SDS1000X HD

Digital Storage Oscilloscope

Data Sheet

EN01F

SIGLENT TECHNOLOGIES CO.,LTD

SDS1104X HD
SDS1204X HD
SDS1102X HD
SDS1202X HD

Product Overview

SIGLENT's SDS1000X HD series high resolution digital storage oscilloscopes are based on 2 GSa/s, 12-bit Analog-Digital Converters and front ends with excellent noise floor performance. They are available in bandwidths of 200 MHz and 100 MHz, have maximum record length of 100 Mpts, and display 2/4 analog channels + 16 digital channels mixed signal analysis ability.

The SDS1000X HD series employs Siglent's SPO technology with a maximum waveform capture rate of up to 120,000 wfm/ s (normal mode, up to 500,000 wfm/s in Sequence mode), 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, serial decoding as well as an optional 25 MHz arbitrary waveform generator are also features of the SDS1000X HD.

The large 10.1'' display capacitive touch screen supports multi-touch gestures, with the addition of user-friendly UI design, can greatly improve the operation efficiency. It also supports mouse control, and remote web control over LAN.

Key Features

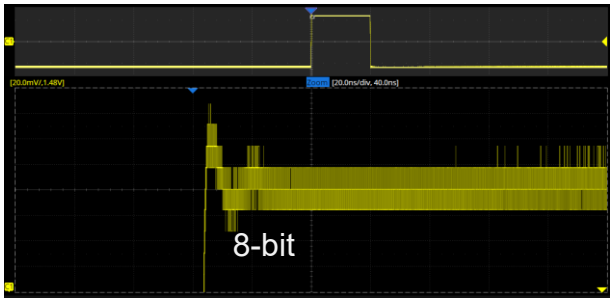
- 12-bit High Resolution
  - 12-bit Analog-Digital Convertors with sample rate up to 2 GSa/s
  - Front ends with 70 μVrms noise floor @ 200 MHz bandwidth
- 2/4 analog channels, up to 200 MHz bandwidth
- SPO technology
  - Waveform capture rate up to 120,000 wfm/s (normal mode), and 500,000 wfm/s (sequence mode)
  - Supports 256-level intensity grading and color temperature display modes
  - Up to 100 Mpts record length
  - Digital trigger system
- Intelligent trigger: Edge, Slope, Pulse width, Window, Runt, Interval, Dropout, Pattern, Video (HDTV supported) , Qualified, Nth edge, Delay, Setup/Hold time.
- Serial bus triggering and decoder, supports protocols I^2C, SPI, UART, CAN, LIN, CAN FD(decode only), FlexRay(decode only)
- Segmented acquisition (Sequence) mode, dividing the maximum record length into multiple segments (up to 80,000), 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 80,000 frames
- Automatic measurements on 50+ parameters, supports statistics with histogram, track, trend, Gating measurement, and measurements on Math, History and Ref
- 4 Math traces (2 Mpts FFT, addition, subtraction, multiplication, division, integration, differential, square root, etc.), supports formula editor
- Abundant data analysis functions such as Search, Navigate, Counter, Bode Plot and Power Analysis
- High Speed hardware-based Mask Test function, with Mask Editor tool for creating user-defined masks
- 16 digital channels (optional)
- 25 MHz waveform generator(optional)
- Large 10.1" TFT-LCD display with 1024 * 600 resolution; Capacitive touch screen supports multi-touch gestures
- Interfaces include: USB Hosts, USB Device (USBTMC), LAN (VXI-11/Telnet/Socket), Pass/Fail, Trigger Out
- Built-in web server supports remote control over the LAN port using a web browser. Supports SCPI remote control commands. Supports external mouse and keyboard

