SDS5000X Series
Digital Storage
Oscilloscope

Data Sheet

EN02B

SIGLENT TECHNOLOGIES CO.,LTD

SDS5104X
SDS5054X
SDS5034X

Product Overview

SIGLENT's SDS5000X series Digital Storage Oscilloscopes are available in bandwidths of 1 GHz, 500 MHz and 350 MHz, have a maximum sample rate of 5 GSa/s, maximum record length of 250 Mpts/ch, and display up to 4 analog channels + 16 digital channels mixed signal analysis ability.

The SDS5000X series employs Siglent's SPO technology with a maximum waveform capture rate of up to 110,000 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 25 MHz arbitrary waveform generator, as well as serial decoding are also features of the SDS5000X.

The large 10.1'' display capacitive touch screen supports multi touch gestures, with the addition of user-friendly one-button design for most commonly used functions, can greatly improve the operation efficiency of the SDS5000X. It also supports mouse and external keyboard control.
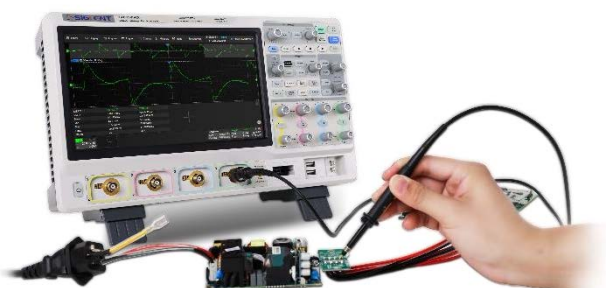
Key Features

- 1 GHz, 500 MHz, 350 MHz models with real-time sample rate up to 5 GSa/s
- SPO technology
  - Waveform capture rates up to 110,000 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 250 Mpts/ch, 500 Mpts in total for all 4 channels
  - Digital trigger system
- Intelligent trigger: Edge, Slope, Pulse, Window, Runt, Interval, Dropout, Pattern, Qualified, Nth edge, Setup/hold, Delay and Video (HDTV supported). Trigger zone helps to simplify advanced triggering
- Serial bus triggering and decoder, supports protocols I2C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I2S, MIL-STD-1553B, SENT and Manchester
- Low background noise, supports 0.5 mV/div to 10 V/div vertical scales
- Segmented acquisition (Sequence) mode, dividing the maximum record length into multiple segments (up to 100,000), 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 100,000 frames
- Automatic measurement function on 50+ parameters, supports statistics with histogram, trend, Gating measurement, and measurements on Math, History and Ref
- Math function (2 Mpts FFT, 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 and Power Analysis
- High Speed hardware-based Average, ERES (Enhanced Resolution); High Speed hardware-based Mask Test function, with Mask Editor tool for creating user-defined masks
- 16 digital channels (optional) with sample rate up to 1.25 GSa/s, record length up to 62.5 Mpts
- 25 MHz function / arbitrary waveform generator, built-in multiple predefined waveforms
- Large 10.1" TFT-LCD display with 1024 * 600 resolution; Capacitive touch screen supports multi-touch gestures
- Multiple interfaces: USB Host, USB Device (USBTMC), LAN (VXI-11, telnet, socket, web), Pass/Fail, Trigger Out, 10 MHz In, 10 MHz Out, VGA output
- Built-in web server supports remote control by the LAN port using a web browser; Supports SCPI remote control commands; Supports external mouse and keyboard

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Models and Key Specifications

