RIGOL

MSO8000 Series

Digital Oscilloscope

Data Sheet

DSA26108-1110

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MSO8000 Series Digital Oscilloscope

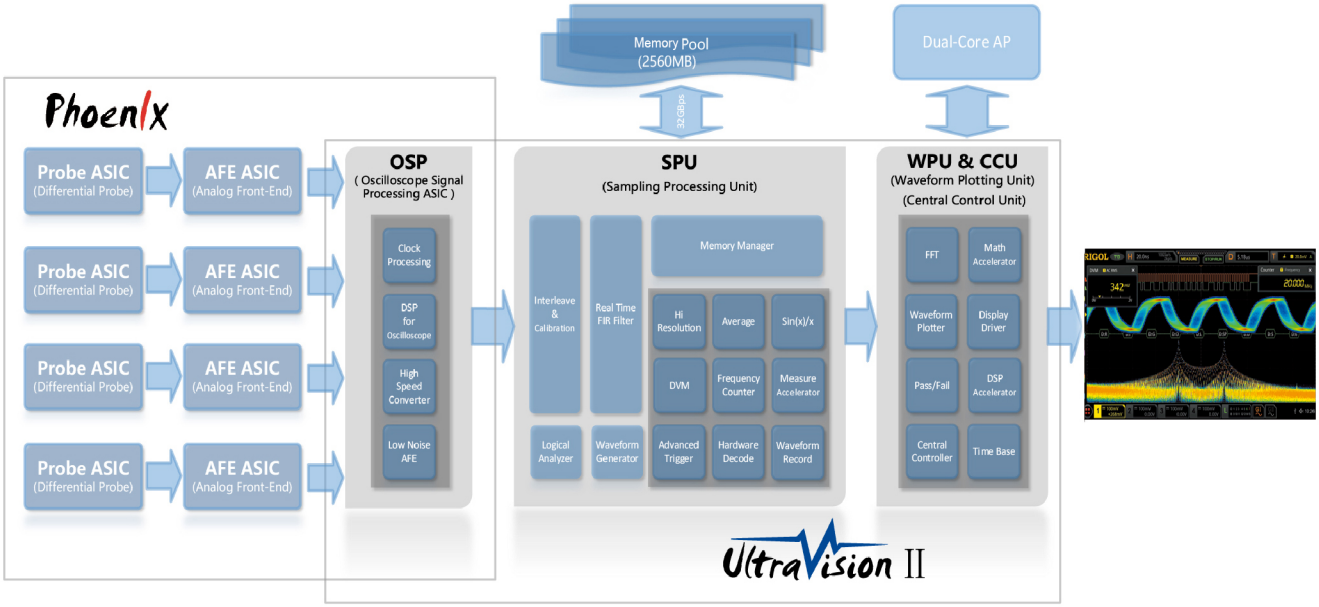
Main Specifications

- 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
- Integrates 7 independent instruments into 1
- Analog bandwidth: 600 MHz, 1 GHz and 2 GHz (single-channel and half-channel modes)
- 10.1-inch capacitive multi-touch screen, 256-level intensity grading display, with color persistence
- Web Control and VNC remote command
- Waveform histogram analysis (standard)
- Auto measurement of 41 waveform parameters; full-memory hardware measurement function



New UltraVision II Technology Platform

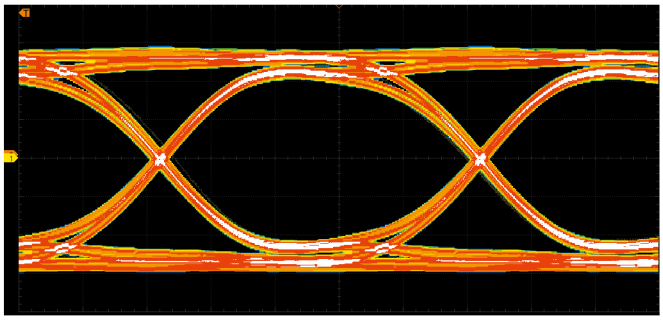
MSO8000 series digital oscilloscope adopts RIGOL's chipset "Phoenix", which can gain the data acquisition capability of up to 10 GSa/s sample rate, realizing the high integration of all the function modules required for the analog front-end (AFE), and greatly improving the consistency and reliability of the digital oscilloscope. This innovative UltraVision II technical platform is equipped with higher waveform capture rate, full digital trigger technology, and full memory hardware measurement technology. The MSO8000 series digital oscilloscope also integrates multiple instrument modules, such as MSO, arbitrary waveform generator, digital voltmeter, 6-digit counter and totalizer, and protocol analyzer, offering extraordinary user experience at an unprecedented price point.

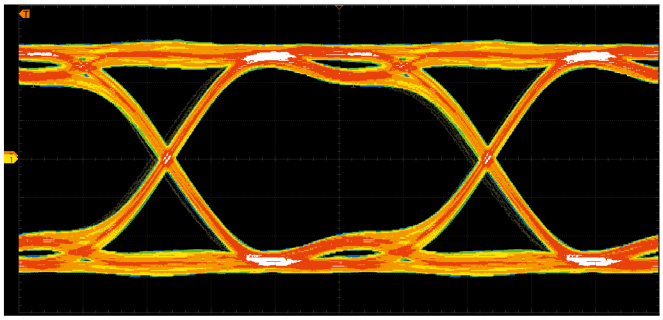


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MSO8000 Series Digital Oscilloscope







Use the 600 MHz bandwidth and 1 GHz bandwidth model respectively to perform eye measurement on the 1 Gb/s signal.

Excellent Bandwidth and Sample Rate Make the Eye Diagram Pre-test Easy

Bandwidth and the sample rate are two key technical specifications that engineers take priority in choosing the digital oscilloscope. The higher the bandwidth of the oscilloscope, the better the oscilloscope can keep the steep fast edge, abundant harmonics components and energies of the signal under test. The sample rate determines the time interval of the sample points, and will affect the bandwidth of the oscilloscope.

The MSO8000 series provides a maximum of 2 GHz analog bandwidth and 10 GSa/s real-time sample rate. Its typical models are equipped with 600 MHz bandwidth, 1 GHz bandwidth and 2 GHz bandwidth. To view the subtle wave-form details, you can upgrade the low bandwidth models to 2 GHz (single-channel and half-channel modes) at any time to achieve higher signal fidelity and lower resolution (as low as 100 ps, capable of reaching 2 ps for the minimum timebase) at an affordable price.

Based on the excellent bandwidth and sample rate, the MSO8000 series oscilloscope provides the real-time eye plot and measurement with the clock recovery function. In the digital signal world, you can use the eye measurement function of the oscilloscope to better observe the transmission quality of the digital signal and understand the strong and weak Inter-Symbol Interference in the system, so that you can make improvement in the system design. For those who need to frequently make qualitative test and verification for the electronic device, serial digital signal in the chip, or high-speed digital signal, it is undoubtedly a good choice for you to choose the MSO8000 series equipped with the eye measurement function.

The MSO8000 series supports the eye measurement for all the analog channels, and also provides measurement for several parameters of the eye diagram: eye height, eye width, eye amplitude, crossing percentage, and Q Factor. It also supports various clock recovery methods, such as constant clock (Auto, Semi-auto, Manual), First-order PLL, Second-order PLL, and explicit clock, to meet the demands of customers for different application scenarios.

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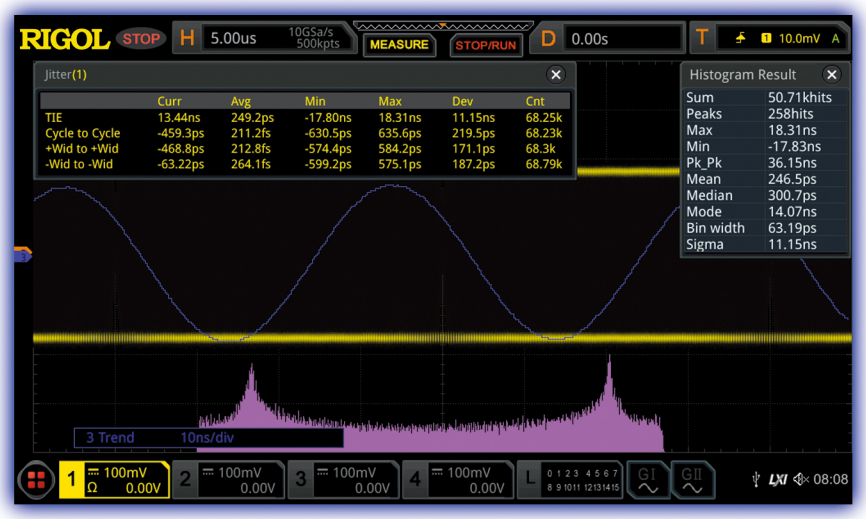
MSO8000 Series
Digital Oscilloscope

Visualize Signal Integrity with Advanced Jitter and Real-time Eye Measurements

In the analysis method and tools for signal integrity, real-time eye measurement and jitter analysis have already become the common debugging methods. The MSO8000 series oscilloscope not only provides the eye measurement function, but also offers the flexible and convenient jitter measurement and analysis, enabling the users to accurately and quickly make deterministic jitter measurement for serial clock signals or parallel bus signals.

If you have purchased and activated the MSO8000-JITTER option, the oscilloscope also supports real-time eye diagram and jitter analysis functions.





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

The various clock recovery methods supported include:

- Constant clock (Auto, Semi-auto, Manual)
- First-order PLL
- Second-order PLL
- Explicit clock

The jitter analysis is mainly used to measure and analyze the clock jitter. The MSO8000 series can accomplish the following jitter analysis items. Among the items, TIE is the most commonly used jitter specification.

