SDS2000X Plus Digital Oscilloscope

Data Sheet

DS0102XP_E01B

DataSheet-2020.11

SIGLENT TECHNOLOGIES CO.,LTD

SDS2354X Plus
SDS2204X Plus
SDS2104X Plus
SDS2102X Plus

Product Overview

SIGLENT's SDS2000X Plus series Digital Storage Oscilloscopes are available in bandwidths of 350 MHz, 200 MHz and 100 MHz, have a maximum sample rate of 2 GSa/s, maximum record length of 200 Mpts/ch, and up to 4 analog channels + 16 digital channels mixed signal analysis ability.

The SDS2000X Plus 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. History waveform recording, Sequence acquisition, Search and Navigate functions allow for extended waveform records to be captured, stored, and analyzed. An impressive array of measurement and math capabilities, options for a 50 MHz waveform generator, as well as serial decoding, mask test, bode plot, and power analysis are also features of the SDS2000X Plus. A 10-bit acquisition mode helps to satisfy applications which require more than 8-bit resolution.

The large 10.1'' capacitive touch screen supports multi-touch gestures, while the remote web control, mouse and external keyboard support greatly improve the operating efficiency of the SDS2000X Plus.

Key Features

- 350 MHz, 200 MHz, 100 MHz models with real-time sample rate up to 2 GSa/s. A 500 MHz bandwidth upgrade option is available for 350 MHz models.
- SPO technology
  - Waveform capture rates 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
  - Record length up to 200 Mpts/ch, 400 Mpts in total for all 4 channels
  - Digital trigger system
- Intelligent trigger: Edge, Slope, Pulse, Window, Runt, Interval, Dropout, Pattern and Video (HDTV supported). Trigger zone helps to simplify advanced triggering
- Serial bus triggering and decoder, supports I^2C, SPI, UART, CAN, LIN (standard) and CAN FD, FlexRay, I^2S, MIL-STD-1553B, SENT and Manchester (optional) protocols
- Low background noise, features 0.5 mV/div to 10 V/div voltage scales
- 10-bit mode provides higher resolution and lower noise
- Segmented acquisition (Sequence) mode, dividing the maximum record length into multiple segments (up to 90,000), 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 for up to 90,000 triggered waveforms (frames)
- Automatic measurement function on 50+ parameters, supports statistics with histogram and trend
- Two Math traces, support 2 Mpts FFT, +, -, x, ÷, d/dt, ∫dt, √, average, ERES, and formula editor
- Abundant data processing and analysis functions such as Search, Navigate, Mask Test, Bode plot, Power Analysis (optional) and Counter
- 16 digital channels (optional)
- Built-in 50 MHz DDS waveform generator (optional)
- Large 10.1" TFT-LCD display with 1024x600 resolution; Capacitive touch screen supports multi-touch gestures
- Multiple interfaces: USB Host, USB Device (USBTMC), LAN（VXI-11/Telnet/Socket）, Pass/Fail, Trigger Out
- Built-in web server supports remote control by the LAN port using a web browser; Supports SCPI remote control commands

Models and Key Specifications

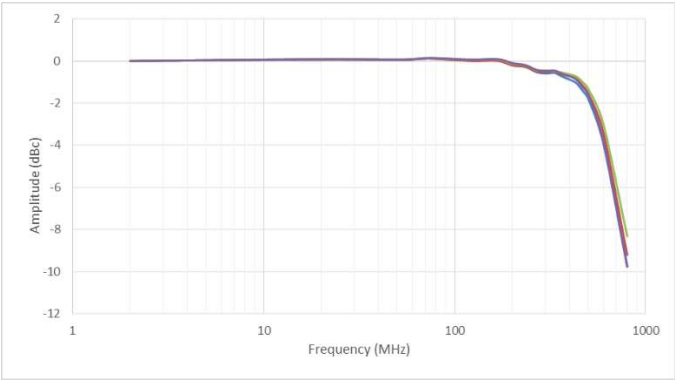
Model	SDS2354X Plus	SDS2204X Plus	SDS2104X Plus SDS2102X Plus
Analog channels	4 + EXT		2/4 + EXT
Bandwidth	350 MHz, (upgradable to 500 MHz)	200 MHz	100 MHz
Sample rate (Max.)	2 GSa/s (interleaving mode) , 1 GSa/s (non-interleaving mode)		
Memory depth (Max.)	200 Mpts/ch (interleaving mode) , 100 Mpts/ch (non-interleaving mode)		
Waveform capture rate (Max.)	Normal mode：120,000 wfm/s; Sequence mode：500,000 wfm/s		
Vertical resolution	8-bit. 10-bit mode (with typical 100 MHz bandwidth)		
Trigger type	Edge, Slope, Pulse, Window, Runt, Interval, Dropout, Pattern, Video and Serial		
Serial trigger and decode	Standard: I^2C, SPI, UART, CAN, LIN Optional: CAN FD, FlexRay, I^2S, MIL-STD-1553B, SENT, Manchester (decode only)		
Measurement	More than 50 parameters , supports statistics with histogram and trend		
Math	2 traces 2 Mpts FFT, +, -, x, ÷, d/dt, ∫dt, √, Identity, Negation, |x|, Sign, e^x, 10^x, ln, lg, Interpolation, average, ERES, and formula editor		
Data processing and analysis tools	Search, Navigate, History, Mask test, Bode plot, Power Analysis (optional) and Counter		
Digital channel (optional)	16-channel; maximum sample rate up to 500 MSa/s; record length up to 50 Mpts/ch		
Waveform generator (optional)	Single channel, frequency up to 50 MHz, 125 MSa/s sample rate, 16 kpts waveform memory		
Interface	USB 2.0 Host x2, USB 2.0 Device, LAN, External trigger, Auxiliary output (TRIG OUT , PASS/FAIL)		
Probe (standard)	SP2035A, 350 MHz, 1 probe supplied for each channel	PP215, 200 MHz, 1 probe supplied for each channel	
Display	10.1” TFT-LCD with capacitive touch screen (1024x600)		