Model	SDS5034X	SDS5054X	SDS5104X
Analog channels	4 + EXT		
Bandwidth	350 MHz	500 MHz	1 GHz
Sample rate (Max.)	5 GSa/s (interleaving mode*), 2.5 GSa/s (non-interleaving mode**)		
Memory depth (Max.)	250 Mpts/ch (interleaving mode), 125 Mpts/ch (non-interleaving mode)		
Waveform capture rate (Max.)	110,000 wfm/s (Normal mode); 500,000 wfm/s (Sequence mode)		
Trigger type	Edge, Slope, Pulse width, Window, Runt, Interval, Dropout, Pattern, Video, Qualified, Nth edge, Setup/hold, Delay		
Serial trigger and decode	Standard: I2C, SPI, UART, CAN, LIN Optional: CAN FD, FlexRay, I2S, MIL-STD-1553B, SENT, Manchester (decode only)		
Measurement	50+ parameters，statistics, histogram, trend supported		
Math	2 traces 2 Mpts FFT, +, -, x, ÷, ∫dt, d/dt, √, Identity, Negation, Absolute, Sign, e^x, 10^x, ln, lg, Interpolation, etc.; supports formula editor		
Data analysis	Search, Navigate, History, Mask Test, Digital Voltmeter, Counter, Waveform Histogram, Bode plot and Power Analysis		
Digital channel (optional)	16-channel; maximum sample rate up to 1.25 GSa/s; record length up to 62.5 Mpts		
Waveform generator (optional)	Single channel external USB waveform generator, frequency up to 25 MHz, 125 MSa/s sample rate, 16 kpts waveform memory		
I/O	USB 2.0 Host, USB 2.0 Device, LAN 10M/100M, Pass/Fail, Trigger Out, 10 MHz In, 10 MHz Out, VGA Output		
Probe (standard)	SP3050A, 500 MHz, 1 probe supplied for each channel		
Display	10.1" TFT-LCD with capacitive touch screen (1024*600)		

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

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

Functions & Characteristics

## 10.1" TFT-LCD Display with Capacitive Touch Screen

- 10.1" display with 1024*600 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

Up to 110,000 wfm/s Waveform Update Rate
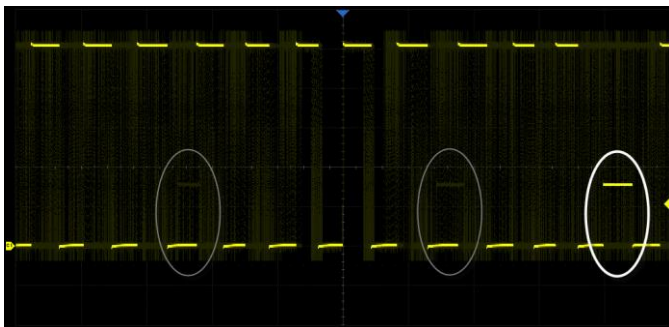
With a waveform update rate of up to 110,000 wfm/s, the oscilloscope can easily capture unusual or low-probability events. In Sequence mode the waveform capture rate can reach 500,000 wfm/s

Record Length of up to 250 Mpts/ch
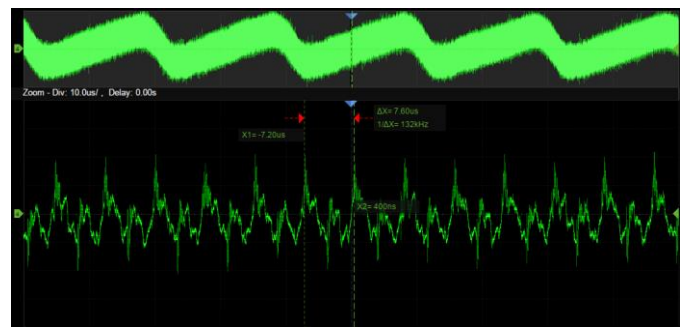
Using hardware-based Zoom technique and record length of up to 250 Mpts, users can select a slower timebase without compromising the sample rate, and then quickly zoom in to focus on the area of interest

## Measurements of a Variety of Parameters

## Parameter Statistics Function

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

Parameter measurements includes 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

