



DataSheet

SDS2000 Series Digital Oscilloscope

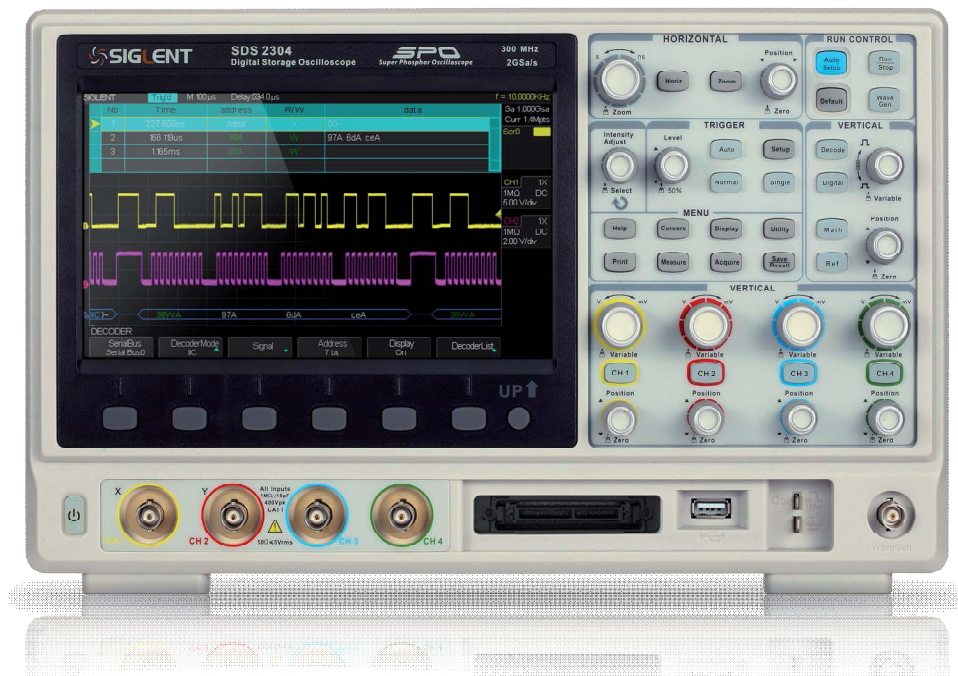


- Innovative SPO technology
- Long Memory Depth up to 28Mpts
- Waveform capture rate up to 110,000 wfs/s
- Zoom function based on the hardware technology
- Advanced math operations(FFT,d/dt,intergrate,square root)
- Built-in waveform generator with the max frequency 25MHz
- Up to 256 levels intensity grading waveform display and color display
- A variety of serial trigger and decode functions(I2C,SPI,UART,CAN,LIN)
- A variety of smart trigger functions(Pattern,Window,Interval,Dropout,Runt)

SDS2000 Series Digital Oscilloscope

Overview

SDS2000 Series is an advanced technology and high performance digital oscilloscope to meet customer's applications with its innovative SPO technology, powerful digital trigger function, serial decode function and logic analyzer.



Innovative SPO Technology

- Higher waveform capture rate(Up to 110,000 wfs/s)
- Up to 256 levels intensity grading waveform display and color display
- Long memory up to 28Mpts
- Digital Trigger function

Main Features

- Innovative SPO technology
- 8 inch TFT LCD(800x480)
- Bandwidth 70MHz,100MHz,200MHz,300MHz
- Max.Sample Rate 2GSa/s
- Smart Trigger functions: Window,Runt,Interval,DropOut,Pattern
- Serial decode/trigger functions(I2C,SPI,UART,RS232,CAN,LIN)
- Support HDTV video trigger function
- Zoom function based on hardware technology
- High speed P/F function based on hardware technology
- 32 kinds built-in measurements and a measurement statistics display,
- Built-in waveform (10 kinds) generator with the max.frequency 25MHz.
- Advanced math operations(FFT,d/dt,intergrate,square root)
- Complete connectivities:USB Host,USB Device(USBTMC,PictBridge), LAN(VXI-11) ,GPIB,Pass/Fail,Trigger Out
- Support SCPI remote control commands
- Multi language user interface and built-in online help system.