- TIE
- Cycle to Cycle
- +Width to +Width
- -Width to –Width

To help engineers easily and conveniently find out the jitter components from the signal, the jitter measurement results can be visualized in various ways: jitter trend graph and jitter histogram. The jitter analysis function enables you to measure several uninterrupted bits at one time and make statistics, efficiently accomplishing the jitter analysis for the large quantity of data. From the jitter trend graph and histogram, you can get a quick view of the jitter nature and source, greatly improving the work efficiency of the engineers.

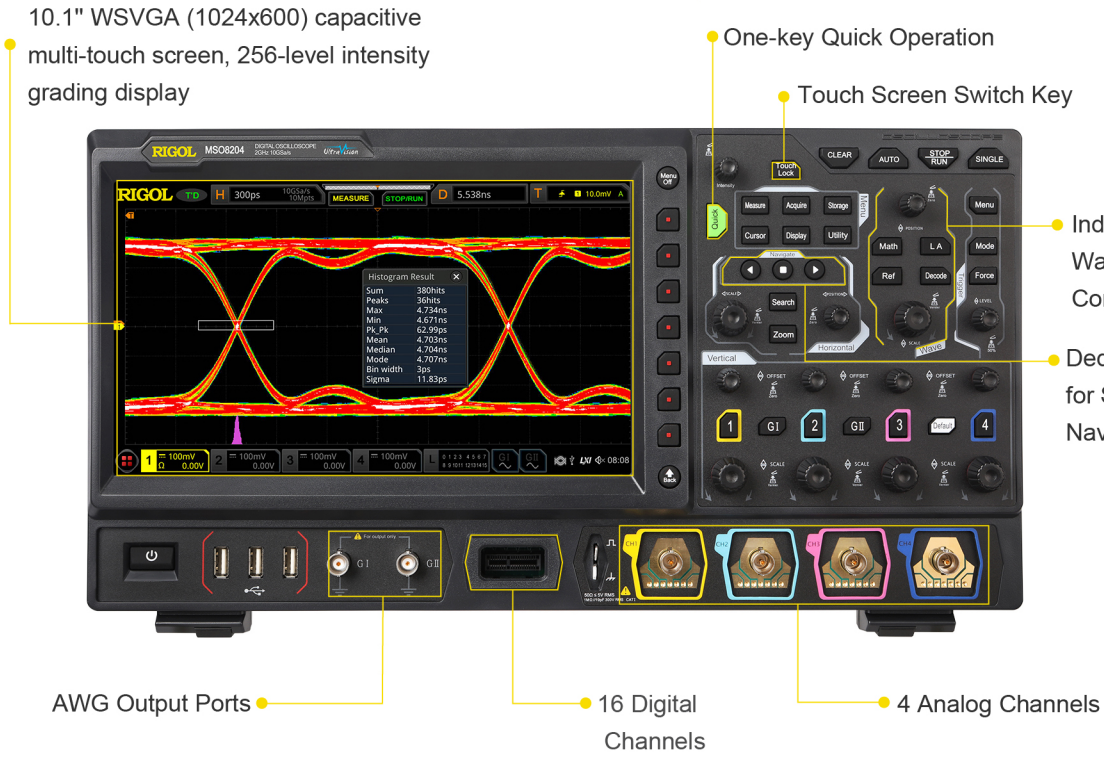
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MSO8000 Series Digital Oscilloscope

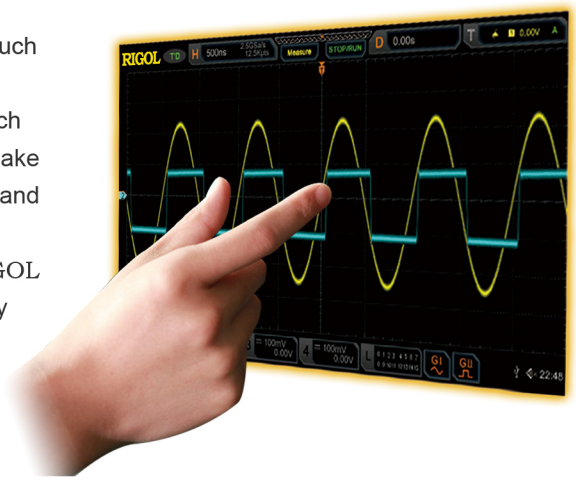
Upgradable With the Software

The innovative physical appearance of the instrument and the thin design in both sides of the instrument ensure its proper LCD display and compact shape, making it portable and easy to operate. Moreover, the MSO8000 series is a great choice for you with limited budget. When leaving the factory, it is equipped with a standard configuration of hardware circuit for the highest analog bandwidth, the logic analyzer, and the arbitrary waveform generator. You do not have to spend time and energy in choosing which model is the most appropriate one while purchasing the oscilloscope. Just buy one and the optional function can be purchased later at any time when you need it.

- **Hardware supports the highest analog bandwidth**
  Any MSO8000 series model with a low bandwidth can be upgraded to a higher bandwidth at any time, without replacing the model.
- **LA interface available as a standard configuration for hardware**
  Any MSO8000 series model has a standard configuration of 16-channel logic analyzer interface and function software. If you need, purchase a probe RPL2316.
- **AWG output port available as a standard configuration for hardware**
  Any MSO8000 series model has a standard configuration of 2-channel AWG output ports. If you need, purchase the AWG option.



The 10.1-inch capacitive multi-touch screen supports various touch gestures, making it always keep up with the mainstream development trend for screen operation. The touch gestures such as "Tap", "Pinch & Stretch", "Drag", and "Rectangle Drawing" make you find the measurement operation more smooth, convenient, and easy to learn. Meanwhile, the MSO8000 series digital oscilloscope still keeps the knob and key operation as what RIGOL traditional digital oscilloscopes have, optimizing the user-friendly interactive experience to a large extent.



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Overview of RIGOL's Medium and High-end Series Products

	MSO5000	DHO4000	MSO/DS7000	MSO8000	MSO8000A
					
Analog Channel	2/4+16	4	4+16	4+16	4+16
Analog Bandwidth	70 MHz to 350 MHz	200/400/800 MHz	100 MHz to 500 MHz	600 MHz/1 GHz/2 GHz	750 MHz/1.5 GHz/3 GHz
Max. Sample Rate	8 GSa/s	4 GSa/s	10 GSa/s	10 GSa/s	10 GSa/s
Max. Memory Depth	200 Mpts (option)	500 Mpts (option)	500 Mpts (option)	500 Mpts	500 Mpts
Max. Waveform Capture Rate	500,000 wfms/s	50,000 wfms/s (Vector mode) 1,500,000 wfms/s (UltraAcquire mode)	600,000 wfms/s	600,000 wfms/s	600,000 wfms/s
Max. Frames of Waveform Recording	450,000	500,000	450,000	450,000	450,000
LCD	9'' capacitive multi-touch screen	10.1'' capacitive multi-touch screen	10.1'' capacitive multi-touch screen	10.1'' capacitive multi-touch screen	10.1'' capacitive multi-touch screen
Hardware Mask Test	Standard	Standard	Standard	Standard	Standard
Built-in Arbitrary Waveform Generator	2 CH, 25 MHz (option)	N/A	2 CH, 25 MHz (option)	2 CH, 25 MHz (option)	2 CH, 25 MHz (option)
Built-in Digital Voltmeter	Standard	Standard	Standard	Standard	Standard
Built-in Hardware Counter	6-digit frequency counter + totalizer	6-digit frequency counter + totalizer	6-digit frequency counter + totalizer	6-digit frequency counter + totalizer	6-digit frequency counter + totalizer
Search and Navigation	Standard, supporting table display	Standard, supporting table display	Standard, supporting table display	Standard, supporting table display	Standard, supporting table display

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	MSO5000	DHO4000	MSO/DS7000	MSO8000	MSO8000A
Power Analysis	Built-in UPA (option) + PC	Built-in UPA (option) + PC	Built-in UPA (option) + PC	Built-in UPA (option) + PC	Built-in UPA (option) + PC
Real-time Eye Diagram	N/A	N/A	N/A	Option	Option
Jitter Analysis	N/A	N/A	N/A	Option	Option
Serial Protocol Analysis	RS232/UART, I2C, SPI, CAN, LIN, FlexRay, I2S, and MIL-STD-1553	RS232/UART, I2C, SPI, CAN, CAN-FD, LIN, FlexRay, I2S, and MIL-STD-1553	RS232/UART, I2C, SPI, CAN, LIN, FlexRay, I2S, and MIL-STD-1553	RS232/UART, I2C, SPI, CAN, CAN-FD, LIN, FlexRay, I2S, and MIL-STD-1553	RS232/UART, I2C, SPI, CAN, CAN-FD, LIN, FlexRay, I2S, and MIL-STD-1553
Waveform Color Persistence	Standard	Standard	Standard	Standard	Standard
Histogram	Standard	N/A	Standard	Standard	Standard
FFT	Enhanced FFT, standard	Enhanced FFT, standard	Enhanced FFT, standard	Enhanced FFT, standard	Enhanced FFT, standard
MATH	Displays 4 functions at the same time	Displays 4 functions at the same time	Displays 4 functions at the same time	Displays 4 functions at the same time	Displays 4 functions at the same time
Connectivity	Standard: USB, LAN, and HDMI option: USB-GPIB	Standard: USB, LAN, and HDMI option: USB-GPIB	Standard: USB, LAN, and HDMI option: USB-GPIB	Standard: USB, LAN, and HDMI option: USB-GPIB	Standard: USB, LAN, and HDMI option: USB-GPIB

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Design Features

7-in-1 Integrated Digital Oscilloscope, with Excellent Performance at Unprecedented Price Point



In today's integration design field, a highly integrated multifunctional oscilloscope has become a useful tool for design engineers. MSO8000 series digital oscilloscope launched by RIGOL this time integrates 7 independent instruments into 1, including 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. MSO8000 series offers you a flexible and economical solution to address your actual needs.