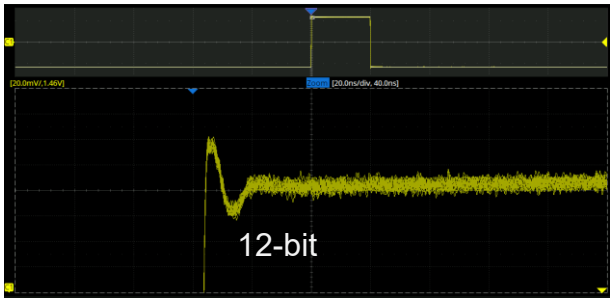
Models and Key Specifications

Model	SDS1104X HD SDS1102X HD	SDS1204X HD SDS1202X HD
Analog channels	4 + EXT(4CH Series: SDSxxx4X HD), 2 + EXT(2CH Series: SDSxxx2X HD)	
Bandwidth	100 MHz	200 MHz
Vertical resolution	12-bit	
Sample rate (Max.)	One channel mode: 2 GSa/s, Two channel mode: 1 GSa/s, Four channel mode: 500 MSa/s	
Memory depth (Max.)	One channel mode: 100 Mpts/ch, Two channel mode: 50 Mpts/ch, Four channel mode: 25 Mpts/ch	
Waveform capture rate (Max.)	Normal mode : 120,000 wfm/s; Sequence mode : 500,000 wfm/s	
Trigger type	Edge, Slope, Pulse width, Window, Runt, Interval, Dropout, Pattern, Video, Qualified, Nth edge, Delay, Setup/Hold time, Serial	
Serial trigger and decode(Standard)	I^2C, SPI, UART, CAN, LIN, CAN FD(Decode Only), FlexRay(Decode Only)	
Measurement	50+ parameters, statistics, histogram, trend, and track supported	
Math	4 traces 2 Mpts FFT, Filter, +, -, x, ÷, ∫dt, d/dt, √, Identity, Negation, Absolute, Sign, ex, 10x, ln, lg, Interpolation, MaxHold, MinHold, ERES, Average. Supports formula editor	
Data analysis	Search, Navigate, History, Mask Test, Counter, Bode plot, and Power Analysis	
Digital channel (optional)	16-channel; maximum sample rate up to 1 GSa/s; record length up to 10 Mpts	
USB AWG module (option)	One channel, 25 MHz, sample rate of 125 MHz, wave length of 16 kpts, isolated output	
I/O	USB 2.0 Host x3, USB 2.0 Device, 10 M / 100 M LAN, External trigger, Auxiliary output (TRIG OUT, PASS/FAIL), SBUS (Siglent MSO)	
Probe (Standard)	Passive probe PP510 for each channel	Passive probe PP215 for each channel
Display	10.1 TFT-LCD with capacitive touch screen (1024*600)	

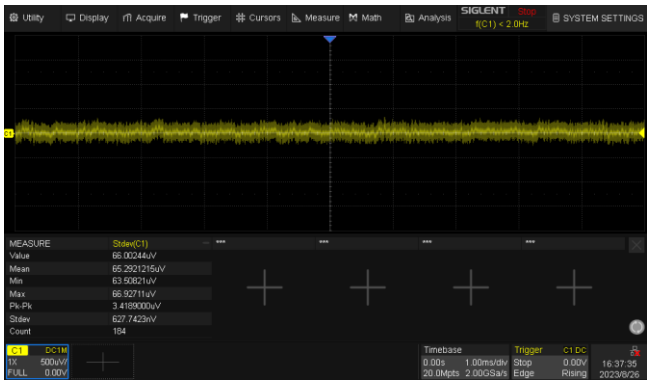
Functions & Characteristics

12-bit High Resolution

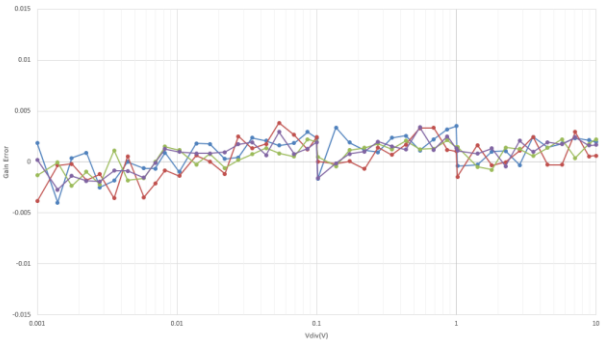




Vertical & Horizontal Zoom along with a large memory depth make the most out of 12-bit ADC resolution. Engineers can observe waveform overall and details simultaneously.



