Digital Oscilloscopes

Digital oscilloscope, an essential electronic equipment for R&D, manufacture and maintenance, is used by electronic engineers to observe various kinds of analog and digital signals. RIGOL is a leading manufacturer and supplier of digital oscilloscope in China and has made many breakthroughs in the domestic industry. It introduces 6 generations of oscilloscopes since its creation. DS6000 series digital oscilloscope, the first DSO in China featuring 1GHz Bandwidth, was introduced in 2009. MSO/DS7000 series digital oscilloscope use the special ASIC chip for digital oscilloscope developed by RIGOL. The consistency and reliability of digital oscilloscope has been greatly improved. The whole memory hardware is used to measure it with high accuracy, which also supports histogram analysis and waveform search, providing a more efficient way to solve the problem of waveform location and analysis. The innovative technique "UltraVision" and "UltraVision II" makes RIGOL oscilloscopes realize deeper memory depth, higher waveform capture rate, hardware full memory auto measurement, real time waveform record and multi-level intensity grading display. Now RIGOL has developed several series of oscilloscopes (including , DS1000Z, MSO/DS2000A, DS4000E, MSO/DS4000, MSO5000, DS6000, MSO/DS7000 and MSO8000) to meet different customer needs and to improve the testing efficiency.

Series	Analog Channels	Digital Channels (MSO)	Max. Sample Rate	Max. Memory Depth	AWG	Bus Analysis	Bandwidth Range(MHz)										
							2000	1000	600	500	350	300	200	150	100	70	50
MSO8000	4	16	10 GSa/s	500 Mpts	●	●	●	●	●								
MSO/DS7000	4	16	10 GSa/s	500 Mpts	●①	●				●	●		●		●		
DS6000	4	--	5 Gsa/s	140 Mpts		●		●									
MSO5000	2 / 4	16	8 Gsa/s	200 Mpts	●	●					●		●	●	●	●	
MSO/DS4000	2 / 4	16	4 Gsa/s	140 Mpts		●				●	●		●		●		
DS4000E	4	--	2 Gsa/s	14 Mpts		●							●		●		
MSO/DS2000A	2	16	2 Gsa/s	56 Mpts	●	●						●	●		●		
DS1000Z	2 / 4	16 ②	1 Gsa/s	24 Mpts	●	●							●		●	●	●
DS1000E/U	2	--	1 Gsa/s	1 Mpts											●	●	●

● Standard or Option, could be supported.

① Option available for MSO models

② Only Plus Models support

# MSO8000 Series Digital Oscilloscopes

The MSO8000 Series Oscilloscopes combine best in class sampling and memory depth with our modern, flexible User Interface enabled by our new UltraVision II architecture and innovative Phoenix Chipset. With 600 MHz, 1 GHz, and 2 GHz models each with 4 analog channels the MSO8000 Series brings RIGOL's UltraVision II performance to the high speed engineering bench. The MSO8000 also adds Jitter and Real-time Eye Analysis capabilities in addition to other UltraVision II functions including zone triggering, 7 instruments in one, Enhanced FFTs, color grading, and histograms all supported by the high sample rate, deep memory, and full memory measurements.

- Analog bandwidth: 600 MHz, 1 GHz, and 2 GHz (single-channel and half-channel modes); bandwidth upgrade supported
- 4 analog channels, 1 EXT channel, and 16 standard configuration of digital channels (required to purchase the probe)
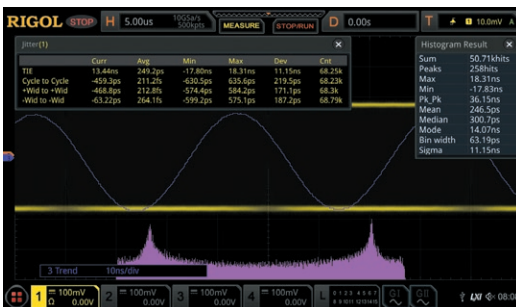
- Up to 10 GSa/s real-time sample rate
- Up to 500 Mpts memory depth (standard)
- High waveform capture rate (over 600,000 waveforms per second)
- Up to 450,000 frames of hardware real-time and ceaseless waveforms recording and playback functions
- Integrates 7 independent instruments into 1, including digital oscilloscope, 16-channel logic analyzer, spectrum analyzer, arbitrary waveform generator (option), digital voltmeter, 6-digit frequency counter and totalizer, and protocol analyzer (option)
- Auto measurement of 41 waveform parameters; full-memory hardware measurement function
- Real-time eye diagram and jitter analysis software (option)
- 10.1-inch capacitive multi-touch screen, 256-level intensity grading display, with color persistence

2GHz bandwidth,10GSa/s sampling rate
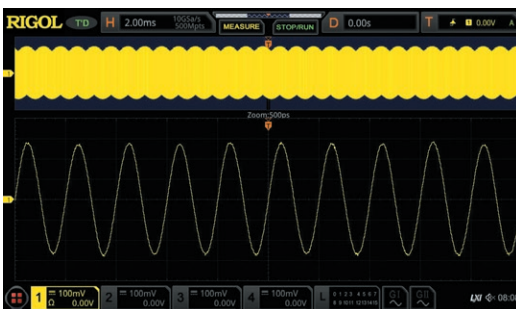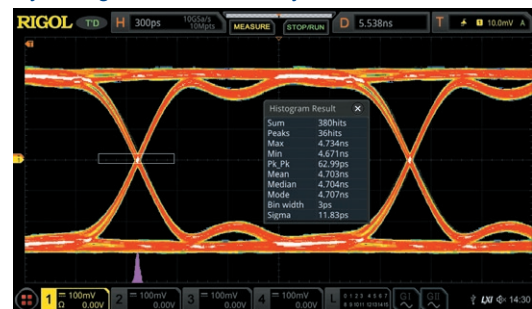
To achieve higher signal fidelity and resolution (as short as 100 ps, capable of reaching 2 ps for the minimum time base) at an affordable price.

Eye Diagram Pre-test Easy

To better observe the transmission quality of the digital signal and understand the Inter-Symbol Interference in the system, so that you can make improvement in the system design.

Visualize Signal Integrity with Advanced Jitter Measurement

Perform TIE measurement on the clock signal with the jitter and make an analysis on the measurement results through trend graph and histogram.

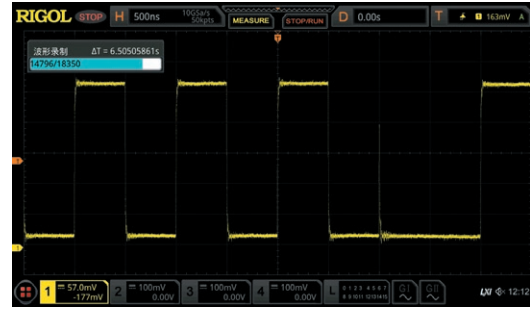## 600,000 wfms/s Capture Rate

Capture occasional exceptional signals in a highly refreshed mode.

Hardware Full Memory Auto Measurement
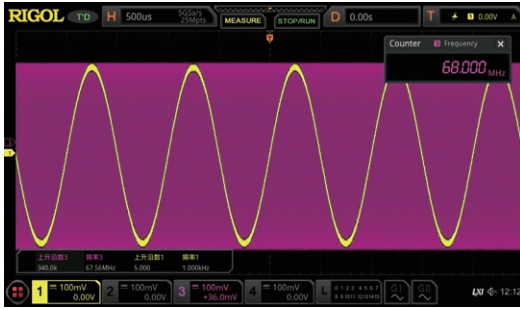
Measure accurate frequency value of the waveforms based on memory, not the screen display.

500 Mpts memory depth, 450,000 frames waveforms recording and playback.

Based on segmented storage technology, deep memory not only ensured the high capture efficiency, but also prolonged the overall observation time for the waveforms.

Key Specifications

| Model		MSO8064	MSO8104	MSO8204
Analog Bandwidth		600 MHz	1 GHz	2 GHz[1]
No. of Input/Output Channels		4 input analog channels		
		1 input EXT channel		
		16 input digital channels (required to purchase the RPL2316 logic analyzer probe)		
		dual-channel arbitrary waveform generator output (required to purchase the MSO8000-AWG option)		
Max. Sample Rate of Analog Channel		10 GSa/s (single-channel), 5 GSa/s (half-channel[2]), 2.5 GSa/s (all channels) Note: When all the channels are enabled, the sample rate is 2.5 GSa/s, and the analog bandwidth can reach up to 1 GHz.		
Max. Memory Depth		analog channel: 500 Mpts (single-channel), 250 Mpts (half-channel[2]), 125 Mpts (all channels)		
		digital channel: 62.5 Mpts (all channels)		
Max. Waveform Capture Rate		≥600,000 wfms/s		
Range of Time Base		600 MHz	1 GHz	2 GHz
		500 ps/div~1 ks/div	500 ps/div~1 ks/div	200 ps/div~1 ks/div
		support fine adjustment		
Vertical Sensitivity Range	1 MΩ	1 mV/div~10 V/div		
	50 Ω	1 mV/div~1 V/div		
DC Gain Accuracy		± 2% of full scale		
Hardware Real-time Waveform Recording and Playing		≥450,000 wfms (single-channel)		
Trigger Type		Standard: Edge trigger, Pulse trigger, Slope trigger, Video trigger, Pattern trigger, Duration trigger, Timeout trigger, Runt trigger, Window trigger, Delay trigger, Setup/Hold trigger, and Nth Edge trigger		
		Option: RS232, UART, I2C, SPI, CAN, FlexRay, LIN, I2S, and MIL-STD-1553		
Decoding Type		Standard: Parallel		
		Option: RS232, UART, I2C, SPI, LIN, CAN, FlexRay, I2S, and MIL-STD-1553		
Waveform Measurement	Number of Measurements	41 auto measurements; and up to 10 measurements can be displayed at a time.		
	Analysis	Frequency counter, DVM, power analysis (option), histogram, zone trigger, eye analysis (option), and jitter analysis (option)		
Waveform Calculation		A+B, A-B, A×B, A/B, FFT, A&&B, A||B, A^B, !A, Intg, Diff, Lg, Ln, Exp, Sqrt, Abs, AX+B, LowPass, HighPass, BandPass, BandStop, and Trend		
Enhanced FFT	Record Length	Max. 1 Mpts		
	Window Type	Rectangular (default), Blackman-Harris, Hanning, Hamming, Flattop, and Triangle.		
	Peak Search	a maximum of 15 peaks, confirmed by the settable threshold and offset threshold set by users		
Arbitrary Waveform Generator		25 MHz, 2 CH (Need AWG option)		
Interface		USB2.0 Host, USB2.0 Device, LAN, GPIB(option), WEB, AUX output, 10M In/Out, HDMI, Probe Compensation Output		
LCD Size and Type		10.1-inch capacitive multi-touch screen/gesture enabled operation		
Display Resolution		1024 × 600		
Dimensions		410 mm (W)×224 mm (H)×135 mm (D)		
Weight		<4.0 kg (Package Excluded)		

Note[1]: 2 GHz bandwidth is only applicable to single-channel or half-channel mode.
Note[2]: Half-channel mode: CH1 and CH2 are considered as a group; CH3 and CH4 are considered as another group. Each group share the same sample rate 5 GSa/s, and either one of the channels in each group is enabled.