Advanced Math Function
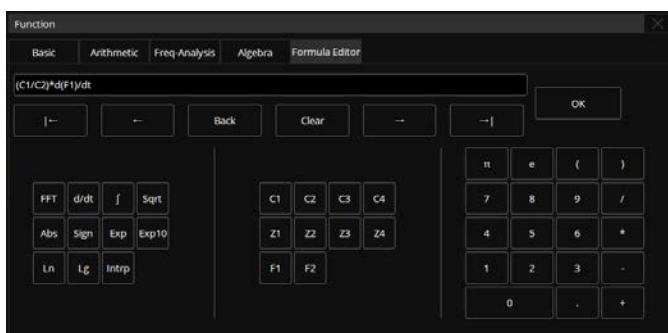
In addition to the traditional (+, -, X, /) operations, FFT, integration, differential, square root and so on are supported. Formula Editor is available for more complex operations. 2 math traces are available
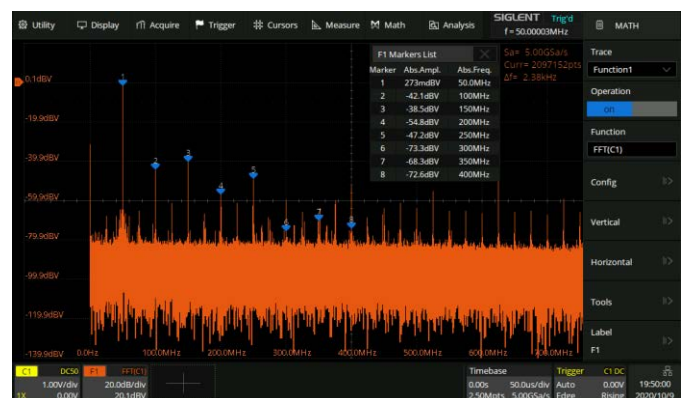
Hardware accelerated FFT supports up to 2 Mpts operation. This provides high frequency resolution with a fast refresh rate. The FFT function also supports a variety of window functions so that it can adapt to different spectrum measurement needs. Three modes (Normal, Average and Max hold) can satisfy different requirements for observing the power spectrum. Auto peak detection and markers are supported

Multiple Trigger Functions
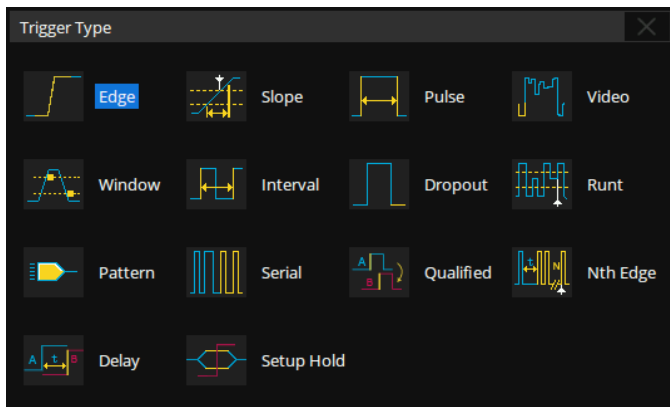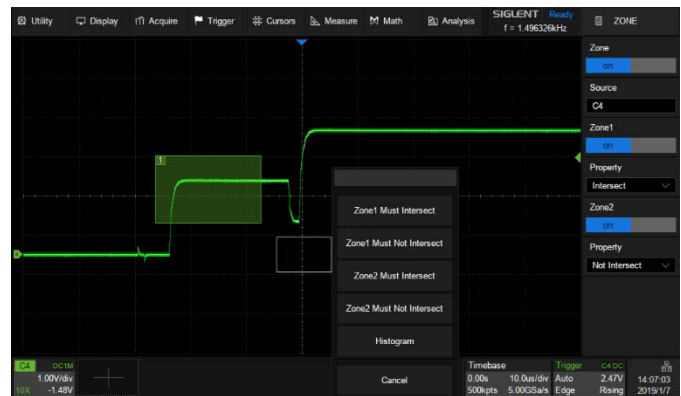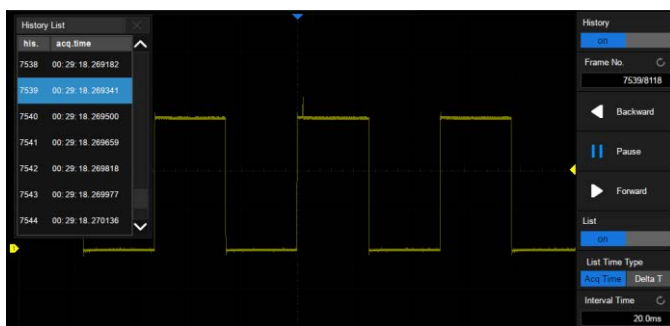

Edge, Slope, Pulse, Video, Windows, Runt, Interval, Dropout, Pattern, Qualified, Nth edge, Setup/hold, Delay and serial trigger

