2).

Every window has three icons on the top-right corner:

Perform a screenshot of the window.

Full-screen mode. If the window has been in full-screen mode, the icon will become . At this time click it to retore to window mode

Floating mode. If the window has been in floating mode, the icon will become . At this time click it to retore to fixed mode. A floating window can be dragged to any location in the display, including the extended display.

Front Panel

The front panel (only of the SDS5000X HD) is designed to operate the basic functions without having to open the software menu. Most of the front panel controls duplicate functionality available through the touch screen display but the operation is more quickly achieved:

Push to switch between Run mode and Stop mode. The button is light in green in Run mode, and red in Stop mode

Automatically sets the waveform to adapt the display according to its frequency and amplitude

Resets the oscilloscope to the default configuration

Clears the data or displays in multiple sweeps, including display persistence, measurement statistics, average sweeps, and Pass/Fail statistics

Enables or disables the touch screen. When it is lighted the functionality is enabled

Press the button to recall the Display dialog box. The second press turns on Persist and lights the button. Press the button again to turn off Persist

Rotate the universal knob to set the value of the activated parameter, or to move the selected cursor. The default function is to adjust the waveform intensity.
The middle wheel of the scrolling mouse has an equivalent function to rotating a multifunctional knob.

All the knobs on the front panel are multi-function. They can be pushed as well as rotated. Pushing a knob quickly recalls a specific function, which is indicated by the silkscreen near the knob

Choosing the Language

Utility > Menu > System > Language .

Basic Operations

Turn On / Disable a Channel

From the Front Panel

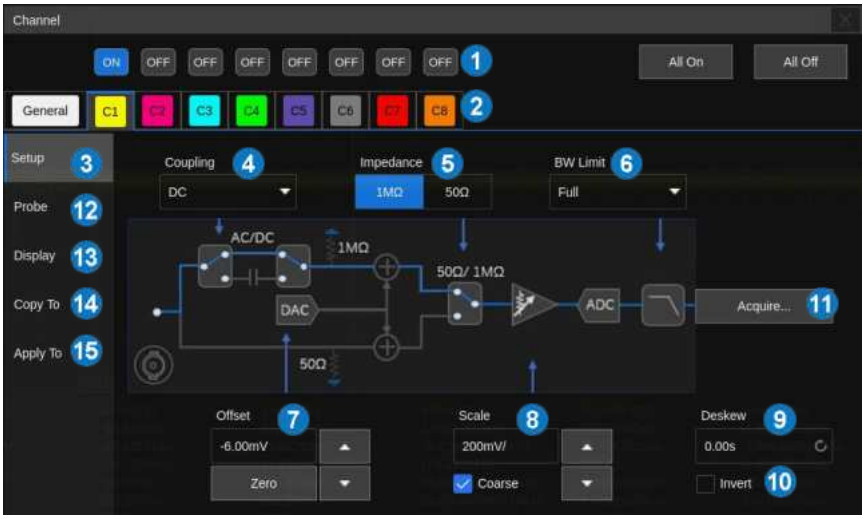
For the SDS5000X HD users can push the channel button (1-8, Digital, Math, Ref) to turn on the corresponding channel. If a channel is already on but not activated, push the button to activate it. If a channel is already on and activated, push the same button again to disable the channel.

From the Touch Screen

Click the + button and then select the expected channel to turn it on, click again to turn off. Click the channel descriptor box and then click the ON/OFF in the dialog box.