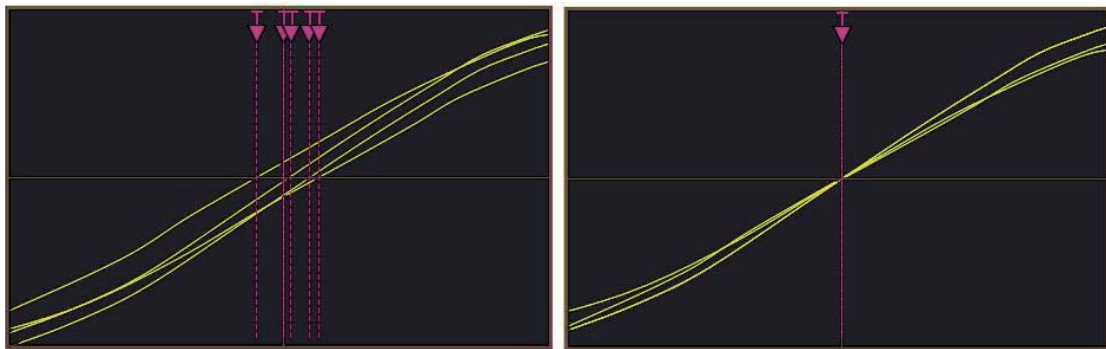
Digital Trigger function

Base on hardware technology, SDS2000 series realized digital trigger system with its high triggering sensitivity, low trigger jitter, and supports smart trigger function,HDTV video trigger and serial trigger function.

Superiority

- Precisely trigger
- Low trigger jitter
- High trigger sensitivity
- 1ns trigger timing
- Configurable Noise Reject
- High stability,not affected by temperature

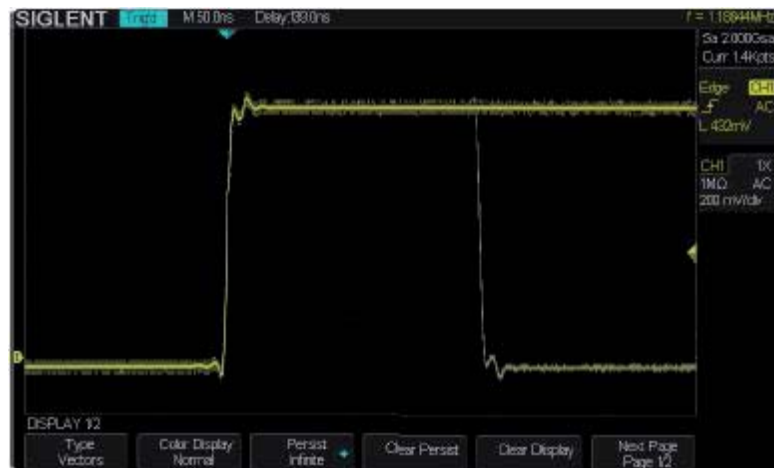
Jitter compare between Analog and Digital trigger



Function & Characteristic

Waveform capture rate up to 110,000 wf/s

The higher capture rate can improve the ability of capturing abnormal event or low probability event.



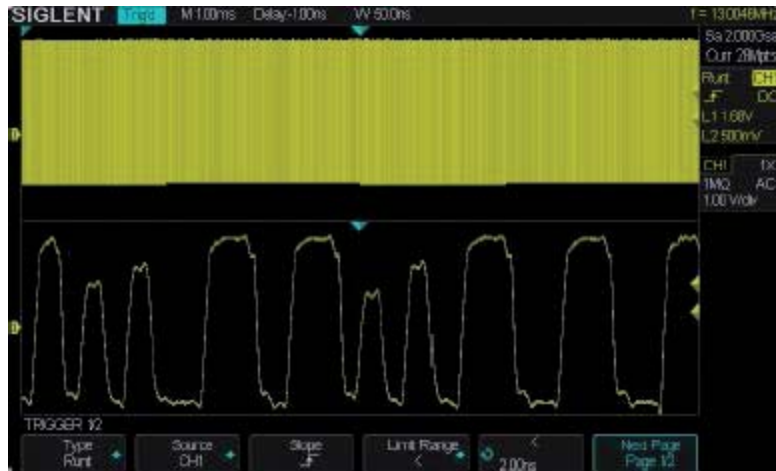
Up to 256 levels intensity grading waveform display