Trigger Zone

Trigger Zone is available for advanced triggering

History Mode

History function can record up to 100,000 frames of waveforms. The recording is executed automatically, so that the customer can play back the history waveforms at any time in order to observe unusual events and quickly locate the area of interest using the cursors or measurements. The failed frames of Mask Test can be stored as history

Sequence Mode
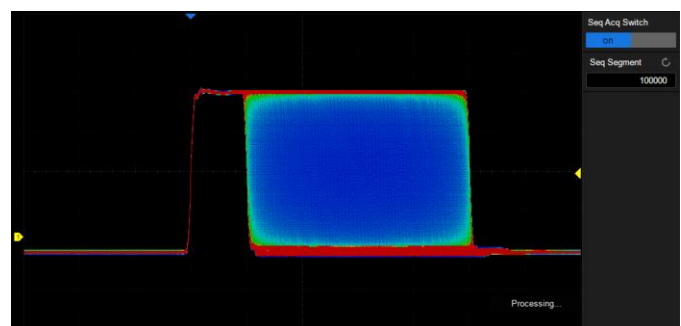
Segmented memory collection will store the waveform into multiple memory segments (up to 100,000) and each segment will store a triggered waveform as well the dead time information. The interval between segments can be as small as 2 µs. All of the segments can be played back using the History function

Search and Navigate
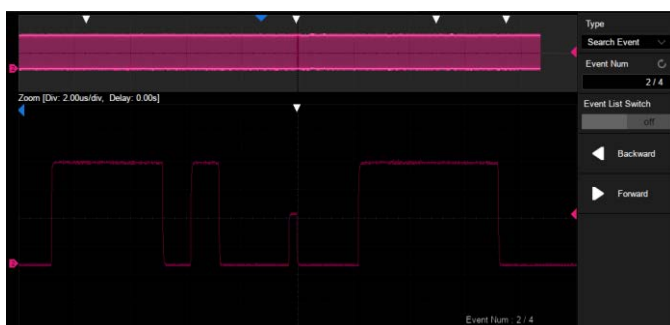
The SDS5000X can search events specified by the user in a frame. Events flagged by the Search can be recalled automatically using Navigate. It can also navigate by time (delay position) and history frames

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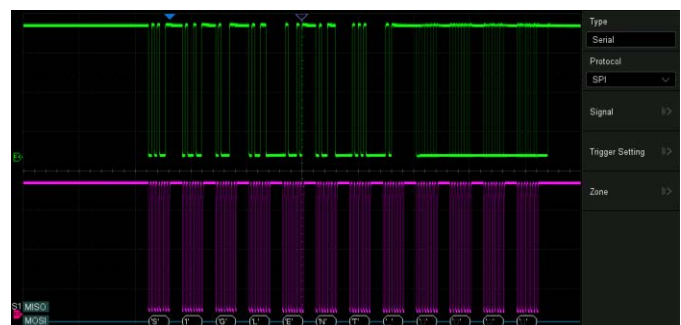
Display the decoded characters through the events list. Bus protocol information can be quickly and intuitively displayed in tabular form. I²C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I²S, MIL-STD-1553B, SENT and Manchester are supported

Hardware-based Average and ERES Acquisition

Normal   Average   ERES
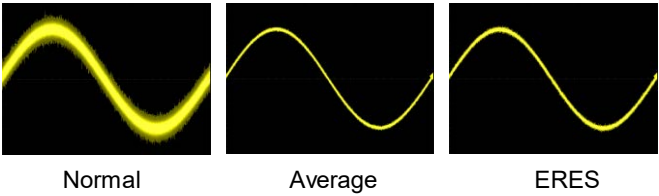
Average and ERES (Enhanced Resolution) acquisition modes are hardware-based, allowing the waveforms to be captured at a faster rate