Functions & Characteristics

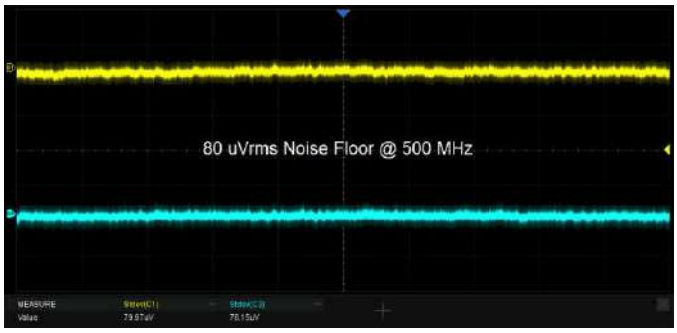
Excellent Operability

- 10.1” display with 1024x600 resolution
- Capacitive touch screen, supports multi-touch gestures, traces can be moved or scaled efficiently by a finger touch
- Built-in web server supports remote control over the LAN port using a web browser
- External mouse and keyboard support

Competitive Front End Performance

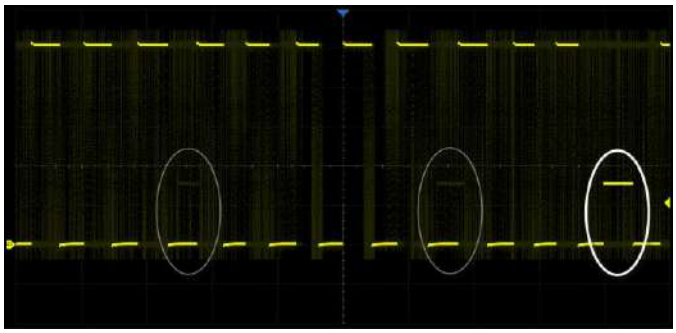


500 MHz bandwidth (at 2 GSa/s sample rate with 500 MHz bandwidth option).



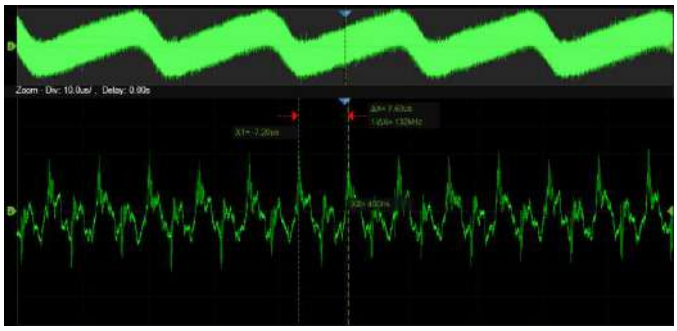
Low noise floor: Only 80 μV rms at 500 MHz bandwidth.