View the brightness of waveform easily focus on low probability event or occasional event.



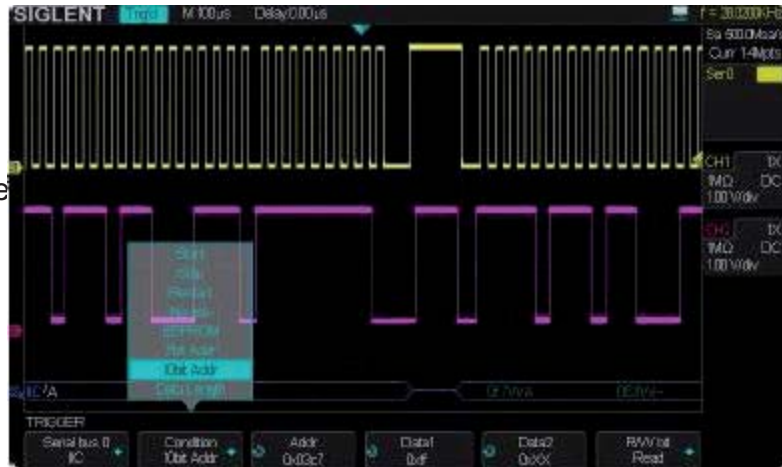
Memory Depth up to 28Mpts

The 2Gsa/S, 28Mpts architecture provides the ability to capture a fast transient or a long acquisition.



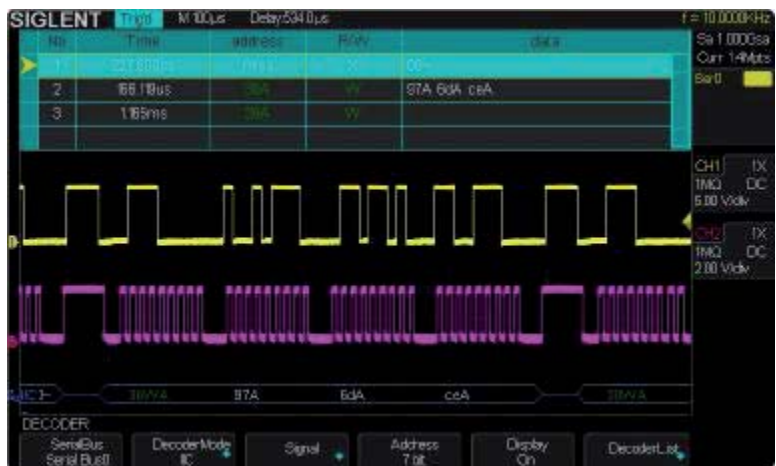
Serial Trigger functions (Option)

The serial trigger will quickly isolate events on a bus eliminating the need to set manual triggers and hoping to catch the right info.



Serial Decode functions (Option)

