SDS7000A Series

Digital Storage Oscilloscope

Data Sheet

EN01B

12-bit HARDWARE

SIGLENT TECHNOLOGIES CO.,LTD

SDS7404A H12

SDS7304A H12

Product Overview

SIGLENT's SDS7000A series Digital Storage Oscilloscopes are available in bandwidths of 4 GHz and 3 GHz, have 12-bit ADCs with sample rate up to 20 GSa/s, maximum record length of 1Gpts/ch, and display up to 4 analog channels + 16 digital channels for high performance mixed signal analysis.

The SDS7000A series employs Siglent's SPO technology with a maximum waveform capture rate of up to 1,000,000 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, Signal Scan, Mask Test, Bode Plot, Power Analysis, Eye/Jitter Analysis and Compliance Test allow for extended waveform records to be captured, stored, and analyzed. An impressive array of measurement and math capabilities, options for a 50 MHz arbitrary waveform generator, as well as serial decoding are also features of the SDS7000A .

The large 15.6" HD display capacitive touch screen supports multi-touch gestures, with the addition of user-friendly UI design, can greatly improve the operational efficiency. It also supports mouse control, and remote web control over LAN.

Key Features

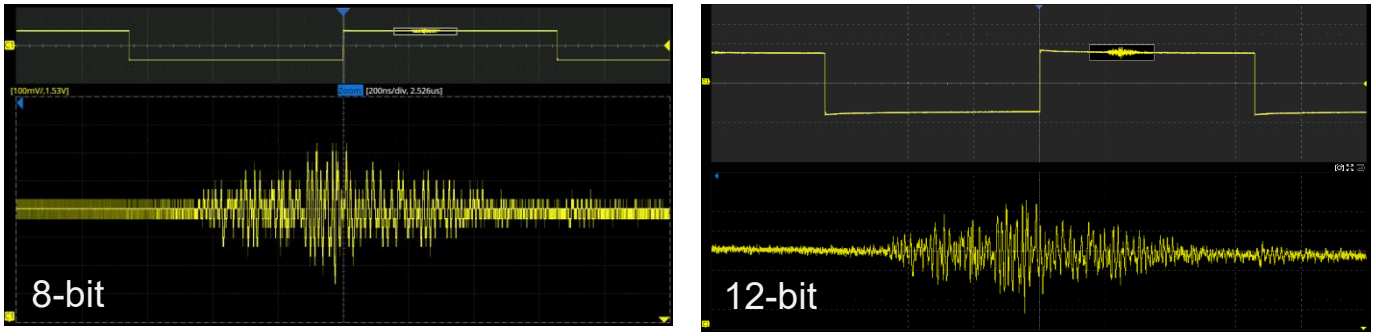
- 4 analog channels, up to 4 GHz bandwidth with up to 20GSa/s sample rate
- 12-bit ADC
- Low background noise: 220 μVrms @ 4 GHz bandwidth
- SPO technology
  - Waveform capture rates up to 1,000,000 wfm/s
  - Supports 256-level intensity grading and color temperature display modes
  - 500 Mpts/ch standard, 1 Gpts/ch optional
  - 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 I^2C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I^2S, MIL-STD-1553B, SENT, Manchester, ARINC429 and USB 2.0
- Segmented acquisition (Sequence) mode, dividing the maximum record length into multiple segments (up to 124,000), 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 124,000 frames
- Automatic measurements on 50+ parameters, supports statistics with histogram, track, trend, Gating measurement, and measurements on Math, History and Memory traces
- 4 Math traces (32 Mpts FFT, Filter, addition, subtraction, multiplication, division, integration, differential, square root, etc.), supports formula editor
- Abundant data analysis functions such as Search, Navigate, SignalScan, Digital Voltmeter, Counter, Waveform Histogram, Bode plot, Power Analysis, Eye/Jitter Analysis and Compliance 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 (optional)
- Built-in 50 MHz waveform generator
- Large 15.6" HD TFT-LCD display with 1920 * 1080 resolution; Capacitive touch screen supports multi-touch gestures
- Interfaces include: 4x USB Host 3.1 Gen 1，2x USB 3.0 Host，USB 2.0 Device，2x 1000M LAN，DVI-D，DP 1.2，HDMI 1.4，Audio, External Triger 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. Supports SCPI remote control commands. Supports external mouse and keyboard

Models and Key Specifications

Model	SDS7404A H12	SDS7304A H12
Analog channels	4 + EXT	
Bandwidth	4 GHz	3 GHz
Sample rate (Max.)	20 GSa/s (dual-channel) 10 GSa/s (3 or 4 channels)	
Vertical Resolution	12-bit Up to 16-bit in ERES mode	
Memory depth (Max.)	Standard: 500 Mpts/ch Optional: 1 Gpts/ch in dual-channel mode	
Waveform capture rate (Max.)	1,000,000 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^2C, SPI, UART, CAN, LIN Optional: CAN FD, FlexRay, I^2S, MIL-STD-1553B, SENT, Manchester (decode only), ARINC429, USB 2.0 (decode only)	
Measurement	50+ parameters，statistics, histogram, trend, and track supported	
Math	4 traces 32 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 and Power Analysis, Eye/Jitter Analysis, SignalScan, Compliance Test (USB 2.0, 100Base-TX, 1000Base-T, 100Base-T1, 1000Base-T1)	
Digital channel (optional)	16-channel; maximum sample rate up to 1 GSa/s; record length up to 50 Mpts	
Waveform generator (optional)	Builit-in, frequency up to 50 MHz, 125 MSa/s sample rate, 16 kpts waveform memory	
Processor System	Intel Core i3-8100 or better，32GB memory，250GB storage，Linux operating system	
I/O	I/O: 4x USB Host 3.1 Gen 1，2x USB 3.0 Host，USB 2.0 Device (USBTMC)，2x 1000M LAN (VXI-11+SCPI， Telnet (5024)+SCPI，Socket (5025)+SCPI，LXI，WebServer) Display: 1x DVI-D: up to 1920x1200 @ 60Hz; 1x DP 1.2: up to 4096x2304 @ 60Hz; 1x HDMI 1.4: up to 4096x2160 @ 60Hz Audio: Mic input, Audio Output Others: External Trigger In, Aux Out (TRIG OUT，PASS/FAIL)，10 MHz In，10 MHz Out	
Probe (Standard)	500 MHz, 1 probe supplied for each channel	
Display	15.6” HD TFT-LCD with capacitive touch screen (1920*1080)	

