

SDS5000X HD SDS5000L Series Digital Storage Oscilloscope



Data Sheet

EN01A

12-bit

HARDWARE



SIGLENT TECHNOLOGIES CO., LTD.

SDS5108X HD	SDS5106X HD
SDS5058X HD	SDS5056X HD
SDS5038X HD	SDS5036X HD
SDS5104X HD	SDS5108L
SDS5054X HD	SDS5058L
SDS5034X HD	SDS5038L

Product Overview

SIGLENT's SDS5000X HD and SDS5000L series high resolution Digital Storage Oscilloscopes are available in 4, 6 and 8 channels, bandwidths of 350 MHz, 500 MHz and 1 GHz, have 12-bit ADCs with sample rate up to 5 GSa/s, maximum record length of 2.5 Gpts/ch.

Both series employs Siglent's SPO technology with a maximum waveform capture rate of up to 160,000 wfm/s, 256-level intensity grading display function plus a color temperature display mode. It also employs an innovative digital trigger system with high sensitivity and low jitter. The trigger system supports multiple powerful triggering modes including serial bus triggering. Tools such as History waveform recording, Search and Navigate functions, Mask Test, Bode Plot, Power Analysis allow for extended waveform records to be captured, stored, and analyzed. An impressive array of measurement and math capabilities, as well as serial decoding are also features of them.

The SDS5000X HD employs a 12.1" capacitive touch screen and supports multi-touch gestures, with the addition of user-friendly UI design, can greatly improve the operational efficiency.

The SDS5000L is the low profile version, without display and digital channels. Combined with a 64-channel synchronization distributor (SYN64), multiple SDS5000L modules can be organized as a high-speed acquisition system with up to 512 channels. It can also be used as a stand-alone oscilloscope by being connected to an external display and a mouse.

Both the two series support remote web control over LAN. A complete SCPI command set over the standard 1000M LAN connection provides fast data acquisition to speed automated test applications.

Key Features

- ✚ 8/6/4 analog channels for SDS5000X HD and 8 channels for SDS5000L
- ✚ Up to 1 GHz bandwidth with up to 5 GSa/s sample rate
- ✚ 12-bit ADC
- ✚ Low noise floor: 140 μ Vrms @ 1 GHz bandwidth (typical)
- ✚ SPO technology
 - Waveform capture rates up to 160,000 wfm/s in normal mode and 650,000 wfm/s in sequence mode
 - Supports 256-level intensity grading and color temperature display modes
 - Up to 2.5 Gpts/ch waveform length
 - Digital trigger system
- ✚ Intelligent trigger: Edge, Slope, Pulse, Window, Runt, Interval, Dropout, Pattern, Qualified, Nth edge, Setup/hold, Delay and Video (HDTV supported). Zone Trigger simplifies advanced triggering
- ✚ Serial bus triggering and decoder, supports protocols including I²C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I²S, MIL-STD-1553B, SENT, Manchester and ARINC429
- ✚ Segmented acquisition (Sequence) mode, dividing the maximum record length into multiple segments (up to 170,000), according to trigger conditions set by the user, with a very small dead time between segments to capture the qualifying event
- ✚ History waveform record (History) function, the maximum recorded waveform length is 170,000 frames
- ✚ Automatic measurements on 60+ parameters, supports statistics with histogram, track, trend, gating measurement, and measurements on Math, History and Memory traces
- ✚ 8 Math traces (8 Mpts FFT, Filter, addition, subtraction, multiplication, division, integration, differential, square root, etc.), supports formula editor
- ✚ Abundant data analysis functions such as Search, Navigate, Digital Voltmeter, Counter, Waveform Histogram, Bode plot, Power Analysis and Double Pulse Test
- ✚ High Speed hardware-based Average, Hi-Res; High Speed hardware-based Mask Test function, with Mask Editor tool for creating user-defined masks
- ✚ 16 digital channels (only for SDS5000X HD)
- ✚ External 50 MHz waveform generator supported
- ✚ Large 12.1" TFT-LCD display with 1280 * 800 resolution; Capacitive touch screen supports multi-touch gestures (only for SDS5000X HD)
- ✚ Interfaces include: 2x USB Host 3.0 (1x for SDS5000L), USB 2.0 Host, USB 3.0 Device (USBTMC), 1000M LAN, HDMI, External Trigger In, Aux Out (Pass/Fail, Trigger Out), 10 MHz In, 10 MHz Out
- ✚ Built-in web server supports remote control over the LAN port using a web browser. Support SCPI remote control commands. Support external mouse and keyboard

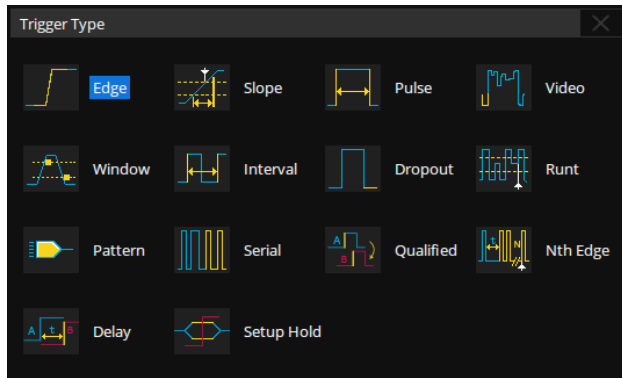
Models and Key Specifications

Model Channel	1 GHz	500 MHz	350 MHz
8	SDS5108X HD SDS5108L	SDS5058X HD SDS5058L	SDS5038X HD SDS5038L
6	SDS5106X HD	SDS5056X HD	SDS5036X HD
4	SDS5104X HD	SDS5054X HD	SDS5034X HD

Model	SDS5108X HD SDS5106X HD SDS5104X HD SDS5108L	SDS5058X HD SDS5056X HD SDS5054X HD SDS5058L	SDS5038X HD SDS5036X HD SDS5034X HD SDS5038L
Analog channels	8/6/4 + EXT		
Bandwidth	1 GHz	500 MHz	350 MHz
Sample rate (Max.)	5 GSa/s (quarter channel/half channel mode) 2.5 GSa/s (full channel mode)		
Vertical Resolution	12-bit Up to 16-bit in HiRes mode		
Memory depth (Max.)	2.5 Gpts/ch (quarter channel mode) 1 Gpts/ch (half channel mode) 500 Mpts/ch (full channel mode)		
Waveform capture rate (Max.)	Normal mode: Up to 160,000 wfm/s; Sequence mode: Up to 650,000 wfm/s		
Trigger type	Edge, Slope, Pulse width, Window, Runt, Interval, Dropout, Pattern, Video, Qualified, Nth edge, Setup/hold, Delay, Serial		
Serial trigger and decode	Standard: I ² C, SPI, UART, CAN, LIN Optional: CAN FD, FlexRay, I ² S, MIL-STD-1553B, SENT, Manchester (decode only), ARINC429		
Measurement	60+ parameters. Statistics, histogram, trend, and track supported		
Math	8 traces 8 Mpts FFT, +, -, x, ÷, ∫dt, d/dt, √, Identity, Negation, Absolute, Sign, e ^x , 10 ^x , ln, lg, Interpolation, MaxHold, MinHold, ERES, Average, Filter. Supports formula editor		
Data analysis	Search, Navigate, History, Mask Test, Digital Voltmeter, Counter, Waveform Histogram, Bode plot, Power Analysis, Double Pulse Test		
Waveform generator (optional)	SAG1021I USB isolated waveform generator module, frequency up to 50 MHz, 125 MSa/s sample rate, 16 kpts waveform memory		
Probe (Standard)	500 MHz, 1 probe supplied for each channel		