Low noise floor: Only 70 μVrms at 200 MHz bandwidth

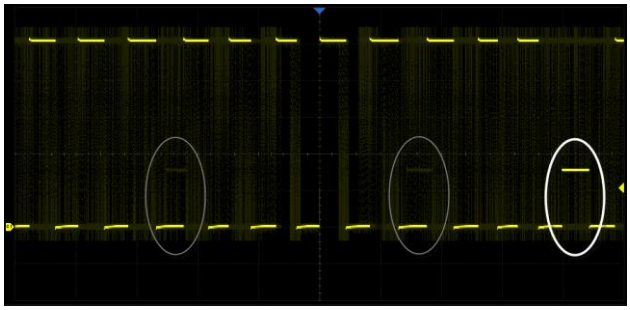


0.5% DC gain accuracy

Excellent User Interface and User Experience

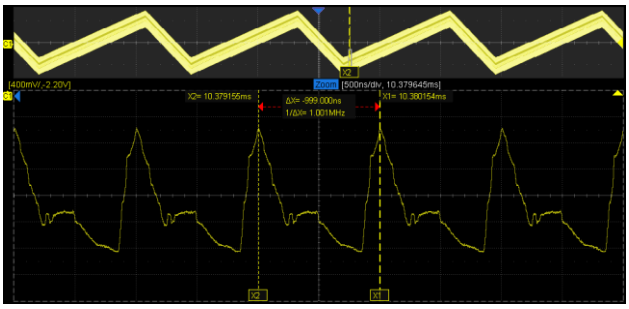
- 10.1” display with 1024x600 resolution
- Capacitive touch screen, supporting multi-touch gestures, can move or scale the waveform traces quickly by finger-touch movements, which greatly improves the operation efficiency
- Built-in WebServer supports remote control on a web page over LAN
- Supports external mouse and keyboard

High Waveform Update Rate



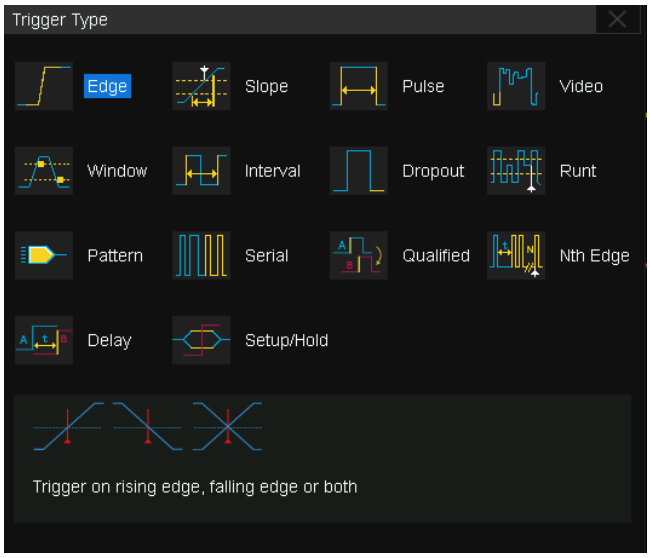
With a waveform update rate of up to 120,000 wfm/s, the oscilloscope can easily capture unusual or low-probability events. In Sequence mode, the waveform capture rate can reach 500,000 wfm/s.

Deep Record Length



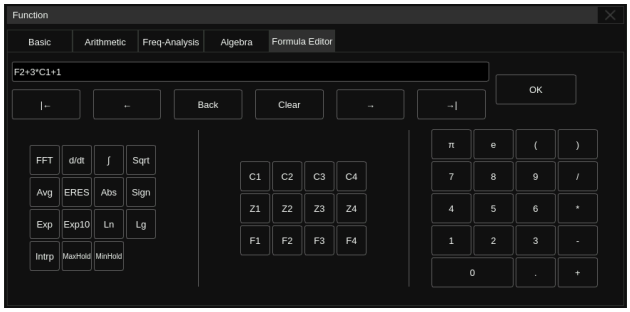
Using hardware-based Zoom technique and record length of up to 100 Mpts, users can select a slower timebase without compromising the sample rate, and then quickly zoom in to focus on the area of interest.

Multiple Trigger Functions

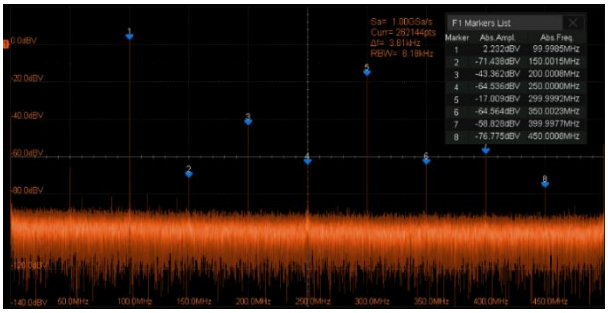


Edge, Slope, Pulse width, Video, Window, Runt, Interval, Dropout, Pattern, Qualified, Nth edge, Delay, Setup/Hold time, and serial trigger.