Functions & Characteristics

12-bit High Resolution



12-bit resolution shows you more details and less noise on the waveform.

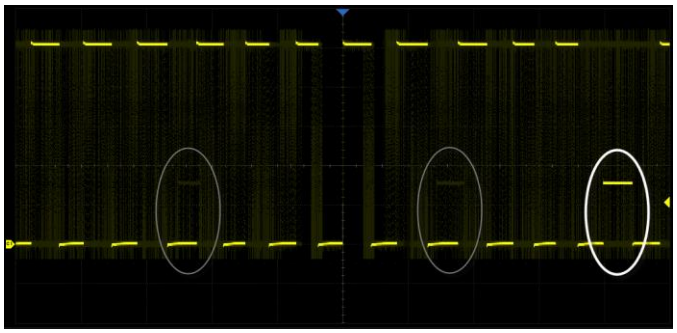
Upgraded processor system

Processor fully upgraded from the embedded ARM processor to the X86 processor, has greatly improved the system response speed and the speed of measurement, calculation, and analysis, presenting more possibilities for the expansion of software analysis functions in the future.

Excellent User Interface and User Experience

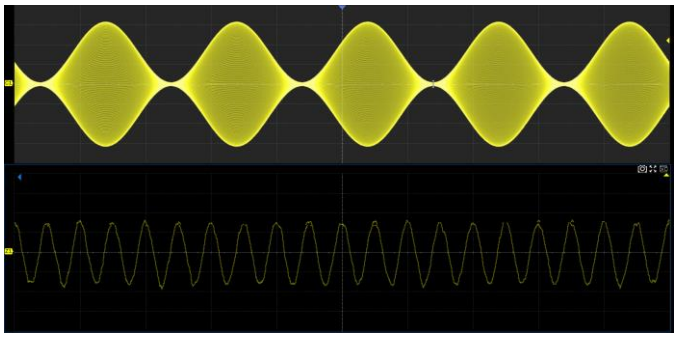
- 15.6” HD display with 1920*1080 resolution
- Capacitive touch screen, supporting multi-touch gestures, can move or scale the waveform traces quickly by finger-touch movements, which greatly improves the operational efficiency
- Built-in WebServer supports remote control on a web page over LAN
- Supports external mouse and keyboard

High Waveform Update Rate



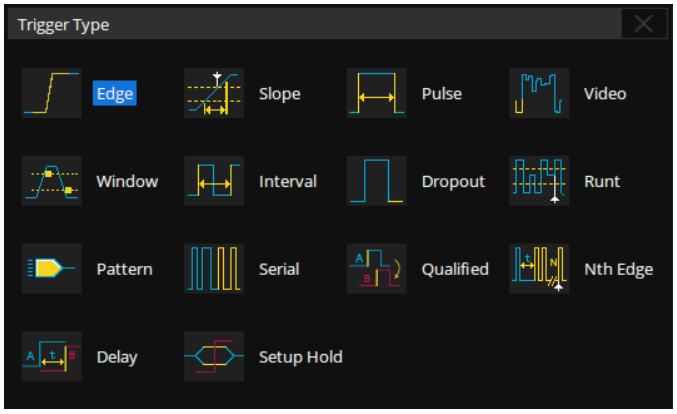
With a waveform update rate of up to 1,000,000 wfm/s, the oscilloscope can easily capture unusual or low-probability events. In Sequence mode, the waveform capture rate can reach 1,100,000 wfm/s

Deep Record Length



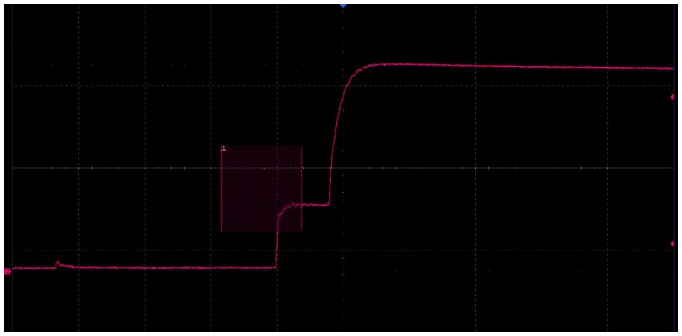
Using hardware-based Zoom technique and record length of up to 1 Gpts, users can select a slower timebase without compromising the sample rate, and then quickly zoom in to focus on the area of interest