Up to 120,000 wfm/s waveform update rate



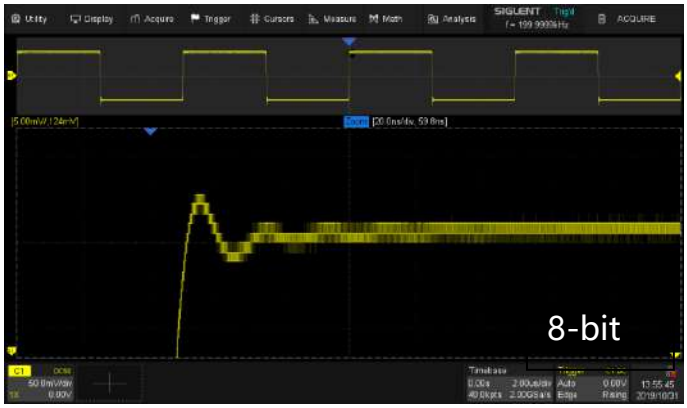
With a waveform update rate of up to 120,000 wfm/s, the oscilloscope can easily capture low-probability events. In Sequence mode the waveform capture rate can reach 500,000 wfm/s.

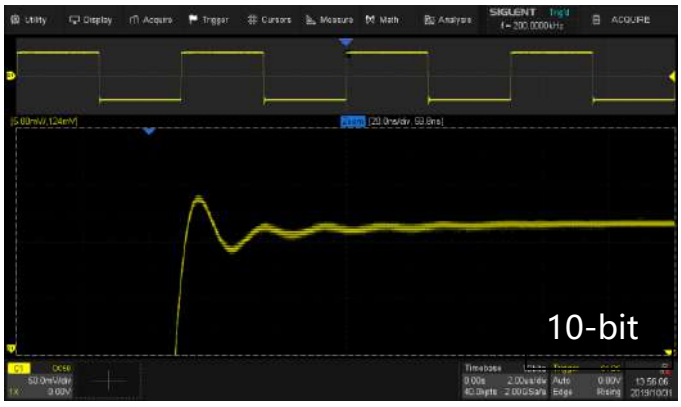
Record Length of up to 200 Mpts/ch



Utilizing a hardware-based Zoom technique and record length up to 200 Mpts, users can select a slower timebase without compromising the sample rate and then quickly zoom in to focus on the area of interest.

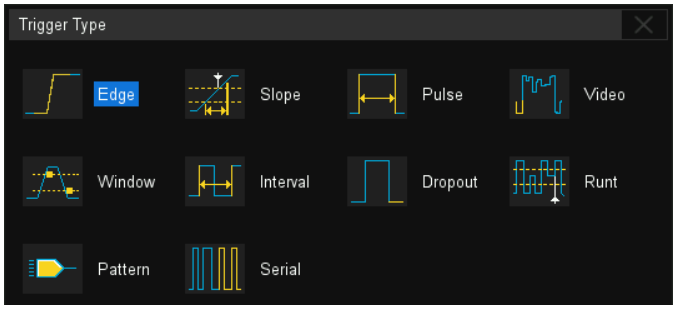
10-bit Mode





10-bit mode combined with Zoom shows you more details and less noise on the waveform.

Multiple Trigger Functions



Edge, Slope, Pulse, Video, Windows, Runt, Interval, Dropout, Pattern and serial trigger.

Trigger Zone

Trigger Zone is available for advanced triggering.

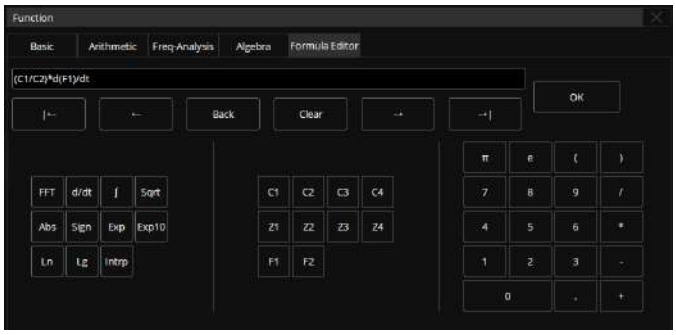
Measurements for All relevant Parameters and Parameter Statistics

Parameter measurements includes 4 categories: Vertical, Horizontal, Miscellaneous and Channel 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.

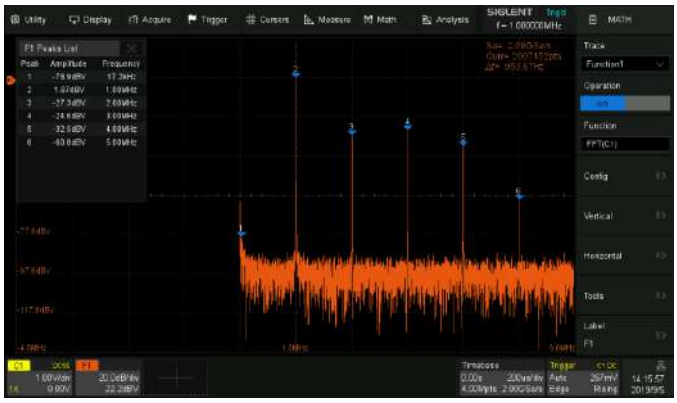
Statistics shows the current value, maximum value, minimum value, standard deviation and mean value of up to 12 parameters simultaneously. Histogram is available to show the probability distribution of a parameter. Trend is available to show the parameter value vs. time.