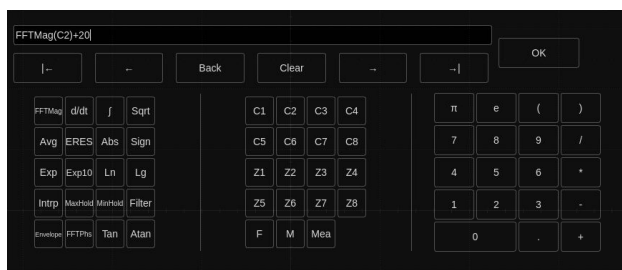
Series	SDS5000X HD	SDS5000L
Display	12.1" TFT-LCD with capacitive touch screen (1280*800)	None
Digital channel	16-channel; maximum sample rate up to 1.25 GSa/s; record length up to 250 Mpts	None
I/O	I/O: 2x USB 3.0 Host, USB 2.0 Host, USB 3.0 Device (USBTMC), 1000M LAN (VXI-11+SCPI, Telnet (5024)+SCPI, Socket (5025)+SCPI, LXI, WebServer) Display: HDMI Others: External Trigger In, Aux Out (TRIG OUT, PASS/FAIL), 10 MHz In, 10 MHz Out	I/O: USB 3.0 Host, USB 2.0 Host, USB 3.0 Device (USBTMC), 1000M LAN (VXI-11+SCPI, Telnet (5024)+SCPI, Socket (5025)+SCPI, LXI, WebServer) Display: HDMI Others: External Trigger In, Aux Out (TRIG OUT, PASS/FAIL), 10 MHz In, 10 MHz Out

Multiple Trigger Functions



Edge, Slope, Pulse, Video, Windows, Runt, Interval, Dropout, Pattern, Qualified, Nth edge, Setup/hold, Delay and serial trigger

Advanced Math Function



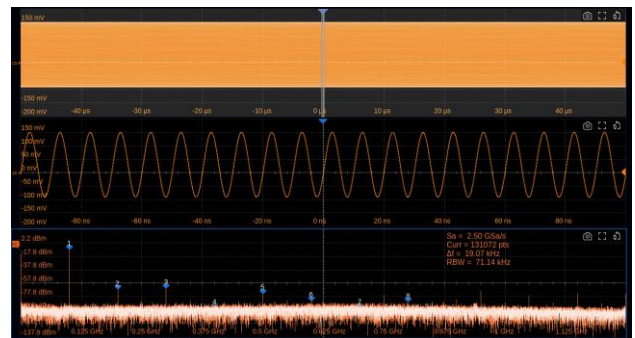
In addition to the traditional (+, -, X, /) operations, FFT, Filter, integration, differential, square root, and more are supported. Formula Editor is available for more complex operations. 8 math traces are available.

Zone Trigger



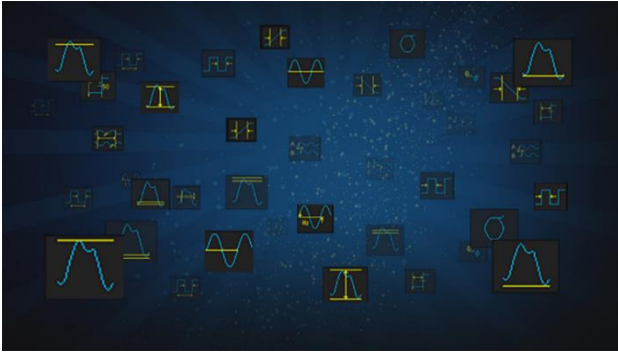
Zone Trigger is available for advanced triggering. Combine spatial triggering with common trigger modes to isolate signals of interest

Deep Memory FFT



FFT supports up to 8 Mpts operation. This provides high-frequency resolution with a fast refresh rate. The FFT function also supports a variety of window functions so that it can adapt to different spectrum measurement needs. Three modes (Normal, Average, and Max hold) can satisfy different requirements for observing the power spectrum. Auto peak detection and markers are supported.

Measurements of a Variety of Parameters



Parameter measurements include 4 categories: horizontal, vertical, miscellaneous, and CH delay providing a total of 60+ different types of measurements. Measurements can be performed within a specified gate period. Measurements on Math, Reference, and History frames are supported

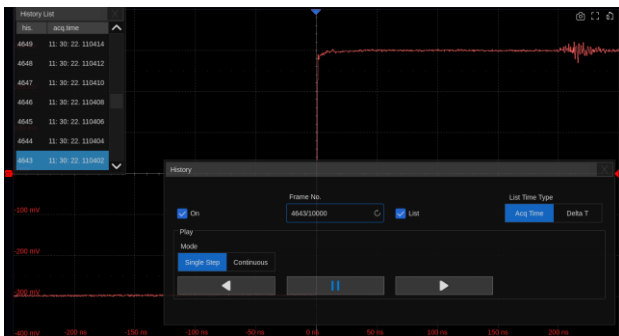
Parameter Statistics Function



Statistics show the current value, maximum value, minimum value, standard deviation, and mean value of up to 12 parameters simultaneously. A histogram is available to show the probability distribution of a parameter. Trend and Track are available to show the parameter value vs. time.