Vertical System

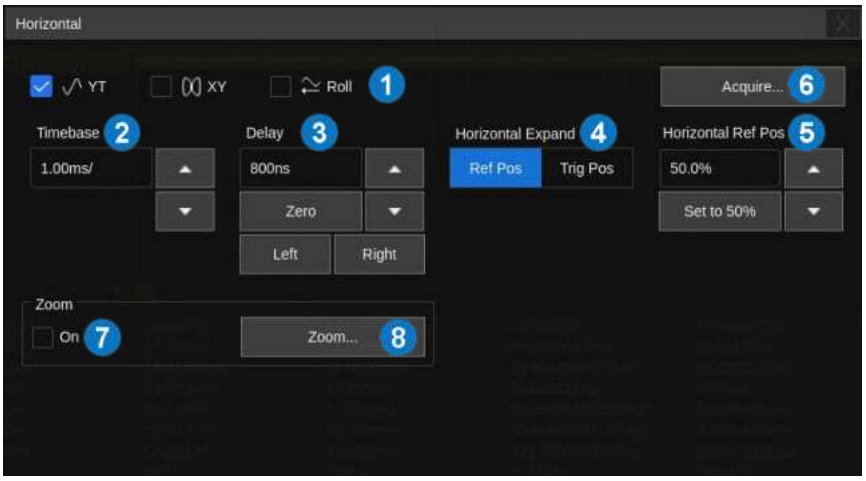
Click the channel descriptor box to open the channel settings dialog box:



1. Turn channel on/off. Click All On/All Off to turn on/off all channels
2. Tabs. Vertical expand strategy can be set on the General tab; Corresponding channel parameters can be set on the channel tab
3. Basic channel settings
4. Coupling (DC, AC, or GND)
5. Impedance
6. Bandwidth limit (Full, 200 MHz, or 20 MHz)
7. Click the region to set the offset with the mouse wheel or virtual keypad. ▲ to increase the offset and ▼ to decrease. The SDS5000X HD can also be set through the vertical offset knob; Click Zero to set the offset to zero
8. Click the region to set the vertical scale with the mouse wheel or virtual keypad. ▲ to increase the vertical scale and ▼ to decrease. The SDS5000X HD can also be set through the vertical scale knob. Check the Coarse box to coarsely adjust the vertical scale and uncheck to enable fine adjustment
9. Deskew
10. Enable/disable invert
11. Open the Acquire Settings dialog box
12. Channel probe settings. Set probe attenuation ratio (1X, 10X, 100X or custom)
13. Channel display settings. Set channel units, labels, trace visible/hidden
14. Copy the setting of the current channel to another channel
15. Quickly select the current channel as the source of a specified operation (Trigger, FFT, Measure, Cursor, Search, DVM, and Counter)

Horizontal System

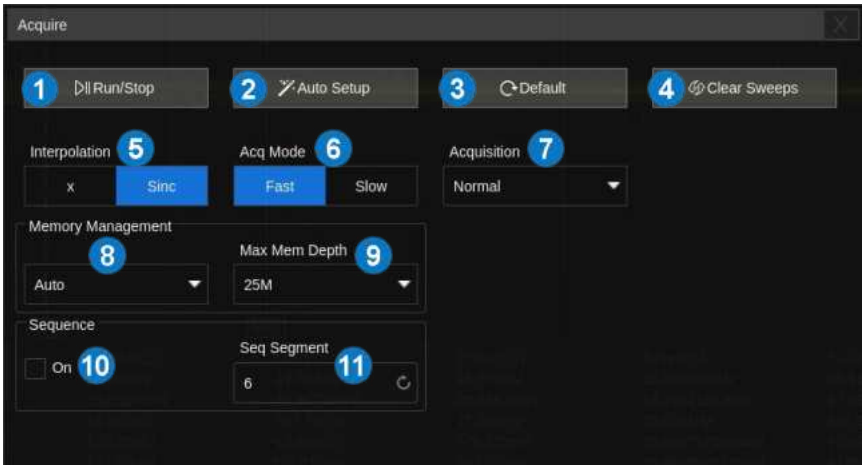
Click the timebase descriptor box to open the Horizontal Settings dialog box:



1. Set horizontal mode (YT, XY, or Roll)
2. Set the horizontal scale (timebase) by the virtual keypad. ▲ to increase and ▼ to decrease the horizontal scale. The SDS5000X HD can also be set through the horizontal scale knob
3. Set the trigger delay by the virtual keypad. ▲ to increase and ▼ to decrease the trigger delay. SDS5000X HD can be set through the delay knob. Click Zero to set the trigger delay to zero. Click Left to set the trigger point to the left part of the screen. Click Right to set the trigger point to the right part of the screen
4. Select horizontal expand strategy
5. Set the horizontal reference position when the horizontal expand is “Ref Pos”. Click the region to set with the virtual keypad. ▲ to increase and ▼ to decrease the horizontal reference position. Click Set to 50% to set the horizontal reference position to 50%
6. Open the Acquire Settings dialog box
7. Turn on/off Zoom
8. Open the Zoom dialog box

Acquisition System

Click the menu bar Acquire to open the Acquire dialog box:

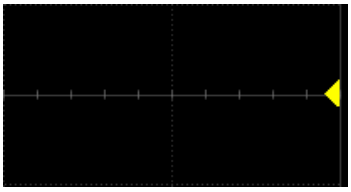


1. Start/stop acquisition, which is same as **Run|Stop** on the front panel of SDS5000X HD
2. Automatically set the time base, trigger, and vertical scale to display periodic signal. It is same as **AutoSetup** on the front panel of SDS5000X HD
3. Reset the oscilloscope's state to default configuration. It is same as **Default** on the front panel of SDS5000X HD
4. Clears the data or displays in multiple sweeps, including display persistence, measurement statistics, average sweeps, and Pass/Fail statistics. It is same as **ClearSweeps** on the front panel of SDS5000X HD
5. Select the interpolation mode
6. Select the Acq mode
7. Select the acquisition mode (Normal / Peak / Average / Hi-Res)
8. Select the Memory Management mode (Auto, Fixed Sample Rate, and Fixed Memory)
9. Select the maximum memory depth
10. Turn on/off the sequence
11. Set the segment of the sequence

