











## ► Specifications

All the specifications are guaranteed except the parameters marked with "Typical" and the oscilloscope needs to operate for more than 30 minutes under the specified operation temperature.

Sample	
Sample Mode	Real-time Sample
Real Time	4.0 GSa/s (single-channel)
Sample Rate	2.0 Gsa/s (dual-channel)
Peak Detect	250 ps (single-channel) 500 ps (dual-channel)
Averaging	After all the channels finish N samples at the same time, N can be 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096 or 8192.
High Resolution	12 bits of resolution when $\geq 5 \mu\text{s}/\text{div}$ @ 4 GSa/s (or $\geq 10 \mu\text{s}/\text{div}$ @ 2 GSa/s).
Memory Depth	single-channel: Auto, 14k pts, 140k pts, 1.4M pts, 14M pts and 140M pts are available Dual-channel: Auto, 7k pts, 70k pts, 700k pts, 7M pts and 70M pts are available

Input	
Number of Channels	DS40X4: four channels DS40X2: two channels
Input Coupling	DC, AC or GND
Input Impedance	(1 M $\Omega$ ±1%)    (14 pF±3 pF) or 50 $\Omega$ ±1.5%
Probe	0.01X-1000X 1-2-5 step
Attenuation Coefficient	
Maximum Input Voltage (1M $\Omega$ )	Maximum Input Voltage of the Analog Channel CAT I 300 Vrms, CAT II 100 Vrms, Transient Overvoltage 1000V pk with RP2200 10:1 probe: CAT II 300 Vrms with RP3300 10:1 probe: CAT II 300 Vrms with RP3500 10:1 probe: CAT II 300 Vrms with RP5600 10:1 probe: CAT II 300 Vrms

Horizontal	
Time Base Scale	DS405x: 1 ns/div to 50 s/div DS403x: 1 ns/div to 50 s/div DS402x: 2 ns/div to 50 s/div DS401x: 5 ns/div to 50 s/div
Time Base Accuracy	$\leq \pm 4$ ppm
Time Base Drift	$\leq \pm 2$ ppm/Year
Delay Range	Pre-trigger (negative delay): $\geq 1$ screen width Post-trigger (positive delay): 1 s to 1000 s
Time Base Mode	Y-T, X-Y, Roll, Delayed
Number of X-Ys	2 paths at the same time (four-channel model)
Waveform Capture Rate <sup>1</sup>	110,000 wfms/s (dots display)

Vertical	
Bandwidth (-3dB)	DS405x: DC to 500 MHz DS403x: DC to 350 MHz DS402x: DC to 200 MHz DS401x: DC to 100 MHz
Single Bandwidth	DS405x: DC to 500 MHz DS403x: DC to 350 MHz DS402x: DC to 200 MHz DS401x: DC to 100 MHz
Vertical Resolution	8bits, two channels sample at the same time
Vertical Scale	1 mV/div to 5 V/div (1 M $\Omega$ ) 1 mV/div to 1 V/div (50 $\Omega$ )

Offset Range	1 mV/div to 120 mV/div: $\pm 1.2\text{V}$ (50 $\Omega$ ) 125 mV/div to 1 V/div: $\pm 12\text{V}$ (50 $\Omega$ ) 1 mV/div to 225 mV/div: $\pm 2\text{V}$ (1M $\Omega$ ) 230 mV/div to 5 V/div: $\pm 40\text{V}$ (1M $\Omega$ )
Bandwidth Limit <sup>2</sup>	DS405x/ DS403x: 20 MHz/100MHz/200MHz DS402x: 20 MHz/100MHz DS401x: 20 MHz
Low Frequency Response (AC coupling -3dB)	$\leq 5$ Hz (on BNC)
Rise Time <sup>2</sup>	DS405x: 700ps DS403x: 1ns DS402x: 1.8ns DS401x: 3.5ns
DC Gain Accuracy	$\pm 2\%$ full scale
DC Offset Accuracy	200 mV/div to 5 V/div: 0.1 div $\pm 2$ mV $\pm 0.5$ offset 2 mV/div to 195 mV/div: 0.1 div $\pm 2$ mV $\pm 1.5$ offset
ESD Tolerance	$\pm 2$ kV
Channel to Channel Isolation	DC to maximum bandwidth: $>40$ dB