Ordering Information

| Order Information	Order No.
Models	
MSO8204 (2 GHz, 10 GSa/s, 500 Mpts, 4+16 CH MSO)	MSO8204
MSO8104 (1 GHz, 10 GSa/s, 500 Mpts, 4+16 CH MSO)	MSO8104
MSO8064 (600 MHz, 10 GSa/s, 500 Mpts, 4+16 CH MSO)	MSO8064
Standard Accessories	
USB cable	CB-USBA-USBB-FF-150
4 passive high-impedance probes (500 MHz)	RP3500A
2 passive low-impedance probes (1.5 GHz, only for MSO8204/MSO8104)	RP6150A
Front panel cover	MSO8000-FPC
Quick guide (hard copy)	-
Power cord conforming to the standard of the destination country	-
Recommended Accessories	
16-channel logic analyzer probe	RPL2316
Active differential probe (1.5 GHz BW)	RP7150
Active differential probe (800 MHz BW)	RP7080
Active single-ended probe (1.5 GHz BW)	RP7150S
Active single-ended probe (800 MHz BW)	RP7080S
Rack mount kit	RM6041
USB-GPIB interface converter	USB-GPIB
Near-field probe	NFP-3
Power analysis phase deviation correction jig	RPA246
Bandwidth Upgrade Option	
Bandwidth upgrades from 600 MHz to 1 GHz	MSO8000-BW6T10
Bandwidth upgrades from 600 MHz to 2 GHz	MSO8000-BW6T20
Bandwidth upgrades from 1 GHz to 2 GHz	MSO8000-BW10T20
Bundle Option	
Function and application bundle option, including MSO8000-COMP, MSO8000-EMBD, MSO8000-AUTO, MSO8000-FLEX, MSO8000-AUDIO, MSO8000-AERO, MSO8000-AWG, MSO8000-JITTER and MSO8000-PWR	MSO8000-BND
Serial Protocol Analysis Option	
PC serial bus trigger and analysis (RS232/UART)	MSO8000-COMP
Embedded serial bus trigger and analysis (I2C, SPI)	MSO8000-EMBD
Auto serial bus trigger and analysis (CAN, LIN)	MSO8000-AUTO
FlexRay serial bus trigger and analysis (FlexRay)	MSO8000-FLEX
Audio serial bus trigger and analysis (I2S)	MSO8000-AUDIO
MIL-STD-1553 serial bus trigger and analysis (MIL-STD-1553)	MSO8000-AERO
Measurement Application Option	
Dual-channel 25 MHz arbitrary waveform generator	MSO8000-AWG
Built-in power analysis (required to purchase the RPA246 phase deviation correction jig)	MSO8000-PWR
Real-time eye diagram and jitter analysis	MSO8000-JITTER

MSO/DS7000 Series Digital Oscilloscopes
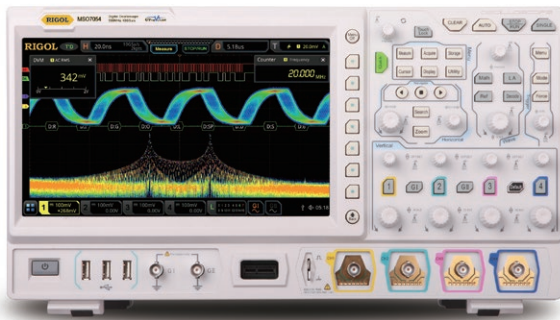
MSO/DS7000 Series Digital Oscilloscope adopts RIGOL's self-developed ASIC chip for digital oscilloscope, which can gain the data acquisition capability of up to 10 GSa/s real-time sample rate, realizing the high integration of all the function modules required for the analog front-end(AFE), and greatly improving the consistency and reliability of the digital oscilloscope.

- Analog bandwidth: 500 MHz, 350 MHz, 200 MHz, and 100 MHz; bandwidth upgrade option supported
- 4 analog channels, 1 EXT channel, 16 digital channels (option)
- Up to 10 GSa/s real-time sample rate
- Up to 500 Mpts memory depth (option)

- High waveform capture rate (over 600,000 waveforms per second)
- Up to 450,000 frames of hardware real-time and ceaseless waveforms recording and playback Functions
- Integrates 7 independent instruments into 1, including one digital oscilloscope, one 16-channel logic analyzer, one spectrum analyzer, one arbitrary waveformgenerator, one digital voltmeter, one high-precision frequency counter and totalizer, and one protocol analyzer
- A variety of serial protocol triggers and decodes
- 10.1-inch capacitive multi-touch screen, 256-level intensity grading display, with color persistence

7-into-1 Integrated Digital Oscilloscope
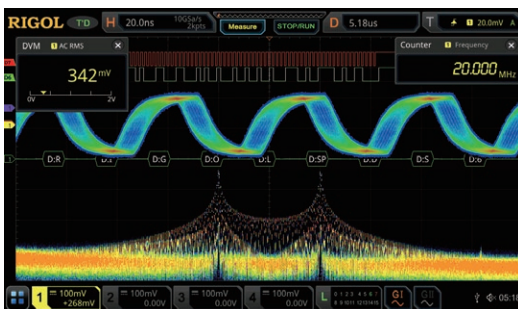
Include one digital oscilloscope, one 16-channel logic analyzer, one spectrum analyzer, one arbitrary waveform generator, one digital voltmeter, one high-precision frequency counter and totalizer, and one protocol analyzer
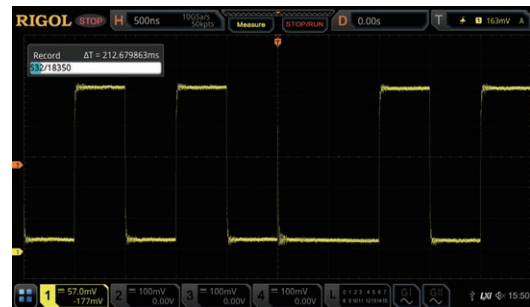
Over 600,000 wfms/s Capture Rate

Capture occasional exceptional signals in a highly refresh mode

Hardware Full Memory Auto Measurement

Observe and accurately measure two signals with great frequency deviations

Hardware Waveform Recording and Playback

Adopt the segmented storage technology, you can set the trigger conditions to make a selective choice in capturing and saving the signals that you are interested in

Variety of Protocol Decodings

Support 4 serial buses simultaneously. The full memory data analysis and the decoding event table display can help engineers quickly find out the system failure and locate the symbol error waveforms

Histogram Analysis

Measurement histogram is applicable for observing the distribution of the measurement signal over a long period of time to help users quickly find out the potential abnormalities of the signal.

Key Specifications

| Model	MSO7014	DS7014	MSO7024	DS7024	MSO7034	DS7034	MSO7054	DS7054
Analog BW	100MHz		200 MHz		350 MHz		500 MHz	
Analog Channels	4 analog channels							
Digital Channels	16 digital channels (only for the MSO model)							
Max. Sample Rate of Analog Channel	10 GSa/s(single-channel),5 GSa/s(dual-channel),2.5 GSa/s(four-channel)							
Max. Memory Depth	Analog Channel, 500 Mpts(single-channel), 250 Mpts(dual-channel),125 Mpts(four-channel)							
	Digital Channel: 62.5 Mpts(All Channels)							
Max. Waveform Capture Rate	≥600,000 wfms/s							
Timebase Scale	5 ns/div~1 ks/div		2 ns/div~1 ks/div		1 ns/div~1 ks/div		500 ps/div~1 ks/div	
Vertical Sensitivity Range	1 mV/div to 10 V/div(1 MΩ); 1 mV/div to 1 V/div(50 Ω)							
DC Gain Accuracy	± 2% FullScale							
Waveform Record	≥450,000 wfms(1 CH)							
Trigger Type	Standard: Edge trigger, Pulse trigger, Slope trigger, Video trigger, Pattern trigger, Duration trigger, Timeout trigger, Runt trigger, Window trigger, Delay trigger, Setup/Hold trigger, and Nth Edge trigger Option: RS232, UART, I2C, SPI, CAN, FlexRay, LIN, I2S, and MIL-STD1553							
Decoding Type	Standard: Parallel Option: RS232, UART, I2C, SPI, LIN, CAN, FlexRay, I2S, and MIL-STD-1553							
Operation	A+B, A-B, A×B, A/B, FFT, A&&B, A||B, A^B, !A, Intg, Diff, Sqrt, Lg, Ln, Exp, Abs, and AX+B							
Auto Measurement	Vmax, Vmin, Vpp, Vtop, Vbase, Vamp, Vupper, Vmid, Vlower, Vavg, VRMS, Per. VRMS,Overshoot, Preshoot, Area, Period Area, and Std Dev,Period, Frequency, Rise Time, Fall Time, +Width, -Width, +Duty, -Duty, Positive Pulse Count,Negative Pulse Count, Rising Edge Count, Falling Edge Count, Tvmax, Tvmin, +Slew Rate, -Slew Rate, Delay(1↑-2↑), Delay(1↑-2↓), Delay(1↓-2↑), Delay(1↓-2↓), Phase(1↑-2↑),Phase(1↑-2↓), Phase(1↓-2↑), Phase(1↓-2↓)							
Enhanced FFT	Record Length Max. 1 Mpts							
	Window Type Rectangular (default), Blackman-Harris, Hanning, Hamming, Flattop, and Triangle.							
	Peak Search a maximum of 15 peaks, confirmed by the settable threshold and offset threshold set by users							
Analysis	Frequency counter, DVM, power analysis, histogram							
Arbitrary Waveform Generator	25 MHz,2CH(option, only for the MSO model)							
Connectivity	USB2.0 Host X 4, USB2.0 Device, LAN, HDMI 1.4b, TRIG OUT							
Display	10.1-inch capacitive multi-touch screen/gesture enabled operation							