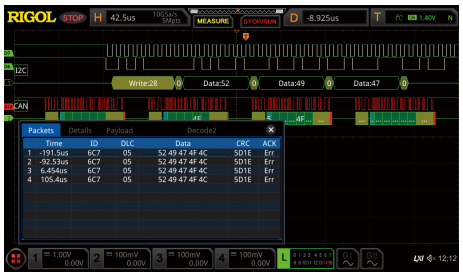
Digital Oscilloscope

- Three bandwidth models: 2 GHz, 1 GHz, and 600 MHz; with the bandwidth upgradeable
- Up to 10 GSa/s real-time sample rate
- 4 analog channels and 1 EXT channel
- Up to 500 Mpts memory depth
- Maximum waveform capture rate of 600,000 wfms/s
- 500 MHz passive voltage probe for each channel (std.)
- Two 1.5 GHz passive low-impedance probes (std.) for the 2 GHz and 1 GHz bandwidth models



Logic Analyzer

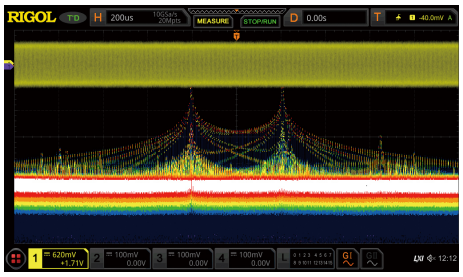
- Standard configuration of 16 digital channels and one optional RPL2316 logic analyzer probe
- 62.5 Mpts memory depth for the waveforms of all the digital channels
- Up to 1.25 GSa/s sample rate
- Hardware real-time waveform recording and playback functions supported
- Mixed (analog channel and digital channel) trigger and decode supported
- Convenient digital channel grouping and group operation



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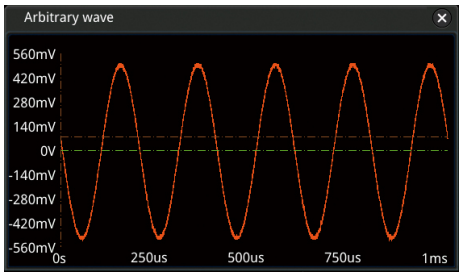
Spectrum Analyzer

- Standard configuration of enhanced FFT, real-time operation for max. 1 Mpts waveform data
- Max. frequency range: oscilloscope analog bandwidth
- Up to 4 groups of operations can be displayed at the same time
- Independent FFT color persistence view supported
- Up to 15 peaks available for the peak search function; event table available to be exported



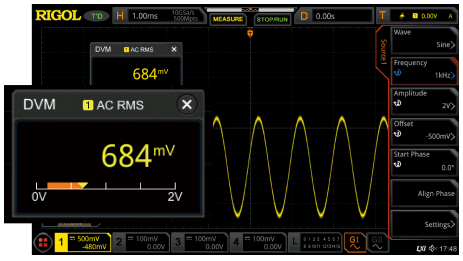
Arbitrary Waveform Generator (Opt.)

- Standard hardware configuration of two waveforms output channels, AWG option is required to be ordered
- 13 pre-defined waveforms
- Up to 25 MHz frequency
- Up to 200 MSa/s sample rate
- Advanced modulation, sweep, and burst signal output supported



Digital Voltmeter

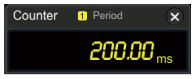
- 3-digit DC, AC RMS, and AC+DC RMS voltage measurement
- Sound an alarm for reaching or exceeding the limits
- Display the latest measurement results in the form of a diagram, and display the extrema over the last 3 seconds



High-Precision Frequency Counter and Totalizer

- 3 to 6-digit (selectable) high-precision frequency counter
- Support the statistics on the maximum and minimum values of the frequency
- 48-bit totalizer (std.)

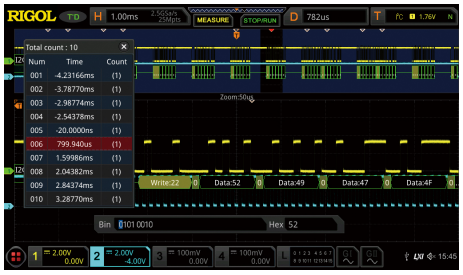






Protocol Analyzer (Opt.)

- Support RS232/UART, I2C, SPI, CAN, CAN-FD, LIN, I2S, FlexRay, and MIL-STD-1553 serial bus
- Support analog channels and digital channel trigger and decode
- RS232/UART, I2C, and SPI support waveform search function
- Work with waveform recording, pass/fail, and zone trigger



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600,000 wfms/s Capture Rate

Engineers often have to spend a lot of time and efforts in locating the problem in design and debugging. Therefore, a proper debugging tool will help engineers to work more efficiently. MSO8000 series digital oscilloscope can provide the waveform capture rate of up to 600,000 wfms/s, so that the glitches and infrequent events in waveforms can be quickly identified, greatly improving the debugging efficiency for the engineers.

256-level intensity grading display can reflect the occurrence frequencies of the infrequent events. Its newly added color persistence function can highlight the signal of different probabilities with a different color grading. You can set the persistence time to control the duration time for the waveforms to be displayed on the screen, so that the display capability of the infrequent events can be further enhanced.



Capture occasional exceptional signals in high refresh mode.



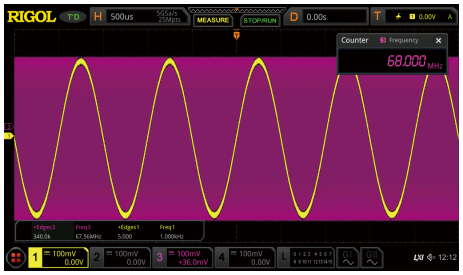
Changes of each frame of waveforms of the sweep signal can be clearly observed in high refresh mode.

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Hardware Full Memory Auto Measurement

The auto measurement is the basic tool for engineers to make a rapid analysis of the signals, and it requires more efficient measurement process and accurate measurement results. MSO8000 supports hardware full memory auto measurement, provides measurements of 41 waveform parameters, supports displaying the statistics and analysis of the measurement results for 10 items. In addition, the auto measurement function also supports auto cursor indicator and measurement range selection. You can also set the threshold for each measurement source independently, making the waveform measurement more flexible. To get a quick view about how to make measurements, we provide you with detailed help documents and diagrams to better illustrate the measurement methods for each item.

Based on the different data sources, auto measurement consists of two modes: Normal and Precision. In Normal mode, the data volume increases from 1 k to 1 M, optimizing the basic measurement function. In Precision mode, the oscilloscope provides hardware full-memory auto measurement, greatly improving the precision of the waveform measurement. With the 500 Mpts memory depth, any measurement for the item can be completed within 1.5 s, making long duration of high speed captures possible.



Observe and accurately measure two signals with great frequency deviations. The full-memory hardware measurement can measure accurate frequency value of the waveforms with 340k rising edges.

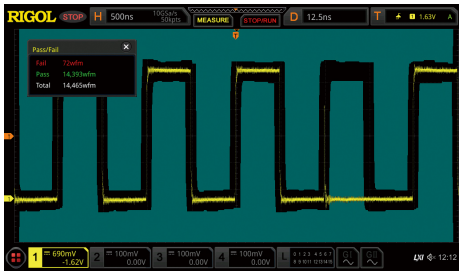


The ordinary 1 Mpts software measurement can no longer measure the accurate frequency of the high-frequency signal.

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Hardware Pass/Fail Test

The MSO8000 series is equipped with hardware pass/fail test function as the standard configuration, which can be used in signal monitoring for a long time, signal monitoring during design, and signal test in the production line. You can set the test mask based on the known "standard" waveform, and then compare the signal under test with the "standard" waveform to display the statistics on the test results. When a successful or failed test is detected by the oscilloscope, you can choose to immediately stop monitoring, enable the beeper to sound an alarm, or save the current screen image. Also, you can choose to continue monitoring.