Waveform Histogram
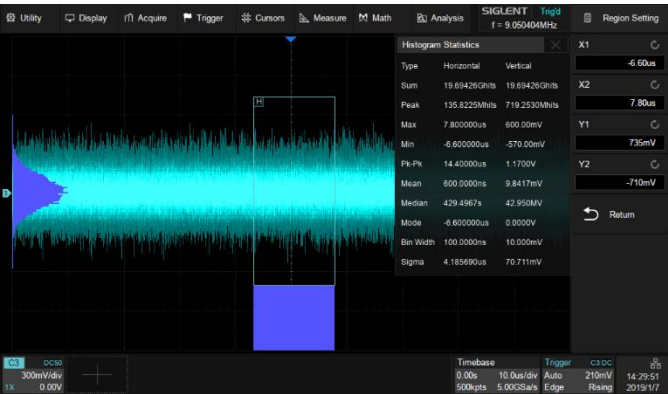
The Waveform Histogram feature provides a statistics view of the waveform in horizontal and vertical directions

Hardware-based High Speed Mask Test Function
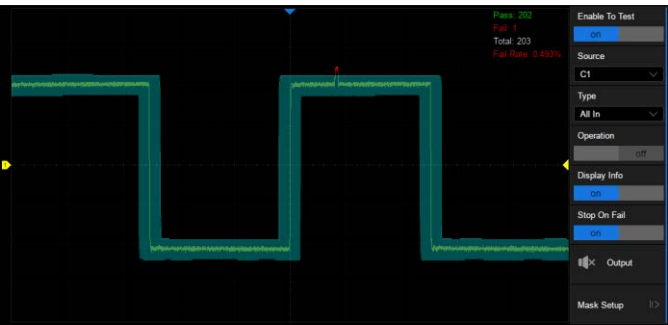
The SDS5000X utilizes a hardware-based Mask Test function, performing up to 18,000 Pass / Fail decisions each second. It is easy to generate user-defined test templates in order to provide trace mask comparisons, making it suitable for long-term signal monitoring or automated production line testing
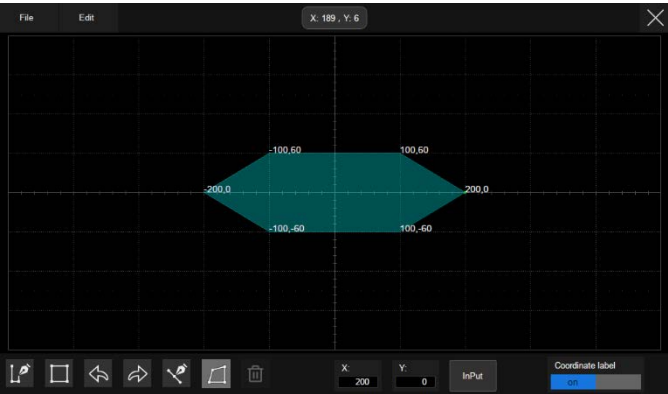
Built-in Mask Editor application helps to create custom masks

Bode Plot

The SDS5000X can control the USB AWG module or a stand-alone SIGLENT SDG generator, to scan the amplitude and phase frequency response of the DUT, and display the data as a Bode Plot. This makes it possible to replace expensive network analyzer in some applications

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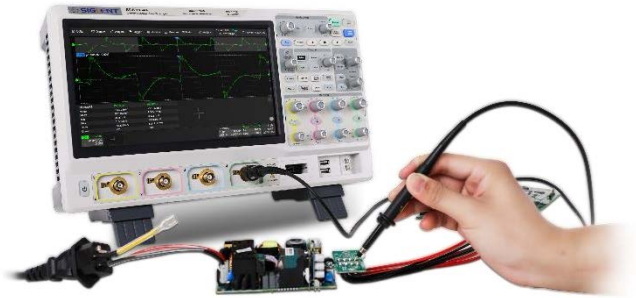
The Power Analysis option provides a full suite of power measurements and analysis, which greatly improve the measurement efficiency in switching power supplies and power devices design

Digital Channels / MSO (Optional)

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

25 MHz Function/Arbitrary Waveform Generator (Optional)

The SDS5000X can control the SAG1021I USB Function/Arbitrary waveform generator to output waveform with up to 25 MHz frequency and ±3 V amplitude. Six basic waveforms plus multiple types of arbitrary waveforms are built-in

Complete Connectivity

USB 2.0 Host, USB 2.0 Device (USBTMC), LAN 10M/100M (VXI-11, telnet, socket, web), Pass/ Fail, Trigger Out, 10 MHz In/Out and VGA output