Advanced Math Function

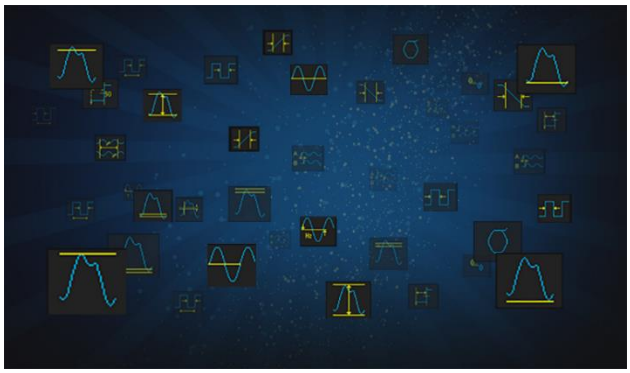


In addition to the traditional (+, -, X, /) operations, FFT, integration, differential, square root, and more are supported. Formula Editor is available for more complex operations. 4 math traces are available.



Hardware-accelerated FFT supports up to 2 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



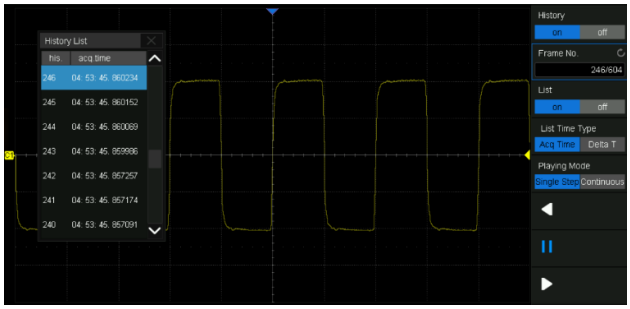
Parameter measurements include 4 categories: horizontal, vertical, miscellaneous, and CH delay providing a total of 50+ different types of measurements. Measurements can be performed within a specified gate period. Measurements on Math, Reference, and History frames are supported.

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.

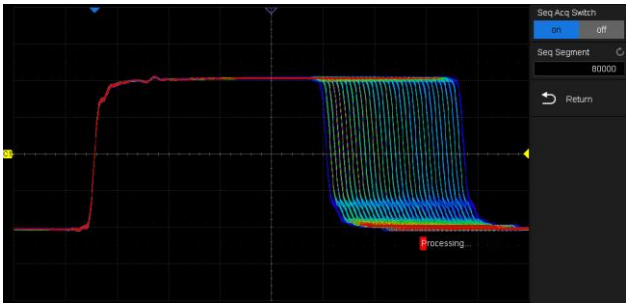
For horizontal parameters such as period, all results are extracted from a frame, instead of just calculating the first one. This accelerates statistics on horizontal measurements much more and enables distribution observation in a frame using Histogram and Track.

History Mode



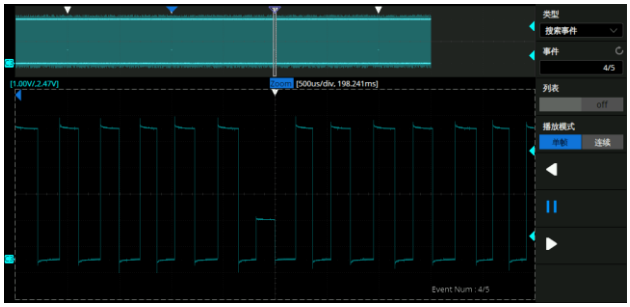
History function can record up to 80,000 frames of waveforms. The recording is executed automatically so that the customer can playback the history waveforms at any time to observe unusual events and quickly locate the area of interest using the cursors or measurements.

Sequence Mode



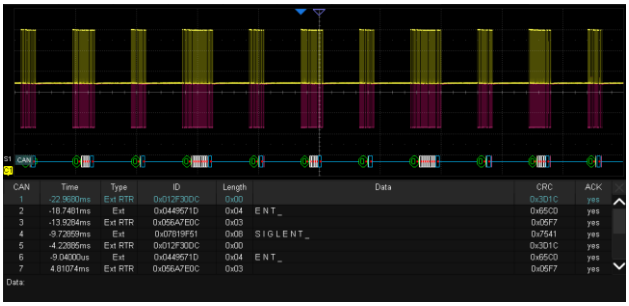
Segmented memory collection will store the waveform into multiple memory segments (up to 80,000) and each segment will store a triggered waveform as well the dead time information. The interval between segments can be as small as 2 µs. All of the segments can be played back using the History function.