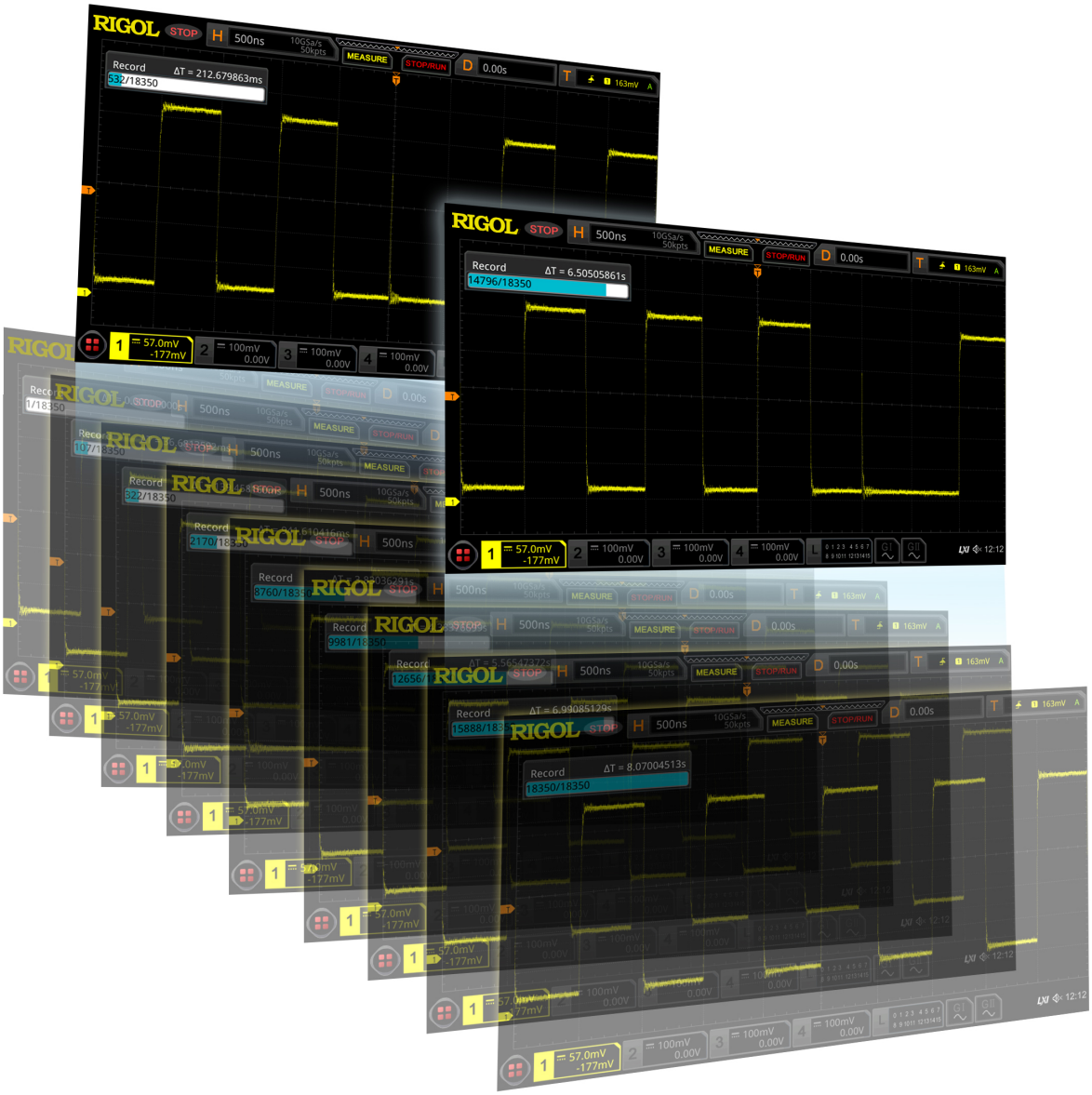
The Pass/Fail test function can quickly make statistics on the occurrence probability of the signal exceptions.

Hardware Waveform Recording and Playback

The memory depth is one of the key specifications of the oscilloscope. However, no matter how high the memory depth, it cannot be guaranteed that all the signals that users are concerned about can be captured in one time. This is especially true for the occurrence of the infrequent signals during debugging design or locating specific events from the long captured complicated signals. In addition, the long memory depth will be bound to reduce the response time for the oscilloscope. The hardware waveform recording and playback function can address this issue.

The MSO8000 series provides ceaseless recording and playback for a maximum of 450,000 frames of hardware real-time waveforms. This specification is second to none in the industry. The hardware waveform recording function adopts the segmented storage technology. With the technology, you can set the trigger conditions to make a selective choice in capturing and saving the signals that you are interested in, then mark the time on the signal. This has not only ensured the high capture efficiency, but also prolonged the overall observation time for the waveforms. The hardware waveform playback function enables you to have sufficient time to take a careful view and analysis of the recorded segment of the waveforms.

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Zone Trigger

In face of the complex and variable circuit signal in the circuit debugging, it is easy for us to find the transient occasional exception signals on the oscilloscope with a high waveform capture rate. However, it is not easy to isolate the exceptional signal from the complex circuit signals and trigger them stably. You have to spend more time on the usage of some advanced trigger types, and sometimes even the powerful advanced trigger is unable to make it. The MSO8000 series is specially equipped with touch screen-based zone trigger function, which can help users accelerate the signal isolation process. The zone trigger function is easy to operate. You only need to use the specified rectangle drawing gesture to draw one or two rectangular zones on the corresponding signal section, then you can quickly isolate the signal for observation.

The zone trigger works together with other 20 trigger types. The decoding, waveform recording, and pass/fail test functions are also supported. This is conducive to the debugging of the complex signals.



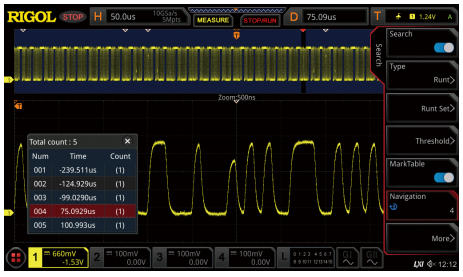
Draw a rectangle on the transient exception signal and select Trigger zone B.



Quickly isolate the exceptional signal with Edge trigger and Zone trigger.

Search and Navigation

As the memory depth of the oscilloscope becomes higher, locating a specific event from the thousands of captured complicated waveforms is a tedious task that requires much time and efforts. The waveform search function can help you quickly locate the concerned events and make a mark. Then, you can use the specific navigation keys to quickly locate the marked signal and make measurements easily. The search conditions for waveform search include edge, pulse, runt pulse, and slope. The searched event information is displayed in the form of a list.

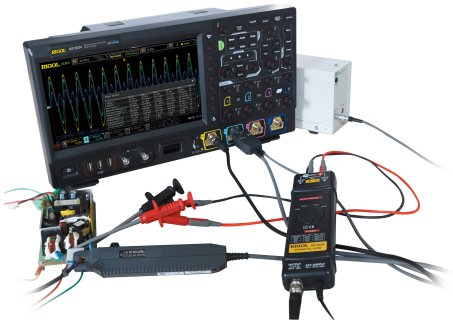


The search and navigation function can quickly search for the signals with exceptions and locate them accurately.

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Power Analysis (Option)

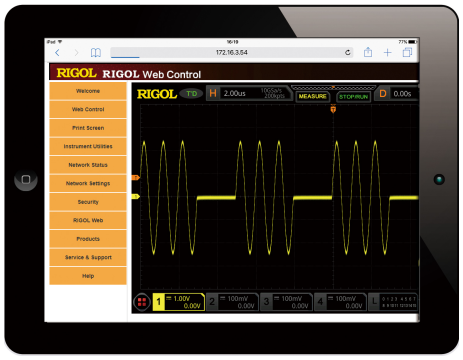
To cater to the increasing test demand for the switching power supply and the power component, we configure the MSO8000 series with the optional built-in power analysis software. The current power analysis software can complete the power quality analysis and ripple analysis. The power analysis software can help engineers analyze the commonly used power parameters rapidly and accurately, without needing to make tedious configurations manually or do complicated formula calculation.





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Remote Control and Offline Analysis Software

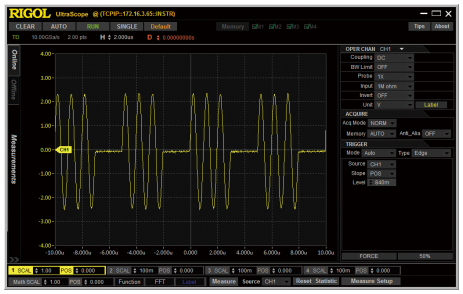


The Web Control software, VNC, and Ultra Scope control analysis software are served as the standard configurations for the MSO8000 series. You can use them to migrate the instrument control and waveform analysis to the PC, and then click the mouse to operate easily.

You only need to input the IP address of the oscilloscope into the address bar of the Web browser to open the Web Control software. The display of the waveform interface and instrument control in the software are consistent with that in the MSO8000 series. You can use the mouse to click the menus in the Web Control interface to complete the waveform control, measurement, and analysis. In the Web Control interface, you can view the basic information of the instrument, set or modify the network status.



The VNC client (VNC Viewer) can be downloaded from its official website. When the VNC client is installed and your instrument is connected to the network, open the VNC Viewer client and input the IP address of the instrument into the VNC address bar. Then, you can view the screen of the instrument and operate the instrument remotely. The display of the waveform interface and instrument control in the software are consistent with that in the MSO8000 series. You can use the mouse to click the menus in the VNC interface to complete the waveform control, measurement, and analysis.



The powerful data analysis function of the MSO8000 series is not only limited to the oscilloscope itself. The Ultra Scope control analysis software can not only realize the basic control for the instrument, but also can export the 500 M waveform big data to the PC, and then make measurements, math operation, and analysis of the data offline. It also supports real-time monitoring of the oscilloscope status and multi-pane windowing on multiple instruments. The available remote control interfaces include USB, LAN, and GPIB. You can select any one of them to realize remote control.

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User-defined One-key Quick Operation

There is a dedicated Quick key on the front panel of the MSO8000 series, enabling you to customize the function of the key and complete the commonly used operation quickly. With the customized setting of the Quick key, you can quickly capture the screen image, realize waveform saving, setup saving, all measurement, reset measurement statistics, reset pass/fail test statistics, waveform recording, send the mail, printing, and group saving.



Multiple External Interfaces



The MSO8000 series provides a variety of external interfaces, including USB HOST & DEVICE, LAN (LXI), HDMI, TRIG OUT, and USB-GPIB (opt.). The oscilloscope is in compliance with the standards specified in *LXI Device Specification 2011*. The LXI web page is available to access via the LAN interface. You can purchase the USB-GPIB adaptor from RIGOL to enjoy the reliable GPIB communication service. It also provides HDMI video output interface.