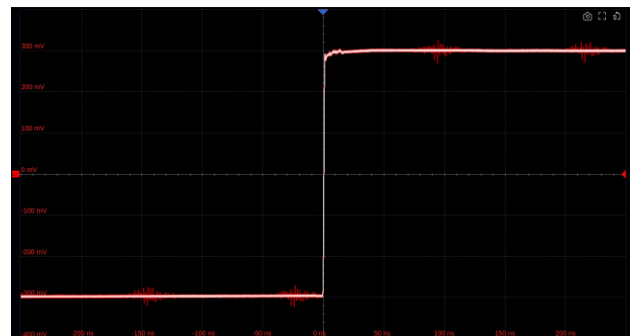
For horizontal parameters such as period, all results are extracted from a frame, instead of just calculating the first one. This accelerates statistics on horizontal measurements and enables distribution observation in a frame using Histogram and Track

History Mode



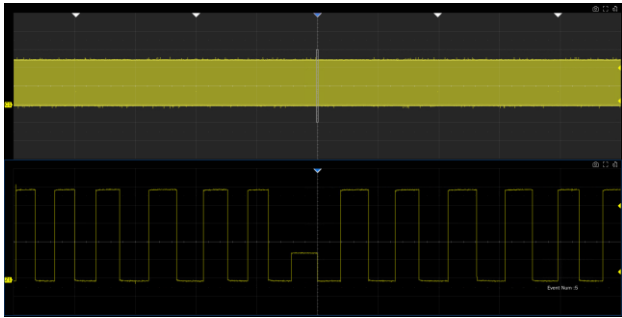
History function can record up to 170,000 frames of waveforms. The recording is executed automatically so that the customer can playback the history waveforms at any time to observe unusual events and quickly locate the area of interest using the cursors or measurements. The failed frames of the Mask Test can be stored as history

Sequence Mode



Segmented memory collection will store the waveform into multiple memory segments (up to 170,000) and each segment will store a triggered waveform as well the dead time information. The interval between segments can be as small as 1.5 μ s. All of the segments can be played back using the History function

Search and Navigate



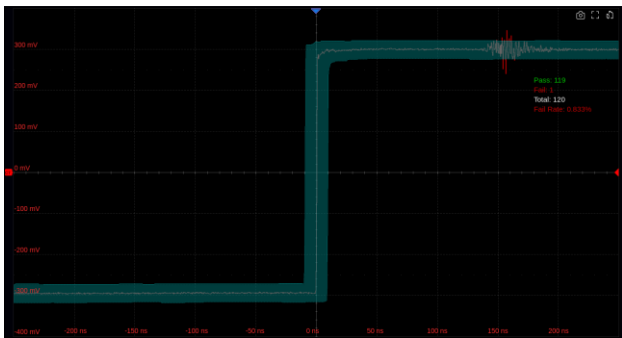
The oscilloscope can search events specified by the user in a frame based on hardware. Events flagged by the Search can be recalled automatically using Navigate. It can also navigate by time (delay position) and history frames

Serial Bus Decode

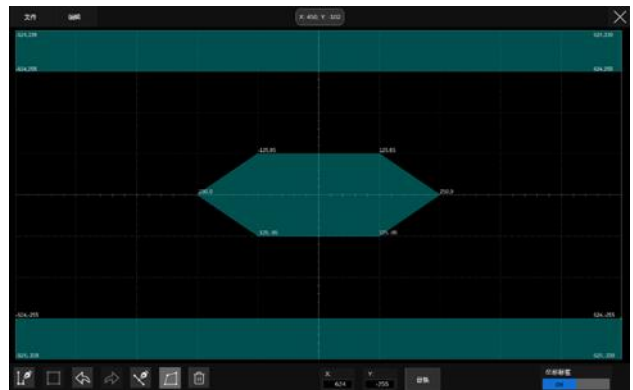


Display the decoded characters through the events list. Bus protocol information can be quickly and intuitively displayed in tabular form. I²C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I²S, MIL-STD-1553B, SENT, Manchester, and ARINC429 are supported

Hardware-based High Speed Mask Test Function



The oscilloscope utilizes a hardware-based Mask Test function, performing up to 28,000 Pass / Fail decisions each second. It is easy to generate user-defined test templates to provide trace mask comparisons, making it suitable for long-term signal monitoring or automated production line testing



Built-in Mask Editor application helps to create custom masks

Excellent User Interface and User Experience

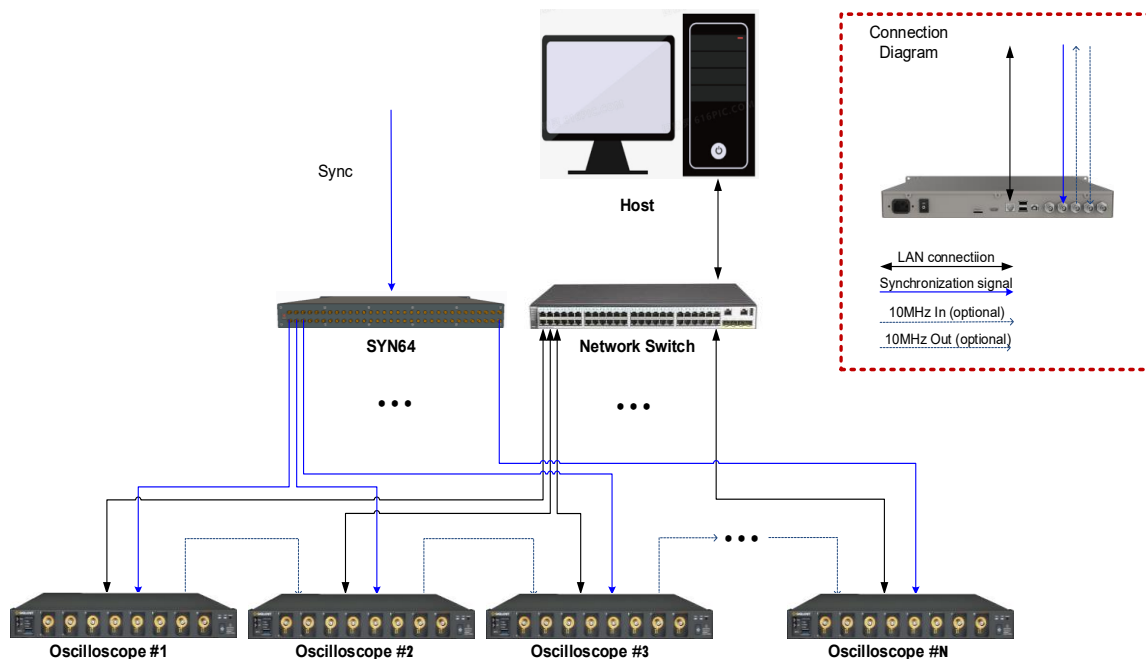


12.1" capacitive touch screen on the SDS5000X HD, supporting multi-touch gestures, can move or scale the waveform traces quickly by finger-touch movements, which greatly improves the operational efficiency

Built-in WebServer supports remote control on a web page over LAN

Supports external display, mouse and keyboard

Flexible Multi-channel High-speed Acquisition System with the SDS5000L



Standard sizes: 1U height

Multiple units are combined to create a high-speed acquisition system with up to 512 channels by being triggered with low-skew synchronization signals from the 64-channel synchronization distributor SYN64

The host can access each unit over 1000M LAN. A complete SCPI command set as well as LabVIEW and IVI drivers are provided for easy data acquisition. The LAN port is LXI compliant.