Search and Navigate



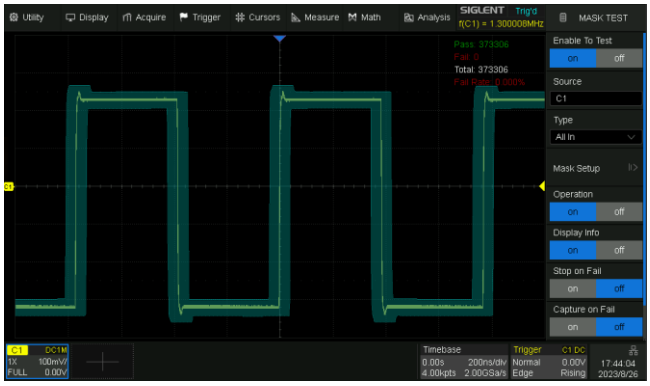
The oscilloscope can search events specified by the user in a frame. Events flagged by the Search can be recalled automatically using Navigate. It can also navigate by time (delay position) and history frames.

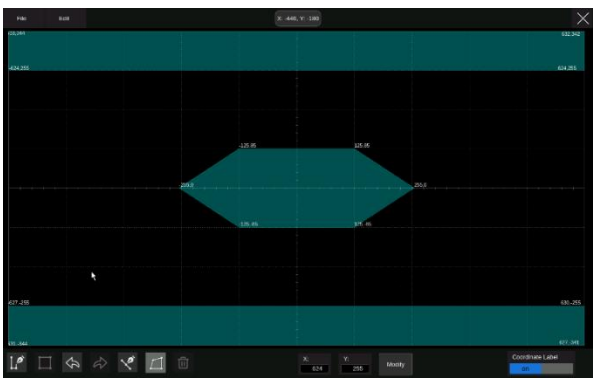
Serial Bus Decode



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 are supported.

Hardware-based High-Speed Mask Test Function

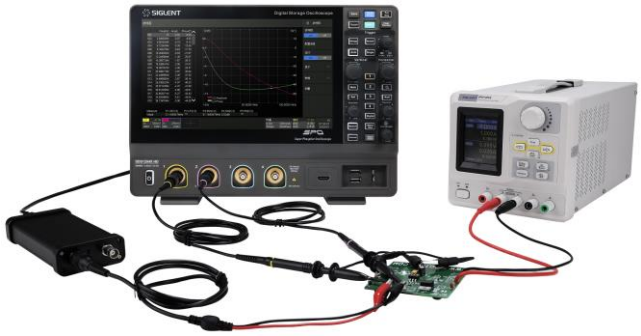




The oscilloscope utilizes a hardware-based Mask Test function, performing up to 80,000 Pass / Fail decisions each second. It is easy to generate user-defined test templates to provide trace mask comparisons, making it suitable for long-term signal monitoring or automated production line testing.

Built-in Mask Editor application helps to create custom masks.

Bode Plot

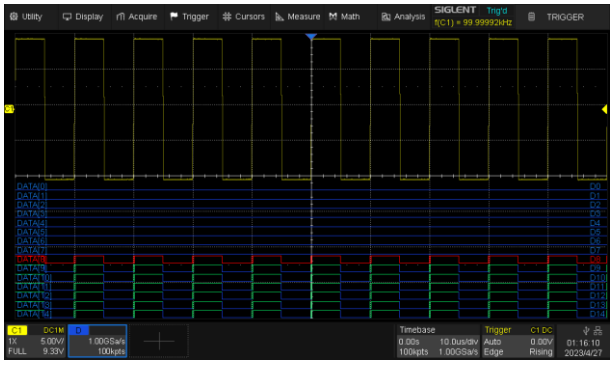


SDS1000X HD can control the USB AWG module or control an independent SIGLENT SDG instrument, scan a devices amplitude and phase frequency response, and display the data as a Bode Plot. There is also a Vari-level Mode for accurately measuring Power Supply Control Loop Response (PSRR).

Power Analysis (Optional)

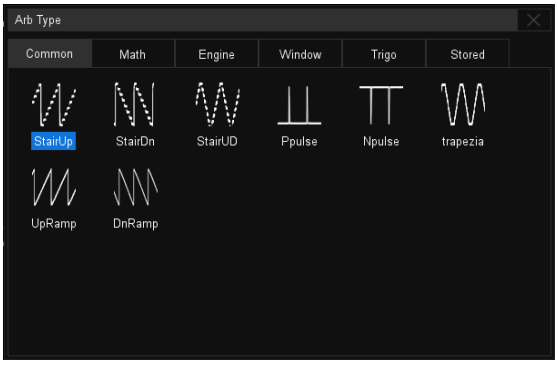
The Power Analysis option provides a full suite of power measurements and analysis, which greatly improve the measurement efficiency in switching power supplies and power devices design.

Digital Channels / MSO (Optional)



Four analog channels plus 16 digital channels enable users to acquire and trigger the waveforms then analyze the pattern, simultaneously with one instrument.