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RIGOL Probes and Accessories Supported

RIGOL Passive Probes

Model	Type	Description
 PVP2150	High-impedance Probe	• Attenuation Ratio: 10:1/1:1 • 1X BW: DC to 35 MHz • 10X BW: DC to 150 MHz • Compatibility: All models of RIGOL's digital oscilloscopes
 PVP2350	High-impedance Probe	• Attenuation Ratio: 10:1/1:1 • 1X BW: DC to 35 MHz • 10X BW: DC to 350 MHz • Compatibility: All models of RIGOL's digital oscilloscopes
 RP3500A	High-impedance Probe	• Attenuation Ratio: 10:1 • BW: DC to 500 MHz • Compatibility: MSO/DS7000, MSO8000/A, DHO4000/1000, MHO/DHO5000, and DS70000/80000 series
 RP6150A	Low-impedance Probe	• BW: DC to 1.5 GHz • Compatibility: MSO/DS7000, MSO8000/A, and DS70000/80000 series
 RP1300H	High-voltage Probe	• Attenuation Ratio: 100:1 • BW: DC to 300 MHz • CAT I 2000 V (DC+AC) • CAT II 1500 V (DC+AC) • Compatibility: All models of RIGOL's digital oscilloscopes

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Model	Type	Description
 RP1010H	High-voltage Probe	• Attenuation Ratio: 1000:1 • BW: DC to 40 MHz • DC: 0 to 10 kV DC • AC: pulse ≤20 kVp-p • AC: sine ≤7 kV_{rms} • Compatibility: All models of RIGOL's digital oscilloscopes
 RP1018H	High-voltage Probe	• Attenuation Ratio: 1000:1 • BW: DC to 150 MHz • DC+AC_{peak}: 18 kV CAT II • AC_{rms}: 12 kV CAT II • Compatibility: All models of RIGOL's digital oscilloscopes
 RPL2316	Logic Analyzer Probe	• Logic analyzer probe (dedicated probe for MSO/DS7000, and MSO8000/A series)

RIGOL Active & Current Probes

Model	Type	Description
 PVA7250	Single-ended/ Differential Active Probe	• BW: DC to 2.5 GHz • 30 V peak CAT I • Compatibility: MSO/DS7000, MSO8000/A, DHO4000, MHO/DHO5000, and DS70000/80000 series
 RP7150	Single-ended/ Differential Active Probe	• BW: DC to 1.5 GHz • 30 V peak CAT I • Compatibility: MSO/DS7000, MSO8000/A, DHO4000, MHO/DHO5000, and DS70000/80000 series

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Model	Type	Description
 RP7080	Single-ended/ Differential Active Probe	• BW: DC to 800 MHz • 30 V peak CAT I • Compatibility: MSO/DS7000, MSO8000/A, DHO4000, MHO/DHO5000, and DS70000/80000 series
 RP7150S	Single-ended Active Probe	• BW: DC to 1.5 GHz • 30 V peak CAT I • Compatibility: MSO/DS7000, MSO8000/A, DHO4000, MHO/DHO5000, and DS70000/80000 series
 RP7080S	Single-ended Active Probe	• BW: DC to 800 MHz • 30 V peak CAT I • Compatibility: MSO/DS7000, MSO8000/A, DHO4000, MHO/DHO5000, and DS70000/80000 series
 RP1001C	Current Probe	• BW: DC to 300 kHz • Maximum Input AC: ±100 A AC P-P: 200 A AC RMS: 70 A • Compatibility: All models of RIGOL's digital oscilloscopes
 RP1002C	Current Probe	• BW: DC to 1 MHz • Maximum Input AC: ±70 A AC P-P: 140 A AC RMS: 50 A • Compatibility: All models of RIGOL's digital oscilloscopes
 RP1003C	Current Probe	• BW: DC to 50 MHz • Maximum Input AC P-P: 50 A (non-continuous) AC RMS: 30 A • Compatibility: All models of RIGOL's digital oscilloscopes • Required to order RP1000P power supply.

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Model	Type	Description
 RP1004C	Current Probe	• BW: DC to 100 MHz • Maximum Input AC P-P: 50 A (non-continuous) AC RMS: 30 A • Compatibility: All models of RIGOL's digital oscilloscopes • Required to order RP1000P power supply.
 RP1005C	Current Probe	• BW: DC to 10 MHz • Maximum Input AC P-P: 300 A (non-continuous), 500 A (@pulse width ≤ 30 us) AC RMS: 150 A • Compatibility: All models of RIGOL's digital oscilloscopes • Required to order RP1000P power supply.
 RP1000P	Power Supply	• Power supply for RP1003C, RP1004C, RP1005C, and RP1006C; supporting 4 channels.
 RP1025D	High-voltage Differential Probe	• BW: DC to 25 MHz • Max. voltage ≤ 1400 Vpp (DC + AC P-P) • Compatibility: All models of RIGOL's digital oscilloscopes
 RP1050D	High-voltage Differential Probe	• BW: DC to 50 MHz • Max. voltage ≤ 7000 Vpp (DC + AC P-P) • Compatibility: All models of RIGOL's digital oscilloscopes
 RP1100D	High-voltage Differential Probe	• BW: DC to 100 MHz • Max. voltage ≤ 7000 Vpp (DC + AC P-P) • Compatibility: All models of RIGOL's digital oscilloscopes

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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.

Overview of the MSO8000 Series Technical Specifications

Model	MSO8064	MSO8104	MSO8204
Analog bandwidth (50 Ω, -3 dB)[1]	600 MHz	1 GHz	2 GHz
Analog bandwidth (1 MΩ, -3 dB)	500 MHz		
Calculated Rising Time under 50 Ω (single-channel mode, 10%-90%, typical)	≤583 ps	≤350 ps	≤175 ps
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)		
Sampling Mode	Real-time sampling		
Max. Analog Channel Sample Rate	Single-channel: 10 GSa/s, half-channel[2]: 5 GSa/s, full-channel: 2.5 GSa/s **NOTE:** Under the max. sample rate, the max. bandwidths for different models are different[3].		
Max. Memory Depth	Analog channel: 500 Mpts (single-channel), 250 Mpts (half-channel[2]), 125 Mpts (full-channel) digital channel: 62.5 Mpts (full-channel)		
Max. Waveform Capture Rate[4]	≥600,000 wfms/s		
Hardware real-time waveform recording and playing	≥450,000 wfms (single-channel)		

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Model	MSO8064	MSO8104	MSO8204
Peak Detection	Captures 400 ps glitches		
LCD Size and Type	10.1-inch capacitive multi-touch screen/gesture enabled operation		
Display Resolution	1024 × 600		

Vertical System Analog Channel

Vertical System Analog Channel		
Input Coupling	DC or AC	
Input Impedance	1 MΩ ± 1%, 50 Ω ± 1%	
Input Capacitance	19 pF ± 3 pF	
Probe Attenuation Coefficient	0.0001X, 0.0002X, 0.0005X, 0.001X, 0.002X, 0.005X, 0.01X, 0.02X, 0.05X, 0.1X, 0.2X, 0.5X, 1X, 2X, 5X, 10X, 20X, 50X, 100X, 200X, 500X, 1000X, 2000X, 5000X, 10000X, 20000X, and 50000X	
Probe Recognition	Auto-recognized RIGOL probe	
Maximum Input Voltage	1 MΩ	CAT I, 300 V_{rms}, 400 V_{pk}; Transient Overvoltage 1,600 V_{pk}
	50 Ω	5V_{rms}
Vertical Sensitivity Range[5]	1 MΩ	1 mV/div to 10 V/div
	50 Ω	1 mV/div~1 V/div
Offset Range	1 MΩ	± 1 V (1 mV/div to 50 mV/div) ± 30 V (51 mV/div to 260 mV/div) ± 100 V (265 mV/div to 10 V/div)
	50 Ω	±1 V (1 mV/div to 100 mV/div) ±4 V (102 mV/div to 1 V/div)
Dynamic Range		±5 div(8 bits)
Bandwidth Limit (Typical)	1 MΩ	20 MHz, 250 MHz; selectable for each channel
	50 Ω	20 MHz
DC Gain Accuracy[5]		±2% of full scale

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Vertical System Analog Channel	
DC Offset Accuracy	>200 mV/div (±0.1 div±2 mV±1.5% of offset value)
	>200 mV/div (±0.1 div±2 mV±1.0% of offset value)
Channel-to-Channel Isolation	≥100:1 (from DC to 1 GHz), ≥30:1 (> 1 GHz)
ESD Tolerance	±8 kV (on input BNCs)

Vertical System Digital Channel

Vertical System Digital Channel	
Number of Channels	16 input channels (D0~D15) (D0~D7, D8~D15)
Threshold Range	±20.0 V, in 10 mV step
Threshold Accuracy	±(100 mV + 3% of the threshold setting)
Threshold Selection	TTL(1.4 V), CMOS5.0(2.5 V), CMOS3.3(1.65 V), CMOS2.5(1.25 V), CMOS1.8(0.9 V), ECL(-1.3 V),PECL(3.7 V), LVDS(1.2 V), 0.0V User (adjustable threshold for 8 channels in a group)
Max. Input Voltage	± 40 Vpp CAT I; transient overvoltage 800 Vpk
Max. Input Dynamic Range	±10 V + threshold
Minimum Voltage Swing	500 mVpp
Input Impedance	About 101 kΩ
Probe Load	≈8 pF
Vertical Resolution	1 bits