Web Control
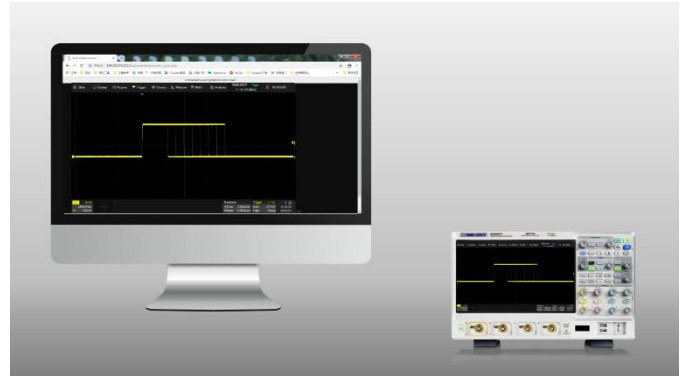
With the embedded web server, users can control the oscilloscope from a simple web page. This provides wonderful remote troubleshooting and monitoring capabilities

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 System (analog channel)	
Sample rate	5 GSa/s (interleaving mode), 2.5 GSa/s (non-interleaving mode)
Memory depth	250 Mpts (interleaving mode), 125 Mpts (non-interleaving mode)
Peak detect	400 ps
Average	4, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536
ERES	Enhanced bit: 0.5, 1, 1.5, 2, 2.5, 3
Sequence	Up to 100,000 segments, interval between triggers = 2 µs min
History	Up to 100,000 frames
Interpolation	sinx/x, x

Vertical System (analog channel)	SDS5034X	SDS5054X	SDS5104X
Bandwidth (-3dB) @50 Ω	350 MHz*	500 MHz**	1 GHz**
Rise time (typical) @50 Ω	1.0 ns	0.7 ns	0.4 ns
Vertical range	8 divisions		
Vertical scale (probe 1X)	1 MΩ: 500 µV/div – 10 V/div(setting range), 1 mV/div – 10 V/div (specified range) 50 Ω: 500 µV/div – 1 V/div(setting range), 1 mV/div – 1 V/div (specified range)		
DC gain accuracy	< 1.5%, ≥5mV/div < 3.0%, <5mV/div		
Offset accuracy	±(1.5%*offset+1.5%*full scale+1mV)		
Offset range (probe 1X)	0.5mV/div~100mV/div: ±2V; 102mV/div~1V/div: ±20V; 1.02V/div~10V/div: ±200V	0.5mV/div~20mV/div: ±2V; 20.5mV/div~100mV/div: ±5V; 102mV/div~200mV/div: ±20V; 205mV/div~1V/div: ±50V; 1.02V/div~2V/div: ±200V 2.05V/div~10V/div: ±400V	
Bandwidth flatness (>2 mV/div, @50 Ω)	50 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 (±40%) 200 MHz (±40%)		
Low frequency response (AC coupling -3 dB)	5 Hz (typical)		
Overshoot (150 ps pulse @50 Ω)	<10% (typical)	<10% (typical)	<15% (typical)
Coupling	DC, AC, GND		
Impedance	DC1M: (1 MΩ±2%) || (16 pF±2 pF) AC1M: (1.2 MΩ±2%) || (16 pF±2 pF) 50 Ω: 50 Ω±1%		
Max. Input voltage	1MΩ ≤ 400Vpk(DC + AC), DC~10kHz 50Ω ≤ 5Vrms, ±10V Peak		
SFDR	≥ 32 dBc		
CH to CH Isolation (@50Ω)	DC ~ 100 MHz >40 dB 100 MHz ~ BW: ≥34 dB		
Probe Attenuation	1X, 10X, 100X, custom		

* Below 1 mV/div (included) the bandwidth is limited to 200 MHz
** Below 2.45 mV/div (included) the bandwidth is limited to 200 MHz

Horizontal System	SDS5034X	SDS5054X	SDS5104X
Time scale	1 ns/div – 1000 s/div	500 ps/div – 1000 s/div	200 ps/div – 1000 s/div
Waveform update rate	Up to 110,000 wfm/s		
Intensity grading	256-level		
Display mode	Y-T, X-Y, Roll		
Roll mode	≥ 50 ms/div		
Skew (CH1~CH4)	< 150 ps		