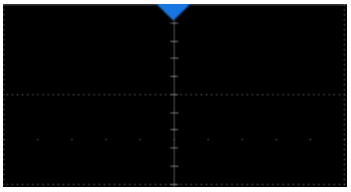
Trigger

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

Indicators Relative to Trigger



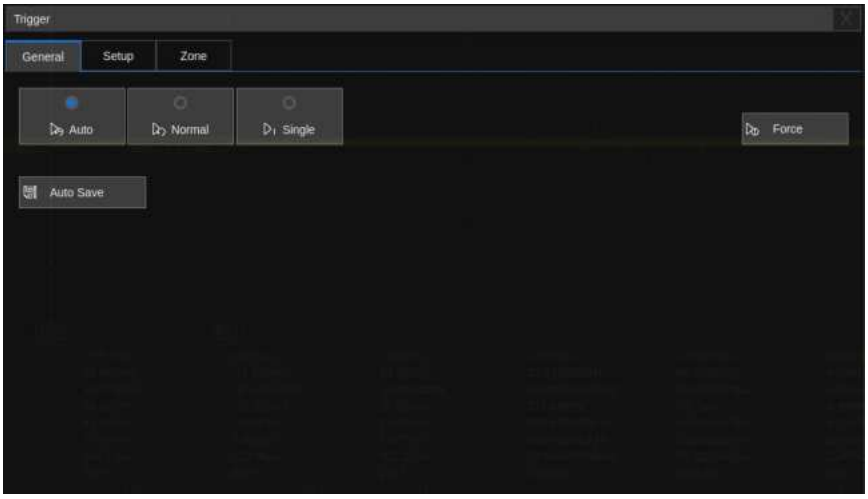
Trigger level Indicator



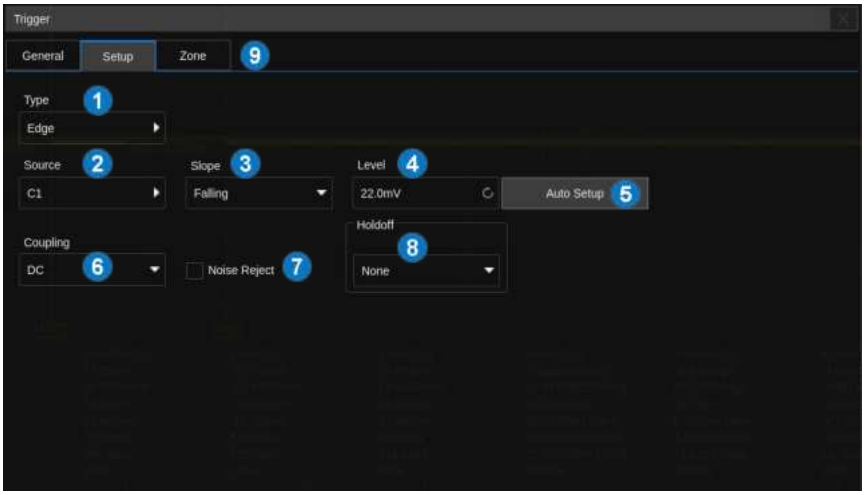
Horizontal 0 position Indicator

Horizontal position (offscreen) Indicator

Click the menu bar trigger or the trigger descriptor box to open the trigger settings dialog box:

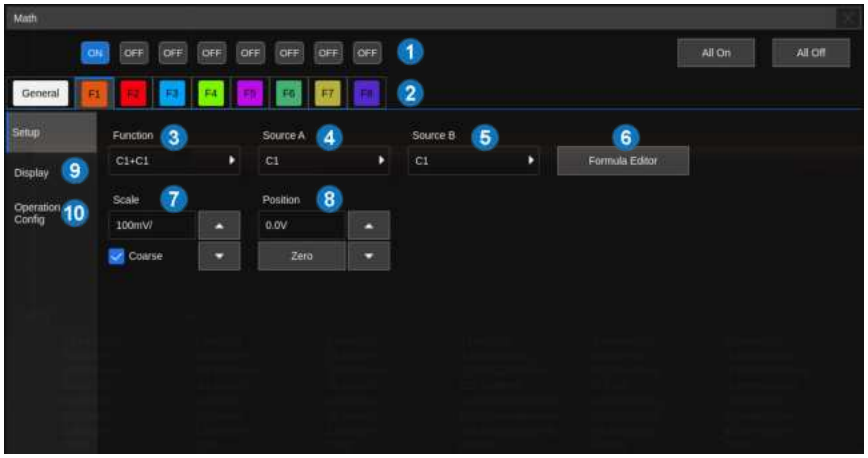


The trigger mode can be set on the general page. “Auto” mode can be also set by pressing the **Auto** button on the front panel of SDS5000X HD. This is similar with the “Single” mode and “Normal” mode. Switch pages for more trigger settings:



1. Select trigger type
2. Select the trigger source
3. Select the trigger slope (When the trigger type is "Edge", "Slope" and other specific types)
4. Trigger level setting region. It can also be set by the ”Level” knob on the front panel
5. Automatically set the trigger level to the vertical center of the waveform
6. Set trigger coupling mode (DC / AC / LF Reject / HF Reject)
7. 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
8. Set holdoff (None / Time / Events)
9. Set the zone Trigger

Math



1. Turn on/off the math trace. Click All On / All Off to turn on/off all math traces
2. Tabs
3. Select operator
4. Select source A
5. Select source B
6. Open the formula editor
7. Click the region to set the vertical scale with the mouse wheel or virtual keypad. ▲ to increase the vertical scale and ▼ to decrease. The SDS5000X HD can also be set through the vertical scale knob. Check the Coarse box to coarsely adjust the vertical scale and uncheck to enable fine adjustment
8. Click the region to set the offset with the mouse wheel or virtual keypad. ▲ to increase the offset and ▼ to decrease. The SDS5000X HD can also be set through the vertical position knob. Click Zero to set the offset to zero
9. Display settings for math trace. Set labels and trace visible/hidden
10. Operator related settings