Vertical Resolution

Vertical Resolution					
Resolution		9 bits	10 bits	11 bits	12 bits
Bandwidth[7]	10 GSa/s	1 GHz	500 MHz	250 MHz	125 MHz
	5 GSa/s	500 MHz	250 MHz	125 MHz	62.5 MHz
	2.5 GSa/s	250 MHz	125 MHz	62.5 MHz	31.25 MHz

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Horizontal System--Analog Channel

Horizontal System--Analog Channel				
Range of Time Base		600 MHz	1 GHz	2 GHz
		500 ps/div to 1 ks/div	500 ps/div to 1 ks/div	200 ps/div to 1 ks/div
		Fine		
Time Base Resolution		2 ps		
Time Base Accuracy		±1 ppm ± 2 ppm/year		
Time Base Delay Range	Pre-trigger	≥1/2 of the screen width		
	after trigger	1 s to 100 div		
Time Interval (ΔT) Measurement		±(1 sample interval) ± (2 ppm x readout) ± 50 ps		
Inter-channel Offset Correction Range		±100 ns		
Horizontal Mode	YT	Default		
	XY	X = Channel 1, Y = Channel 2		
	SCAN	Time base ≥200 ms/div, available to enter or exit the SCAN mode		
	ROLL	Time base ≥200 ms/div, available to enter or exit the ROLL mode[6]		

Horizontal System--Digital Channel

Horizontal System--Digital Channel	
Min. Detectable Pulse Width	3.2 ns
Maximum Input Frequency	500 MHz (accurately copied as the sine wave of the maximum frequency of the logic square wave; input amplitude is the minimum swing; the shortest the ground cable is required for the logic probe)
Inter-channel Time Delay	1 ns (typical), 2 ns (maximum)

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Acquisition System

Acquisition System		
Max. Sample Rate of Analog Channel	10 GSa/s (single-channel), 5 GSa/s (half-channel[2]), 2.5 GSa/s (full-channel) **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 of Analog Channel	500 Mpts (single-channel), 250 Mpts (half-channel[2]), 125 Mpts (full-channel)	
Max. Sample Rate of Digital Channel	1.25 GSa/s (full-channel)	
Max. Memory Depth of Digital Channel	62.5 Mpts (full-channel)	
Acquisition Mode	Normal	Default
	Peak Detection	Captures 400 ps glitches
	Average Mode	2, 4, 8, 16...65536 are available for you to choose, averaging point by point
	High Resolution	9-12 bits

Trigger System

Trigger System		
Trigger Source		Analog channel (1~4), digital channel (D0~D15), EXT TRIG, AC Line
Trigger Mode		Auto, Normal, Single
Trigger Coupling	DC	DC coupling trigger
	AC	AC coupling trigger
	High Frequency Rejection	High frequency rejection, cut-off frequency~75 kHz (internal trigger only)
	Low Frequency Rejection	Low frequency rejection, cut-off frequency~75 kHz (internal trigger only)

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Trigger System		
Noise Rejection		Increases delay for the trigger circuit (internal trigger only), On/Off
Holdoff Range		8 ns to 10 s
Trigger Bandwidth	Internal Trigger	Analog Bandwidth
	External Trigger	200 MHz
Trigger Sensitivity	Internal Trigger	1.3 div, <10 mV/div 0.7 div, ≥10 mV/div When the noise rejection is enabled, the trigger sensitivity is reduced half.
	External Trigger	200 mVpp, DC to 100 MHz 500 mVpp, 100 MHz to 200 MHz
Trigger Level Range	Internal Trigger	± 5 div from the center of the screen
	External Trigger	±8 V
	AC Line	fixed 50%

Trigger Type

Trigger Type	
Zone Trigger	Triggers in the rectangle area drawn manually, supporting trigger zone A and trigger zone B. The trigger conditions can be "Intersect" or "Not intersect". Source channel: CH1~CH4; only one analog channel is triggered each time.
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
Edge	Triggers on the threshold of the specified edge of the input signal. The types can be Rising, Falling, or Either Source channel: CH1~CH4, D0~D15, EXT, or AC Line

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Trigger Type	
Pulse	Triggers on the positive or negative pulse with a specified width. The pulse width is greater or smaller than a certain value or within a certain time range. Source channel: CH1~CH4, D0~D15
Slope	Triggers on the positive or negative slope of the specified time. The slew time is greater or smaller than a certain value or within a certain time range (800 ps~10 s). Source channel: CH1~CH4
Video	Triggers on all lines, specified line, odd field, or even field that conforms to the video standards. The supported video standards include NTSC, PAL/SECAM, 480p/60Hz, 576p/50Hz, 720p/60Hz, 720p/50Hz, 720p/30Hz, 720p/25Hz, 720p/24Hz, 1080p/60Hz, 1080p/50Hz, 1080p/30Hz, 1080p/25Hz, 1080p/24Hz, 1080i/60Hz, and 1080i/50Hz Source channel: CH1~CH4
Pattern	Identifies a trigger condition by searching for a specified pattern. The pattern is a combination of multiple selected channel sources. The logic pattern of each channel is H, L, X, Rising, and Falling Source channel: CH1~CH4, D0~D15
Duration	Triggers when the specified pattern meets the specified duration condition. The pattern is a combination of multiple selected channel sources. The logic pattern of each channel is H, L, and X. The duration is greater or smaller than a certain value, or within a certain time range, or outside a certain time range. Source channel: CH1~CH4, D0~D15
Timeout	Triggers when duration of a certain event exceeds the specified time (200 ps~10 s). The event can be specified as Rising, Falling, or Either Source channel: CH1~CH4, D0~D15
Runt	Triggers when the pulses pass through one threshold but fail to pass through another threshold. The channel only supports analog channels Source channel: CH1~CH4
Window	Triggers in a specified window state when the rising edge of the signal crosses the upper threshold or the falling edge crosses the lower threshold. The window state can be Enter, Exit, or Time Source channel: CH1~CH4
Delay	Triggers when the time difference between the specified edges of Source A and Source B meets the preset time. Delay is greater or smaller than a certain value, or within a certain time range, or outside a certain time range. Source channel: CH1~CH4
Setup/Hold	When the setup time or hold time between the input clock signal and the data signal is smaller than the specified time (8 ns~10 s). Source channel: CH1~CH4

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Trigger Type	
Nth Edge	Triggers on the Nth edge that appears after the specified idle time. The edge can be specified as Rising or Falling Source channel: CH1~CH4, D0~D15
RS232/UART (Option)	MSO8000-COMP option Triggers on the Start, Error, Check Error, or Data frame of the RS232/UART bus (up to 20 Mb/s). Source channel: CH1~CH4, D0~D15
I2C (Option)	MSO8000-EMBD option Triggers on the Start, Stop, Restart, MissedACK, Address (7 bits, 8 bits, or 10 bits), Data, or Address Data of the I2C bus. Source channel: CH1~CH4, D0~D15
SPI (Option)	MSO8000-EMBD option Triggers on the specified pattern of the specified data width (4~32) of SPI bus. CS and Timeout are supported Source channel: CH1~CH4, D0~D15
CAN (Option)	MSO8000-AUTO option Triggers on the start of a frame, end of a frame, Remote ID, Overload, Frame ID, Frame Data, Data&ID, Frame Error, Bit Fill, Answer Error, Check Error, Format Error, and Random Error of the CAN signal (up to 5Mb/s). The supported CAN bus signal types include CAN_H, CAN_L, TX/RX, and DIFF. Source channel: CH1~CH4, D0~D15
FlexRay (Option)	MSO8000-FLEX option Triggers on the specified position (TSS End, FSS_BSS End, FES End, DTS End), frame (null, Sync, Start, All), symbol (CAS/MTS and WUS), error (Head CRC Err, Tail CRC Err, Decode Err, and Random Err) of the FlexRay signal (up to 10 Mb/s). Source channel: CH1~CH4, D0~D15
LIN (Option)	MSO8000-AUTO option Triggers on the Sync, ID, Data (length settable), Data&ID, Wakeup, Sleep, and Error frame of the LIN bus signal (up to 20 Mb/s). Source channel: CH1~CH4, D0~D15
I2S (Option)	MSO8000-AUDIO option Triggers on 2's complement data of audio left channel, right channel, or either channel (=, ≠, >, <, <>, ><). The available alignment modes include I2S, LJ, and RJ Source channel: CH1~CH4, D0~D15

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Trigger Type	
MIL-STD-1553 (Option)	MSO8000-AERO option Triggers on Sync (Data Sync, Cmd/Status Sync, and All Sync), Data, RTA, RTA +11Bit, and Error (Sync Error and Check Error) of the MIL-STD-1553 bus. Source channel: CH1~CH4

Search&Navigation

Search, Navigation, and Table	
Type	Edge, Pulse, Runt, Slope, RS232, I2C, and SPI
Source	Any analog channel
Copy	Copies the search settings to the trigger settings, and copies from the trigger settings
Result Display	Event table or navigation. Goes to the specific event through the event table index
Navigation	Memory playing: views the memory waveforms with the navigation keys by scrolling through stored waveform data, supporting viewing at three speeds.
	ZOOM playing: views the details of waveforms with the navigation keys by panning the ZOOM window automatically, supporting viewing at three speeds.
	Recording playback: plays back the recorded waveforms with the navigation keys.
	Event navigation: uses the navigation keys to scroll through the event search results.