USB AWG module (Optional)



The USB waveform generator can output waveforms with up to 25 MHz frequency and ±3 V amplitude. Six basic waveforms together with multiple types of predefined waveforms and as user-defined arbitrary waveforms are supported.

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℃ ~ 28℃)

Acquire (analog)	
Sample rate	One channel mode: 2 GSa/s, Two channel mode: 1 GSa/s, Four channel mode: 500 MSa/s
Memory depth	One channel mode: 100 Mpts/ch, Two channel mode: 50 Mpts/ch, Four channel mode: 25 Mpts/ch
Waveform update rate	Normal mode : up to 120,000 wfm/s Sequence mode : up to 500,000 wfm/s
Intensity grading	256-level
Peak detect	2 ns
Sequence	Up to 80,000 segments, interval between triggers = 2 μs min.
History	Up to 80,000 frames
Interpolation	sinx/x, x

Vertical (analog)	
Channel	4 + EXT (4CH Series: SDSxxx4X HD), 2 + EXT (2CH Series: SDSxxx2X HD)
Bandwidth (-3 dB) @ 50 Ω	SDS1104X HD, SDS1102X HD: 100 MHz SDS1204X HD, SDS1202X HD: 200 MHz
Flatness@50 Ω	DC - 10% (BW): ±1 dB 10% - 50% (BW): ±2 dB 50% - 100% (BW): +2 dB / -3 dB
Rise time@50 Ω (typical)	Typical 3.5 ns (SDS1104X HD, SDS1102X HD) Typical 1.8 ns (SDS1204X HD, SDS1202X HD)
Resolution	12-bit
ENOB *1 (typical)	8.4-bit
Noise floor*2 (rms, @50 Ω, typical,1 mV/div)	70 μV(Full Bandwith)
Range	8 divisions
Vertical scale (probe 1X)	1 MΩ: 0.5 mV/div – 10 V/div 50 Ω: 0.5 mV/div – 1 V/div

DC gain accuracy	0.5 mV/div ~ 4.95 mV/div:	±1.5 %
	5 mV/div ~ 10 V/div:	±0.5 % (typical)
		±1 % (max)
Offset accuracy	± (0.5% of the offset setting + 0.5% of full scale + 1 mV)	
Offset range (probe 1X)	1 MΩ: 0.5 mV/div ~ 5 mV/div: ±1.6 V; 5.1 mV/div ~ 10 mV/div: ±4 V; 10.2 mV/div ~ 100 mV/div: ±8 V; 102 mV/div ~ 1 V/div: ±80 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 ~ 100 mV /div: ±8 V; 102 mV/div ~ 1 V/div: ±10 V;
Bandwidth limit	Hardware Bandwidth limit: 20 MHz, 200 MHz	
Low frequency response (AC coupling -3 dB)	2 Hz (typical)	
Overshoot (150 ps edge @50 Ω, typical)	10%	
Coupling	DC, AC, GND	
Impedance	1 MΩ: (1 MΩ±2%) || (17 pF±2 pF) 50 Ω: 50 Ω±1%	
Max. input voltage	1 MΩ ≤ 400 Vpk (DC + AC), DC ~ 10 kHz 50 Ω ≤ 5V rms	
SFDR	≥ 35dBc	
CH to CH Isolation (@50Ω)	DC ~ Max BW: > 40dB	
Probe attenuation	1X, 10X, 100X, Custom	

* 1:24.99 MHz input , -0.25 dBFS , 20 mV/div , 50 Ω input impedance

* 2:Use the “Stdev” measurement

Horizontal	
Time scale	1 ns/div – 1000 s/div
Range	10 divisions
Display mode	Y-T, X-Y, Roll
Roll mode	≥ 50 ms/div
Skew (CH1~CH4)	< 100 ps
Time base accuracy	±25 ppm