Sample clocks are synchronized between all units in the test system by cascading the 10 MHz In and 10 MHz Out clocks in a daisy chain

Specifications

All specifications are not guaranteed unless the following conditions are met:

- The oscilloscope calibration period is current
- The oscilloscope has been working continuously for at least 30 minutes at the specified temperature (18°C ~ 28°C)

Acquire (analog)	
Sample rate	5 GSa/s (quarter channel/half channel mode) ^{*1} 2.5 GSa/s (full channel mode)
Memory depth ^{*2}	2.5 Gpts/ch (quarter channel mode) 1 Gpts/ch (half channel mode) 500 Mpts/ch (full channel mode)
Real time signal processing depth	Measure, math, decode, analysis: 100 Mpts/ch max.
Waveform update rate	160,000 wfm/s, 650,000 wfm/s in sequence mode
Intensity grading	256-level
Peak detect	500 ps
Average	4, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192
Hi-Res	Enhanced bit: 1, 2, 3, 4 bits
Sequence	Up to 170,000 segments, interval between triggers = 1.5 μ s min.
History	Up to 170,000 frames
Interpolation	sinx/x, x

* 1: Divide C1 – C8 to two groups, C1 – C4 as group 1 and C5 – C8 as group 2.

quarter channel: in both groups at most one channel is turned on

half channel: in one group two channels are turned on and in the other group at most two channels are turned on

full channel: in any group at least three channels are turned on

* 2: In Average and Hi-Res modes, the memory depth is 25 Mpts/ch in full channel mode and 50 Mpts/ch in quarter channel/half channel mode

Vertical (analog)	SDS5108X HD SDS5106X HD SDS5104X HD SDS5108L	SDS5058X HD SDS5056X HD SDS5054X HD SDS5058L	SDS5038X HD SDS5036X HD SDS5034X HD SDS5038L
Channel	8/6/4 + EXT		
Bandwidth (-3dB) @ 50 Ω	1 GHz	500 MHz	350 MHz
Rise time@50 Ω	460 ps typical	610 ps typical	830 ps typical
Bandwidth (-3dB) @ 1 M Ω	500 MHz	500 MHz	350 MHz
Resolution	12-bit		
Bandwidth in Hi-Res mode (typical)	Enhanced bits: 1: 0.25*Sample rate, up to the analog bandwidth 2: 0.115*Sample rate, up to 575 MHz, limited by the analog bandwidth 3: 0.055*Sample rate, up to 275 MHz 4: 0.028*Sample rate, up to 140 MHz		
Noise floor (rms,50 Ω ,typical)			
≤ 5 mV/div	140 μ V	120 μ V	100 μ V
ENOB ^{*1} (typical)	8.2-bit	8.4-bit	8.6-bit

Range	8 divisions
Vertical scale (probe 1X)	1 M Ω : 0.5 mV/div – 10 V/div. 2 μ V/div – 10 V/div in Zoom mode 50 Ω : 0.5 mV/div – 1 V/div. 2 μ V/div – 1 V/div in Zoom mode
DC gain accuracy	0.5 mV/div ~ 4.95 mV/div: $\pm 1.5\%$ FS 5 mV/div ~ 10 V/div: $\pm 1\%$ FS max. $\pm 0.5\%$ FS typical
Offset accuracy	$\pm (1\%$ of the offset setting + 0.5% of full scale + 0.02% of max offset + 1 mV)
Offset range (probe 1X)	1 M Ω : 0.5 mV/div ~ 5 mV/div: ± 1.6 V; 5.1 mV/div ~ 10 mV/div: ± 4 V; 10.2 mV/div ~ 20 mV/div: ± 8 V; 20.5 mV/div ~ 100 mV/div: ± 16 V; 102 mV/div ~ 200 mV/div: ± 80 V; 205 mV/div ~ 1 V/div: ± 160 V; 1.02 V/div ~ 10 V/div: ± 400 V 50 Ω : 0.5 mV/div ~ 5 mV/div: ± 1.6 V; 5.1 mV/div ~ 10 mV/div: ± 4 V; 10.2 mV/div ~ 20 mV/div: ± 8 V; 20.5 mV/div ~ 1 V/div: ± 10 V
Bandwidth limit	20 MHz $\pm 20\%$, 200 MHz $\pm 20\%$
Low frequency response (AC coupling -3 dB)	6 Hz (typical)
Coupling	DC, AC, GND
Impedance	1 M Ω : SDS5000X HD: (1 M $\Omega \pm 2\%$) (17 pF ± 3 pF), SDS5000L: (1 M $\Omega \pm 2\%$) (18 pF ± 3 pF) 50 Ω : 50 $\Omega \pm 1\%$
Max. Input voltage	1 M $\Omega \leq 400$ Vpk(DC + AC), DC ~ 10 kHz 50 $\Omega \leq 5$ Vrms, ± 10 V Peak
SFDR	≥ 45 dBc
CH to CH Isolation (@50 Ω)	60 dB
Probe Attenuation	1X, 10X, 100X, custom

* 1: 50 Ω , 50 mV/div, 5 GSa/s, -1dBFS/12 MHz input

Horizontal	SDS5108X HD SDS5106X HD SDS5104X HD SDS5108L	SDS5058X HD SDS5056X HD SDS5054X HD SDS5058L	SDS5038X HD SDS5036X HD SDS5034X HD SDS5038L
Time scale	0.2 ns/div – 1000 s/div	0.5 ns/div – 1000 s/div	1 ns/div – 1000 s/div
Range	10 divisions		
Display mode	Y-T, X-Y, Roll		
Roll mode	≥ 50 ms/div		
Skew (C1 ~ C8)	± 100 ps		
Time base Accuracy	± 2 ppm initial (0~50°C); ± 0.5 ppm 1st year aging; ± 3 ppm 20-year aging		

Trigger	
Mode	Auto, Normal, Single
Level	Internal: ± 4.5 div from the center of the screen EXT: ± 0.61 V EXT/5: ± 3.05 V
Ext Trigger Channel input voltage	1 M $\Omega \leq 42$ Vpk 50 $\Omega \leq 5$ Vrms

Hold off range	By time: 8 ns ~ 30 s (8 ns step) By event: 1 ~ 10 ⁸			
Coupling	C1 ~ C8 DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 15 Hz LFRJ: Attenuates the frequency components below 2.4 MHz HFRJ: Attenuates the frequency components above 1.3 MHz Noise RJ: Increases the trigger hysteresis EXT DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 18 Hz LFRJ: Attenuates the frequency components below 7.5 kHz HFRJ: Attenuates the frequency components above 250 kHz			
Accuracy (typical)	C1 ~ C8: ±0.2 div EXT: ±0.3 div			
Sensitivity	C1 ~ C8		Noise RJ = OFF	Noise RJ = ON
		> 2 mV/div	0.52 div	0.66 div
		≤ 2 mV/div	1 div	1 div
	EXT:	200 mVpp, DC ~ 10 MHz 300 mVpp, 10 MHz ~ bandwidth (300 MHz)		
	EXT/5:	1 Vpp, DC ~ 10 MHz 1.5 Vpp, 10 MHz ~ bandwidth (300 MHz)		
Jitter	C1 ~ C8: < 10 ps RMS (typical) for ≥ 300 MHz frequency, ≥ 6 divisions peak to peak amplitude for vertical gain settings from 2.5 mV/div to 10 V/div EXT: < 200 ps rms			
Displacement	Pre-Trigger: 0 ~ 100% memory Delay-Trigger: 0 ~ 10,000 div			
Zone	Up to 2 zones Source: C1 ~ C8 Property: Intersect, Not Intersect			
Edge Trigger				
Source	C1 ~ C8/EXT/(EXT/5)/AC Line/D0 ~ D15			
Slope	Rising, Falling, Rising & Falling			
Slope Trigger				
Source	C1 ~ C8			
Slope	Rising, Falling			
Limit range	<, >, in range, out of range			
Time range	2 ns ~ 20 s, Resolution = 1 ns			
Pulse Width Trigger				
Source	C1 ~ C8/D0 ~ D15			
Polarity	+wid, -wid			
Limit range	<, >, in range, out of range			
Time range	2 ns ~ 20 s, Resolution = 1 ns			
Video Trigger				