Multiple Trigger Functions



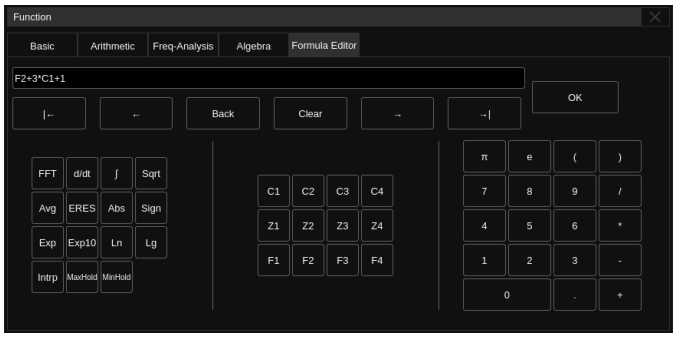
Edge, Slope, Pulse, Video, Windows, Runt, Interval, Dropout, Pattern, Qualified, Nth edge, Setup/hold, Delay and serial trigger

Zone Trigger



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

Advanced Math Function

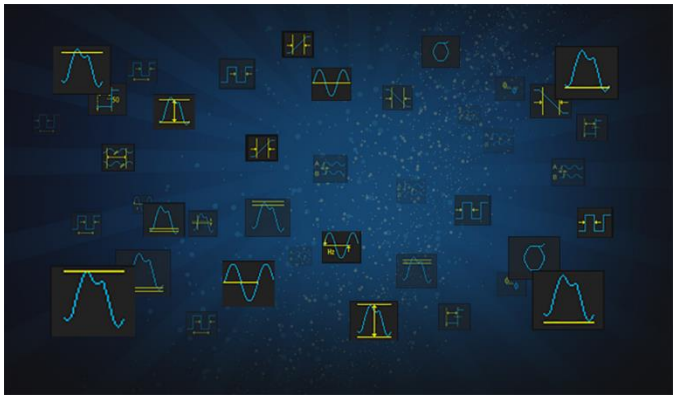


In addition to the traditional (+, -, X, /) operations, FFT, Filter, integration, differential, square root, and more are supported. Formula Editor is available for more complex operations. 4 math traces are available.

Deep Memory FFT

FFT supports up to 32 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



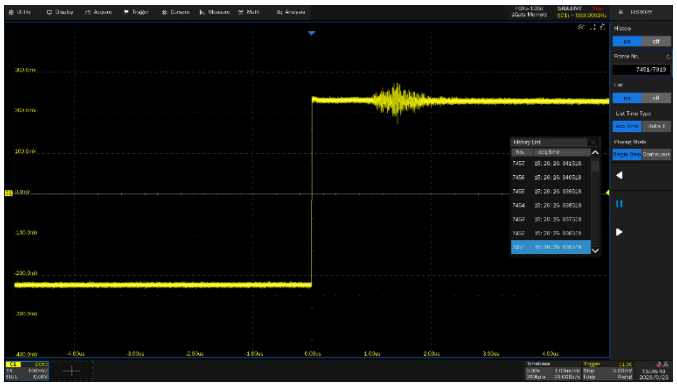
Parameter measurements include 4 categories: horizontal, vertical, miscellaneous, and CH delay providing a total of 50+ different types of measurements. Measurements can be performed within a specified gate period. Measurements on Math, Reference, and History frames are supported

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.

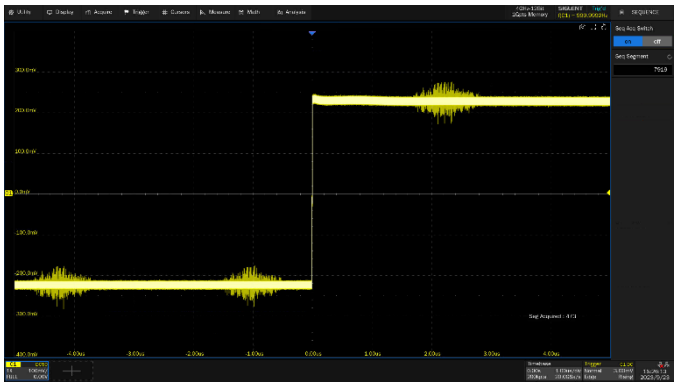
For horizontal parameters such as period, all results are extracted from a frame, instead of just calculating the first one. This accelerates statistics on horizontal measurements and enables distribution observation in a frame using Histogram and Track

History Mode



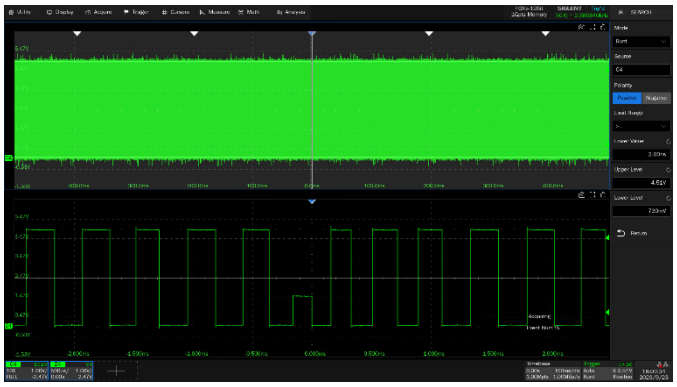
History function can record up to 124,000 frames of waveforms. The recording is executed automatically so that the customer can playback the history waveforms at any time to observe unusual events and quickly locate the area of interest using the cursors or measurements. The failed frames of the Mask Test can be stored as history