Ordering Information

Order Information	Order Number
Models	
MSO7054 (500 MHz, 10 GSa/s, 100 Mpts, 4+16 CH MSO)	MSO7054
MSO7034 (350 MHz, 10 GSa/s, 100 Mpts, 4+16 CH MSO)	MSO7034
MSO7024 (200 MHz, 10 GSa/s, 100 Mpts, 4+16 CH MSO)	MSO7024
MSO7014 (100 MHz, 5 GSa/s, 100 Mpts, 4+16 CH MSO)	MSO7014
DS7054 (500 MHz, 10 GSa/s, 100 Mpts, 4CH DS)	DS7054
DS7034 (350 MHz, 10 GSa/s, 100 Mpts, 4CH DS)	DS7034
DS7024 (200 MHz, 10 GSa/s, 100 Mpts, 4CH DS)	DS7024
DS7014 (100 MHz, 5 GSa/s, 100 Mpts, 4CH DS)	DS7014
Standard Accessories	
Power cord conforming to the standard of the destination country	-
USB cable	CB-USBA-USBB-FF-150
4 passive probes (500 MHz)	RP3500A
1 logic analyzer probe (only for MSO model)	RPL2316
Front panel cover	DS7000-FPC
Quick guide (hard copy)	-
Recommended Accessories	
Active differential probe (1.5 GHz BW)	RP7150
Active differential probe (800MHz BW)	RP7080
Rack mount kit	DS7000-RM
USB-GPIB interface converter	USB-GPIB
Near-field probe	NFP-3
Power analysis phase deviation correction jig	RPA246
Digital oscilloscope demonstration plate	DK-DS6000
Bandwidth Upgrade Option	
Bandwidth upgrades from 100 MHz to 200 MHz	DS7000-BW1T2
Bandwidth upgrades from 100 MHz to 350 MHz	DS7000-BW1T3
Bandwidth upgrades from 100 MHz to 500 MHz	DS7000-BW1T5
Bandwidth upgrades from 200 MHz to 350 MHz	DS7000-BW2T3
Bandwidth upgrades from 200 MHz to 500 MHz	DS7000-BW2T5
Bandwidth upgrades from 350 MHz to 500 MHz	DS7000-BW3T5
Memory Depth Option	
Maximum memory depth up to 250 Mpts	DS7000-2RL
Maximum memory depth up to 500 Mpts	DS7000-5RL
Bundle Option	
Function and application bundle option, including DS7000-COMP, DS7000-EMBD, DS7000-AUTO, DS7000-FLEX, DS7000-AUDIO, DS7000-AERO, MSO7000-AWG, DS7000-PWR	DS7000-BND
Serial Protocol Analysis Option	
PC serial bus trigger and analysis (RS232/UART)	DS7000-COMP
Embedded serial bus trigger and analysis (I2C, SPI)	DS7000-EMBD
Auto serial bus trigger and analysis (CAN, LIN)	DS7000-AUTO
FlexRay serial bus trigger and analysis (FlexRay)	DS7000-FLEX
Audio serial bus trigger and analysis (I2S)	DS7000-AUDIO
MIL-STD 1553 serial bus trigger and analysis (MIL-STD 1553)	DS7000-AERO
Measurement Application Option	
Dual-channel 25 MHz arbitrary waveform generator (only for MSO model)	MSO7000-AWG
Built-in power analysis	DS7000-PWR

Note: For all the mainframes, accessories and options, please contact the local office of **RIGOL**.

DS6000 Series Digital Oscilloscopes
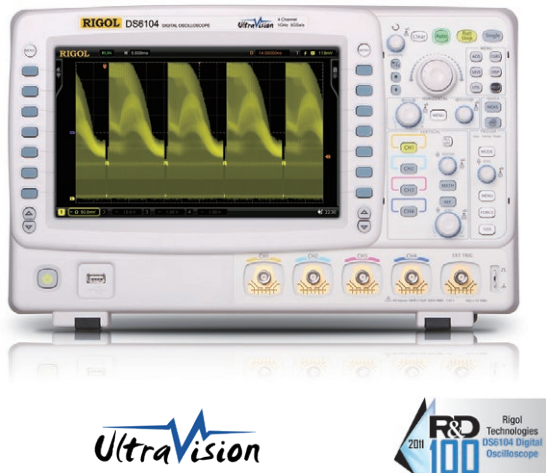
## Innovative UltraVision technique
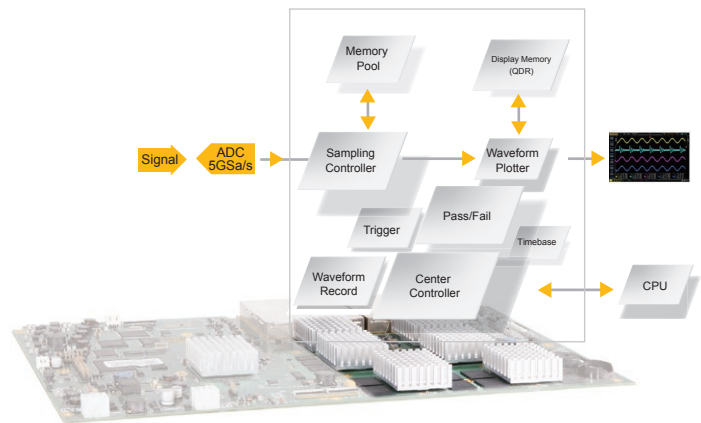
Key Features

DS6000 series digital oscilloscope provides up to 1GHz bandwidth, 5GSa/s sample rate. It has the deepest memory depth and fastest waveform capture rate of this class.

DS6000 series adopts many today's new technologies to achieve high performance, abundant features in the same class. It's designed to aim at the requirements of the largest digital oscilloscope market segment from the communications, semiconductor, computing, aerospace defense, instrumentation, research/education, industrial electronics, consumer electronics and automotive industries with its innovative technology, industry leading specifications, powerful trigger functions and broad analysis capabilities.
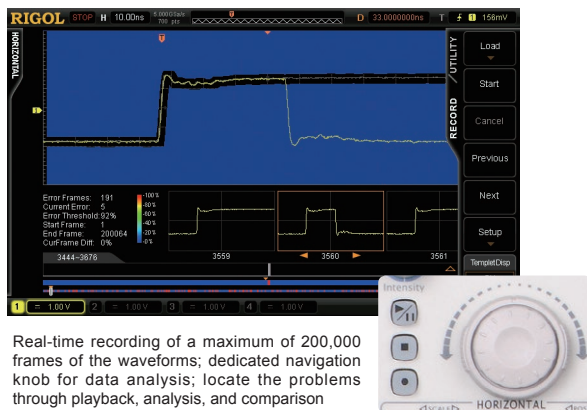
- Up to 1 GHz bandwidth
- Standard 140Mpts deep memory
- Up to 180,000 waveforms per second capture rate
- Up to 200,000 frames for waveform record and replay
- Standard serial bus trigger and optional decode

### Up to 180k wfms/s capture rate capture rate
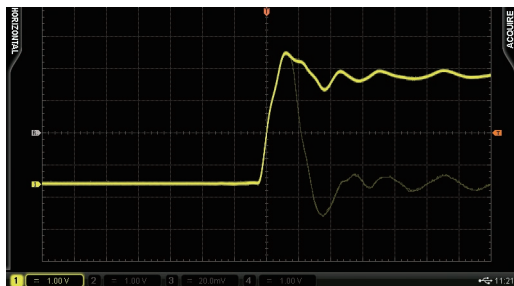
Find out the abnormal problems in a timely manner to avoid potential risks

Real time waveform record, replay & analysis

Real-time recording of a maximum of 200,000 frames of the waveforms; dedicated navigation knob for data analysis; locate the problems through playback, analysis, and comparison

Deeper memory; multi-Level intensity grading display
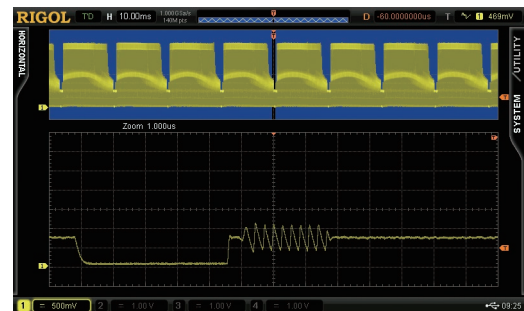
High sample rate and extremely deep memory ensure both the observation of details and the overall

Standard trigger and optional decoding functions for serial bus
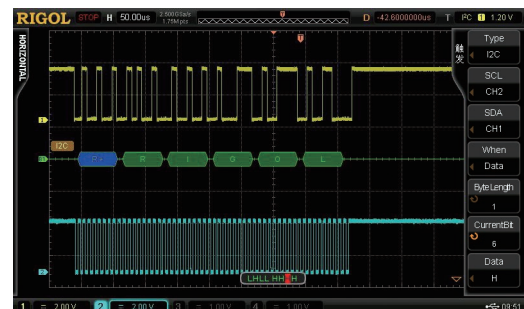
Obtain more serial bus frames with the deep memory capture and display them in the event table of the decoding

Key Specifications

Model	DS6104
Analog BW	1GHz
Channels	4
Max. Sample Rate	5 GSa/s
Max. Memory Depth	140 Mpts (Std.)
Max. Waveform Capture Rate	180,000 wfms/s
Time Base Accuracy	≤ ±4 ppm
Time Base Drift	≤ ±2 ppm/Year
Timebase Scale	500 ps/div to 50 s/div
Input Impedance	1MΩ, 50 Ω
Vertical Sensitivity Range	2 mV/div to 5 V/div(1 MΩ) 2 mV/div to 1 V/div(50 Ω)
DC Gain Accuracy	±2% full scale
Bandwidth Limit	20 MHz or 250 MHz
Real Time Waveform Record, Replay and Analysis Function	Max. 200,000 frames(Std.)
Standard Trigger Function	Edge, Pulse width, Slope, Video, HDTV, Pattern, RS232, I2C, SPI, CAN, USB, FlexRay
Serial Bus Decording	RS232, I2C, SPI, CAN, FlexRay
Waveform Calculation	A+B, A-B, A×B, A/B, FFT, Advanced Math, Logic operation
Auto Measurements	Vpp, Vamp, Vmax, Vmin, Vtop, Vbase, Vavg, Vrms, Area, Period Area, Overshoot, Preshoot, Freq, Period, Rise Time, Fall Time, +Width, -Width, +Duty, -Duty, Delay A→B rising edge, Delay A→B falling edge, Phase A→B rising edge, Phase A→B falling edge
Connectivity	Dual USB HOST, USB DEVICE, LAN, VGA, 10MHz Input/Output, Aux Output(TrigOut, Quick Edge, PassFail, Calibration, GND)
Display	10.1-inch WVGA(800X480) TFT LCD display, 256 intensity grading level
Size（W×H×D）	399.0 mm× 255.3 mm×123.8 mm
Weight	5.345 ± 0.2 kg

Ordering Information

	Description	Order Number
Models	DS6104 (1GHz, 5GSa/s, 140Mpts, 4-channel)	DS6104
Standard Accessories	600MHz Passive Probe x 4 (for DS6104 and DS6064) 600MHz Passive Probe x 2 (for DS6102 and DS6062)	RP5600A
	1.5GHz Passive Probe x 2 (for DS6104) 1.5GHz Passive Probe x 1 (for DS6102)	RP6150A
	USB Cable	CB-USBA-USBB-FF-150
	Front Panel Cover	FPCS-DS6000
	Power Cord Conforming to the Standard of the Destination Country	-
	Quick Guide	-
For probes and optional accessories, please refer to "Probes and Accessories Guide".		
For decoding options , please refer to "Bus Analysis Guide".		