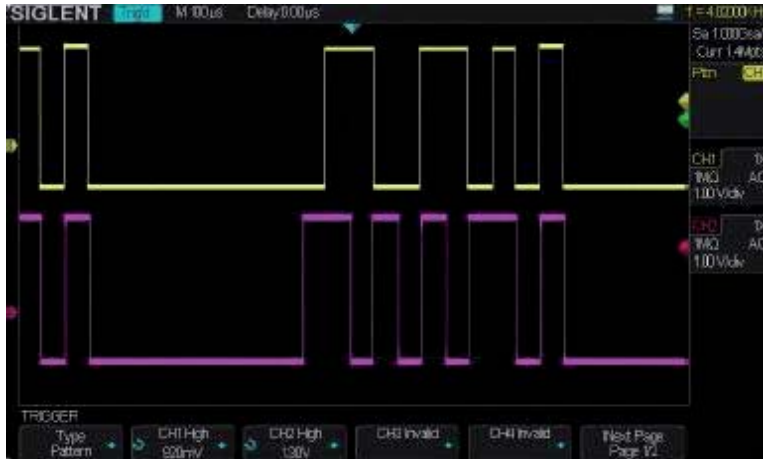
Protocol decoding is shown directly on the waveform with an intuitive, color-coded overlay and presented in hex.



Smart Trigger Functions

SDS2000 series support a variety of smart trigger functions, such as Window, Interval, Runt, DropOut, Pattern.