Sequence Mode



Segmented memory collection will store the waveform into multiple memory segments (up to 124,000) and each segment will store a triggered waveform as well the dead time information. The interval between segments can be as small as 0.9 μs. All of the segments can be played back using the History function

Search and Navigate

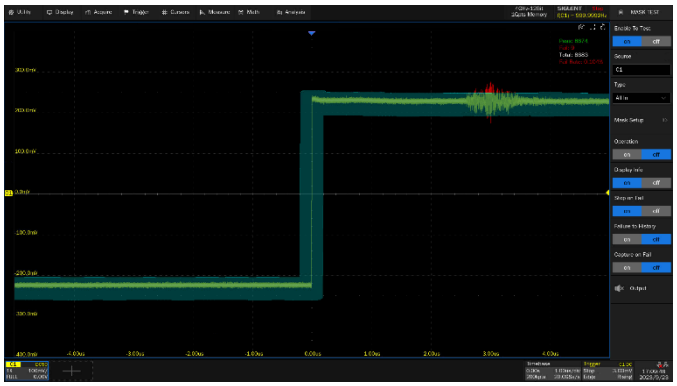


The oscilloscope can search events specified by the user in a frame. Events flagged by the Search can be recalled automatically using Navigate. It can also navigate by time (delay position) and history frames

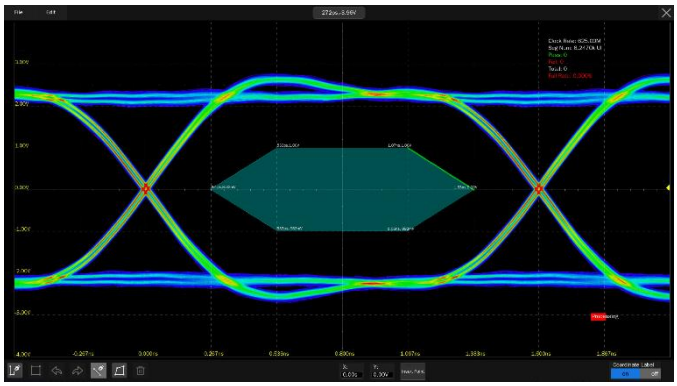
Serial Bus Decode

Display the decoded characters through the events list. Bus protocol information can be quickly and intuitively displayed in tabular form. I^2C, SPI, UART, CAN, LIN, CAN FD, FlexRay, I^2S, MIL-STD-1553B, SENT, Manchester , ARINC429 and USB 2.0 are supported

Hardware-based High Speed Mask Test Function

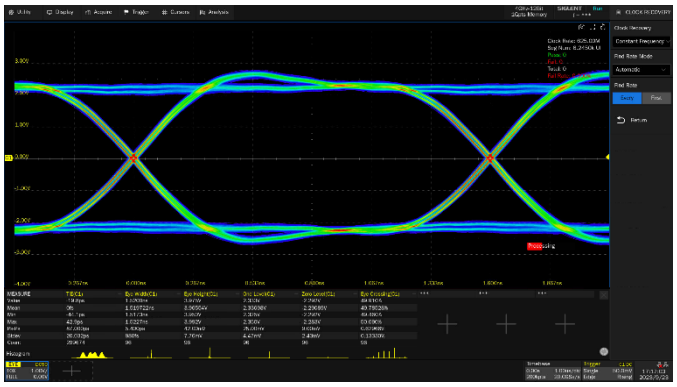


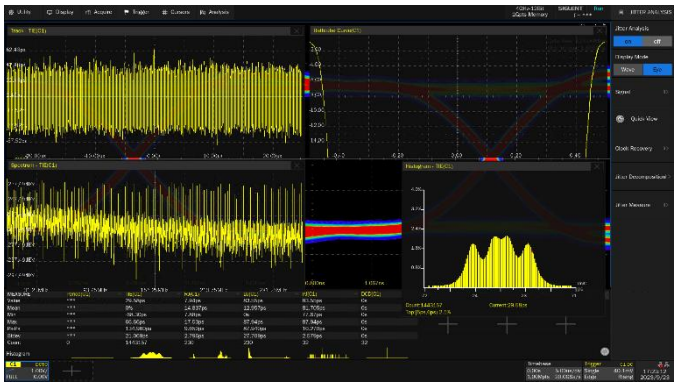
The oscilloscope utilizes a hardware-based Mask Test function, performing up to 80,000 Pass / Fail decisions each second. It is easy to generate user-defined test templates to provide trace mask comparisons, making it suitable for long-term signal monitoring or automated production line testing



Built-in Mask Editor application helps to create custom masks

Eye/Jitter Analysis





Supports eye diagram and jitter analysis/measurement. It can automatically extract the embedded reference clock from serial data and create the eye diagram. Measurement on multiple eye/jitter parameters is provided. Mask test on eye diagrams is supported

Compliance Test（Optional）

USB 2.0, 100Base-TX, 1000Base-T, 100Base-T1, 1000Base-T1 protocol conformance testing are available. When the user sets up the environment according to the prompts, by using the related test fixture, the oscilloscope and related instruments can be automatically set up and related measurement, calculation, decoding and other functions will be used for testing, helping the user to complete each test project quickly and efficiently, and reports are generated automatically.