In addition, horizontal measurements can process up to 1000 signal edges within one single frame, thus greatly improving the test efficiency.

Advanced Math Function

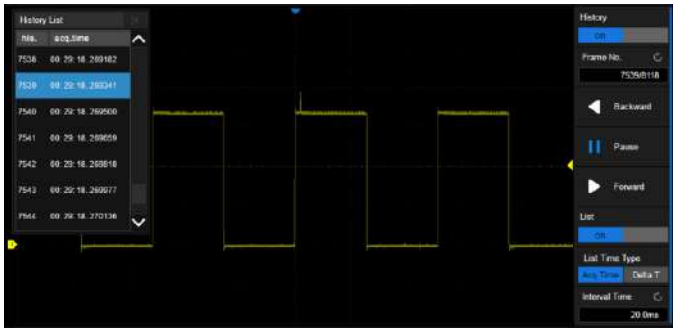


Two Math traces, support FFT, +, -, x, ÷, d/dt, ∫dt, √, Identity, Negation, |x|, Sign, e^x, 10^x, ln, lg, Interpolation, average, ERES, and formula editor.



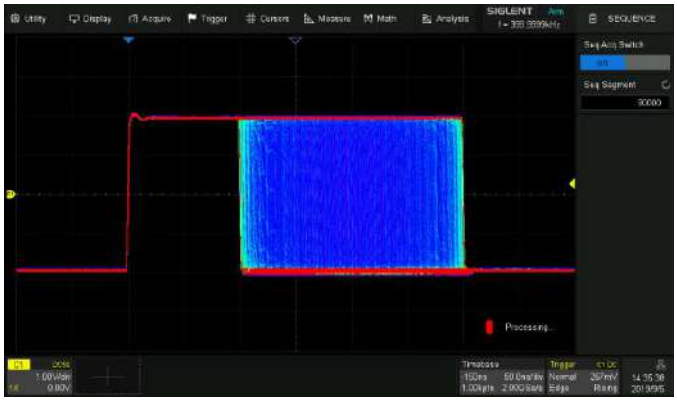
Hardware accelerated FFT up to 2 Mpts. This provides high frequency resolution with fast refresh rate. The FFT function also supports a variety of window functions so that it can adapt to different spectrum measurement needs. Three modes (Normal, Average and Max hold) can satisfy different requirements for observing the power spectrum. Auto peak detection and markers are supported.

History Mode



History function records up to 90,000 triggered waveforms (frames). This is done continuously in the background, so the history waveforms can be played back at any time to find and analyze past events. Serial decode, zoom and cursors measurements can be used.

Sequence Mode

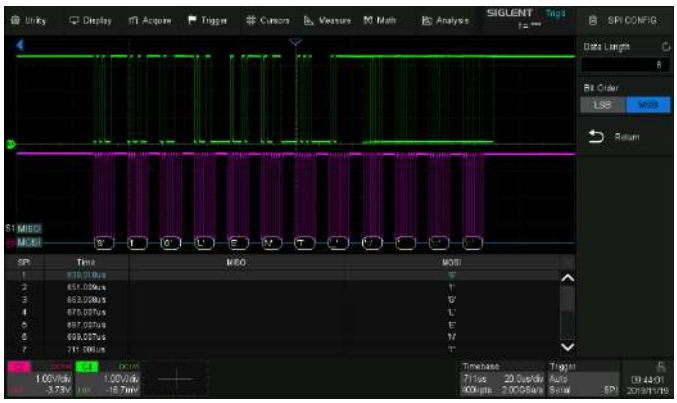


Segmented memory collection will store the waveform into multiple memory segments (up to 90,000) and each segment will store a triggered waveform together with the dead time information. The interval between segments can be as small as 2 μs. All segments can be played back at an arbitrary frame rate using the History function.

Search and Navigate

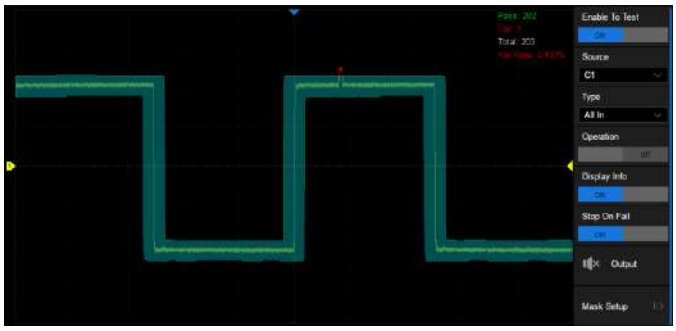
The SDS2000X Plus can find events within a record and history based on user specified trigger conditions. Navigate browses through Events flagged by the Search, plays back history frames or continuously moves the delay position on long records (useful in zoom view).