MSO5000 Series Digital Oscilloscopes

MSO5000 series digital oscilloscope is a high-performance oscilloscope model designed based on RIGOL UltraVision II technology. With a 9-inch capacitive multi-touch screen, the MSO5000 series integrates 7 independent instruments into one, delivering super sample bandwidth ratio, extremely high memory depth, and other excellent specifications. Highly integrated ASIC chipset and innovative non relay front-end have prolonged the service life of the oscilloscope to a large extent, indirectly reducing

the usage cost for users. It is compact and portable in design, and all of the MSO5000 series (except MSO5152-E, it is a model dedicated for online sale and does not support the upgrade of the channel and bandwidth) products support the upgrade of the channels, bandwidths, and the analysis software. As it integrates many functions of multiple instruments, different user groups can have more choices in selecting their desired product based on their needs, helping them save their budget to a large extent while enjoying the superior test support and user experience.

- Analog bandwidth: 350 MHz, 200 MHz,150MHz,100 MHz, and 70 MHz; bandwidth upgrade option supported
- 2 or 4 analog channels (upgradable for all the MSO5000 series except MSO5152-E), standard 16 digital channels (need to buy LA probe)
- Up to 8 GSa/s real-time sample rate(4 GSa/s for MSO5152-E)
- Up to 200 Mpts memory depth (option)
- Up to 500,000 wfm/s capture rate (300,000 wfm/s for MSO5152-E)
- 41 measurement items; full-memory hardware measurement function
- A variety of serial protocol triggers and decodes
- 9-inch capacitive multi-touch screen, 256-level intensity grading display, with color persistence

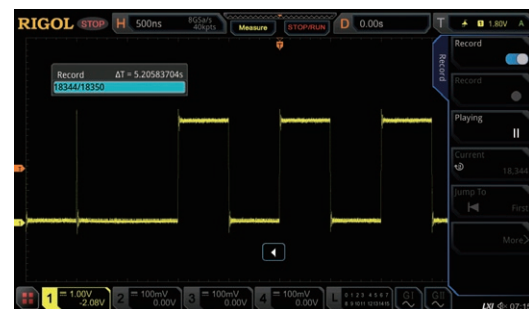## 7-into-1 Integrated Digital Oscilloscope
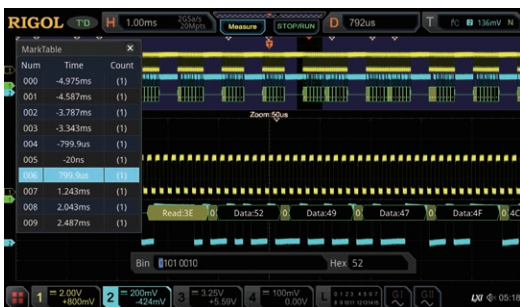

Max. 500,000 wfms/s Capture Rate

Hardware Full Memory Auto Measurement

Hardware Waveform Recording and Playback

Variety of Protocol Decodings

Convenient Remote Control of Web Control

Key Specifications

Model	MSO5072	MSO5074	MSO5102	MSO5104	MSO5204	MSO5354	MSO5152-E
Analog Bandwidth	70 MHz		100 MHz		200 MHz	350 MHz	150 MHz
Channels	2	4	2	4	4	4	2
	16 input digital channels (required to purchase PLA2216 active logic probe)						
	Dual-channel arbitrary waveform generator (option activation software function, option MSO5000-AWG)						Single-channel arbitrary waveform generator (option activation software function, option MSO5000-E-AWG)
Max. Sample Rate of Analog Channel	MSO5354/MSO5204/MSO5104/MSO5074: 8 GSa/s (single-channel), 4 GSa/s (half-channel[1]), 2 GSa/s (all channels) MSO5102 and MSO5072: 8 GSa/s (single-channel), 2 GSa/s (all channels)						4 GSa/s (single-channel), 2 GSa/s (all channels)
Max. Memory Depth	Analog channel: 200 Mpts (single-channel), 100 Mpts (half-channel[1]), 50 Mpts (all channels)						100 Mpts (single-channel), 50 Mpts (all channels)
	Digital channel: 25 Mpts (all channels)						
Max. Waveform Capture Rate[2]	≥500,000 wfms/s						≥300,000 wfms/s
Range of Time Base	5 ns/div~1 ks/div		5 ns/div~1 ks/div		2 ns/div~1 ks/div	1 ns/div~1 ks/div	5 ns/div~1 ks/div
Vertical Sensitivity Range	500 uV/div~10 V/div						
DC Gain Accuracy[3]	± 3% of full scale						
Hardware Real-time Waveform Recording and Playing	≥450,000 wfms (single-channel)						
Trigger Type	Standard: Edge trigger, Pulse trigger, Slope trigger, Video trigger, Pattern trigger, Duration trigger, Timeout trigger, Runt trigger, Window trigger, Delay trigger, Setup/Hold trigger, and Nth Edge trigger Option: RS232, UART, I2C, SPI, CAN, FlexRay, LIN, I2S, and MIL-STD1553						
Decoding Type	Standard: Parallel Option: RS232, UART, I2C, SPI, LIN, CAN, FlexRay, I2S, and MIL-STD-1553						
Waveform Calculation	A+B, A-B, A×B, A/B, FFT, A&&B, A||B, A^B, !A, Intg, Diff, Sqrt, Lg, Ln, Exp, Abs, AX+B, LowPass, HighPass, BandPass, and BandStop						
Auto Measurement	41 auto measurements; and up to 10 measurements can be displayed at a time						
Enhanced FFT	Record Length	Max. 1 Mpts					
	Window Type	Rectangular, Blackman-Harris, Hanning (default), Hamming, Flattop, and Triangle.					
	Peak Search	a maximum of 15 peaks, confirmed by the settable threshold and offset threshold set by users					
Analysis	Frequency counter, DVM, power analysis, histogram						
Arbitrary Waveform Generator	25 MHz,2CH (required to install the AWG option)						25 MHz, single-channel (required to install the AWG option)
Connectivity	USB2.0 Host × 1, USB2.0 Device, LAN(10/100/1000 Base-T), HDMI 1.4b, TRIG OUT						
LCD Size and Type	9-inch capacitive multi-touch screen/gesture enabled operation						

Note: [1]: Half-channel mode: CH1 and CH2 are considered as a group; CH3 and CH4 are considered as another group. Each group share the same sample rate 4 GSa/s, and either one of the channels in each group is enabled.
[2]: Maximum value. single-channel, 10 ns horizontal time base, input amplitude 4 div, sine wave signal with 10 MHz frequency. Others are default settings.
[3]: 1 mV/div and 2 mV/div are a magnification of 4 mV/div setting. For vertical accuracy calculations, use full scale of 32 mV for 1 mV/div and 2 mV/div sensitivity setting.

Ordering Information

Order Information	Order No.
Models	
MSO5354 (350 MHz, 8 GSa/s, 100 Mpts, 4+16 CH MSO)	MSO5354
MSO5204 (200 MHz, 8 GSa/s, 100 Mpts, 4+16 CH MSO)	MSO5204
MSO5104 (100 MHz, 8 GSa/s, 100 Mpts, 4+16 CH MSO)	MSO5104
MSO5102 (100 MHz, 8 GSa/s, 100 Mpts, 2+16 CH MSO)	MSO5102
MSO5074 (70 MHz, 8 GSa/s, 100 Mpts, 4+16 CH MSO)	MSO5074
MSO5072 (70 MHz, 8 GSa/s, 100 Mpts, 2+16 CH MSO)	MSO5072
MSO5152-E (150 MHz, 4 GSa/s, 150 Mpts, 2+16 CH MSO)	MSO5152-E
Standard Accessories	
Power cord conforming to the standard of the destination country	-
USB cable	CB-USBA-USBB-FF-150
2 or 4 passive probes (350 MHz)	PVP2350
Quick guide (hard copy)	-
Optional Accessories	
16-channel logic analyzer probe (dedicated probe for MSO5000 series)	PLA2216
Front protective cover	MSO5000-FPC
Front protective cover	MSO5000-E-FPC[1]
Rack mount kit	MSO5000-RM
USB-GPIB interface converter	USB-GPIB
Near-field probe	NFP-3
Power analysis phase deviation correction jig	RPA246
Digital oscilloscope demonstration plate	DK-DS6000
Bandwidth Upgrade Option(unavailable for MSO5152-E)	
Bandwidth upgrades from 70 MHz to 100 MHz	MSO5000-BW0T1
Bandwidth upgrades from 70 MHz to 200 MHz	MSO5000-BW0T2
Bandwidth upgrades from 70 MHz to 350 MHz	MSO5000-BW0T3
Bandwidth upgrades from 100 MHz to 200 MHz	MSO5000-BW1T2
Bandwidth upgrades from 100 MHz to 350 MHz	MSO5000-BW1T3
Bandwidth upgrades from 200 MHz to 350 MHz	MSO5000-BW2T3
Memory Depth Option	
Maximum memory depth upgradable to 200 Mpts	MSO5000-2RL
Maximum memory depth upgradable to 100 Mpts	MSO5000-E-1RL[1]
Channel Number Upgrade Option	
Upgrade the number of analog channels to 4 (only available for the MSO5XX2 model excluding MSO5152-E)	MSO5000-4CH
Bundle Option	
Function and application bundle option, including MSO5000-COMP, MSO5000-EMBD, MSO5000-AUTO, MSO5000-FLEX, MSO5000-AUDIO, MSO5000-AERO, MSO5000-AWG, and MSO5000-PWR	MSO5000-BND
Function and application bundle option, including MSO5000-COMP, MSO5000-EMBD, MSO5000-AUTO, MSO5000-FLEX, MSO5000-AUDIO, MSO5000-AERO, MSO5000-E-AWG, and MSO5000-PWR	MSO5000-E-BND[1]
Serial Protocol Analysis Option	
PC serial bus trigger and analysis (RS232/UART)	MSO5000-COMP
Embedded serial bus trigger and analysis (I2C and SPI)	MSO5000-EMBD
Auto serial bus trigger and analysis (CAN and LIN)	MSO5000-AUTO
FlexRay serial bus trigger and analysis (FlexRay)	MSO5000-FLEX
Audio serial bus trigger and analysis (I2S, only available for the MSO5XX4 model or the model installed with the MSO5000-4CH option)	MSO5000-AUDIO
MIL-STD-1553 serial bus trigger and analysis (MIL-STD-1553)	MSO5000-AERO
Measurement Application Option	
Dual-channel 25 MHz arbitrary waveform generator	MSO5000-AWG
Single-channel 25 MHz arbitrary waveform generator	MSO5000-E-AWG[1]
Built-in power analysis	MSO5000-PWR

[1] Note: Only available for MSO5152-E

MSO/DS4000 Series Digital Oscilloscopes
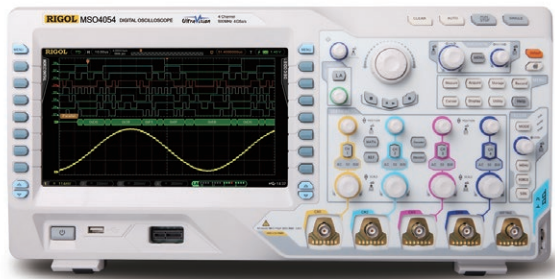
MSO/DS4000 series is high performance oscilloscope with 100MHz ~ 500MHz bandwidth and up to 4GSa/s sample rate. They also provide deep memory depth and high waveform capture rate. MSO/DS4000 Series is the new mainstream digital scope to meet the customer's applications with its innovative technology, industry leading specifications, powerful trigger functions and broad analysis capabilities.