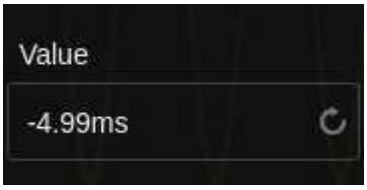
Measure & Statistics

1. Click Measure to open the measure setup dialog box.
2. Measurement parameters and statistics display area
3. Turn on/off measurement
4. Set the mode of measure: Simple or Advanced. "Simple" shows the specified basic measurement parameters of the selected channel. In "Advanced" mode, the measurement parameters can be added one by one as needed
5. Select the measurement result style
6. In advanced measurement, select the display mode (M1 can display up to 6 parameter measurements, M2 can display up to 12 parameter measurements)
7. Choose an amplitude calculation strategy which can measure top and bottom values with more accuracy
8. Threshold settings
9. Select measurement parameters and sources
10. Measurement Statistics Settings
11. Measurement track settings
12. Measurement trend settings

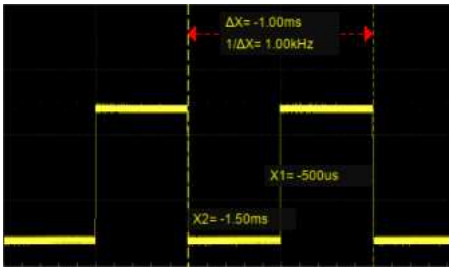
Cursors

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

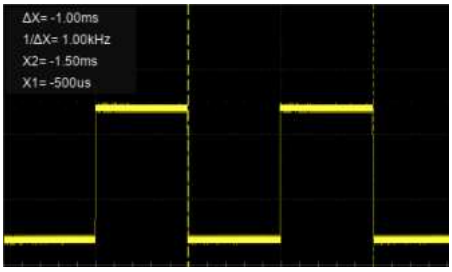
The cursors can be moved by touch gestures and mouse, Move the cursor position through the multifunctional knob on the front panel (As shown on the left in the figure below), press to change the currently moving cursor. For example, the currently moving cursor is MX1, press to switch to moving MX2, and so on. Gesture is quick but not precise, while knob is precise but not quick. It is recommended to combine gesture and knob: to use gesture to finish coarse move, and then use the knobs to finish fine move. If the user needs the cursor to precisely locate to a value, use the "Value" dialog box to directly input the value of the location (As shown on the right in the figure below).



The display mode of cursors



Following mode



Fixed mode

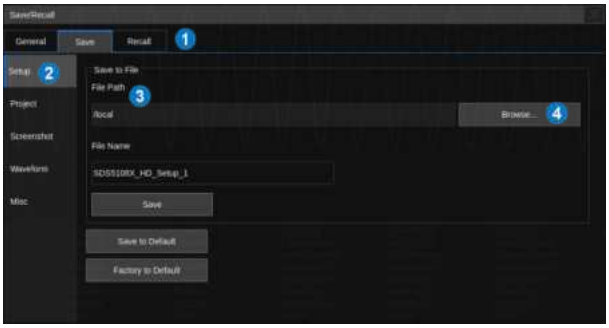
Memory Traces

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. Click + at the bottom and select M1 ~ M4 to set a memory trace.

1. Turn on/off the memory trace. Click All On / All Off to turn on/off all memory traces
2. Switch dialog box pages to set memory traces
3. Set the memory trace to be visible/hidden
4. Select the source (Channel / Zoom / Math / Memory / File). Click Import to save the trace of the selected source to the memory location
5. Click the region to set the vertical scale with the mouse wheel or virtual keypad. ▲ to increase the vertical scale and ▼ to decrease. The SDS5000X HD can also be set through the vertical scale knob. Check the Coarse box to coarsely adjust the vertical scale and uncheck to enable fine adjustment
6. Click the region to set the offset with the mouse wheel or virtual keypad. ▲ to increase the offset and ▼ to decrease. The SDS5000X HD can also be set through the vertical position knob. Click Default to set the vertical position as the value at the import time
7. Synchronize the horizontal parameters. When adjusting the horizontal scale or position of the source, memory trace will remain consistent
8. Click the region to set the horizontal scale with the mouse wheel or virtual keypad. ▲ to increase the scale and ▼ to decrease. The SDS5000X HD can also be set through the horizontal scale knob
9. Click the region to set the horizontal position with the mouse wheel or virtual keypad. ▲ to increase the position and ▼ to decrease. SDS5000X HD can also be set through the horizontal position knob. Click Default to set the horizontal position as the value at the import time
10. Set the label text of the memory trace
11. Display the memory information, including source, vertical and horizontal parameters, sampling rate, and length