Serial Bus Decode

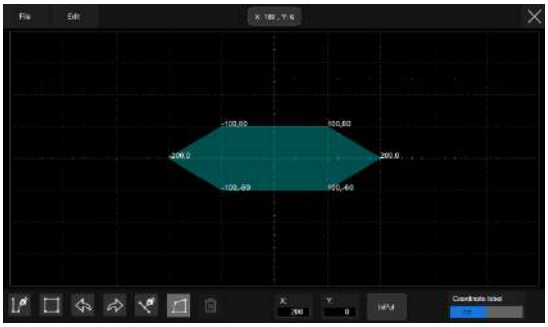


In addition to the decoder lanes correlated to the waveform, bus protocol information can be displayed in tabular form. I^2C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I^2S, MIL-STD-1553B, SENT and Manchester are supported.

Hardware-based High Speed Mask Test Function



The SDS2000X Plus 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 which the signal trace can be continuously compared to. The failed frames can be automatically stored as history frames or screen shots, 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

The SDS2000X Plus can control the built-in waveform generator or any stand-alone SIGLENT SDG device to scan the amplitude and phase response over frequency of passive or active circuits. The data is presented as Bode Plot. This makes it possible to replace expensive network analyzers in less demanding applications.

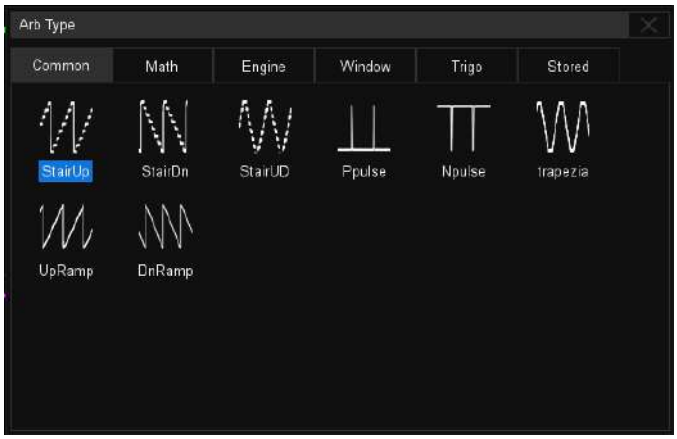
Power Analysis (Optional)

The Power Analysis option provides a full suite of power measurements and analysis, thus improving the efficiency of measurement in switching power supplies and power device designs.

Digital Channels / MSO (Optional)

Four analog channels plus 16 digital channels allow the acquisition and triggering of mixed waveforms with one instrument.

50 MHz Built-in Waveform Generator (Optional)



The built-in DDS waveform generator can output waveforms with up to 50 MHz frequency and ±3 V amplitude. Six basic waveforms together with multiple types of predefined waveforms and as user defined arbitrary waveforms are supported.

Complete Connectivity

2 x USB Host, 1 x USB Device (USBTMC)

1 x LAN（VXI-11/Telnet/Socket)

1 x Auxiliary Output（Pass/Fail and Trigger Out）

Specifications

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

• The oscilloscope calibration period has not expired

• The oscilloscope has been working continuously for at least 30 minutes at the specified temperature (18 ℃ ~ 28 ℃)

Acquisition System (analog channels)	
Sample rate	2 GSa/s (interleaving mode*1) , 1 GSa/s (non-interleaving mode*2)
Memory depth	200 Mpts/ch (interleaving mode) *3 , 100 Mpts/ch (non-interleaving mode) *3
Waveform capture rate	Normal mode: 120,000 wfm/s max. Sequence mode: 500,000 wfm/s max.
Trace intensity	256 grades
Peak detect	1 ns minimum detectable pulse
Sequence	90,000 frames max.; Interval between triggers = 2 μs min.
History	90,000 frames max.
Interpolation	Sin(x)/x, x

* 1 : Interleaving mode: only one of CH1/CH2 and/or only one of CH3/CH4 activated