- Bandwidth 500MHz, 350MHz, 200MHz, 100MHz
- Bandwidth Upgradable
- Real-time sample rate up to 4GSa/s
- Standard Memory depth: Analog channel up to 140Mpts, Digital Channel up to 28Mpts
- Real Time Waveform Record, Replay & Analysis (Std. up to 200,000 frames)
- Support serial bus trigger and decoding
- 9 inch WVGA (800X480), 256-level intensity grading display

Up to 110k Waveforms/s Waveform capture rate

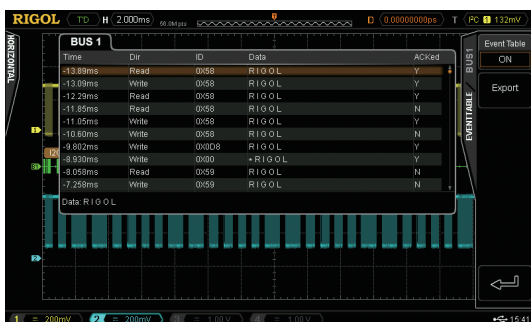## Realtime waveform record, replay, analysis function (std.)

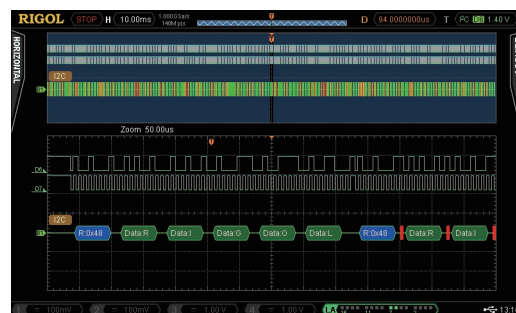## Deeper Memory with 256-Level intensity grading display

Mixed Signal Analysis with analog and digital channels

Serial bus Triggering and Decoding (Support both Analog and Digital channels)

Serial bus triggering and decoding on digital channels

Key Specifications

| Model	DS4054 MSO4054	DS4052 MSO4052	DS4034 MSO4034	DS4032 MSO4032	DS4024 MSO4024	DS4022 MSO4022	DS4014 MSO4014	DS4012 MSO4012
Analog BW	500MHz		350MHz		200MHz		100MHz	
Analog Channels	4	2	4	2	4	2	4	2
Digital Channels(MSO)	16 （support group operations）							
Max. Sample rate	Analog Channel: Max. 4GSa/s half channel, 2GSa/s per channel; Digital Channel: Max. 1GSa/s per channel							
Max. Memory Depth	Analog Channel: Std. up to 140Mpts half channel,70Mpts per channel Digital Channel: Std. up to 28Mpts per channel (only MSO)							
Max. Waveform Capture rate	DS: 110,000wfms/s; MSO: 110,000wfms/s (digital channel off); 85,000wfms/s (digital channel on)							
Timebase Scale	1ns/div to 1000s/div		2ns/div to 1000s/div				5ns/div to 1000s/div	
Input Impedance	Analog channel: (1MΩ±1%) || (14 pF±3 pF) or 50 Ω±1.5%; Digital channel: (101 kΩ±1%) || (9 pF ± 1 pF)							
Vertical Scale	1 mV/div to 5 V/div (1 MΩ); 1 mV/div to 1 V/div (50 Ω) Threshold per set of 8 channels, User-defined threshold range ±20V in 10mV step							
DC Gain Accuracy	±2% full scale							
Real Time waveform Record and Analysis	Analog channel: Up to 200,000 frames(Std.) Digital channel: Up to 64,000 frames(Std.)							
Trigger functions	Std:Edge, Pulse width, Runt, Nth Edge, Slope, Video, HDTV, Pattern,RS232/UART,I2C,SPI,CAN,USB,FlexRay; Opt:LIN							
Serial Bus decoding	Standard: Parallel; Optional: RS232/UART, I2C, SPI, CAN, LIN, FlexRay (analog and digital channel)							
Math functions	Analog channel: A+B, A-B, A×B, A/B, FFT,Digital Filter, Advanced Math, Logic operation; Digital channel: Logic operation							
Auto Measurements	Analog channel: 29 types; Digital channel: 12 types							
Connectivity	USB Host, USB Device, LAN, VGA, AUX, 10MHz input/output							
Display	9.0 inches WVGA(800X480) TFT LCD display, 256 intensity grading level							

Ordering Information

	Description	Order Number
Models	DS4012 (100 MHz, 4 GSa/s, 140 Mpts, 2-channel）	DS4012
	DS4014 (100 MHz, 4 GSa/s, 140 Mpts, 4-channel）	DS4014
	DS4022 (200 MHz, 4 GSa/s, 140 Mpts, 2-channel）	DS4022
	DS4024 (200 MHz, 4 GSa/s, 140 Mpts, 4-channel）	DS4024
	DS4032 (350 MHz, 4 GSa/s, 140 Mpts, 2-channel）	DS4032
	DS4034 (350 MHz, 4 GSa/s, 140 Mpts, 4-channel）	DS4034
	DS4052 (500 MHz, 4 GSa/s, 140 Mpts, 2-channel）	DS4052
	DS4054 (500 MHz, 4 GSa/s, 140 Mpts, 4-channel）	DS4054
	MSO4012 (100 MHz, 4 GSa/s, 140 Mpts, 2+16 channels MSO）	MSO4012
	MSO4014 (100 MHz, 4 GSa/s, 140 Mpts, 4+16 channels MSO）	MSO4014
	MSO4022 (200 MHz, 4 GSa/s, 140 Mpts, 2+16 channels MSO）	MSO4022
	MSO4024 (200 MHz, 4 GSa/s, 140 Mpts, 4+16 channels MSO）	MSO4024
	MSO4032 (350 MHz, 4 GSa/s, 140 Mpts, 2+16 channels MSO）	MSO4032
	MSO4034 (350 MHz, 4 GSa/s, 140 Mpts, 4+16 channels MSO）	MSO4034
	MSO4052 (500 MHz, 4 GSa/s, 140 Mpts, 2+16 channels MSO）	MSO4052
	MSO4054 (500 MHz, 4 GSa/s, 140 Mpts, 4+16 channels MSO）	MSO4054
Standard Accessories	2 or 4 500MHz Passive Probe	RP3500A
	Logic Analyzer Probe (MSO models)	RPL2316
	USB Cable	CB-USBA-USBB-FF-150
	Front Panel Cover	FPCS-DS4000
	Power Cord Conforming to the Standard of the Destination Country	-
	Quick Guide	-
Bandwidth Update Option	Bandwidth Upgrades from 200 MHz to 350 MHz for MSO/DS402x	BW2T3-MSO/DS4000
	Bandwidth Upgrades from 200 MHz to 500 MHz for MSO/DS402x	BW2T5-MSO/DS4000
	Bandwidth Upgrades from 350 MHz to 500 MHz for MSO/DS403x	BW3T5-MSO/DS4000
Optional kit	Including: SD-AUTO-DS4000, SD-FlexRay-DS4000, SD-I2C/SPI-DS4000, SD-RS232-DS4000	BND-MSO/DS4000

For probes and optional accessories please refer to "Probes & Accessories Guide".

For decoding options please refer to "Bus Analysis Guide".

DS4000E Series Digital Oscilloscopes
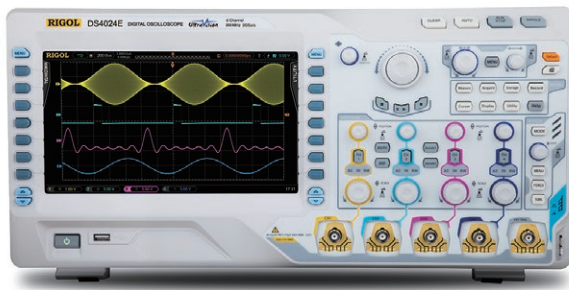
The DS4000E series of digital oscilloscopes is a high-performance, economical general-purpose digital oscilloscope with a bandwidth of 100MHz to 200MHz, a sampling rate of up to 2GSa/s, and a 4-channel memory depth of up to 14Mpts. Designed for the design, debugging, and test needs of the broadest range of mainstream digital oscilloscope markets, its ultra-high price/performance ratio reinvigorates the economical oscilloscope market and offers more options for low-cost test and measurement solutions.

- Bandwidth 100MHz, 200MHz
- Real-time sample rate up to 2GSa/s per channel
- Standard memory depth up to 14Mpts per channel
- Standard with 4 analog channels
- Real-time waveform recording, playing, and analysis (Std. up to 127,000 frames)
- Support serial bus trigger (Std.) and decoding (Opt.)
- 9-inch WVGA (800×480), 256-level intensity grading display

UltraVision

Up to 60,000 wfms/s waveform capture rate
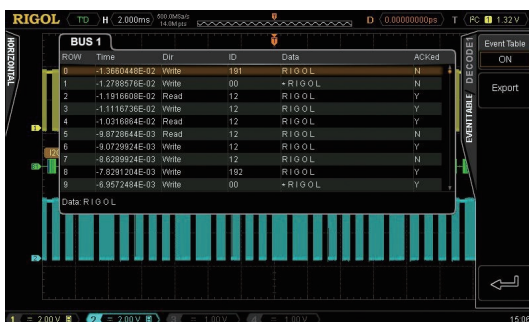
Standard with 4 analog channels

Deeper memory per channel (Std. 14Mpts)

Real-time waveform recording, playing, and analysis function (Std.)

Support serial bus trigger (Std.) and decoding (Opt.)