Bode Plot

The oscilloscope can control the Built-in waveform generator, SIGLENT isolated 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 analyzers in some applications

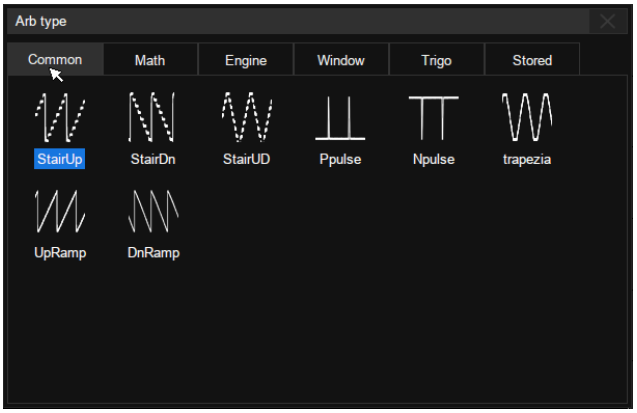
Power Analysis (Optional)

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 the waveforms then analyze the pattern, simultaneously with one instrument

Builit-in 50 MHz Function/Arbitrary Waveform Generator (Optional)



The oscilloscope can control the built-in waveform generator to output waveform with up to 50 MHz frequency and ±3 V amplitude. Six basic waveforms plus multiple types of arbitrary waveforms are built-in

5 GHz Active Differential Probe

The SAP5000D differential probe is provided with 5GHz bandwidth, 80 ps rise time, 400 fF differential input capacitance, and 10:1 attenuation ratio

Complete Connectivity

- 2x USB 3.0 Host， 4x USB Host 3.1 Gen 1，USB 2.0 Device（USBTMC），2x 1000M LAN（VXI-11+SCPI， Telnet（5024）+SCPI，Socket（5025）+SCPI，LXI，WebServer），
- 1x DVI-D: up to 1920x1200 @ 60Hz，1x DP 1.2: up to 4096x2304 @ 60Hz，1x HDMI 1.4: up to 4096x2160 @ 60Hz
- Mic input, Audio Output
- External Trigger In，Aux Out (TRIG OUT，PASS/FAIL), 10 MHz In，10 MHz Out

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	20 GSa/s (dual-channel) *1 10 GSa/s (3 or 4 channels) *1
Memory depth *2*3	Standard: 500 Mpts/ch Optional: 1 Gpts/ch in dual-channel mode
Real time signal processing depth	Measure, math, decode, analysis: 100 Mpts/ch max.
Waveform update rate	1,000,000 wfm/s, 1,100,000 wfm/s in sequence mode
Intensity grading	256-level
Peak detect	100 ps
Average	4, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192
ERES	Enhanced bit: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4 bit
Sequence	Up to 124,000 segments, interval between triggers = 0.9 μs min.
History	Up to 124,000 frames
Interpolation	sinx/x, x

* 1: dual-channel: C1/C2 are not both active, and C3/C4 are not both active

* 2: In Average and Hi-Res modes，the memory depth is 25 Mpts/ch

* 3: When digital channels are active，the memory depth is 50 Mpts/ch

Vertical (analog)	SDS7404A H12	SDS7304A H12
Channel	4 + EXT	
Bandwidth (-3dB) @ 50Ω	4 GHz	3 GHz
Rise time@50Ω	116 ps typical < 125 ps	130 ps typical < 150 ps
Bandwidth (-3dB) @ 1 MΩ, with probe	500 MHz	500 MHz
Resolution	12-bit	
Bandwidth in ERES mode (typical)	Enhanced bits: 0.5: 0.25*Sample rate, up to the analog bandwidth 1: 0.115*Sample rate, up to 2.3 GHz, limited by the analog bandwidth 1.5: 0.055*Sample rate, up to 1.1 GHz, limited by the analog bandwidth 2: 0.028*Sample rate, up to 560 MHz 2.5: 0.014*Sample rate, up to 280 MHz 3: 0.007*Sample rate, up to 140 MHz 3.5: 0.0035*Sample rate, up to 70 MHz 4: 0.0017*Sample rate, up to 34 MHz	
Noise floor (rms,50Ω,typical)		
≤ 5 mV/div	220 μV	200 μV
10 mV/div	237 μV	214 μV
20 mV/div	280 μV	255 μV
50 mV/div	635 μV	564 μV
100 mV/div	1.01 mV	935 μV
200 mV/div	3.06 mV	2.68 mV
500 mV/div	6.84 mV	5.89 mV
1 V/div	10.65 mV	9.58 mV
ENOB*1 (typical)	7.3-bit	7.5-bit
Range	8 divisions	
Vertical scale (probe 1X)	1 MΩ: 1 mV/div – 10 V/div 50 Ω: 1 mV/div – 1 V/div	
DC gain accuracy	1 mV/div ~ 4.95 mV/div: ±1.5%	

(typical)	5 mV/div ~ 10 V/div: ±0.5%
Offset accuracy	± (1% of the offset setting + 0.5% of full scale + 0.02% of max offset + 1mV)
Offset range (probe 1X)	1MΩ: 1 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 50Ω: 1 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	25 MHz, 200 MHz, Custom
Low frequency response (AC coupling -3 dB)	6 Hz (typical)
Coupling	DC, AC, GND
Impedance	(1 MΩ ± 2%) || (15 pF ± 3 pF) 50 Ω: 50 Ω ± 2%
Max. Input voltage	1 MΩ ≤ 400 Vpk(DC + AC), DC ~ 10 kHz 50 Ω ≤ 5 Vrms, ± 10V Peak
SFDR	≥ 45dBc
CH to CH Isolation (@50Ω)	70 dB up to 200 MHz 60 dB up to 500 MHz 40 dB up to 1 GHz 30 dB up to 4 GHz
Probe Attenuation	1X, 10X, 100X, custom