* 2 : Non-interleaving mode: both CH1/CH2 and/or both CH3/CH4 activated

* 3 : In 10-bit mode the maximum memory depth reduces by half

Vertical System	SDS2354X Plus	SDS2204X Plus	SDS2104X Plus SDS2102X Plus
Analog channels	4 + EXT		2/4 + EXT
Bandwidth (-3dB) @ 50 Ω	350 MHz (standard) *2 500 MHz (optional)*1,2	200 MHz *2	100 MHz
Rise time (typical) @ 50 Ω	1 ns (standard) *2 800 ps (optional)*1,2	1.7 ns *2	3.5 ns *2
Resolution	8-bit. 10-bit mode (with typical 100 MHz bandwidth)		
Vertical range	8 divisions		
Vertical scale (probe 1X)	1 MΩ: 500 μV/div – 10 V/div 50 Ω: 500 μV/div – 1 V/div		
DC gain accuracy	≤ 3.0%		
Offset accuracy	±(1.5%*offset+1.5%*full scale+1 mV)		
Offset range (probe 1X)	500 μV/div ~ 100 mV/div: ± 2 V 102 mV/div ~ 1 V/div: ± 20 V 1.02 V/div ~ 10 V/div: ± 200 V		
Bandwidth flatness @ 50 Ω	10 kHz ~ BW/10: ±0.5 dB BW/10 ~ BW/3: ±0.8 dB BW/3 ~ BW2/3: +1.0 dB, -1.2 dB BW2/3 ~ BW: +2.0 dB, -2.5 dB		
Bandwidth limit	20 MHz (-0, +20%) 200 MHz (-0, +20%)		
Low frequency response (AC coupling -3 dB)	5 Hz (typical)		
Overshoot (150ps fast edge input @50Ω)	<12% (typical)		
Coupling	DC, AC, GND		
Impedance	(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 ≤5 Vrms, ±10 V Peak		
SFDR	≥40 dB		
CH to CH Isolation @ 50Ω	DC ~ 100 MHz: >40 dB 100 MHz ~ BW: ≥34 dB		
Probe Attenuation	1X, 10X, 100X, Custom		

* 1 : In interleaving mode bandwidth is 500 MHz, rise time is 0.8 ns; in non-interleaving mode bandwidth is 350 MHz, rise time is 1 ns

* 2 : In 10-bit mode bandwidth is 100 MHz (typical) , rise time is 3.3 ns (typical)

Horizontal System	
Time scale	1 ns/div – 1000 s/div 0.5 ns/div – 1000 s/div when 500 MHz bandwidth option is installed
Horizontal range	10 divisions
Display mode	Y-T, X-Y, Roll (≥50 ms/div)
Skew（CH1~CH4）	<100 ps
Time base Accuracy	±1ppm initial; ±1ppm 1st year aging; ±3.5ppm 10-year aging

Trigger System				
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) By event：1 ~ 10^8			
Coupling	CH1~CH4 DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 20 Hz LFRJ: Attenuates the frequency components below 1.2 MHz HFRJ: Attenuates the frequency components above 600 kHz Noise RJ: Increases the trigger hysteresis EXT DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 8 Hz LFRJ: Attenuates the frequency components below 33 kHz HFRJ: Attenuates the frequency components above 967 kHz			
Accuracy (typical)	CH1～CH4: ±0.2 div EXT: ±0.3 div			
Sensitivity	CH1 ~ CH4:		Noise RJ = OFF	Noise RJ = ON
		>10 mV/div:	±0.13 div	±0.33 div
		5 mV/div~10 mV/div:	±0.26 div	±0.33 div
		≤ 2 mV/div:	±0.5 div	±0.5 div
	EXT:	200 mVpp, DC ~ 10 MHz 300 mVpp, 10 MHz ~ 300 MHz		
	EXT/5:	1 Vpp, DC ~ 10 MHz 1.5 Vpp, 10 MHz ~ 300 MHz		
Jitter	CH1～CH4: <10 ps rms, 6 divisions pk-pk, 2 ns edge EXT: <200 ps rms			
Displacement	Pre-Trigger: 0 ~ 100% memory Delay-Trigger: 0 ~ 5,000 div			
Zone	Up to 2 zones; Source: CH1~CH4; Property: Intersect, Not Intersect			
Edge Trigger				
Source	CH1~CH4/EXT/(EXT/5)/AC Line/D0~D15			
Slope	Rising, Falling, Rising & Falling			
Slope Trigger				
Source	CH1~CH4			
Slope	Rising, Falling			
Limit range	≤, ≥, in range, out of range			
Time range	2 ns ~ 20 s，1 ns resolution			
Pulse Width Trigger				
Source	CH1~CH4/D0~D15			
Polarity	+wid, -wid			
Limit range	≤, ≥, in range, out of range			
Time range	2 ns ~ 20 s，1 ns resolution			
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，1 ns resolution
Dropout Trigger	
Source	CH1~CH4/D0~D15
Timeout type	Edge, State
Slope	Rising, Falling
Time range	2 ns ~ 20 s，1 ns resolution
Runt Trigger	
Source	CH1~CH4
Polarity	Positive, Negative
Limit range	≤, ≥, in range, out of range
Time range	2 ns ~ 20 s，1 ns resolution
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，1 ns resolution
Serial Trigger	
Source	CH1~CH4/D0~D15
Protocol	Standard: I^2C、SPI、UART、CAN、LIN Optional: CAN FD、FlexRay、I^2S、MIL-STD-1553B
I^2C trigger	Type: Start, Stop, Restart, No Ack, EEPROM, Address & Data, Data Length
SPI trigger	Type: Data
UART trigger	Type: Start, Stop, Data, Parity Error
CAN trigger	Type: All, Remote, ID, ID+Data, Error
LIN trigger	Type: Break, Frame ID, ID+Data, Error
CAN FD trigger (optional)	Type: Start, Remote, ID, ID+Data, Error
FlexRay trigger (optional)	Type: TSS, Frame, Symbol, Errors
I^2S trigger (optional)	Type: Data, Mute, Clip, Glitch, Rising Edge, Falling Edge
MIL-STD-1553B trigger (optional)	Type: Transfer, Word, Error, Timing
SENT（Optional）	Type：Start, Slow channel, Fast channel, Error