Source	C1 ~ C8
Standard	NTSC, PAL, 720p/50, 720p/60, 1080p/50, 1080p/60, 1080i/50, 1080i/60, Custom
Synchronization	Any, Select
Trigger Condition	Line, Field
Window Trigger	
Source	C1 ~ C8
Window type	Absolute, Relative
Interval Trigger	
Source	C1 ~ C8/D0 ~ D15
Slope	Rising, Falling
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Dropout Trigger	
Source	C1 ~ C8/D0 ~ D15
Timeout type	Edge, State
Slope	Rising, Falling
Time range	2 ns ~ 20 s, Resolution = 1 ns
Runt Trigger	
Source	C1 ~ C8
Polarity	Positive, Negative
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Pattern Trigger	
Source	C1 ~ C8/D0 ~ D15
Pattern Setting	Don't Care, Low, High
Logic	AND, OR, NAND, NOR
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Qualified Trigger	
Type	State, State with Delay, Edge, Edge with Delay
Qualified Source	C1 ~ C8/D0 ~ D15
Edge Trigger Source	C1 ~ C8/D0 ~ D15
Nth Edge Trigger	
Source	C1 ~ C8/D0 ~ D15
Slope	Rising, Falling
Idle time	8 ns ~ 20 s, Resolution = 1 ns
Edge Number	1 ~ 65535
Delay Trigger	
Source A	C1 ~ C8/D0 ~ D15
Source B	C1 ~ C8/D0 ~ D15

Slope	Rising, Falling
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Serial Trigger	
Source	C1 ~ C8/D0 ~ D15
Protocol	Standard: I ² C, SPI, UART, CAN, LIN Optional: CAN FD, FlexRay, I ² S, MIL-STD-1553B, SENT, ARINC429
I ² C	Type: Start, Stop, Restart, No Ack, EEPROM, Address & Data, Data Length
SPI	Type: Data
UART	Type: Start, Stop, Data, Parity Error
CAN	Type: All, Remote, ID, ID+Data, Error
LIN	Type: Break, Frame ID, ID+Data, Error
CAN FD (Optional)	Type: Start, Remote, ID, ID+Data, Error
FlexRay (Optional)	Type: TSS, Frame, Symbol, Errors
I ² S (Optional)	Type: Data, Mute, Clip, Glitch, Rising Edge, Falling Edge
MIL-STD-1553B (Optional)	Type: Transfer, Word, Error, Timing
SENT (Optional)	Type: Start, Slow channel, Fast channel, Error
ARINC429 (Optional)	Type: Word Start, Word End, Label, Label+Data, Error, Any Bit, Any Bit of 0, Any Bit of 1

Serial Decoder	
Decoders	2
Threshold	-4.1 ~ 4.1 div
List	1 ~ 7 lines
Decoder type	Full duplex
I²C	
Source	C1 ~ C8/D0 ~ D15
Signal	SCL, SDA
Address	7-bit, 10-bit
SPI	
Source	C1 ~ C8/D0 ~ D15
Signal	CLK, MISO, MOSI, CS
Edge Select	Rising, Falling
Chip select	Active high, Active low, Clock timeout
Bit Order	LSB, MSB
UART	
Source	C1 ~ C8/D0 ~ D15
Signal	RX, TX
Data Width	5-bit, 6-bit, 7-bit, 8-bit
Parity Check	None, Odd, Even, Mark, Space
Stop Bit	1-bit, 1.5-bit, 2-bit

Idle Level	Low, High
Bit Order	LSB, MSB
CAN	
Source	C1 ~ C8/D0 ~ D15
LIN	
LIN Version	Ver 1.3, Ver 2.0
Source	C1 ~ C8/D0 ~ D15
Baud Rate	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, Custom
CAN FD (Optional)	
Source	C1 ~ C8/D0 ~ D15
Nominal Baud Rate	10 kbps, 25 kbps, 50 kbps, 100 kbps, 250 kbps, 1 Mbps, Custom
Data Baud Rate	500 kbps, 1 Mbps, 2 Mbps, 5 Mbps, 8 Mbps, 10 Mbps, Custom
FlexRay (Optional)	
Source	C1 ~ C8/D0 ~ D15
Baud Rate	2.5 Mbps, 5 Mbps, 10 Mbps, Custom
I²S (Optional)	
Source	C1 ~ C8/D0 ~ D15
Signal	BCLK, WS, DATA
Audio Variant	Audio-I2S, Audio-LJ, Audio-RJ
Start Bits	0~31
Data Bits	1~32
MIL-STD-1553B (Optional)	
Source	C1 ~ C8
SENT (Optional)	
Source	C1 ~ C8/D0 ~ D15
Manchester (Optional)	
Source	C1 ~ C8
Baud Rate	500 bps~5 Mbps
ARINC429 (Optional)	
Source	C1 ~ C8
Baud Rate	12.5 kbps~100 kbps, tolerance 1%~20%
Word format	L/SDI/D/SSM, L/D/SSM, L/D

Measurement	
Automatic Measurement	
Source	C1 ~ C8, D0 ~ D15, Z1 ~ Z8, F1 ~ F8, M1 ~ M4, History
Mode	Simple, Advanced
Range	Screen Gated: inside screen, definable with separate Gate cursors
Custom Threshold	Upper, Middle, Lower
No. of Measurements	Display 12 measurements at the same time (Display mode = M2)