*1: 50 Ω, 50 mV/div, 20 GSa/s, -1dBFS/47.999 MHz input

Horizontal	
Time scale	0.05 ns/div – 1000 s/div
Range	10 divisions
Display mode	Y-T, X-Y, Roll
Roll mode	≥ 50 ms/div
Skew (C1~C4)	< 100 ps
Time base Accuracy	Standard (TCXO): ±2 ppm initial (0~50℃); ±0.5 ppm 1st year aging; ±3 ppm 20-year aging Optional (OCXO)： ±100 ppb initial (25℃)； ±1 ppb over temperature (0~50℃)； ±50 ppb 1st 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 MΩ ≤ 42 Vpk 50 Ω ≤ 5 Vrms			
Hold off range	By time: 4 ns ~ 30 s (4 ns step) By event: 1 ~ 10^8			
Coupling	C1~C4 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 10 Hz LFRJ: Attenuates the frequency components below 500 kHz HFRJ: Attenuates the frequency components above 1.8 MHz			
Accuracy (typical)	C1 ~ C4: ±0.2 div EXT: ±0.3 div			
Sensitivity	C1 ~ C4:		Noise RJ = OFF	Noise RJ = ON
		> 10mV/div	±0.13 div	±0.33 div
		(5mV/div, 10mV/div]	±0.26 div	±0.33 div
		(2mV/div, 5mV/div]	±0.5 div	±0.6 div
		≤ 2mV/div	±0.75 div	±0.85 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 ~ C4: < 9 ps RMS (typical) for ≥ 300 MHz sine and ≥ 6 divisions peak to peak amplitude for vertical gain settings from 2.5 mV/div to 10 V/div < 5 ps RMS (typical) for ≥ 500 MHz sine and ≥ 6 divisions peak to peak amplitude for vertical gain settings from 2.5 mV/div to 10 V/div EXT: < 50 ps rms	
Displacement	Pre-Trigger: 0 ~ 100% memory Delay-Trigger: 0 ~ 10,000 div	
Zone	Up to 2 zones Source: C1~C4 Property: Intersect, Not Intersect	
Edge Trigger		
Source	C1~C4/EXT/(EXT/5)/AC Line/D0~D15	
Slope	Rising, Falling, Rising & Falling	
Slope Trigger		
Source	C1~C4	
Slope	Rising, Falling	
Limit range	<, >, in range, out of range	
Time range	2 ns ~ 20 s, Resolution = 0.2 ns	
Pulse Width Trigger		
Source	C1~C4/D0~D15	
Polarity	+wid, -wid	
Limit range	<, >, in range, out of range	
Time range	2 ns ~ 20 s, Resolution = 0.2 ns	
Video Trigger		
Source	C1~C4	
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~C4	
Window type	Absolute, Relative	
Interval Trigger		
Source	C1~C4/D0~D15	
Slope	Rising, Falling	
Limit range	<, >, in range, out of range	
Time range	2 ns ~ 20 s, Resolution = 0.2 ns	
Dropout Trigger		
Source	C1~C4/D0~D15	
Timeout type	Edge, State	
Slope	Rising, Falling	
Time range	2 ns ~ 20 s, Resolution = 0.2 ns	
Runt Trigger		
Source	C1~C4	
Polarity	Positive, Negative	
Limit range	<, >, in range, out of range	
Time range	2 ns ~ 20 s, Resolution = 0.2 ns	
Pattern Trigger		
Source	C1~C4/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 = 0.2 ns	
Qualified Trigger		
Type	State, State with Delay, Edge, Edge with Delay	
Qualified Source	C1~C4/D0~D15	

Edge Trigger Source	C1~C4/D0~D15
Nth Edge Trigger	
Source	C1~C4/D0~D15
Slope	Rising, Falling
Idle time	8 ns ~ 20 s, Resolution = 0.2 ns
Edge Number	1 ~ 65535
Delay Trigger	
Source A	C1~C4/D0~D15
Source B	C1~C4/D0~D15
Slope	Rising, Falling
Limit range	<, >, in range, out of range
Time range	2 ns ~ 20 s, Resolution = 0.2 ns
Serial Trigger	
Source	C1~C4/D0~D15
Protocol	Standard: I²C, SPI, UART, CAN, LIN Optional: CAN FD, FlexRay, I²S, MIL-STD-1553B, SENT, ARINC429
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
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~C4/D0~D15
Signal	SCL, SDA
Address	7-bit, 10-bit
SPI	
Source	C1~C4/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~C4/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~C4/D0~D15
LIN	
LIN Version	Ver 1.3, Ver 2.0
Source	C1~C4/D0~D15
Baud Rate	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, Custom
CAN FD（Optional）	

Source	C1~C4/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~C4/D0~D15
Baud Rate	2.5 Mbps, 5 Mbps, 10 Mbps, Custom
I^2S（Optional）	
Source	C1~C4/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~C4
SENT（Optional）	
Source	C1~C4/D0~D15
Manchester（Optional）	
Source	C1~C4
Baud Rate	500 bps~5 Mbps
ARINC429（Optional）	
Source	C1~C4
Baud Rate	12.5 kbps~100 kbps, tolerance 1%~20%
Word format	L/SDI/D/SSM，L/D/SSM，L/D
USB 2.0（Optional）	
Source	Full speed/Low speed: C1~C4/D0~D15 High speed: C1~C4
Data type	Low speed (1.5 Mbps), Full speed (12 Mbps), High speed (480Mbps)