Serial Decoder	
Decoders	2
Decoder Type	Full duplex
Threshold	-4.1 ~ 4.1 div
List	1 ~ 7 lines
I^2C	
Signal	SCL，SDA
Address	7bit，10bit
Decoded frames (Max.)	2,000
SPI	
Signal	CLK，MISO，MOSI，CS
Edge Select	Rising, Falling
Chip select	Active high, active low, clock timeout
Bit Order	LSB, MSB
Decoded frames (Max.)	15,000
UART	

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
Decoded frames (Max.)	15,000
CAN	
Source	CH1~CH4/D0~D15
Decoded frames (Max.)	2,000
LIN	
LIN Specification Package Revision	Ver1.3，Ver2.0
Baud Rate	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, custom
Decoded frames (Max.)	3,000
CAN FD (optional)	
Source	CH1~CH4/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
Decoded frames (Max.)	1,000
FlexRay (optional)	
Source	CH1~CH4
Data Baud Rate	2.5 Mbps, 5 Mbps, 10 Mbps, custom
Decoded frames (Max.)	1,000
I^2S (optional)	
Signal	BCLK, WS, DATA
Audio Variant	Audio-I2S, Audio-LJ, Audio-RJ
Start Bits	0~31
Baud Rate	1~32
Decoded frames (Max.)	10,000
MIL-STD-1553B (optional)	
Source	CH1~CH4
Decoded frames (Max.)	10,000
SENT（Optional）	
Source	CH1~CH4/D0~D15
Manchester（Optional）	
Source	CH1~CH4
Baud Rate	500 bps~5 Mbps

Measurement	
Auto measurement	
Source	CH1~CH4, D0~D15, F1~F2, Ref, History, Z1~Z4
Mode	Simple, Advanced
Range	Screen, Gate
Vertical	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	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	+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
Delay	Phase, FRFR, FRFF, FFFR, FFFF, FRLR, FRLF, FFLR, FFLF, Skew
Statistics	Current, Mean, Min, Max, Sdev, Count, Histogram, Trend
Cursors	
Source	CH1~CH4, D0~D15, Math, Ref
Type	Manual: Time X1, X2, (X1-X2), (1/ΔT) Voltage/Current: Y1, Y2, (Y1-Y2) Track: Time X1, X2, (X1-X2)

Math	
Traces	F1, F2
Source	CH1~CH4, Z1~Z4, F1~F2
Operation	+, -, *, ÷, FFT, d/dt, ∫dt, √, Identity, Negation, |x|, Sign, e^x, 10^x, ln, lg, Interpolation, Average, ERES, 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 Window: Rectangular, 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), Custom (Mask Editor)
Mask test speed	Up to 80,000 frames/s
Store failed frames	To history, To screenshot
Bode Plot	
Source	CH1~CH4
Supported signal sources	Built-in waveform generator 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
Counter	
Source	CH1~CH4
Frequency resolution	7 digits
Totalizer	Counter on edges, support Gate and Trigger

500 MHz Bandwidth Extension (optional)	
Channels	2 (CH1&CH3, CH1&CH4, CH2&CH3 or CH2&CH4)
Bandwidth (-3dB) @50 Ω	500 MHz
Rise time (typical) @50 Ω	800 ps
Sample Rate	2 GSa/s
Resolution	8-bit. 10-bit mode (with typical 100 MHz bandwidth)
Memory Depth	200 Mpts/ch

Digital Channels (optional)	
Channels	16, divided to 2 groups: D0~D7, D8~D15
Max. Sampling Rate	500 MSa/s
Memory Depth	50 Mpts/ch
Min. Detectable Pulse	3.3 ns
Level Range	-10 V~10 V
Logic Type	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, Custom
Skew	D0~D15: ±1 sampling interval Digital to Analog: ± (1 sampling interval +1 ns)