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Waveform Measurement

Waveform Measurement		
Cursor	Number of Cursors	2 pairs of XY cursors
	Manual Mode	Voltage deviation between cursors (ΔY) Time deviation between cursors (ΔX) Reciprocal of ΔX (Hz) (1/ΔX)
	Track Mode	Fix Y-axis to track X-axis waveform point's voltage and time values Fix X-axis to track Y-axis waveform point's voltage and time values
	Auto Measurement	Allows to display cursors during auto measurement
	XY Mode	Measures the voltage parameters of the corresponding channel waveforms in XY time base mode. X = Channel 1, Y = Channel 2

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Waveform Measurement		
Auto Measurement	Number of Measurements	41 auto measurements; and up to 10 measurements can be displayed at a time.
	Measurement Source	CH1~CH4, Math1~Math4, D0~D15
	Measurement Mode	Normal and Precision (full-memory hardware measurement)
	Measurement Range	Main, Zoom, and Cursor
	All Measurement	Display 33 measurement items for the current measurement channel; the measurement results are updated continuously; you can switch the measurement channel.
	Vertical	Vmax, Vmin, Vpp, Vtop, Vbase, Vamp, Vupper, Vmid, Vlower, Vavg, VRMS, Per. VRMS, Overshoot, Preshoot, Area, Period Area, and Std Dev.
	Horizontal	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, and -Slew Rate
	Others	Delay(A↑-B↑), Delay(A↑-B↓), Delay(A↓-B↑), Delay(A↓-B↓), Phase(A↑-B↑), Phase(A↑-B↓), Phase(A↓-B↑), and Phase(A↓-B↓)
	Analysis	Frequency counter, DVM, power analysis (option), histogram, zone trigger, eye diagram (option), and jitter analysis (option)
	Statistics	Items: Current, Average, Max, Min, Standard Deviation, Count Statistical times settable

Waveform Calculation

Waveform Calculation	
No. of Math Functions	4, 4 math functions available to be displayed at one time
Operation	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

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Waveform Calculation		
Color Grade		Supports Math and FFT
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, determined by the user-defined threshold and offset threshold

Waveform Analysis

Waveform Analysis		
Waveform Recording		Stores the signal under test in segments according to the trigger events, i.g. saves all the sampled waveform data as a segment to the RAM for each trigger event. The maximum number of the sampled segments reaches 450,000.
	Source	All enabled analog channels and digital channels
	Analysis	Supports playing frame by frame or continuous playing; capable of calculating, measuring, and decoding the played waveforms
Pass/Fail Test		Compares the signal under test with the user-defined mask to provide the test results: the number of successful tests, failed tests, and the total number of tests. The pass/fail event can enable immediate stop, beeper, and the screenshot.
	Source	Any analog channel

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Waveform Analysis		
Histogram		The waveform histogram provides a group of data, showing the number of times a waveform hits within the defined region range on the screen. The waveform histogram not only shows the distribution of hits, but also the ordinary measurement statistics.
	Source	Any analog channel, eye diagram, auto measurement item, or jitter measurement
	Type	Horizontal, vertical, and measure
	Measure	Sum, Peaks, Max, Min, Pk_Pk, Mean, Median, Mode, Bin width, Sigma, and XScale
	Mode	Supports all modes, except the Zoom, XY, and ROLL modes
Color Grade		Provides a dimensional view for color grade waveforms
	Source	Any analog channel
	Color Theme	Temperature and Intensity
	Mode	Supports all modes
Real-time Eye Diagram (JITTER Option)		Makes measurements for the clock or data signal over time, analyze the variance of the technical specifications.
	Source	Any analog channel
	Clock Recovery	Constant clock, first-order PLL, second-order PLL, and explicit clock
	Type	Fully automatic, semi automatic, and manual
	Eye Measurement Item	one level, zero level, eye height, eye width, eye amplitude, crossing percentage, Q Factor

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Waveform Analysis		
Jitter Analysis (JITTER option)		Makes measurements for the clock or data signal over time, analyze the variance of the technical specifications.
	Source	Any analog channel
	Clock Recovery	Constant clock, first-order PLL, second-order PLL, and explicit clock
	Type	Fully automatic, semi automatic, and manual
	Jitter Measurement	TIE, Cycle to Cycle, +Width to +Width, and –Width to -Width
	Measurement Display	Meas trend, meas histogram

Serial Decoding

Serial Decoding	
Number of Decodings	4, four protocol types can be decoded and enabled at the same time
Decoding Type	Standard: Parallel Option: RS232/UART, I2C, SPI, LIN, CAN, CAN-FD, FlexRay, I2S, and MIL-STD-1553
Parallel	Up to 20 bits of Parallel decoding, supporting the combination of any analog channel and digital channel. Supports user-defined clock and auto clock settings. Source channel: CH1~CH4, D0~D15
RS232/UART	MSO8000-COMP option Decodes the RS232/UART (up to 20 Mb/s) bus's TX/RX data (5-9 bits), parity (Odd, Even, or None), and stop bits (1-2 bits). Source channel: CH1~CH4, D0~D15
I2C	MSO8000-EMBD option Decodes the address (with or without the R/W bit), data, and ACK of the I2C bus. Source channel: CH1~CH4, D0~D15

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Serial Decoding	
SPI	MSO8000-EMBD option Decodes the MISO/MOSI data (4-32 bits) of the SPI bus. CS and Timeout are supported Source channel: CH1~CH4, D0~D15
LIN	MSO8000-AUTO option Decodes the protocol version (1.X or 2.X) of the LIN bus (up to 20 Mb/s). The decoding displays sync, ID, data, and check sum. Source channel: CH1~CH4, D0~D15
CAN	MSO8000-AUTO option Decodes the remote frame (ID, byte number, CRC), overload frame, and data frame (standard/extended ID, control domain, data domain, CRC, and ACK) of the CAN bus (up to 5 Mb/s). The supported CAN bus signal types include CAN_H, CAN_L, TX/RX, and DIFF. Supports 10 Mb/s CAN-FD baud. Source channel: CH1~CH4, D0~D15
FlexRay	MSO8000-FLEX option Decodes the frame ID, PL (payload), Header CRC, Cycle Count, Data, Tail CRC, and DTS of the FlexRay bus (up to 10 Mb/s). The supported signal types include BP, BM, and RX/TX. Source channel: CH1~CH4, D0~D15
I2S	MSO8000-AUDIO option Decodes I2S audio bus left channel data and right channel data, supporting 4-32 bits. The available alignment modes include I2S, and and RJ Source channel: CH1~CH4, D0~D15
MIL-STD-1553	MSO8000-AERO option Decodes the MIL-STD-1553 bus signal's data word, command word, and status word (address+last 11 bits). Source channel: CH1~CH4

Auto

Auto	
AutoScale	Min voltage greater than 10 mVpp, duty cycle 1%, frequency over 35 Hz

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Arbitrary Waveform Generator

Arbitrary Waveform Generator (technical specifications are typical values) (option)		
Number of Channels	2	
Output Mode	Normal (2-channel output)	
Sample Rate	200 MSa/s	
Vertical Resolution	14 bits	
Max. Frequency	25 MHz	
Standard Waveform	Sine, Square, Ramp, Pulse, DC, Noise	
Built-in Waveform	Sinc, Exp.Rise, Exp.Fall, ECG, Gauss, Lorentz, Haversine	
Sine	Frequency Range	100 mHz to 25 MHz
	Flatness	±0.5 dB (relative to 1 kHz)
	Harmonic Distortion	-40 dBc
	Spurious (non-harmonics)	-40 dBc
	Total Harmonic Distortion	1%
	S/N Ratio	40 dB

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Arbitrary Waveform Generator (technical specifications are typical values) (option)		
Square/Pulse	Frequency Range	Square: 100 mHz to 15 MHz
		Pulse: 100 mHz to 1 MHz
	Rise/Fall Time	<15 ns
	Overshoot	<20%
	Duty	Square: always be 50%
		Pulse: 2%~ 98%, adjustable
	Duty Cycle Resolution	1% or 10 ns (whichever is greater)
	Min. Pulse Width	20 ns
	Pulse Width Resolution	5 ns
	Jitter	5 ns
Ramp	Frequency Range	100 mHz to 100 kHz
	Linearity	1%
	Symmetry	1% to 100%
Noise	Bandwidth	>25 MHz
Built-in Waveform	Frequency Range	100 mHz to 1 MHz
Arbitrary Waveform	Frequency Range	100 mHz to 10 MHz
	Waveform Length	2 to 16 kpts
	Supports loading channel waveforms and stored waveforms	
Frequency	Accuracy	100 ppm (<10 kHz), 50 ppm (>10 kHz)
	Resolution	100 mHz or 4 bits (whichever is greater)
Amplitude	Output Range	20 mVpp~5 Vpp (HighZ), 10 mVpp~2.5 Vpp (50 Ω)
	Resolution	100 uV or 3 bits (whichever is greater)
	Accuracy	±(2% of setting + 1 mV) (Frequency=1 kHz)

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Arbitrary Waveform Generator (technical specifications are typical values) (option)		
DC Offset	Range	±2.5 V (HighZ), ±1.25 V (50 Ω)
	Resolution	100 uV or 3 bits (whichever is greater)
	Accuracy	±(2% of offset setting+5 mV+0.5% of amplitude)
Modulation	AM	Modulating Waveforms: Sine, Square, Triangle, and Noise.
		Modulation Frequency: 1 Hz to 50 kHz
		Modulation Depth: 0% to 120%
	FM	Modulating Waveforms: Sine, Square, Triangle, and Noise.
		Modulation Frequency: 1 Hz to 50 kHz
		Modulation Offset: 1 Hz to carrier frequency
	FSK	Modulating Waveforms: 50% duty cycle square
		Modulation Frequency: 1 Hz to 50 kHz
		Hopping Frequency: 100 mHz to max. carrier frequency
Sweep	Linear, Log, and Step	
	Sweep Time	1 ms to 500 s
	Start Frequency and End Frequency	Any frequencies within the waveform range
Burst	N Cycle, Infinite	
	Cycle Count	1 to 1000000
	Burst Period	1 us to 500 s
	Burst Delay	0 s to 500 s
	Trigger Source	Internal, Manual