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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 8 Hz LFRJ: Attenuates the frequency components below 1.2 MHz HFRJ: Attenuates the frequency components above 740 kHz Noise RJ: Increases the trigger hysteresis EXT DC: Passes all components of the signal AC: Blocks DC components and attenuates signals below 10 Hz LFRJ: Attenuates the frequency components below 400 kHz HFRJ: Attenuates the frequency components above 1.6 MHz
Accuracy (typical)	CH1 ~ CH4: ±0.2div EXT: ±0.3div

Sensitivity	CH1 ~ CH4:		Noise RJ = OFF	Noise RJ = ON
		>10mV/div:	±0.15div	±0.35div
		5mV/div~10mV/div:	±0.25 div	±0.35 div
		≤ 2mV/div:	±0.5 div	±0.75 div
	EXT:	200mVpp, DC ~ 10MHz 300mVpp, 10MHz ~ bandwidth (300 MHz typical)		
	EXT/5:	1Vpp, DC ~ 10MHz 1.5Vpp, 10MHz ~ bandwidth (300 MHz typical)		

Jitter	<9ps RMS (typical) for ≥300MHz sine and ≥6 divisions peak to peak amplitude for vertical gain settings from 2.5mV/div to 10V/div <5ps RMS (typical) for ≥500MHz sine and ≥6 divisions peak to peak amplitude for vertical gain settings from 2.5mV/div to 10V/div
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	2ns ~ 20s, Resolution = 1 ns

Pulse Width Trigger

Source	CH1~CH4/D0~D15
Polarity	+wid, -wid
Limit range	<, >, in range, out of range
Time range	2ns ~ 20s, 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

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Source	CH1~CH4/D0~D15
Slope	Rising, Falling
Limit range	<, >, in range, out of range
Time range	2ns ~ 20s, Resolution = 1 ns
Dropout Trigger	
Source	CH1~CH4/D0~D15
Timeout type	Edge, State
Slope	Rising, Falling
Time range	2ns ~ 20s, Resolution = 1 ns
Runt Trigger	
Source	CH1~CH4
Polarity	Positive, Negative
Limit range	<, >, in range, out of range
Time range	2ns ~ 20s, 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	2ns ~ 20s, Resolution = 1 ns
Qualified Trigger	
Type	State, State with Delay, Edge, Edge with Delay
Qualified Source	CH1~CH4/D0~D15
Edge Trigger Source	CH1~CH4/D0~D15
Nth Edge Trigger	
Source	CH1~CH4/D0~D15
Slope	Rising, Falling
Idle time	8ns ~ 20s, Resolution = 1 ns
Edge Number	1 ~ 65535
Delay Trigger	
Source A	CH1~CH4/D0~D15
Source B	CH1~CH4/D0~D15
Slope	Rising, Falling
Limit range	<, >, in range, out of range
Time range	2ns ~ 20s, Resolution = 1 ns
Serial Trigger	
Source	CH1~CH4/D0~D15
Protocol	Standard：I²C、SPI、UART、CAN、LIN Optional：CAN FD、FlexRay、I²S、MIL-STD-1553B、SENT
I²C	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
I²S（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

Serial Decoder	
Decoders	2
Threshold	-4.1 ~ 4.1 div
List	1 ~ 7 lines

Decoder type	Full duplex
I²C	
Source	CH1~CH4/D0~D15
Signal	SCL，SDA
Address	7bit，10bit
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	Ver1.3，Ver2.0
Source	CH1~CH4/D0~D15
Baud Rate	600bps, 1200bps, 2400bps, 4800bps, 9600bps, 19200bps, Custom
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
FlexRay（Optional）	
Source	CH1~CH4/D0~D15
Baud Rate	2.5 Mbps, 5 Mbps, 10 Mbps, Custom
I²S（Optional）	
Source	CH1~CH4/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	CH1~CH4
SENT（Optional）	
Source	CH1~CH4/D0~D15
Manchester（Optional）	
Source	CH1~CH4
Baud Rate	500 bps~5 Mbps