Waveform Generator (optional)	
Channels	1
Max. Output Frequency	50 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 50Ω) -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 ~ 50 MHz
Offset accuracy (10 kHz)	±(1%*offset setting value +3 mVpp)
Amplitude flatness	Compare to 10 kHz, 5 Vpp: ±0.3 dB，≤25 MHz ±0.5 dB，>25 MHz
SFDR	DC~1 MHz: -60 dBc 1 MHz~5 MHz: -55 dBc 5 MHz~25 MHz: -50 dBc 25 MHz~50 MHz: -40 dBc
Harmonic distortion	DC~5 MHz: -50dBc 5 MHz~25MHz: -45dBc 25 MHz~50 MHz: -40 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
Waveform memory	16 kpts DDS memory
Sample rate	125 MSa/s
Wave import	From EasyWaveX, from U-disk, directly from waveform data of analog channels

I/O	
Front panel	USB 2.0 Host x2 Probe compensation: 1 kHz, 3 V_{PP} square wave
Rear panel	USB 2.0 Device LAN: 100M EXT 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	500:1 typical
Backlight	500 nit typical

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; Supports customer trace color
Language	Simplified Chinese, Traditional Chinese, English, French, Japanese, German, Spanish, Russian, Italian, Portuguese
Built-in help	Simplified Chinese, English

Environmental			
Temperature	Operating: 0 °C ~ 40 °C Non-operating: -20 °C ~ 60 °C		
Humidity	Operating: 85% RH, 40 °C , 24 hours Non-operating: 85% RH, 65 °C, 24 hours		
Altitude	Operating: ≤3,000 m 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 , 150kHz-30MHz
	Radiated disturbance	CISPR 11/EN 55011	CLASS A group 1 , 30MHz-1GHz
	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 half cycle; 0% UT during 1 cycle; 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.		

Power Supply	
Input Voltage & Frequency	100 ~ 240 Vrms 50/60Hz
Power consumption	80 W max., 50 W typical, 4 W typical in standby mode

Mechanical	
Dimensions	Length x Height x Width = 352 mm×224 mm×111 mm
Weight	Net Weight: 3.3 kg (2-ch); 3.9 kg (4-ch) Gross Weight: 4.8 kg (2-ch); 5.4 kg (4-ch)

Ordering Information

Model	Description
SDS2354X Plus	350 MHz , 4-ch , 2 GSa/s (Max.) , 200 Mpts , 10.1”touch screen
SDS2204X Plus	200 MHz , 4-ch , 2 GSa/s (Max.) , 200 Mpts , 10.1”touch screen
SDS2104X Plus	100 MHz , 4-ch , 2 GSa/s (Max.) , 200 Mpts , 10.1”touch screen
SDS2102X Plus	100 MHz , 2-ch , 2 GSa/s (Max.) , 200 Mpts , 10.1”touch screen

Standard Accessories	Quantity
USB cable	1
Quick start	1
Passive probe	x2 (2-ch model); x4 (4-ch model)
Certificate of calibration	1
Power cord	1

Optional Accessories	Part Number
Waveform generator option (software)	SDS2000XP-FG
16 digital channels (software)	SDS2000XP-16LA
16-channel logic probe	SPL2016
Power Analysis (software)	SDS2000XP-PA
Power Analysis deskew fixture	DF2001A
I^2S trigger & decode (software)	SDS2000XP-I2S
MIL-STD-1553B trigger & decode (software)	SDS2000XP-1553B
FlexRay trigger & decode (software)	SDS2000XP-FlexRay
CAN FD trigger & decode (software)	SDS2000XP-CANFD
SENT trigger & decode (software)	SDS2000XP-SENT
Manchester decode (software)	SDS2000XP-Manch
100 MHz to 200 MHz bandwidth upgrade (4-ch model) (software)	SDS2000XP-4BW02
200 MHz to 350 MHz bandwidth upgrade (4-ch model) (software)	SDS2000XP-4BW03
350 MHz to 500 MHz bandwidth upgrade (4-ch model) (software)	SDS2000XP-4BW05
100 MHz to 350 MHz bandwidth upgrade (2-ch model) (software)	SDS2000XP-2BW03
ISFE isolated front end	ISFE
STB3 demo signal source	STB3
High voltage probe	HPB4010
High voltage differential probe	DPB1300/DPB4080/DPB5150/DPB5150A/DPB5700/DPB5700A
Current probe	CPL5100/CP4020/CP4050/CP4070/CP4070A/CP5030/CP5030A/CP5150/CP5500
Bag	BAG-S2

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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