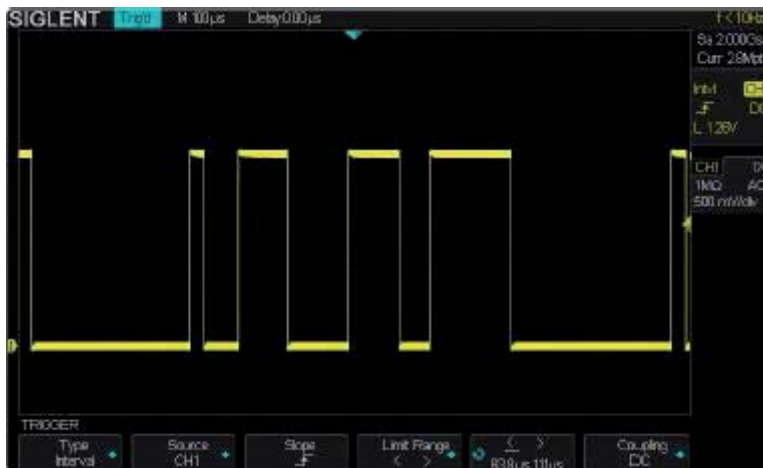
Pattern trigger



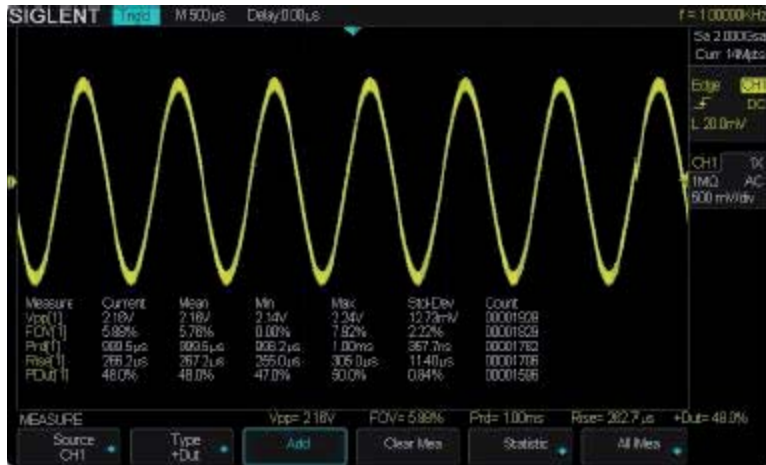
Runt trigger



Interval trigger



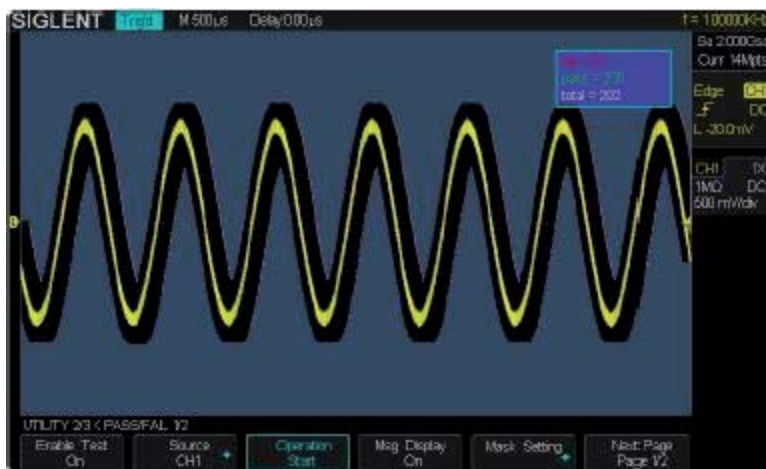
Automatic measurements with statistics



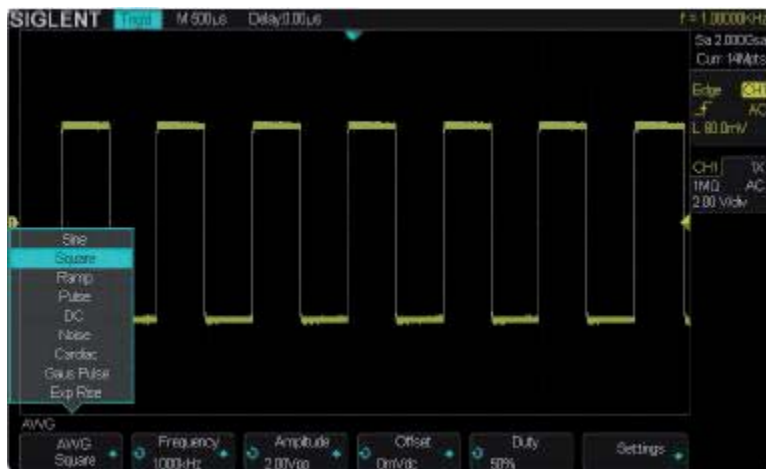
Zoom function based on hardware technology



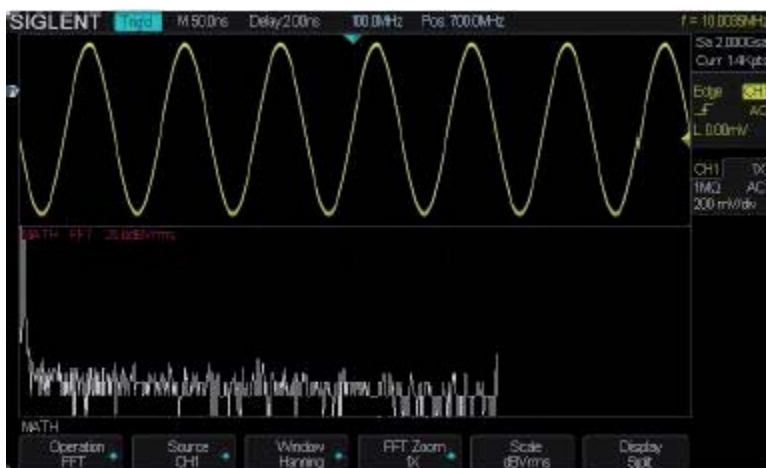
High speed P/F Test Function



Built-in Waveform Generator (Option)



Advanced Math Function



Various Connectivity (USB Host&Device, LAN, AUX)