Measurement	
Automatic Measurement	
Source	C1~C4, D0~D15, Z1~Z4, F1~F4, 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
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
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~C4, Z1~Z4, D0~D15, F1~F4, M1~M4, Histogram
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, F2, F3, F4
Source	C1~C4, F1~F4, M1~M4
Operation	FFT, +, -, x, ÷, ∫dt, d/dt, √, Identity, Negation, |x|, Sign, e^x, 10^x, ln, lg, Interpolation, Max hold, Min hold, ERES, Average, Filter, Formula Editor

FFT	Length: 32 Mpts, 16 Mpts, 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 Display: Full Screen, Split, Exclusive Mode: Normal, Max hold, Average Tools: Peaks, Markers

Analysis	
Search	
Source	C1~C4, History
Mode	Edge, Slope, Pulse, Interval, Runt
Copy setting	Copy from trigger, Copy to trigger
SignalScan	
Source	C1~C4, F1~F4, M1~M4, D0~D15
Mode	Edge, Non-monotonic, Runt, Measure, Serial pattern, Bus pattern
Copy setting	
Navigate	
Type	Search event, Time, History frame
Mask Test	
Source	C1~C4，Z1~Z4
Mask creating	Auto (Create mask), Customized (Mask Editor)
Mask test speed	Up to 80,000 frames/s
DVM	
Source	C1~C4
Mode	DC mean, DC RMS, AC RMS, Peak-peak, Amplitude
Plot	Bar, Histogram, Trend
Gate	20 ms
Bode Plot	
Source	C1~C4
Supported signal sources	Built-in waveform generator, 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
Histogram	
Source	C1~C4
Type	Horizontal, Vertical, Both
Counter	
Source	C1~C4
Frequency resolution	7 digits
Totalizer	Counter on edges, supports Gate and Trigger
Eye Diagram (optional)	
Source	C1~C4
Clock recovery	Constant frequency, PLL
Measure	Eye height, “1”level, “0”level, Eye amplitude, Eye width, Eye crossing, Average power, Q factor, TIE
Mask Test	Supported
Jitter Analysis (optional)	
Source	C1~C4
Clock recovery	Constant frequency, PLL
Measure	Period, Frequency, +Width, -Width, +Duty cycle, -Duty cycle, Cycle-cycle jitter, Cycle-cycle +width, Cycle-cycle -Width, Cycle-cycle +Duty cycle, Cycle-cycle -Duty cycle, Bit Rate, Unit interval
Jitter decomposition	TIE, RJ, DJ, DCD, DDJ, PJ, TJ@BER Statistics: Histogram, Track, Spectrum

Compliance Test（Optional）	
USB2.0	
Specification	USB 2.0 Electrical Compliance Test Specification, Version 1.07

Items	EL_1, EL_2, EL_3, EL_4, EL_5, EL_6, EL_7, EL_9, EL_21, EL_22, EL_23, EL_25, EL_27, EL_28, EL_29, EL_31, EL_33, EL_34, EL_35, EL_38, EL_39, EL_40, EL_41, EL_42, EL_43, EL_44, EL_45, EL_46, EL_47, EL_48, EL_55
Ethernet	
Specification	100Base-TX
Items	AOI Template, Peak Voltage (POS, NEG, Signal Amplitude Symmetry), Overshoot (POS, NEG), Rise/Fall Times (POS Rise Time, Pos Fall Time, POS Rise/Fall Symmetry, NEG Rise Time, NEG Fall Time, NEG Rise/Fall Symmetry, Overall Rise/Fall Symmetry), Duty Cycle Distortion, Peak to Peak Transmit Jitter, Return Loss (Transmitter Return Loss, Receiver Return Loss)
Specification	1000Base-T
Items	No Disturber Peak Output Voltage (Point A, Point B, Difference A and B, Point C, Point D), No Disturber Droop(Point G, Point J), No Disturber Templates(Point A, Point B, Point C, Point D, Point F, Point H), No Disturber Transmitter Distortion(no TX_TCLK, with TX_TCLK), With Disturber Peak Output Voltage (Point A, Point B, Difference A and B, Point C, Point D), With Disturber Droop (Point G, Point J), With Disturber Templates (Point A, Point B, Point C, Point D, Point F, Point H), With Disturber Transmitter Distortion (no TX_TCLK, with TX_TCLK), No TX_TCLK Master Jitter (Filtered, Unfiltered), No TX_TCLK Slave Jitter (Filtered, Unfiltered), Master JTXOUT, With TX_TCLK Master Jitter (Filtered, Unfiltered), Slave JTXOUT, With TX_TCLK Slave Jitter (Filtered, Unfiltered), Return Loss, Common-mode Output Voltage
Specification	100Base-T1
Items	Transmitter Output Droop (Transmitter Output Droop(POS)/Transmitter Output Droop(NEG)), Master Transmitter Clock Frequency And Timing Jitter (Master Transmitter Clock Frequency/Master Transmitter Timing Jitter), TX_TCLK Frequency And Timing Jitter (TX_TCLK Frequency/TX_TCLK Timing Jitter), Transmitter Distortion, MDI Return Loss, MDI Mode Conversion Loss, Transmitter Power Spectral Density And Peak Differential Output (Transmitter Power Spectral Density/Transmitter Peak Differential Output), MDI Common Mode Emission
Specification	1000Base-T1
Items	TX_TCLK125 Tests (TX_TCLK125 Frequency/Master TX_TCLK125 RMS Jitter/ Master TX_TCLK125 Peak-to-Peak Jitter/Slave TX_TCLK125 RMS Jitter/ Slave TX_TCLK125 Peak-to-Peak Jitter),Transmit Clock Frequency And MDI Jitter (Transmit Clock Frequency(Master)/MDI Output RMS Jitter(Master)/MDI Output Peak-to-Peak Jitter(Master)),Transmitter Distortion, MDI Return Loss, MDI Mode Conversion Loss, Transmitter Power Spectral Density And Peak Differential Output(Transmitter Power Spectral Density/Transmitter Peak Differential Output), Transmitter Output Droop(Transmitter Output Droop(POS)/Transmitter Output Droop(NEG))