Vertical Parameters	Max, Min, Pk-Pk, Top, Base, Amplitude, Mean, Cycle Mean, Stdev, Cycle Stdev, RMS, Cycle RMS, Median, Cycle Median, FOV, FPRE, ROV, RPRE, Level@Trigger, UpperLower
Horizontal Parameters	Period, Frequency, Time@max, Time@min, +Width, -Width, 10-90%Rise time, 90-10%Fall time, Rise time, Fall time, +Burst Width, -Burst Width, +Duty Cycle, -Duty Cycle, Delay, Time@Middle, Cycle-Cycle jitter
Miscellaneous Parameters	+Area@DC, -Area@DC, Area@DC, Absolute Area@DC, +Area@AC, -Area@AC, Area@AC, Absolute Area@AC, Cycles, Rising Edges, Falling Edges, Edges, Positive pulses, Negative pulses, Positive Slope, Negative Slope
Delay Parameters	Phase, FRFR, FRFF, FFFR, FFFF, FRLR, FRLF, FFLR, FFLF, Skew, tsu@R, tsu@F, th@R, th@F, Δ time1~4
Statistics	Current, Mean, Min, Max, Sdev, Count; Histogram, Trend, Track
Statistics Count	Unlimited, 1 ~ 1024
Statistics Count in one frame	Up to 100,000
Cursors	
Source	C1 ~ C8, Z1 ~ Z8, D0 ~ D15, F1 ~ F8, M1 ~ M4, Histogram
Type	Manual : Time MX1-MX8; Vertical MY1-MY8 Track: TX1-TX8 Measure: MEA1-MEA4, indicate the measurement on specific parameter XY: XY_X1, XY_X2, XY_Y1, XY_Y2

Math	
Trace	F1 ~ F8
Source	C1 ~ C8, F1 ~ F8, M1 ~ M4
Operation	FFT, +, -, x, $\div$, fdt, d/dt, $\sqrt{\quad}$, Identity, Negation, x , Sign, ex, 10x, ln, lg, Interpolation, Max hold, Min hold, Delay, Envelope, ERES, Average, Filter, Formula Editor
FFT	Operators: FFT Magnitude, FFT Phase Length: 8 Mpts, 4 Mpts, 2 Mpts, 1 Mpts, 512 kpts, 256 kpts, 128 kpts, 64 kpts, 32 kpts, 16 kpts, 8 kpts, 4 kpts, 2 kpts Window: Rectangular, Blackman, Hanning, Hamming, Flattop, Gaussian, Blackman-Harris Mode: Normal, Max hold, Average Tools: Peaks, Markers

Analysis	
Search	
Source	C1 ~ C8, History
Mode	Edge, Slope, Pulse, Interval, Runt
Copy setting	Copy from trigger, Copy to trigger
Navigate	
Type	Search event, Time, History frame
Mask Test	
Source	C1 ~ C8, Z1 ~ Z8
Mask creating	Auto (Create mask), Customized (Mask Editor)
Mask test speed	Up to 28,000 frames/s

DVM	
Source	C1 ~ C8
Mode	DC mean, DC RMS, AC RMS, Peak-peak, Amplitude
Plot	Bar, Histogram, Trend
Gate	20 ms
Bode Plot	
Source	C1 ~ C8
Supported signal sources	SAG1021I (Connection: USB), SDG series waveform generators (Connection: USB, LAN)
Sweep type	Simple, Vari-level
Frequency	Mode: Linear, Logarithmic Range: 10 Hz ~ 120 MHz
Measure	Upper cutoff frequency, Lower cutoff frequency, Bandwidth, Gain margin, Phase margin
Power Analysis (optional)	
Measure	Power quality, Current Harmonics, Inrush current, Switching loss, Slew rate, Modulation, Output ripple, Turn on/turn off, Transient response, PSRR, Efficiency, SOA
TPPA (3-phase Power Analysis, optional)	
Measure	Power quality, Harmonics, Ripple, Efficiency
Chart	Track, Trend, Phasor diagram
Double Pusle Test	
Measure	Switching parameter analysis, Switching timing analysis, Dialog recovery analysis, Capacitance analysis
Histogram	
Source	C1 ~ C8
Type	Horizontal, Vertical, Both
Counter	
Source	C1 ~ C8
Frequency resolution	7 digits
Totalizer	Counter on edges, supports Gate and Trigger

Digital Channels (Only for SDS5000X HD)	
Max. Sampling Rate	1.25 GSa/s
Memory Depth	250 Mpts/ch
Min. Detectable Pulse Width	3.3 ns
Level Group	D0 ~ D7, D8 ~ D15
Level Range	-10 V ~ 10 V
Logic Type	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, Custom
Skew	D0 ~ D15: ± 1 sampling interval Digital to Analog: $\pm (1 \text{ sampling interval} + 1 \text{ ns})$

Waveform Generator (Optional)	
Channels	1
Max. Output Frequency	50 MHz
Sampling Rate	125 MSa/s
Frequency Resolution	1 μ Hz
Frequency Accuracy	± 50 ppm
Vertical Resolution	14 bit
Amplitude Range	-1.5 V ~ +1.5 V (into 50 Ω) -3 V ~ +3 V (into High-Z)
Waveforms	Sine, Square, Ramp, Pulse, DC, Noise, 45 Arbitrary
Output Impedance	50 $\Omega \pm 2\%$
Protection	Over voltage protection, Current limit
Isolated voltage	± 42 Vpk
Sine	
Frequency	1 μ Hz ~ 50 MHz
Offset accuracy (10 kHz)	$\pm (1\% \times \text{offset setting value} + 3 \text{ mVpp})$
Amplitude flatness	± 0.3 dB, compare to 10 kHz, 2.5 Vpp into 50 Ω
SFDR	DC ~ 1 MHz -60 dBc 1 MHz ~ 5 MHz -55 dBc 5 MHz ~ 25 MHz -50 dBc
Harmonic distortion	DC ~ 5 MHz -50 dBc 5 MHz ~ 25 MHz -45 dBc
Square/Pulse	
Frequency	1 μ Hz ~ 10 MHz
Duty cycle	1% ~ 99%
Edge	< 24 ns (10% ~ 90%)
Overshoot	< 3% (typical, 1 kHz, 1 Vpp)
Pulse width	> 50 ns
Jitter (cycle-cycle)	< 500 ps + 10 ppm
Ramp	
Frequency	1 μ Hz ~ 300 kHz
Linearity	< 0.1% of Pk-Pk (typical, 1 kHz, 1 Vpp, 50% symmetry)
Channels	0% ~ 100%
DC	
Offset range	± 1.5 V (into 50 Ω) ± 3 V (into Hi-Z)
Accuracy	$\pm (\text{setting value} \times 1\% + 3 \text{ mV})$
Noise	
Bandwidth (-3 dB)	> 50 MHz
Arb	
Frequency	1 μ Hz ~ 5 MHz

Waveform memory	16 kpts
Sample rate	125 MSa/s
Wave import	From EasyWaveX, from U-disk, directly from waveform data of analog channels