Specifications

Input	
Channels	2/4
Coupling	AC, DC, GND
Impedance	(1MΩ±2%) (20pF ±4pF)
	50Ω: 50Ω±2%
Max.Input voltage	400Vrms, CAT I, 10X, 1MΩ
CH to CH Isolation	>100:1
Probe attenuator	1X, 10X, 50X, 100X, 500X,1000X
Vertical System	
Bandwidth	300MHz (SDS2304/ SDS2302)
	200MHz (SDS2204/ SDS2202)
	100MHz (SDS2104/ SDS2102)
	70MHz (SDS2074/ SDS2072)
Vertical Resolution	8 bit
Vertical Scale	2 mV/div ~ 10 V/div
Offset Range	2mV/div ~ 100mV/div: ± 1V
	1.02mV/div ~ 1V/div: ± 10V
	1.02V/div ~ 10V/div: ± 100V
Bandwidth Limit	20MHz ±40%
Bandwidth Flatness	DC ~ 10% of BW: ± 1dB
	10% ~ 50% of BW: ± 2dB
	50% ~ 100% of BW: + 2dB/-3dB
Low Frequency Response (AC - 3dB)	≤10Hz
Noise	≤0.6 Div for average of 10 Pk-Pk readings, Fixed gain settings
	≤ 1.0 Div for average of 10 Pk-Pk readings (152mV/div ~ 198mV/div, 1.52V/div ~ 1.98V/div)
SFDR including harmonics	≤0.7 Div for average of 10 Pk-Pk readings, variable gain settings
DC Gain Accuracy	≥35dB(≥10mV/div); ≥30dB(<10mV/div)
	≤±3.0%: 5mV/div ~10V/div
DC Measurement Accuracy	≤±4.0%: 2mV/div
	±[3%× (Reading + Offset) +1%× Offset +0.2div+2mV] , ≤100mV/div
	±[3%× (Reading + Offset) +1%× Offset +0.2div+100mV] , > 100mV/div
Offset Accuracy	± (1%*Offset+1%*8*div+2mV)
Risetime	<1.2ns (SDS2304/ SDS2302)
	<1.7ns (SDS2204/ SDS2202)
	<3.5ns (SDS2104/ SDS2102)
	<5.0ns (SDS2074/ SDS2072)

Overshoot	<10%
Channel Skew	<200ps

Math Function	
Operation	+, -, *, /, FFT, d/dt, ∫ dt, √
FFT	Window: Rectangular, Blackman, Hanning, Hamming Sample points: 1024

Horizontal System	
Timebase Scale	1.0ns/div ~ 50s/div
Waveform Capture	110,000 wfm/s
Intensity grading	256 Levels
Display Format	Y-T, Zoom, Roll, X-Y
Timebase Accuracy	±25ppm
Roll mode	100ms/div ~ 50s/div (1-2-5 step)

Trigger System	
Trigger Mode	Auto, Normal, Single
Trigger Level	Internal: ±4.5 div from the center of the screen
Range	EXT: ±1.2V ; EXT/5: ±6v
Holdoff Range	100ns ~ 1.5s
Trigger Coupling	AC, DC, LF Rej, HF Rej
	DC: Passes all components of the signal
	AC: Blocks DC components and attenuates signals below 5.8Hz
	LF Rej: Blocks the DC component and attenuates the low-frequency components below 2.08MHz HF Rej: Attenuates the high-frequency components above 1.27MHz
Trigger Accuracy	±0.2div
Trigger Sensitivity	Internal: 0.5 div
	EXT: 200mVpp DC ~ 10MHz 300mVpp 10MHz ~ BW
	EXT/5: 1Vpp DC ~ 10MHz 1.5Vpp 10MHz ~ BW
Trigger Jitter	<200ps :
Trigger Displacement	Pre-Trigger: 7 divisions
	Delay Trigger: 10s ~ 1,000,000,000s

Edge Trigger	
Slope	Rising, Falling, Rising&Falling
Source	CH1/CH2/CH3/CH4/EXT/(EXT/5)/AC Line

Slope Trigger	
Slope	Rising, Falling
Limit Range	<, >, < >, > <
Source	CH1/CH2/CH3/CH4