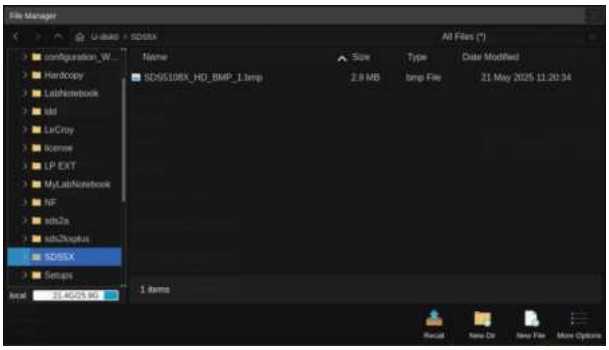
Save/Recall

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



1. Choose save or recall operation
2. Select the object type
3. Set the save path and file name
4. Recall the File Manager for further operations

File Manager and Quick Screenshot



Perform Utility > Print or pressing the Print button to capture the screen to a .bmp\ .jpg\ .png picture. The file will be saved in the path specified in the File Manager.

Calibration

The oscilloscope is calibrated at the factory before being shipped. The calibration is run at 23℃ (± 2℃) and is valid for temperatures 23 ± 5℃. 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 ± 5℃, 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 > System > 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.

Advanced Analysis Features

The instrument integrates a number of advanced analysis features to help users quickly characterize or debug systems. These features can be accessed on the Analysis menu. The brief introduction of the features is below. For detailed description, refer to the user manual.

Decode	The instrument supports automatic decode on serial bus protocols: I^2C, SPI, UART, CAN, LIN, FlexRay, CAN FD, I^2S, MIL-STD-1553B, SENT, and Manchester.
Power Analysis	Power analysis can help users quickly and easily analyze and debug switching power supply design. It automatically calculates Power Quality, Current Harmonics, Inrush Current, Switching Loss, Slew Rate, Modulation, Turn On/Turn Off, Transient Response, PSRR, Power Efficiency, Output Ripple, and SOA.
Double Pulse Test	Equipped with a waveform generator that supports dual pulse signals, it captures the waveform of the switching process, automatically measures parameters such as switching loss, switching time, energy loss, etc., and evaluates the dynamic characteristics of power devices.
Three Phase Power Analysis	Automatically measure and analyze the vector diagram, power quality, efficiency, etc. of three-phase electricity to simplify the testing of three-phase motors / inverters.
Bode Plot	This function provides a frequency response curve of the device-under-test as well as the interface for output sweep parameter control and data display settings.
Search	The instrument can search for the specified events in a frame. The location of the events is displayed with white triangle indicators. The Search function is based on hardware.
Navigate	Provides three navigation modes: Search Event, Time, and History Frame.
Mask Test	Users can create masks and define the mask shape used to evaluate Pass/Fail operations. An event violating the mask is defined as a failure and a pulse can be generated from the "Aux Out" port on the back panel. This is very useful to find and quantify anomalies in production tests or similar batch measurements.
Counter	The counter is used to measure the frequency and period of a signal or count the events happening within it. The counter is asynchronous to the acquisition system of the oscilloscope. It functions even if the acquisition of the oscilloscope is stopped.
Histogram	The instrument supports waveform histograms for observing probability distributions of the waveform in the specified region. The statistics can be performed in both horizontal and vertical directions.
DVM	The DVM (Digital Voltage Meter) function can be used to measure parameters such as DC and AC amplitudes. DVM is asynchronous to the acquisition system of the oscilloscope. Data sources for the DVM and the measurement function can be different.

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