I/O (SDS5000X HD)	
Front	2x USB 3.0 Host, Calibration signal for passive probe: 1 kHz, 3 V Square
Rear	USB 2.0 Host, USB 2.0 Device (USBTMC) , 1000M LAN, External trigger in, EXT: ≤ 1.5 Vrms, EXT/5: ≤ 7.5 Vrms, Aux out: TRIG OUT(3.3 V LVCMOS), PASS/FAIL OUT(3.3 V TTL), 10 MHz In, 10 MHz Out HDMI video output
I/O (SDS5000L)	
Front	USB 3.0 Host, Calibration signal for passive probe: 1 kHz, 3 V Square
Rear	USB 2.0 Host, USB 2.0 Device (USBTMC) , 1000M LAN, External trigger in, EXT: ≤ 1.5 Vrms, EXT/5: ≤ 7.5 Vrms, Aux out: TRIG OUT(3.3 V LVCMOS), PASS/FAIL OUT(3.3 V TTL), 10 MHz In, 10 MHz Out HDMI video output

Display (Only for SDS5000X HD)	
Display Type	12.1" TFT LCD with capacitive touch screen
Resolution	1280×800

Display Setting	
Range	8 x 10 grid
Multiple-window	1x1, 2x1, 4x1, 1x2, 2x2, 4x2, 3x3
Display Type	Dot, Vector
Persistence Time	OFF, 0.1 s, 0.2 s, 0.5 s, 1 s, 5 s, 10 s, 30 s, infinite
Color Display	Normal, Color; Supports customer trace color
Language	Simplified Chinese, Traditional Chinese, English, French, Japanese, German, Spanish, Russian, Italian, Portuguese
Built-in Help System	Simplified Chinese, English

Environmental	
Temperature	Operating: 0 °C ~ 50 °C Non-operating: -30 °C ~ 70 °C
Humidity	Operating: 5% ~ 90%RH, 30°C, degraded to 50%RH at 50 °C Non-operating: 5% ~ 95%
Altitude	Operating: $\leq 3,000$ m, 25 °C Non-operating: $\leq 15,000$ m

Electromagnetic Compatibility	Meets EMC directive (2014/30/EU), meets or exceeds IEC 61326-1:2012/EN61326-1:2013 (Basic)		
	Conducted disturbance	CISPR 11/EN 55011	CLASS A group 1 150 kHz–30 MHz
	Radiated disturbance	CISPR 11/EN 55011	CLASS A group 1 30 MHz–1 GHz
	Electrostatic discharge (ESD)	IEC 61000-4-2/EN 61000-4-2	4.0 kV (Contact), 8.0 kV (Air)
	Radio-frequency electromagnetic field Immunity	IEC 61000-4-3/EN 61000-4-3	10 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 2 GHz); 1 V/m (2.0 GHz to 2.7GHz)
	Electrical fast transients (EFT)	IEC 61000-4-4/EN 61000-4-4	2kV (Input AC Power Ports)
	Surges	IEC 61000-4-5/EN 61000-4-5	1kV (Line to line) 2kV (Line to ground)
	Radio-frequency continuous conducted Immunity	IEC 61000-4-6/EN 61000-4-6	3 V, 0.15–80MHz
	Voltage dips and interruptions	IEC 61000-4-11/EN 61000-4-11	Voltage Dips: 0% UT during 1 cycle; 40% UT during 10/12 cycles; 70% UT during 25/30 cycles Voltage interruptions: 0% UT during 250/300 cycles
Safety	UL 61010-1:2012/R: 2018-11; CAN/CSA-C22.2 No. 61010-1:2012/A1:2018-11. UL 61010-2-030:2018; CAN/CSA-C22.2 No. 61010-2-030:2018.		
RoHS	EU 2015/863		

Power Supply	
Input Voltage & Frequency	100 ~ 240 Vrms 50/60Hz
Power consumption	200 W max., 123 W typical, 4 W typical in standby mode

Mechanical (SDS5000X HD)	
Dimensions	Width × Height × Depth = 379mm×288mm×159mm
Weight	Net Weight 5.5 kg, Gross Weight 7.1 kg
Mechanical (SDS5000L)	
Dimensions	Width × Height × Depth = 395mm×43.15mm×413.85mm
Weight	Net Weight 6.2 kg, Gross Weight 10.7 kg

Ordering Information

Model	Description
SDS5108X HD	8-ch, 1 GHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5058X HD	8-ch, 500 MHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5038X HD	8-ch, 350 MHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5106X HD	6-ch, 1 GHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5056X HD	6-ch, 500 MHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5036X HD	6-ch, 350 MHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5104X HD	4-ch, 1 GHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5054X HD	4-ch, 500 MHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5034X HD	4-ch, 350 MHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, 12.1" capacitive touch screen
SDS5108L	8-ch, 1 GHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, low profile, 1u height
SDS5058L	8-ch, 500 MHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, low profile, 1u height
SDS5038L	8-ch, 350 MHz, 5 GSa/s, 12-bit, 2.5 Gpts/ch memory depth, low profile, 1u height

Standard Accessories	Quantity
USB cable	1
Quick start	1
Passive probe	1/channel , 500 MHz
Certificate of calibration	1
Wireless mouse	1
Power cord	1

Optional Accessories	Description
SPL2016	16-channel logic probe: input impedance 100 k Ω 18 pF, input range ± 20 V, min. input swing 800 mVpp, max. data rate 300 Mbps (with leadset), 100 Mbps (without leadset)
DF2001A	Power Analysis deskew fixture
STB3	STB3 demo signal source
USB-GPIB	USB-GPIB adapter
SAG1021I	50 MHz isolated USB function/arbitrary waveform generator
SP6150A	High-speed passive probe: 1.5 GHz, 10X, input impedance 1.8 pF 500 Ω
SAP2500D	High-speed differential probe: 2.5 GHz, 10X, differential input impedance 1 pF 200 k Ω , input range ± 4 V, offset range ± 8 V, SAPBus interface
SAP2500	High-speed active probe: 2.5 GHz, 10X, input impedance 1.1 pF 1 M Ω , input range ± 8 V, offset range ± 12 V, SAPBus interface
SAP1000	High-speed active probe: 1 GHz, 10X, input impedance 1.2 pF 1 M Ω , input range ± 8 V, offset range ± 12 V, SAPBus interface
HPB4010	High voltage passive probe: DC-40MHz, 1000X, input impedance 3.0 pF 100 M Ω , Max. input differential voltage DC: 0~10 kVDC, AC: ≤ 7 kVrms (Sinewave) , 20 kVp-p (Pulse)
SDP6150A	High voltage differential probe: 100 MHz, 50X/500X, Max. Differential Test Voltage (DC + Peak AC) ± 1500 V, CATIII 600 V/CATII 1000 V, DC 5 V Power supply