Time Range	2ns ~ 4.2s
Resolution	1ns
Pulse Trigger	
Polarity	+wid , -wid
Limit Range	< , > , < > , > <
Source	CH1/CH2/CH3/CH4
Pulse Range	2ns ~ 4.2s
Resolution	1ns
Video Trigger	
Signal Standard	NTSC, PAL/Secam,720p/50 , 720p/60,1080p/50, 1080p/60, 1080i/50, 1080i/60,Custom
Source	CH1/CH2/CH3/CH4
Sync	ANY,Select
Window Trigger	
Window Type	Absolute,Relative
Source	CH1/CH2/CH3/CH4
Inerval Trigger	
Slope	Rising,Falling
Limit Range	< , > , < > , > <
Source	CH1/CH2/CH3/CH4
Time Range	2ns ~ 4.2s
Dropout Trigger	
Timeout Type	Edge, State
Source	CH1/CH2/CH3/CH4
Slope	Rising,Falling
Time Range	2ns ~ 4.2s
Resolution	1ns
Runt Trigger	
Slope	+wid , -wid
Limit Range	< , > , < > , > <
Source	CH1/CH2/CH3/CH4
Time Range	2ns ~ 4.2s
Resolution	1ns
Pattern Trigger	
Pattern Setting	Invalid, Low, High
Logic	AND, OR, NAND, NOR
Source	CH1/CH2/CH3/CH4
Limit Range	< , > , < > , > <
Time Range	2ns ~ 4.2s
Resolution	1ns
Serial Trigger	
I2C Trigger	
Condition	Start, Stop, Restart, No Ack, EEPROM, 7bits Address&Data,

10bits Address&Data, Data Length

SPI Trigger	
Trigger Source	MOSI, MISO
Data Length	4 ~ 96 bits
Value	0, 1, X
Bit Order	LSB, MSB
UART/ RS232 Trigger	
Trigger Setting	Trigger Source RX, TX
	Condition Start, Stop, Data, Check Error
Bus Configure	Baud 600/1200/2400/4800/9600/19200/38400/ 57600/115200/Custom
	Data Length 5bits, 6bits, 7bits, 8bits
	Parity Check No, odd, even
	Stop Bit 1, 1.5, 2
	Idle Level Low, High
CAN Trigger	
Trigger Setting	Condition Start, Remote Frame, Data Frame, ID&DATA
Bus Configure	Baud 5kb/s, 10kb/s, 20kb/s, 50kb/s, 100kb/s, 125kb/s, 250kb/s, 500kb/s, 800kb/s, 1Mb/s, Custom
LIN Trigger	
Trigger Setting	Condition Start, ID, ID&DATA, Error
Bus Configure	Baud 600/1200/2400/4800/9600/19200/Custom
Serial Decode	
I2C	
Signal	SCL, SDA
Address	7bits, 10bits
List	1 ~ 7 lines
SPI	
Signal	CLK, MISO, MOSI, CS
Edge Select	Rising, Falling
Idle Level	Low, High
Bit Order	MSB, LSB
Data Length	4 ~ 96 bits
List	1 ~ 7 lines
UART/RS232	
Signal	RX, TX
Configure	Baud 600/1200/2400/4800/9600/19200/38400/ 57600/115200/Custom
	Parity Check No, odd, even
	Stop Bit 1, 1.5, 2
	Idle Level Low, High
	Data Length 5bits, 6bits, 7bits, 8bits
	List

CAN	
Signal	CAN_H, CAN_L
Configure	Baud 5kb/s, 10kb/s, 20kb/s, 50kb/s, 100kb/s, 125kb/s, 250kb/s, 500kb/s, 800kb/s, 1Mb/s, Custom
Decode Source	CAN_H, CAN_L, CAN_H – CAN_L
List	1 ~ 7 lines
LIN	
Configure	Baud 600/1200/2400/4800/9600/19200/Custom
List	1 ~ 7 lines

Measure System	
Auto Measurement (32 Types)	Vpp, Vmax, Vmin, Vamp, Vtop, Vbase, Vavg, Mean, Crms Vrms, ROV, FOV, RPRE, FPRE, Rise time, Fall time, Freq Period, + Wid, - Wid, + Dut, - Dut, Bwid, Phase, FRR FRF, FFR, FFF, LRR, LRF, LFR, LFF
Cursor	Time (X1, X2), (X1X2) Voltage (Y1, Y2), (Y1Y2)
Statistics	Current, Mean, Min, Max, Std-Dev, Count