Trigger		
Trigger Level Range	Internal	$\pm 6$ div from the center of the screen
	EXT	$\pm 0.8$ V
Trigger Mode	Auto, Normal, Single	
Holdoff Range	100 ns to 10 s	
High Frequency Rejection <sup>2</sup>	50 kHz	
Low Frequency Rejection <sup>2</sup>	5 kHz	
Edge Trigger		
Edge Type	Rising, Falling, Rising&Falling	
Pulse Trigger		
Pulse Condition	Positive Pulse Width (greater than, lower than, within specified interval) Negative Pulse Width (greater than, lower than, within specified interval)	
Pulse Width Range	4 ns to 4 s	
Slope Trigger		
Slope Condition	Positive Slope (greater than, lower than, within specified interval) Negative Slope (greater than, lower than, within specified interval)	
Time Setting	10 ns to 1 s	
Video Trigger		
Signal Standard	Support standard NTSC, PAL and SECAM broadcasting standards Support 480P, 576P, 720P, 1080P and 1080I HDTV standards	
Pattern Trigger		
Pattern Setting	H, L, X, Rising Edge, Falling Edge	
RS232/UART Trigger		
Trigger Condition	Start, Error, Check Error, Data	
Baud	2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, User	
Data Bits	5 bit, 6 bit, 7 bit, 8 bit	
I2C Trigger		
Trigger Condition	Start, Restart, Stop, Missing ACK, Address, Data, A&D	
Address Bits	7 bit, 10 bit	
Address Range	0 to 119, 0 to 1023	
Byte Length	1 to 5	

<b>SPI Trigger</b>	
Trigger Condition	CS, Timeout
Timeout Value	100 ns to 999 ns
Data Bits	4 bit to 32 bit
Data Line Setting	H, L, X
Clock Edge	Rising Edge, Falling Edge

<b>CAN Trigger</b>	
Signal Type	Rx, Tx, CAN_H, CAN_L, Differential
Trigger Condition	SOF, EOF, Frame Type, Frame Error
Baud	10kbps, 20kbps, 33.3kbps, 50kbps, 62.5kbps, 83.3kbps, 100kbps, 125kbps, 250kbps, 500kbps, 800kbps, 1Mbps, User
Sample Point	5% to 95%
Frame Type	Data, Remote, Error, OverLoad
Error Type	Bit Fill, Answer Error, Check Error, Format Error, Random Error

<b>FlexRay Trigger</b>	
Baud	2.5Mb/s, 5Mb/s, 10Mb/s
Trigger Condition	Frame, Symbol, Error, TSS

<b>USB Trigger</b>	
Signal Speed	Low Speed, Full Speed
Trigger condition	SOP, EOP, RC, Suspended, ExitSuspend

<b>Measure</b>		
Cursor	Manual mode	Voltage deviation between cursors ( $\Delta V$ ) Time deviation between cursors ( $\Delta T$ )
	Track mode	Reciprocal of $\Delta T$ (Hz) ( $1/\Delta T$ ) Voltage and time values of the waveform point
	Auto mode	Allow to display cursors during auto measurement
Auto Measurement	Measurements of Maximum, Minimum, Peak-Peak Value, Top Value, Bottom Value, Amplitude, Average, Mean Square Root, Overshoot, Pre-shoot, Frequency, Period, Rise Time, Fall Time, Positive Pulse Width, Negative Pulse Width, Positive Duty Cycle, Negative Duty Cycle, Delay A~B $\uparrow$ , Delay A~B $\downarrow$ , Phase A~B $\uparrow$ , Phase A~B $\downarrow$	
Number of Measurements	Display 5 measurements at the same time	
Measurement Range	Screen Region or Cursor Region	
Measurement Statistic	Average, Max, Min, Standard Deviation, Number of Measurements	
Counter	Hardware 6 bits counter (channels are selectable)	