SDP6150D	High voltage differential probe: 400 MHz, 100X/1000X, Max. Differential Test Voltage (DC + Peak AC) ± 1500 V, CATIII 600 V/CATII 1000 V, DC 5 V Power supply
SAP1000H	High voltage differential probe: 1 GHz, 5X/50X, Differential Input Impedance 1 pF 200 k Ω , Input range (DC + Peak AC) ± 42 V, offset range ± 42 V, SAPBus interface
DPB1300	High voltage differential probe: 50 MHz, 50X/500X, Max. Differential Test Voltage (DC + Peak AC) ± 1300 V, CATIII 600 V/CATII 1000 V, DC 12 V Power supply
DPB5150	High voltage differential probe: 70 MHz, 50X/500X, Max. Differential Test Voltage (DC + Peak AC) ± 1500 V, CATIII 600 V/CATII 1000 V, USB 5 V Power supply
DPB5150A	High voltage differential probe: 100 MHz, 50X/500X, Max. Differential Test Voltage (DC + Peak AC) ± 1500 V, CATIII 600 V/CATII 1000 V, USB 5 V Power supply
DPB5700	High voltage differential probe: 70 MHz, 100X/1000X, Max. Differential Test Voltage (DC + Peak AC) ± 7000 V, CATIII 1000V, USB 5 V Power supply
DPB5700A	High voltage differential probe: 100 MHz, 100X/1000X, Max. Differential Test Voltage (DC + Peak AC) ± 7000 V, CATIII 1000V, USB 5 V Power supply
SCP5030	Current probe: DC–50 MHz, 1 V/A and 0.1 V/A, Max. current 30 Arms/50 Apk, 300V, SAPBus interface
SCP5030A	Current probe: DC–100 MHz, 1 V/A and 0.1 V/A, Max. current 30 Arms/50 Apk, 300V, SAPBus interface
SCP5150	Current probe: DC–12 MHz, 0.1 V/A and 0.01 V/A, Max. current 150 Arms/300 Apk, CAT III 300 V/CAT II 600 V, SAPBus interface
SCP5500	Current probe: DC–2 MHz, 0.1 V/A and 0.01 V/A, Max. current 500 Arms/750 Apk, CAT III 300 V/CAT II 600 V, SAPBus interface
CPL5100	Current probe: DC–600 kHz, 0.1 V/A and 0.01 V/A, current range 50 mA~100 A pk, DC 12 V Power supply
CP4020	Current probe: DC–200 kHz, 50 mV/A and 5 mV/A, Max. current 20 Arms/60 Ap-p, CAT III 600 V/CAT II 600 V, DC 9 V Power supply
CP4050	Current probe: DC–1 MHz, 500 mV/A and 50 mV/A, Max. current 50 Arms/140 Ap-p, CAT III 300 V/CAT II 600 V, DC 9 V Power supply
CP4070	Current probe: DC–300 kHz, 50 mV/A and 5 mV/A, Max. current 70 Arms/200 Ap-p, CAT III 600 V/CAT II 600 V, DC 9 V Power supply
CP4070A	Current probe: DC–300 kHz, 100 mV/A and 10 mV/A, Max. current 70 Arms/200 Ap-p, CAT III 600 V/CAT II 600 V, DC 9 V Power supply
CP6030	Current probe: DC–50 MHz, 1 V/A and 0.1 V/A, Max. current 30 Arms/50 Apk, 300V, DC 12 V Power supply
CP6030A	Current probe: DC–100 MHz, 1 V/A and 0.1 V/A, Max. current 30 Arms/50 Apk, 300V, DC 12 V Power supply
CP6150	Current probe: DC–12 MHz, 0.1 V/A and 0.01 V/A, Max. current 150 Arms/300 Apk, CAT III 300 V/CAT II 600 V, DC 12 V Power supply
CP6500	Current probe: DC–5 MHz, 0.1 V/A and 0.01 V/A, Max. current 500 Arms/750 Apk, CAT III 300 V/CAT II 600 V, DC 12 V Power supply
SAP4000P	Power rail probe: DC – 4 GHz, 1.1X, input impedance 50 k Ω @low frequency, 50 Ω @high frequency, input range ± 600 mV, offset range ± 24 V, SAPBus interface
ODP6050B	Optical isolated probe: 500 MHz, 50X, Max. Differential Test Voltage (DC + Peak AC) ± 25 V, Isolated Voltage ± 60 kV, DC 5 V adapter or 7.4 V battery Power supply
ODP6100B	Optical isolated probe: 1 GHz, 50X, Max. Differential Test Voltage (DC + Peak AC) ± 25 V, Isolated Voltage ± 60 kV, DC 5 V adapter or 7.4 V battery Power supply
BAG-S2	Bag
SYN64	64-channel synchronization distributor

Options (SDS5000X HD)	Description
SDS5000HD-PA	Power Analysis (software)
SDS5000HD-PA3	3-Phase Power Analysis (software)
SDS5000HD-I2S	I ² S trigger & decode (software)
SDS5000HD-1553B	MIL-STD-1553B trigger & decode (software)
SDS5000HD-FlexRay	FlexRay trigger & decode (software)
SDS5000HD-CANFD	CAN FD trigger & decode (software)
SDS5000HD-SENT	SENT trigger & decode (software)
SDS5000HD-Manch	Manchester decode (software)
SDS5000HD-ARINC	ARINC429 trigger & decode (software)
SDS5000HD-8BW3T5	8-ch, 350 MHz to 500 MHz bandwidth upgrade (software)
SDS5000HD-8BW3TA	8-ch, 350 MHz to 1 GHz bandwidth upgrade (software)
SDS5000HD-8BW5TA	8-ch, 500 MHz to 1 GHz bandwidth upgrade (software)
SDS5000HD-6BW3T5	6-ch, 350 MHz to 500 MHz bandwidth upgrade (software)
SDS5000HD-6BW3TA	6-ch, 350 MHz to 1 GHz bandwidth upgrade (software)
SDS5000HD-6BW5TA	6-ch, 500 MHz to 1 GHz bandwidth upgrade (software)
SDS5000HD-4BW3T5	4-ch, 350 MHz to 500 MHz bandwidth upgrade (software)
SDS5000HD-4BW3TA	4-ch, 350 MHz to 1 GHz bandwidth upgrade (software)
SDS5000HD-4BW5TA	4-ch, 500 MHz to 1 GHz bandwidth upgrade (software)
Options (SDS5000L)	Description
SDS5000L-PA	Power Analysis (software)
SDS5000L-PA3	3-Phase Power Analysis (software)
SDS5000L-I2S	I ² S trigger & decode (software)
SDS5000L-1553B	MIL-STD-1553B trigger & decode (software)
SDS5000L-FlexRay	FlexRay trigger & decode (software)
SDS5000L-CANFD	CAN FD trigger & decode (software)
SDS5000L-SENT	SENT trigger & decode (software)
SDS5000L-Manch	Manchester decode (software)
SDS5000L-ARINC	ARINC429 trigger & decode (software)
SDS5000L-8BW3T5	350 MHz to 500 MHz bandwidth upgrade (software)
SDS5000L-8BW3TA	350 MHz to 1 GHz bandwidth upgrade (software)
SDS5000L-8BW5TA	500 MHz to 1 GHz bandwidth upgrade (software)



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..

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