Digital Channels（optional）	
Max. Sampling Rate	1 GSa/s
Memory Depth	50 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: ± (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 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
Waveform memory	16 kpts
Sample rate	125 MSa/s
Wave import	From EasyWaveX, from U-disk, directly from waveform data of analog channels

Processor system	
CPU	Intel Core i3-8100 or better
Memory	32 GB DDR4
Storage	250 GB SSD or better
Operating system	Linux

I/O	
Front	2x USB 3.0 Host， Calibration signal for passive probe: 1 kHz, 3 V Square
Side	4x USB Host 3.1 Gen 1，2x 1000M LAN (VXI-11+SCPI， Telnet (5024) +SCPI，Socket (5025) +SCPI，LXI，WebServer) 1x DVI-D: up to 1920x1200 @ 60Hz，1x DP 1.2: up to 4096x2304 @ 60Hz，1x HDMI 1.4: up to 4096x2160 @ 60Hz Mic input, Audio Output
Rear	USB 2.0 Device（USBTMC） External trigger in，EXT: ≤1.5 Vrms，EXT/5: ≤ 7.5Vrms, Aux out: TRIG OUT(3.3 V LVCMOS)，PASS/FAIL OUT(3.3 V TTL), 10 MHz In，10 MHz Out AWG

Display	
Display Type	15.6 HD TFT LCD with capacitive touch screen
Resolution	1920×1080

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 ~ 60 °C		
Humidity	Operating: 5% ~ 90%RH, 30℃, degraded to 50%RH at 40 ℃ Non-operating: 5% ~ 95%		
Altitude	Operating: ≤ 3,048 m, 25 ℃ Non-operating: ≤12,192 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	400 W max., 210 W typical, 4 W typical in standby mode

Mechanical

Dimensions	Width × Height × Depth Without feet: 444.5mm × 334mm × 176.4mm With feet: 444.5mm×367mm×176.4mm
Weight	Net Weight 10.6 kg, Gross Weight 17.0 kg

Ordering Information

Model	Description
SDS7404A H12	4 GHz, 20 GSa/s, 4-CH, 12-bit, standard 500 Mpts/ch memory depth, 15.6” capacitive touch screen
SDS7304A H12	3 GHz, 20 GSa/s, 4-CH, 12-bit, standard 500 Mpts/ch memory depth, 15.6” capacitive touch screen

Standard Accessories	Quantity
USB cable	1
Quick start	1
Passive probe (SP3150A)	1/channel
Certificate of calibration	1
Wireless mouse	1
Power cord	1
Protective Cover	1

Optional Accessories	Part No.
16-channel logic probe	SPL2016
Power Analysis deskew fixture	DF2001A
USB 2.0 test fixture	FX-USB2
Ethernet test fixture	FX-ETH
Automotive Ethernet test fixture	FX-AMETH
STB3 demo signal source	STB3
USB-GPIB adapter	USB-GPIB
High-speed active probe	SAP1000, SAP2500
High voltage probe	HPB4010
High-speed differential probe	SAP2500D, SAP5000D
High voltage differential probe	DPB1300/DPB4080/DPB5150/ DPB5150A/DPB5700/DPB5700A
Current probe	CPL5100/CP4020/CP4050/CP4070/CP4070A CP6030/CP6030A/CP6150/CP6500
Transit case	CASE-S2

Options	Part No.
Waveform generator (software)	SDS7000A-FG
16 digital channels (software)	SDS7000A-16LA
Power Analysis (software)	SDS7000A-PA
Eye Diagram/Jitter Analysis (software)	SDS7000A-EJ
I^2S trigger & decode (software)	SDS7000A-I2S
MIL-STD-1553B trigger & decode (software)	SDS7000A-1553B
FlexRay trigger & decode (software)	SDS7000A-FlexRay
CAN FD trigger & decode (software)	SDS7000A-CANFD
SENT trigger & decode (software)	SDS7000A-SENT
Manchester decode (software)	SDS7000A-Manch
ARINC429 trigger & decode (software)	SDS7000A-ARINC
USB 2.0 decode (software)	SDS7000A-USB2
USB 2.0 compliance test (software)	SDS7000A-CT-USB2
100Base-TX compliance test (software)	SDS7000A-CT-100BASE-T
1000Base-T compliance test (software)	SDS7000A-CT-1000BASE-T
100Base-T1 compliance test (software)	SDS7000A-CT-100BASE-T1
1000Base-T1 compliance test (software)	SDS7000A-CT-1000BASE-T1
1Gpts memory depth（software）	SDS7000A-1GPTS
OCXO timebase (Assembled and calibrated in factory only)	10M_OCXO_L

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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