<b>Math</b>	
Waveform Operation	A+B, A-B, AxB, A/B, FFT, Editable Advanced Operation, Logic Operation
FFT Window	Rectangle, Hanning, Blackman, Hamming
FFT Display	Split, Full Screen
FFT Vertical Scale	Linear RMS, dBV RMS
Logic Operation	AND, OR, NOT, XOR
Math Function	Intg, Diff, Log, Exp, Sqrt, Sine, Cosine, Tangent
Number of Buses for Decoding	2
Decoding Type	Parallel (standard), RS232 /UART (option), I2C (option), SPI (DS6XX4 option), CAN (option), FlexRay (option)

<b>Display</b>	
Display Type	9 inches (229 mm) TFT LCD display
Display Resolution	800 horizontalxRGBx480 vertical pixel
Display Color	160,000 color
Persistence Time	Min, 50ms, 100ms, 200ms, 500ms, 1 s, 2 s, 5 s, 10 s, 20 s, Infinite
Display Type	Dots, Vectors
Real-time Clock	Time and Date (user adjustable)

<b>I/O</b>	
Standard Ports	Dual USB HOST, USB DEVICE, LAN, VGA output, 10MHz input/output, Aux output (trigger output, quick edge, pass/fail, calibration, GND)

## General Specifications

<b>Probe Compensation</b>	
Output Voltage <sup>2</sup>	About 3 V, peak-peak
Frequency <sup>2</sup>	1 kHz
Power	
Power Voltage	100-120 V/50Hz/60Hz/400Hz 100-240 V/50 Hz/60Hz
Power	Maximum 120 W
Fuse	3 A, T degree, 250 V

<b>Environment</b>	
Temperature Range	In operation: 0 °C to +50 °C Out of operation: -20 °C to +70 °C
Cooling Method	Fan
Humidity Range	Under +35 °C: $\leq 90\%$ relative humidity +35 °C to +50 °C: $\leq 60\%$ relative humidity
Altitude	In operation: under 3,000 meters Out of operation: under 15,000 meters

<b>Mechanical</b>	
Dimensions <sup>3</sup>	WidthxHightxDepth =440.0 mmx 218.0 mmx130.0 mm
Weight <sup>4</sup>	Without package 4.8 kg $\pm$ 0.2 kg With package 7.1 kg $\pm$ 1.0kg

<b>Adjustment Interval</b>	
The recommended calibration interval is one year.	

<b>Regulation Standards</b>	
Electromagnetic Compatibility	2004/108/EC Execution standard EN 61326-1:2006 EN 61326-2-1:2006
Safety	UL 61010-1:2004; CAN/CSA-C22.2 NO. 61010-1-2004; EN 61010-1:2001; IEC 61010-1:2001

1. Maximum value. In single-channel mode, sine signal with 10 ns horizontal scale, 4 div input amplitude and 10 MHz frequency, edge trigger.
2. Typical.
3. Tilt tabs and handle folded, knob height included, front panel cover excluded.
4. DS4054 model, standard configuration.

► Ordering Information

Model	Description	Order Number
	DS4012 (100MHz, 2-channel)	DS4012
	DS4014 (100MHz, 4-channel)	DS4014
	DS4022 (200MHz, 2-channel)	DS4022
	DS4024 (200MHz, 4-channel)	DS4024
	DS4032 (350MHz, 2-channel)	DS4032
	DS4034 (350MHz, 4-channel)	DS4034
	DS4052 (500MHz, 2-channel)	DS4052
	DS4054 (500MHz, 4-channel)	DS4054
Standard Accessories	Power Cord conforming to the standard of the country	-
	Front Panel Cover	FPC-DS-4
	USB Data Cable	CB-USB-150
	2 or 4 Passive Probes (500 MHz)	RP3500
	Quick Guide	-
	Resource CD (User's Guide and Application Software)	-
Optional Accessories	Active Differential Probe (1.5 GHz)	RP7150
	Rack Mount Kit	RM-DS-4
Decoding Options	RS232/UART Decoding Kit	SD-RS232-DS4
	I2C Decoding Kit	SD-I2C-DS4
	SPI Decoding Kit	SD-SPI-DS4 (Only for DS4XX4)
	CAN Decoding Kit	SD-CAN-DS4
	FlexRay Decoding Kit	SD-FlexRay-DS4

**RIGOL**