Standard mask test function

Key Specifications

| Model	DS4024E	DS4014E
Analog BW	200MHz	100MHz
Channels (DS)	4	
Sample Rate(Scope channel)	Max. 2GSa/s per channel	
Memory Depth(Scope channel)	Std. up to 14 Mpts per channel	
Waveform Capture rate	Max. 60,000 wfms/s	
Time Base Accuracy	≤ ±4 ppm	
Time Base Drift	≤ ±2 ppm/Year	
Timebase Scale	2 ns/div to 1 ks/div	5 ns/div to 1 ks/div
Input Impedance	(1 MΩ±1%) ‖ (15 pF±3 pF) or 50 Ω±1.5%	
Vertical Sensitivity Range	1 mV/div to 5 V/div (1MΩ) or 1 mV/div to 1 V/div (50Ω)	
DC Gain Accuracy	±2% full scale	
Bandwidth Limit	20 MHz/100MHz	20 MHz
Real-time Waveform Recording, Playing, and Analysis function	Max. 127,000 frames(Std.)	
Trigger functions	Std:Edge, Pulse , Runt, Nth Edge, Slope, Video, HDTV, Pattern,RS232/ UART,I2C,SPI,CAN,USB,FlexRay; Opt:LIN	
Serial Bus Decoding	RS232/UART, I2C, SPI, CAN, LIN, FlexRay	
Math Functions	Analog Channel: A+B, A-B, A×B, A/B, FFT, Digital Filter, Advanced Math, Logic operation	
Auto Measurements	29 types Vpp, Vamp, Vmax, Vmin, Vtop, Vbase, Vavg, Vrms-N, Vrms-1, Area, Period Area, Overshoot, Preshoot, Freq, Period, Rise Time, Fall Time, +Width, -Width, +Duty, -Duty, Delay A→B rising edge, Delay A→B falling edge, Phase A→B rising edge,Phase A→B falling edge	
Connectivity	USB Host x2, USB Device, LAN, VGA, AUX, 10MHz input/output Aux Output (TrigOut, Quick Edge, PassFail, Calibration, GND)	
Display	9-inch WVGA(800X480) TFT LCD Display, 256-level intensity grading display	
Size(W×H×D)	440.0 mm× 218.0 mm×130.0 mm	
Weight	4.8 kg ± 0.2 kg (excluding packaging)	

Ordering Information

|	Description	Order Number
Models	DS4014E (100 MHz, 2 GSa/s, 14 Mpts, 4-channel)	DS4014E
	DS4024E (200 MHz, 2 GSa/s, 14 Mpts, 4-channel)	DS4024E
Standard Accessories	4 Passive Probes (1X:35MHz/10X:350MHz BW)	PVP2350
	USB Cable	CB-USBA-USBB-FF-150
	Front Panel Cover	FPC-DS4000
	Power Cord Conforming to the Standard of the Destination Country	-
	Quick Guide (Hard Copy)	-
Optional Kit	Including: SD-AUTO-DS4000, SD-FlexRay-DS4000, SD-I2C/ SPI-DS4000, SD-RS232-DS4000	BND-MSO/DS4000
For probes and optional accessories, please refer to "Probes & Accessories Guide".		
For decoding options, please refer to "Bus Analysis Guide".		

MSO/DS2000A Series Digital Oscilloscopes
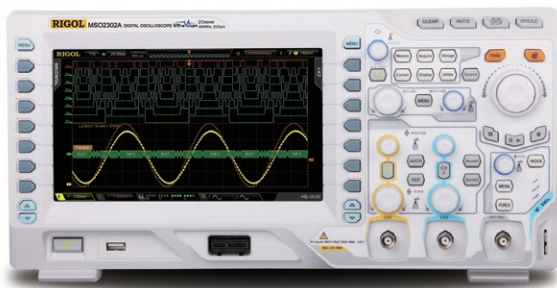
MSO/DS2000A Series is the new mainstream digital scope to meet the customer's applications with its innovative technology. It provides bandwidth from 100MHz to 300MHz, sample rate up to 2GSa/s, and 2+16 channels, targeting for the embedded design and test market with its industry leading specifications, powerful trigger functions and broad analysis capabilities.

- Bandwidth up to 300MHz, standard with 50Ω input
- Two analog channels and 16 digital channels (MSO)
- Lower noise floor, wider vertical range (500uV/div ~ 10V/div)
- Waveform capture rate up to 50,000 wfms/s
- Built-in 2 CH and 25MHz Waveform generator (-S model)
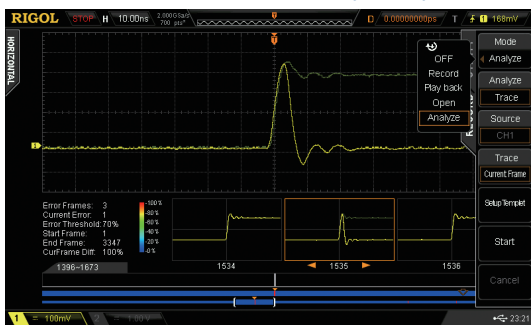- A variety of trigger and serial bus decoding functions

Wider ertical range, ower noise floor, better for small signal capturing
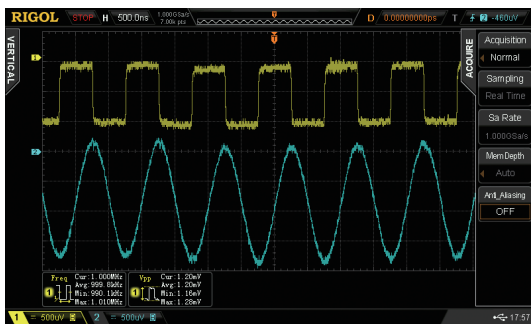
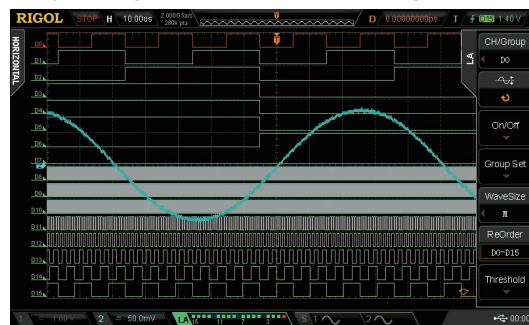### Serial bus Trigger&Decoding functions
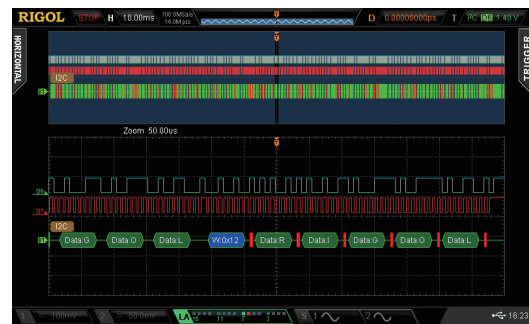
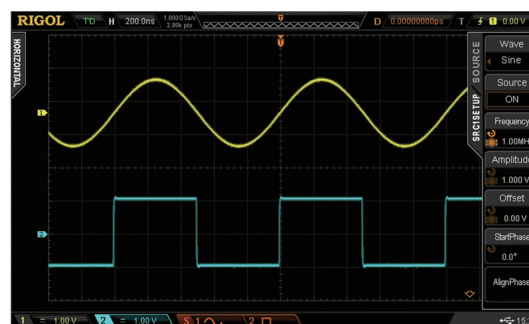### Realtime waveform record, replay, analysis function (std.)

Easy to be grouped and labeled for digital channels

256 level intensity grading display

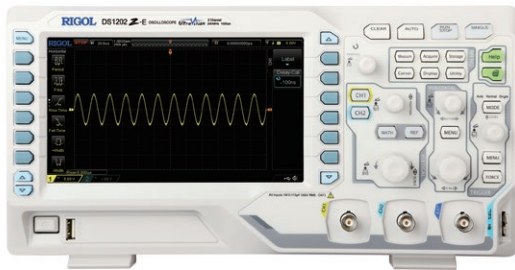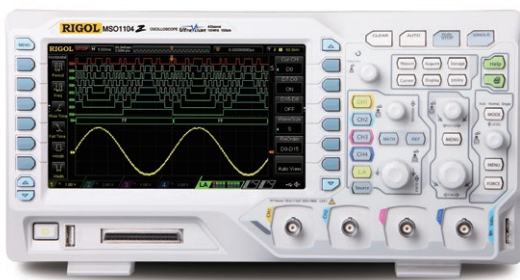### Built-in 2CH and 25MHz Source (-S model)

Key Specifications

Model	DS2302A MSO2302A	MSO2302A-S	DS2202A MSO2202A	MSO2202A-S	DS2102A MSO2102A	MSO2102A-S
Analog BW	300MHz		200MHz		100MHz	
Analog Channels	2					
Digital Channels	16（only MSO)					
Sample rate	Analog Channel: Max. 2 GSa/s single channel, 1 GSa/s dual channel; Digital Channel: 1GSa/s(8 CH), 500MSa/s(16 CH)					
Memory Depth	Analog channel: 7Mpts(2 CH) / 14Mpts(1 CH) std.;28Mpts(2 CH) / 56Mpts(1 CH) opt.; Digital channel: 7Mpts(16 CH) / 14Mpts(8 CH) std.;14Mpts(16 CH) / 28Mpts(8 CH) opt.					
Waveform Capture rate	50,000wfms/s					
Timebase Scale	1ns/div to 1000s/div		2ns/div to 1000s/div		5ns/div to 1000s/div	
Input Impedance	Analog channel: (1MΩ±1%) ‖ （16 pF±3 pF）or 50Ω±1.5%; Digital channel:（101kΩ±1%) ‖ （8 pF±2 pF)					
Vertical Scale	Analog channel: 500 uV/div to 10 V/div(1 MΩ); 500 uV/div to 1 V/div(50 Ω); Digital channel: Threshold per set of 8 channels, User-defined threshold range ±20V in 10mV step					
DC Gain Accuracy	±2% full scale					
Waveform Record	Up to 65, 000 Frames					
Std. trigger functions	Edge, Pulse , Runt, Slope, Video, Pattern, Setup/Hold, RS232/UART,I2C,SPI					
Opt. trigger functions	Windows, Nth Edge, HDTV, Delay, Time Out, Duration, USB, CAN					
Serial Bus decoding	Standard：Parallel Bus（only MSO）; Optional: RS232/UART, I2C, SPI, CAN					
Math functions	Analog channel: A+B,A-B,A×B,A/B,FFT,Digital Filter,Advanced Math,Logic operation;Digital channel: Logic operation					
Auto Measurements	Analog channel: 29 types; Digital channel: 12 types					
Connectivity	USB Host, USB Device, LAN （LXI）, AUX, support USB-GPIB（Opt.)					
Display	8.0 inches WVGA(800X480) LCD display, 256-level intensity grading display					

Built in 2CH 25MHz Function/Arb Generator (MSO/DS2xx2A-S)

Channels	Sample Rate	Vertical Resolution	Max. Output Frequency	Amplitude Range	Waveform Length	Output Waveforms
2	200MSa/s	14bits	25MHz	20mVpp-5Vpp （High Z）	16K	Standard Waveforms: Sine, Square, Ramp, Pulse, Noise, DC
						Arbitrary Waveforms: Sinc, ExpRise, ExpFall, ECG, Gauss, Lorentz, Haversine ,User Defined