Sample System	
Sample Mode	Real Time sample
Sample Rate	2GSa/s
Memory Depth	Max.14Mpts, available
Acquisition	Sample, Peak Detect, Average, High Res
Averages	4, 16, 32, 64, 128, 256, 512, 1024

Waveform Generator	
Channels	1
Max. Frequency	25MHz
Sample Rate	125 MSa/s
Arb waveform length	16 kpts
Frequency Resolution	1 μ Hz
Vertical Resolution	14 bits
Amplitude Range	2 mVpp ~ 3 Vpp (50 Ω) 4 mVpp ~ 6 Vpp (High-z)

Sine Wave	
Frequency	1 μ Hz ~ 25MHz
Offset Accuracy (100 kHz)	\pm (0.3dB of Setting Value + 1mVpp)
Amplitude flat (100 kHz, 5Vpp)	\pm 0.3 dB
SFDR	DC ~ 1 MHz -60dBc 1 MHz ~ 5 MHz -53dBc 5 MHz ~ 25 MHz -35dBc

Square/Pulse Wave	
Frequency	1 μ Hz ~ 10MHz
Duty Cycle	20% ~ 80%
Rise/Fall time	< 24 ns (10% ~ 90%)
Overshoot	< 5%(1kHz, 1Vpp, Typeical)
Pulse Width	48ns~1ms
Jitter	8ns
Ramp Wave	
Frequency	1 μ Hz ~ 300kHz
Linearity	< 0.1% of Pk-Pk value
Symmetry	0% ~ 100%
DC Offset	
Range	± 1.5 V (50 Ω)
	± 3.0 V (High)
Offset Accuracy	\pm (setting value *1%+3 mV)
Noise	
Bandwidth	>20MHz (-3dB)
Cardiac	
Frequency	1 μ Hz ~ 5MHz
Gaus Pulse	
Frequency	1 μ Hz ~ 5MHz
Exp Rise	
Frequency	1 μ Hz ~ 5MHz
Exp Fall	
Frequency	1 μ Hz ~ 5MHz
I/O	
Standard Ports	USB Host, USB Device, LAN, Pass/Fail, Trigger Out
Pass/Fail	3.3V TTL Output

General Specifications

Display

Display Type	8.0 inches TFT LCD
Resolution	800 (Horizontal) × 480 (Vertical) pixel
Color	24 bit
Contrast	500:1
Backlight	300nit
Range	8 x 14 div
Display Mode	Dot, Vector
Persist	Off, 1 sec, 5 sec, 10 sec, 30 sec, Infinite
Color Display	Normal, Color
Screen Saver	1min, 5min, 10min, 30min, 1h, Offset
Language	Chinese, English

Environments

Temperature	Operating: 10°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
Height	Operating: ≤3000m
	Non-Operating: ≤15,266m

Power Supply

Input Voltage	100 ~ 240 VAC, CAT II, Auto selection
Frequency	45Hz ~ 400Hz
Power	50VA Max

Mechanical

Dimensions	Length	352mm
	Width	112mm
	Height	224mm
Weight	N.W. Two channels model: 3.4 kg	
	Four channels model: 3.6 kg	
	G.W. Two channels model: 4.9 kg	
	Four channels model: 5.2 kg	

Ordering information

	Description
Model	SDS2304(300MHz, 4 Channels)
	SDS2204(200MHz, 4 Channels)
	SDS2104(100MHz, 4 Channels)
	SDS2074(70MHz, 4 Channels)
	SDS2302(300MHz, 2 Channels)
	SDS2202(200MHz, 2 Channels)
	SDS2102(100MHz, 2 Channels)
	SDS2072(70MHz, 2 Channels)
Standard Accessories	A Quick Start
	Two pieces 1:1/(10:1) Passive Probe
	A Certification
	An CD(including EasyScopeX computer software system)
	A Power Cord that fits the standard of destination country
	A USB Cable
Optional Accessories	AWG key
	Decode key
	MSO key
	Power Analyse Software

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