Trigger		
Mode	Auto, Normal, Single	
Level	Internal : ± 4.1 div from the center of the screen EXT : ± 0.61 V EXT/5 : ± 3.05 V	
Hold off range	By time : 8 ns ~ 30 s (8 ns step)	
Coupling	AC DC LFRJ HFRJ Noise RJ	
Coupling frequency response (CH1 ~ CH4)	DC : Passes all components of the signal AC : Blocks DC components and attenuates signals below 8 Hz LFRJ : Blocks the DC component and attenuates the low-frequency components below 2 MHz HFRJ : Attenuates the high-frequency components above 2.4 MHz	
Coupling frequency response (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)	CH1 ~ CH4: ±0.2 div EXT : ±0.3 div	
Sensitivity	CH1 ~ CH4 :	DC ~ Max BW : 0.6 div
	EXT :	200 mVpp, DC ~ 200 MHz
	EXT/5 :	1 Vpp, DC ~ 200 MHz
Jitter	CH1 ~ CH4 : < 100ps EXT : < 200 ps rms	
Displacement	Pre-Trigger : 0 ~ 100% memory Delay-Trigger : 0 ~ 10,000 div	
Edge Trigger		
Source	CH1 ~ CH4 / EXT / (EXT/5) / AC Line / D0 ~ D15	
Slope	Rising, Falling, Alternating	
Slope Trigger		
Source	CH1 ~ CH4	
Slope	Rising, Falling	
Limit range	<, >, in range, out of range	
Time range	2 ns ~ 20 s, Resolution = 1 ns	
Pulse Width Trigger		
Source	CH1 ~ CH4 / D0 ~ D15	
Polarity	+width, -width	
Limit range	<, >, in range, out of range	
Time range	2 ns ~ 20 s, Resolution = 1 ns	

Video Trigger	
Source	CH1 ~ CH4
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	CH1 ~ CH4
Window type	Absolute, Relative
Interval Trigger	
Source	CH1 ~ CH4 / D0 ~ D15
Slope	Rising, Falling
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Dropout Trigger	
Source	CH1 ~ CH4 / D0 ~ D15
Timeout type	Edge, State
Slope	Rising, Falling
Time range	2 ns ~ 20 s, Resolution = 1 ns
Runt Trigger	
Source	CH1 ~ CH4
Polarity	Positive, Negative
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Pattern Trigger	
Source	CH1 ~ CH4 / 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	CH1 ~ CH4
Edge source	CH1 ~ CH4
Qualify state	Low, High
Qualify edge	Rising, Falling
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Nth Edge Trigger	
Source	CH1 ~ CH4
Slope	Rising, Falling
Idle time	8 ns ~ 20 s, Resolution = 1 ns

Edge number	1 ~ 65535
Delay Trigger	
Source A	CH1 ~ CH4
Source B	CH1 ~ CH4
Slope	Rising, Falling
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Setup/Hold Trigger	
Option	Setup, Hold
CLK source	CH1 ~ CH4
CLK slope	Rising, Falling
Data source	CH1 ~ CH4
Data state	Low, High
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 1 ns
Serial Trigger	
Source	CH1 ~ CH4 / D0 ~ D15
Protocol	I^2C, SPI, UART, CAN, LIN
I^2C	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

Serial Decoder	
Decoders	2
Threshold	-4.5 ~ 4.5 div
List	1 ~ 7 lines
Decoder type	Full duplex
I²C	
Source	CH1 ~ CH4 / D0 ~ D15
Signal	SCL, SDA
Address	7-bit, 10-bit
SPI	
Source	CH1 ~ CH4 / 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	CH1 ~ CH4 / 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	CH1 ~ CH4 / D0 ~ D15
LIN	
LIN version	Ver 1.3, Ver 2.0
Source	CH1 ~ CH4 / D0 ~ D15
Baud rate	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, Custom
CAN FD	
Source	CH1 ~ CH4
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	
Source	CH1 ~ CH4
Baud rate	2.5 Mbps, 5 Mbps, 10 Mbps, Custom

Measurement	
Automatic Measurement	
Source	CH1 ~ CH4, D0 ~ D15, Z1 ~ Z4, F1 ~ F4, Ref, 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
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
Statistics	Current, Mean, Min, Max, Pk-Pk, Sdev, Count, Histogram, Trend, Track
Statistics count	Unlimited, 1~1024
Cursors	
Source	CH1 ~ CH4, D0 ~ D15, F1 ~ F4, Ref
Type	Manual : Time X1, X2, (X1-X2), (1/ΔT); Vertical Y1, Y2, (Y1-Y2) Track: Time X1, X2, (X1-X2) Measure: indicates the measurement on specific parameter

Math	
Trace	F1 ~ F4
Source	CH1 ~ CH4, Z1 ~ Z4, F1 ~ F4
Operation	FFT, Filter, +, -, x, ÷, ∫dt, d/dt, √, Identity, Negation, |x|, Sign, ex, 10x, ln, lg, Interpolation, Max hold, Min hold, ERES, Average, Formula Editor
FFT	Length: 2 Mpts, 1 Mpts, 512 kpts, 256 kpts, 128 kpts, 64 kpts, 32 kpts, 16 kpts, 8 kpts, 4 kpts, 2 kpts, 1 kpts Window: Rectangle, Blackman, Hanning, Hamming, Flattop Display: Full Screen, Split, Exclusive Mode: Normal, Max hold, Average Tools: Peaks, Markers