Ordering Information

	Description	Order Number
Models	DS2102A (100MHz, 2CH Scope)	DS2012A
	MSO2102A (100MHz, 2+16 CH MSO)	MSO2012A
	MSO2102A-S （100MHz, 2+16 CH MSO + 25MHz, 2CH Source）	MSO2012A-S
	DS2202A (200MHz, 2CH Scope)	DS2022A
	MSO2202A (200MHz, 2+16 CH MSO)	MSO2022A
	MSO2202A-S (200MHz, 2+16 CH MSO + 25MHz, 2CH Source）	MSO2022A-S
	DS2302A （300MHz, 2CH Scope)	DS2302A
	MSO2302A (300MHz, 2+16 CH MSO)	MSO2302A
	MSO2302A-S (300MHz, 2+16 CH MSO + 25MHz, 2CH Source）	MSO2302A-S
Standard Accessories	2 passive probes (1X:35MHz / 10X:350MHz BW)	PVP2350
	1 LA probe(MSO only)	RPL2316
	Power cord conforming to the standard of the destination country	-
	USB cable	CB-USBA-USBB-FF-150
Deep Memory Option	Analog channel memory depth upgraded up to 56 Mpts Digital channel(MSO) memory depth upgraded up to 28 Mpts	MEM-DS2000
Advanced Trigger Option	Windows, Nth Edge, HDTV, Delay, Time Out, Duration, USB	AT-DS2000
Optional kit	Including: MEM-DS2000, AT-DS2000, SD-DS2000, CAN-DS2000A	BND-MSO/DS2000A
For probes and optional accessories, please refer to"Probes & Accessories Guide".		
For decoding options, please refer to "Bus Analysis Guide".		

DS1000Z Series Digital Oscilloscopes

DS1000Z Series is the high performance, economic level general purpose oscilloscope which provides 4 analog channels, the bandwidth from 50MHz to 200MHz, up to 1GSa/s sample rate. In particular, DS1202Z-E is dedicated for online sale. It has two analog channels, with the bandwidth of 200 MHz. With the Ultravision technical platform, the DS1000Z series has sustained its characteristics of deep memory and high capture rate, exhibiting its cost-effective advantages.

- Analog channel Bandwidth: 200 MHz, 100 MHz, 70 MHz, 50 MHz
- 2 or 4 analog channels, 16 digital channels(Only Plus model)
- Memory depth up to 24 Mpts
- Various trigger and bus decoding functions
- Built-in dual-channel 25 MHz source (-S model)
- Various interfaces: USB, LAN (LXI), AUX, GPIB (optional)

4 standard analog channels (2 for DS1202Z-E)

Standard serial bus trigger and decoding functions
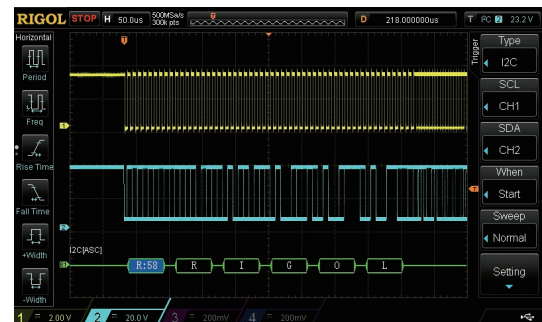
Intensity graded color display

Mixed signal analysis with analog and digital channels

Deeper memory(Std.24Mpts)
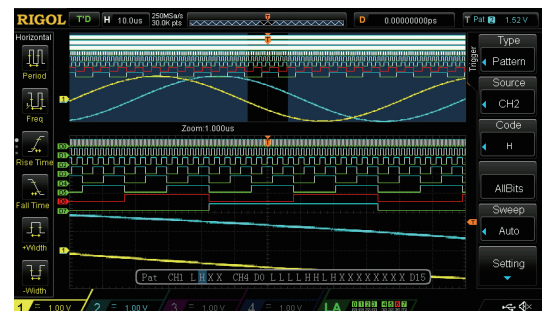
Built-in dual-channel 25 MHz source (-S model)
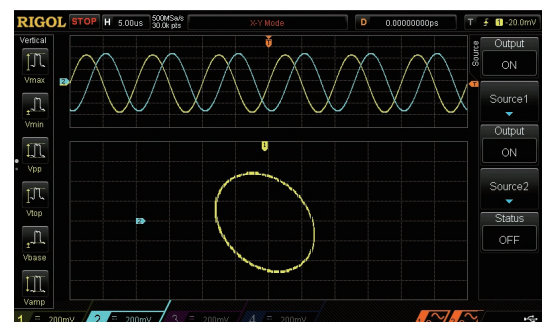
Key Specifications

Model	DS1104Z Plus DS1104Z-S Plus	DS1074Z Plus DS1074Z-S Plus	DS1054Z	DS1202Z-E
Analog BW	100MHz	70MHz	50MHz	200 MHz
Analog Channels	4			2
Digital Channels(PLUS)	16	16	--	
Max. Sample Rate	Analog Channel:1GSa/s (1 CH),500MSa/s(2 CH),250MSa/s (3/4 CH); Digital Channel(only available for PLUS model):1GSa/s (8 CH),500MSa/s(16 CH)			
Max. Memory Depth	Analog Channel: 24Mpts(1 CH), 12Mpts (2 CH), 6Mpts (3/4 CH) . Digital Channel(only available for PLUS model): 24Mpts(8 CH) / 12Mpts(16 CH) .			
Max. Waveform Capture rate	30,000 wfms/s			
Timebase Scale	5 ns/div to 50 s/div			2 ns/div to 50 s/div
Input Impedance	Analog Channel：(1MΩ±2%)||(13 pF±3 pF); Digital Channel(only available for PLUS model)：(100kΩ±1%)||(8 pF±3 pF)			1 MΩ±1%|| 13 pF±3 pF
Vertical Scale	Analog Channel：1 mV/div to 10 V/div Digital Channel(only available for PLUS model)：Threshold per set of 8 channels, User-defined threshold range ±15V in 10mV step			
DC Gain Accuracy	<10 mV: ±4% full scale ; ≥ 10 mV: ±3% full scale			
Real Time waveform Record and Analysis	Up to 60, 000 Frames			
Std. trigger functions	Edge, Pulse, Slope, Video, Pattern, Duration, Runt, Window, Nth Edge, Delay, Timeout, Setup/Hold, RS232/UART, I2C, SPI			
Bus decording	Std: RS232/UART,I2C,SPI			
Math functions	A+B, A-B, A×B, A/B, FFT, A&&B, A||B, A^B, !A, Intg, Diff, Sqrt, Lg, Ln, Exp, Abs, Filter			
Auto Measurements	37 types			
Connectivity	USB Host (support USB-GPIB), USB Device, LAN(LXI), AUX (TrigOut/PassFail)			
Display	7.0-inch WVGA(800×480) TFT LCD display, 64 intensity grading level			

DS1xx4Z-S Plus, 25MHz Function/Arbitrary Waveform Generator

Channels	Max. Sample Rate	Vertical Resolution	Max. Frequecy	Amplitude Range	Waveform Length	Output Waveforms
2	200MSa/s	14 bits	25MHz	20 mVpp-5 Vpp	16 K	Sine, Square, Ramp, Pulse, Noise, DC, Sinc, Exponential Rise, Exponential Fall, ECG,Gauss, Haversine, User defined

Ordering Information

	Description	Order Number
Models	DS1054Z (50 MHz, 4 CH)	DS1054Z
	DS1074Z Plus (70 MHz, 4 CH; MSO ready)	DS1074Z Plus
	DS1074Z-S Plus (70 MHz, 4 CH, 2-ch 25 MHz source; MSO ready)	DS1074Z-S Plus
	DS1104Z Plus (100 MHz, 4 CH; MSO ready)	DS1104Z Plus
	DS1104Z-S Plus (100 MHz, 4 CH, 2-ch 25 MHz source; MSO ready)	DS1104Z-S Plus
	DS1202Z-E (200 MHz, 2 analog channels)	DS1202Z-E
Standard Accessories	Power cord conforming to the standard of the destination country	-
	USB cable	CB-USBA-USBB-FF-150
	4 passive probes (1X:35MHz / 10X:150MHz BW)[1]	PVP3150
	2 passive probes (1X:35MHz / 10X: 350 MHz BW)[2]	PVP2350
Standard Option	Memory depth option	MEM-DS1000Z
	Waveform recording option	REC-DS1000Z
	Serial protocol analysis option	SA-DS1000Z
	Advanced trigger option	AT-DS1000Z
RPL1116	MSO upgrade for DS1000Z Plus only	RPL1116

For probes and optional accessories, please refer to "Probes & Accessories Guide".

[1] Note: available for 4CH model.

[2] Note: available for DS1202Z-E.

DS1000E/U Series Digital Oscilloscopes
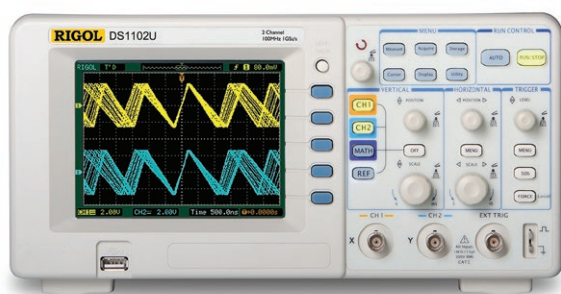
DS1000E/U series are the high-performance, economic digital oscilloscopes. They are widely used in the areas of education, training, production line, research and development.

- 1GSa/s maximum real-time sample rate
- Up to 1Mpts Memory depth
- Abundant trigger types: edge, pulse width, slope, video, alternate
- Standard with Pass/Fail test
- Compact and portable

Key Specifications

Model	DS1102E	DS1052E	DS1102U	DS1072U
Bandwidth	100MHz	50MHz	100MHz	70MHz
Channels	2 + EXT			
Real-time Sample Rate	1GSa/s single channel, 500MSa/s dual- channel			500Msa/s
Memory Depth	Max. 1Mpts		Max. 16Kpts	512Kpts
Timebase Range	2ns/div-50s/div	5ns/div-50s/div		
Input Impedance	1MΩ∥15pF			
Vertical Scale	2mV/div-10V/div			
Rise Time	<3.5ns	<7ns	<3.5ns	<5.8ns
Trigger Types	edge, pulse, slope, video, alternate			

Ordering Information

|	Description	Order Number
Models	DS1102E (100MHz, 1Mpts, 2CH)	DS1102E
	DS1052E (50MHz, 1Mpts, 2CH)	DS1052E
	DS1102U (100MHz, 16Kpts, 2CH)	DS1102U
	DS1072U (70MHz, 512Kpts, 2CH)	DS1072U
Standard Accessories	1 passive probe (1X:35MHz / 10X:150MHz BW) for each analog channel	PVP3150
	Power cord conforming to the standard of the destination country	-

Bus Analysis Guide

Serial bus like I2C, SPI, UART/RS232, USB are widely used in electronic and telecom products as well as other embedded devices. RIGOL mainstream oscilloscope provides commonly used bus analysis functions. The scope can trigger the at start frame, end frame, specific address and/or data, as well as error frame. Also, the scope can finish bus decoding functions which can help users to discover errors, debug hardware and accelerate development easily, so as to guarantee quick and high-quality accomplishment of projects.