Measurement	
Automatic Measurement	
Source	CH1~CH4、D0~D15、Math、Ref、History、Zoom
Mode	Simple, Advanced
Range	Screen, Gating
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
Delay Parameters	Phase, FRFR, FRFF, FFFR, FFFF, FRLR, FRLF, FFLR, FFLF, Skew
Statistics	Current, Mean, Min, Max, Sdev, Count, Histogram, Trend
Statistics Count	Unlimited, 1~1024
Cursors	
Source	CH1~CH4、D0~D15、Math、Ref、Histogram
Type	Manual : Time X1, X2, (X1-X2), (1/ΔT); Vertical Y1, Y2, (Y1-Y2) Track: Time X1, X2, (X1-X2)

Math

Trace	F1, F2
Source	CH1~CH4, F1~F2, Z1~Z4
Operation	FFT, +, -, x, ÷, ∫dt, d/dt, √, Identity, Negation, |x|, Sign, e^x, 10^x, ln, lg, Interpolation, 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), Customized (Mask Editor)
Mask test speed	Up to 18,000 frames/s
DVM	
Source	CH1~CH4
Mode	DC mean, DC RMS, AC RMS, Peak-peak, Amplitude
Plot	Bar, Histogram, Trend
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, Efficiency
Histogram	
Source	CH1~CH4
Type	Horizontal, Vertical, Both
Counter	
Source	CH1~CH4
Frequency resolution	7 digits
Totalizer	Counter on edges, supports Gate and Trigger

Digital Channels（Optional）

No. of Channels	16
Max. Sampling Rate	1.25 GSa/s
Memory Depth	62.5 Mpts/ch
Min. Detectable Pulse	3.3 ns

SDS5000X Series Digital Storage Oscilloscope

Width	
Level Group	D0~D7, D8~D15
Level Range	-10V~10V
Logic Type	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, Custom
Skew	D0~D15: ±1 sampling interval Digital to Analog: ± (1 sampling interval +1 ns)

SAG1021I Waveform Generator (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 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
Insulation Voltage	±42 Vpk
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, 5 Vpp
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
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	
Standard	3 USB 2.0 Hosts, 1 USB 2.0 Device, 10M/100M LAN, AUX (Pass/Fail+Trigger Out), 10 MHz In/ Out
Pass/Fail	3.3 V TTL output
Ext Trigger Channel	Ext≤1.5 Vrms, Ext/5≤7.5 Vrms

Display	
Display Type	10.1"TFT LCD with capacitive touch screen

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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 System	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	100 W max., 70 W typical, 4 W typical in standby mode

Mechanical

Dimensions	Length x Width x Height = 370 mm×144 mm×231 mm
Weight	Net Weight: 4.0 kg Gross Weight: 5.6 kg

Ordering Information

Model	Description
SDS5104X	1 GHz, 4 CH, 5 GSa/s (Max.)
SDS5054X	500 MHz, 4 CH, 5 GSa/s (Max.)
SDS5034X	350 MHz, 4 CH, 5 GSa/s (Max.)

Standard Accessories	Quantity
USB cable	1
Quick start	1
Passive probe (SP3050A)	1/channel
Certificate of calibration	1
Power cord	1

Optional Accessories	Part No.
350 MHz to 500 MHz bandwidth upgrade (4-ch model) * (software)	SDS-5000X-4BW05
500 MHz to 1 GHz bandwidth upgrade (4-ch model) (software)	SDS-5000X-4BW10
Waveform generator (software)	SDS-5000X-FG
25 MHz isolated USB function/arbitrary waveform generator	SAG1021I
16 digital channels (software)	SDS-5000X-16LA
16-channel logic probe	SPL2016
Power Analysis (software)	SDS-5000X-PA
Power Analysis deskew fixture	DF2001A
I2S trigger & decode (software)	SDS-5000X-I2S
MIL-STD-1553B trigger & decode (software)	SDS-5000X-1553B
FlexRay trigger & decode (software)	SDS-5000X-FlexRay
CAN FD trigger & decode (software)	SDS-5000X-CANFD
SENT trigger & decode (software)	SDS-5000X-SENT
Manchester decode (software)	SDS-5000X-Manch
STB3 demo signal source	STB3
1 GHz active probe	SAP1000
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

* SDS5034X cannot be upgraded to SDS5104X