Analysis	
Search	
Source	CH1 ~ CH4, 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	CH1 ~ CH4 , Z1 ~ Z4
Mask creating	Auto (Create mask), Customized (Mask Editor)
Mask test speed	Up to 80,000 frames/s
Bode Plot	
Source	CH1 ~ CH4
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, SOA, Efficiency(four channel series only)
Counter	
Source	CH1 ~ CH4
Frequency resolution	7 digits
Totalizer	Counter on edges, supports Gate and Trigger

Digital Channels (optional)	
Max. sampling rate	1 GSa/s
Memory depth	10 Mpts/ch
Min. detectable pulse width	3.3 ns
Level group	D0 ~ D7, D8 ~ D15
Level range	-8 V ~ +8 V
Logic type	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, Custom
Skew	D0 ~ D15: ±1 sampling interval Analog to Digital(Triggered On Digital): ± (1 sampling interval +1 ns) Digital to Analog(Triggered On Analog): ±4 ns

USB AWG Module (optional)	
Channels	1
Max. output frequency	25 MHz

Sampling rate	125 MSa/s
Frequency resolution	1 μHz
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 Ω ± 2%
Protection	Over voltage protection, Current limit
Sine	
Frequency	1 μHz ~ 25 MHz
Offset accuracy (10 kHz)	±(1%*offset setting value +3 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 μHz ~ 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 μHz ~ 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	±(|setting value|*1% + 3 mV)
Noise	
Bandwidth (-3 dB)	> 25 MHz
Arb	
Frequency	1 μHz ~ 5 MHz
Wave memory	16 kpts

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

I/O	
Front	USB 2.0 Host x2, SBUS: Siglent MSO, Calibration Signal: 1 kHz, 3 V Square
Rear	USB 2.0 Host, USB 2.0 Device, LAN: 10/100MbaseT (RJ45), External Trigger , EXT: ≤ 1.5 Vrms , EXT/5: ≤ 7.5Vrms, Auxiliary Output: TRIG OUT (3.3 V LVCMOS), PASS/FAIL OUT (3.3 V TTL)

Display	
Display type	10.1 TFT LCD with capacitive touch screen
Resolution	1024×600
Contrast (typical)	500:1
Backlight (typical)	500 nit

Display Setting	
Range	8 x 10 grid
Display type	Dot, Vector
Persistence time	OFF, 1 s, 5 s, 10 s, 30 s, infinite
Color display	Normal, 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: ≤ 3,000 m, 25 °C Non-operating: ≤ 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 2.7 GHz)
	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, 0.15-80 MHz
	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 50/60 Hz
Power consumption	120 W max., 70 W typical, 4 W typical in standby mode

Mechanical	
Dimensions	Length × Height × Width = 317.2 mm × 236.0 mm × 149.0 mm (including knobs and supporting legs)
Weight	Net Weight 4.1 kg, Gross Weight 5.6 kg

Ordering Information

Model	Description
SDS1204X HD	200 MHz, 2 GSa/s, 4CH
SDS1104X HD	100 MHz, 2 GSa/s, 4CH
SDS1202X HD	200 MHz, 2 GSa/s, 2CH
SDS1102X HD	100 MHz, 2 GSa/s, 2CH

Standard Accessories	Quantity
USB cable	1
Quick start	1
Passive probe	1/channel
Certificate of calibration	1
Power cord	1

Optional Accessories	Part No.
AWG Software	SDS1000XHD-FG
USB Isolated AWG Module Hardware	SAG1021I
16 Channels MSO Software	SDS1000XHD-16LA
16 Channels Logic Analyzer	SLA1016
Power Analysis Software	SDS1000XHD-PA
Power Analysis Deskew Fixture	DF2001A

Accessories

Accessories	Picture	Model	Specifications &Description
Demo Board		STB-3 Test Board	Output signals including square, sine, AM, fast edge, pulse, PWM, I2C, CAN, LIN etc. Used in teaching and demonstrations.
USB Isolated AWG Module		SAG1021I	Output Sine, Square, Ramp, pulse, Noise, DC and 45 built-in waveforms. The arbitrary waveforms can be accessed and edited by the EasyWave PC software.
16 Channels Logic Analyzer		SLA1016	Provides 16 digital channels by connecting the SBUS interface.

Power Analysis Deskew Fixture		DF2001A	Calibrates the phase between the current and voltage probes.

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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