Series and Options	Decoding Buses	Channel	I2C Trigger	I2C Decode	SPI Trigger	SPI Decode	RS232/UART Trigger	RS232/UART Decode	CAN Trigger	CAN Decode	LIN Trigger	LIN Decode	FlexRay Trigger	FlexRay Decode	I2S Trigger	I2S Decode	MIL-STD 1553 Trigger	MIL-STD 1553 Decode
MSO8000 Series	4	Analog & Digital																
MSO8000-COMP							○	○										
MSO8000-EMBD			○	○	○	○												
MSO8000-AUTO									○	○	○	○						
MSO8000-FLEX													○	○				
MSO8000-AUDIO															○	○		
MSO8000-AERO																	○	○
MSO/DS7000 Series	4	Analog & Digital																
DS7000-COMP							○	○										
DS7000-EMBD			○	○	○	○												
DS7000-AUTO									○	○	○	○						
DS7000-FLEX													○	○				
DS7000-AUDIO															○	○		
DS7000-AERO																	○	○
DS6000 Series	2	Analog	●		●		●		●				●					
SD-I2C/SPI-DS6000				○		○												
SD-RS232-DS6000								○										
SD-CAN-DS6000										○								
SD-FlexRay-DS6000														○				
MSO5000 Series	2	Analog & Digital																
MSO5000-COMP							○	○										
MSO5000-EMBD			○	○	○	○												
MSO5000-AUTO									○	○	○	○						
MSO5000-FLEX													○	○				
MSO5000-AUDIO															○	○		
MSO5000-AERO																	○	○
MSO/DS4000 Series	2	Analog & Digital	●		●		●		●				●					
SD-I2C/SPI-DS4000				○		○												
SD-RS232-DS4000								○										
SD-AUTO-DS4000										○	○	○						
SD-FlexRay-DS4000														○				
BND-MSO/DS4000				○		○		○		○	○	○		○				
DS4000E Series	2	Analog	●		●		●		●				●					
SD-I2C/SPI-DS4000				○		○												
SD-RS232-DS4000								○										
SD-AUTO-DS4000										○	○	○						
SD-FlexRay-DS4000														○				
BND-MSO/DS4000				○		○		○		○	○	○		○				
MSO/DS2000A Series	2	Analog & Digital	●		●		●											
SD-DS2000				○		○		○										
CAN-DS2000A									○	○								
BND-MSO/DS2000A				○		○		○	○	○								
DS1000Z Series	2	Analog & Digital	●	●	●	●	●	●										

● Standard　　　○ Option, could be used

Power Measurement and Analysis
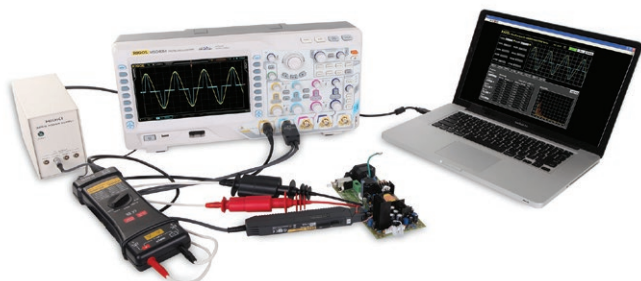
Power supply is an important component of electronic devices. The quality of power supply will have direct influences on the electronic devices. During the design and manufacture of power supply, performance testing becomes more and more important. Ultra Power Analyzer is a power measurement and analysis software. The software along with RIGOL digital oscilloscope, high voltage differential probe, current probe, probe deskew fixture, and passive probe, form a complete power measurement system for power supply design and testing. It can analyze switching power supply efficiency and reliability.

- Power quality analysis
- Current harmonics analysis
- Inrush current analysis
- Power device analysis
- Safe operating area analysis
- Modulation analysis
- Output analysis

Power quality analysis

Safe operating area analysis

Power device switching loss analysis
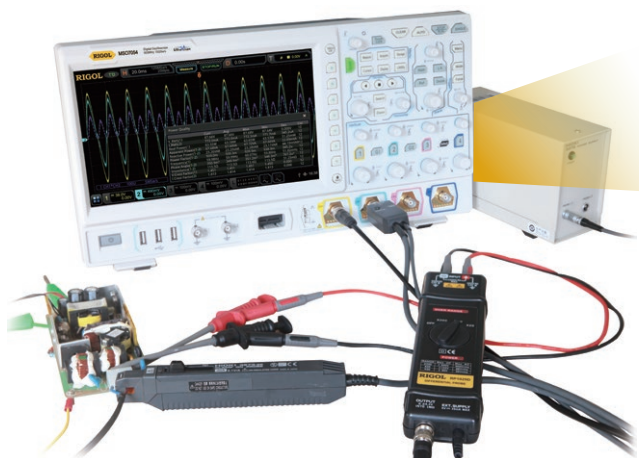
MSO8000series, MSO/DS7000 series and MSO5000 series oscilloscopes support the optional built-in power analysis software, which can complete the power quality analysis and ripple analysis. The power analysis software can help engineers analyze the commonly used power parameters rapidly and accurately, without needing to make tedious configurations manually or do complicated formula calculation.

Recommended Configuration

	Description	Order Number
Scope	MSO8000, MSO/DS7000, DS6000, MSO5000, MSO/DS4000, DS4000E, MSO/DS2000A , DS1000Z Series	
Accessories	High Voltage Differential Probe (depend on bandwidth and voltage range in practical application)	RP1000D Series
	Current probe (depend on bandwidth and current range in practical application)	RP1000C Series
	1:1 Passive HighZ Probe (selected based on measured bandwidth)	PVP3150/PVP2350
	T2R1000 probe adapter (convert TekProbe to RIGOL standard BNC connector, only for DS6000 & MSO/DS4000)	T2R1000
PC Software	Ultra Power Analyzer	UPA-DS
Measurement Application Option	Built-in Power Analysis Software(Only MSO/DS7000 series support)	DS7000-PWR
	Built-in Power Analysis Software(Only MSO5000 series support)	MSO5000-PWR
	Built-in power analysis(Only MSO8000 series support)	MSO8000-PWR

Current & Active Probes

RP1000D High Voltage Differential Probe

RP1003C/RP1004C Current Probe

RP7150/RP7080 Differential Probe

RP1001C/RP1002C Current Probe

RP1018H High Voltage Probe

RP7150S/RP7080S Single ended Probe

Probes & Accessories Guide

Models	Descriptions	MSO8000	MSO/DS7000	DS6000	MSO5000	MSO/DS4000	DS4000E	MSO/DS2000A	DS1000Z	DS1000E
RP7150	1.5GHz Differential/Single ended probe, 30Vp, CATI	○	○	○		○	○			
RP7150S	1.5GHz Single ended probe, 30Vp, CATI	○	○	○		○	○			
RP7080	800MHz Differential/Single ended probe, 30Vp, CATI	○	○	○		○	○			
RP7080S	800MHz Single ended probe, 30Vp, CATI	○	○	○		○	○			
RP6150A	1.5GHz Low Z probe	●①	○	●		○	○			
RP5600A	600MHz high Z probe 10X	○	○	●		○	○			
RP3500A	500MHz high Z probe 10X	●	●	○		●	○	○	○	○
PVP2350	1X:35MHz / 10X:350MHz high Z probe	○	○	○	●	○	●	●	●②	○
PVP3150	1X:35MHz / 10X:150MHz high Z probe	○	○	○	○	○	○	○	●	●
RP1300H	DC-300MHz, 2000V CATI, 1500V CATII (DC+AC)	○	○	○	○	○	○	○	○	○
RP1010H	High voltage probe, DC-50MHz, DC:10KV, AC:pulse≤ 20KVpp, sine≤ 7KVrms	○	○	○	○	○	○	○	○	○
RP1018H	High Voltage Probe, DC-150MHz, DC+AC:18KVp CATII, AC:12KVrms CATII	○	○	○	○	○	○	○	○	○
RP1025D	High voltage differential Probe, DC-25MHz, Vmax ≤ 1400Vpp	○	○	○	○	○	○	○	○	○
RP1050D	High voltage differential Probe, DC-50MHz, Vmax ≤ 7000Vpp	○	○	○	○	○	○	○	○	○
RP1100D	High voltage differential Probe, DC-100MHz, Vmax ≤ 7000Vpp	○	○	○	○	○	○	○	○	○
RP1001C	Current probe,DC-300KHz, DC: ±100A, AC: 200App,70Arms	○	○	○	○	○	○	○	○	○
RP1002C	Current probe,DC-1MHz, DC: ±70A, AC: 140App, 50Arms	○	○	○	○	○	○	○	○	○
RP1003C	Current probe,DC-50MHz, Max. AC peak: 50A (Non-continuous), 30Arms. Must order power supply RP1000P	○	○	○	○	○	○	○	○	○
RP1004C	Current probe,DC-100MHz, Max. AC peak: 50A (non-continuous), 30Arms. Must order power supply RP1000P	○	○	○	○	○	○	○	○	○
RP1005C	Current probe,DC-10MHz, Max.150 Arms, 300 A peak (Non-continuous), 500 A peak (@pulse width <=30 ms). Must order power supply RP1000P.	○	○	○	○	○	○	○	○	○
RPL2316	16-channel logic analyzer probe for MSO4000,MSO2000A series	○	●③			●		●		
PLA2216	16-channel logic analyzer probe for MSO5000 series				○					
RPL1116	16-channel logic analyzer probe for MSO1000Z series								●	
LA Module	DS1000D logic analysis probe: one data cable, one logic probe, 20 test clips,20 test leads									
T2R1000	Tekprobe to RIGOL scope adapter		○	○		○	○			
RM-DSxxxx	Rack Mount Kit for different series	○	○	○	○	○	○	○	○	○
USB-GPIB	USB-GPIB USB to GPIB module	○	○	○	○	○	○	○	○	○
ARM	ARM desk mount instrument arm				○					
ADP0150BNC	50 ohm adapter(2W, 1GHz)				○				○	○
CK-DS6000	Calibration kit for DS6000 & DS4000 series			○		○	○			

● Standard   ○ Option   ① Only available for MSO8204/MSO8104   ② Only available for DS1202Z-E   ③ Only available for MSO7000