Digital Voltmeter

Digital Voltmeter (technical specifications are typical values)	
Source	Any analog channel
Function	DC, AC+DC_{RMS}, AC_{RMS}
Resolution	ACV/DCV: 3 bits
Limits Beeper	Sounds an alarm when the voltage value is within or outside of the limit range.
Range Measurement	Displays the latest measurement results in the diagram, and displays the extremities for the first 3 seconds

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High-Precision Frequency Counter

High-Precision Frequency Counter		
Source		Any analog channel, digital channel, and EXT
Measure		Frequency, period, totalizer
Counter	Resolution	Max. 6 bits, user-defined
	Max. Frequency	Max. analog bandwidth or 2.5 GHz (whichever is less)
Totalizer		48-bit totalizer
	Edge	Counts the number of the rising edges
Time Reference		Internal reference

Customization for Quick Key

Customization for Quick Key	
Quick Screenshot	Quickly saves the screen image to the specified path based on the current image storage menu settings.
Quick Waveform Save	Quickly saves the screen or memory waveforms to the specified path based on the current waveform storage menu settings.
Quick Save Settings	Quickly saves the setup file to the specified path based on the current setup storage menu settings.
Quick All Measurement	Displays all the prompt message windows for all the measurement of the waveforms.
Quick Reset of Statistics	Quickly resets all the measurement statistics data and measurement counts.
	Quickly resets all the statistics information in PassFail function
Quick Waveform Recording	Quickly starts or stops the waveform recording
Quickly Email Sending	Quickly sends the email based on the set email address.
Quick Print	Quickly performs the print operation based on the current printer settings.
Quick Group Saving	Quickly performs the group saving operation based on the currently selected item for saving

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Command Set

Command Set	
Common Commands Support	IEEE488.2 Standard
Error Message Definition	Error messages
Support Status Report Mechanism	Status reporting
Support Syn Mechanism	Synchronization

Display

Display	
LCD	10.1-inch capacitive multi-touch screen/gesture enabled operation
Resolution	1024×600 (Screen Region)
Graticule	(10 horizontal divisions) x (8 vertical divisions)
Persistence	Off, Infinite, variable persistence (100 ms to 10 s)
Brightness	256 intensity levels (LCD, HDMI)

I/O

I/O	
USB 2.0 Hi-speed Host Port	4 (3 on the front panel and 1 on the rear panel)
USB 2.0 Hi-speed Device Port	1 on the rear panel, compatible with USB Test and Measurement Class (USBTMC)
LAN	1 on the rear panel, 10/100/1000-port, supporting LXI-C
GPIB Interface	GPIB-USB adapter (option)
Web Remote Control	Supports Web Control interface (input the IP address of the oscilloscope into the Web browser to display the operation interface of the oscilloscope)

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I/O		
AUX Out		BNC output on the rear panel. Vo (H)≥2.5 V open circuit, ≥1.0 V 50 Ω to GND Vo (L)≤0.7 V to load ≤4 mA, ≤0.25 V 50 Ω to GND
	Trigger Output	Outputs a pulse signal when the oscilloscope is triggered
	Pass/Fail	Outputs a pulse signal when a pass/fail event occurs. Supports user-defined pulse polarity and pulse time (100 ns to 10 ms)
10 M In/Out		1, BNC connector on the rear panel
	Support Mode	Output/input off; output on (10 MHz output); input on (10 MHz input)
	Input Mode	50 Ω, with the amplitude 130 mVpp to 4.1 Vpp (-10 dBm, 20 dBm), the input accuracy 10 MHz ± 10 ppm
	Output Mode	50 Ω, 1.5 Vpp sine waveform
HDMI Video Output		1 on the rear panel, HDMI 1.4b, A plug. Used to connect to an external monitor or projector
Probe Compensation Output		Freq 1 kHz, 3 Vpp square waveform

Power

Power	
Power Voltage	100 V-240 V, 45 Hz-440 Hz
Power	Max. 200 W (connect to various interfaces, USB, active probes)
Fuse	3.15 A, T degree, 250 V

Environment

Environment		
Temperature Range	Operating	0℃~+50℃
	Non-operating	-30℃~+70℃

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Environment		
Humidity Range	Operating	below +30℃: ≤90% RH (without condensation)
		+30℃ to +40℃, ≤75% RH (without condensation)
		+40℃ to +50℃, ≤45% RH (without condensation)
	Non-operating	below 65℃: ≤90% RH (without condensation)
Altitude	Operating	below 3,000 meters
	Non-operating	below 15,000 meters

Warranty and Calibration Interval

Warranty and Calibration Interval	
Warranty	Three years for the mainframe, excluding the probes and accessories.
Recommended Calibration Interval	18 months

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Regulations

Regulations		
Electromagnetic Compatibility	Compliant with EMC DIRECTIVE 2014/30/EU, compliant with or higher than the standards specified in IEC 61326-1:2013/EN 61326-1:2013 Group 1 Class A	
	CISPR 11/EN 55011	
	IEC 61000-4-2:2008/EN 61000-4-2	±4.0 kV (contact discharge), ±8.0 kV (air discharge)
	IEC 61000-4-3:2002/EN 61000-4-3	3 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 2 GHz); 1 V/m (2.0 GHz to 2.7 GHz)
	IEC 61000-4-4:2004/EN 61000-4-4	1 kV power line
	IEC 61000-4-5:2001/EN 61000-4-5	0.5 kV (phase-to-neutral voltage); 1 kV (phase-to-earth voltage); 1 kV (neutral-to-earth voltage)
	IEC 61000-4-6:2003/EN 61000-4-6	3 V, 0.15-80 MHz
	IEC 61000-4-11:2004/EN 61000-4-11	Voltage dip: 0% UT during half cycle; 0% UT during 1 cycle ; 70% UT during 25 cycles short interruption: 0% UT during 250 cycles
Safety	EN 61010-1:2019 EN 61010-031:2015 IEC 61010-1:2016 IEC 61010-2-030:2017 UL 61010-1:2012 R7 UL 61010-2-31:2017 R2 CAN/CSA-22.2 No. 61010-1-12:2017 CAN/CSA-22.2 No. 61010-2-30:2018 CAN/CSA-22.2 No. 61010-031-07:201	
Vibration	Meets GB/T 6587; class 2 random Meets MIL-PRF-28800F and IEC60068-2-6; class 3 random	

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Regulations	
Shock	Meets GB/T 6587-2012; class 2 random Meets MIL-PRF-28800F and IEC 60068-2-27; class 3 random In non-operating conditions: 30 g, half-sine wave, 11 ms duration, 3 shocks along the main axis, total of 18 shocks

Mechanical Characteristics

Mechanical Characteristics	
Dimensions[8]	410 mm (W) x 224 mm (H) x 135 mm (D)
Rack Mount Kit	6U
Weight[9]	Package excluded: <4.0 kg
	Package included: <9.2 kg

Non-volatile Memory

Non-volatile Memory		
Data/File Storage	Setup/Image	setup (*.stp), image (*.png, *.bmp, *.tif, *.jpg)
	Waveform Data	CSV waveform data (*.csv), binary waveform data (*.bin, *.wfm), list data (*.csv), reference waveform data (*.ref, *.csv, *.bin), and arbitrary waveform data (*.arb)
Reference Waveform		Displays 10 internal waveforms, and its storage is limited by the capacity
Setting		Storage is limited by the capacity
USB Capacity		Supports the USB storage device that conforms to the industry standard

NOTE:

[1]: 2 GHz bandwidth is only applicable to single-channel or half-channel mode.

[2]: Half-channel mode: CH1 and CH2 are considered as a group; CH3 and CH4 are considered as another group. Each group share the sample rate of 5 GSa/s, and either one of the channels in each group is enabled.

[3]: The max. bandwidth for different models under the max. sample rate of the analog channel is shown in the following table.

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Model		MSO8064	MSO8104	MSO8204
Bandwidth	Single-channel	600 MHz	1 GHz	2 GHz
	half-channel	600 MHz	1 GHz	2 GHz
	Full-channel	600 MHz	1 GHz	1 GHz

[4]: Maximum value. Single-channel, 10 ns horizontal time base, set a sine wave signal with Auto memory depth, 4 div input amplitude, 10 MHz frequency. Others are default settings.

[5]: 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.

[6]: You need to press 

> **More** > **Auto ROLL** to enable the ROLL mode.

[7]: The bandwidth changes with the time base scale and channel mode. The bandwidth listed in this manual is the maximum approximate bandwidth in different modes.

[8]: Supporting legs and handle folded, knob height included, front protective cover excluded.

[9]: MSO8000 model, standard configuration.

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Order Information and Warranty Period

Order Information

Order Information	Order No.
Model	
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
Passive HighZ Probe x4 (500 MHz)	RP3500A
Passive Low-impedance Probe x2 (1.5 GHz, only for the MSO8204/ MSO8104)	RP6150A
Front Protective Cover	MSO8000-FPC
Power Cord Conforming to the Standard of the Destination Country	-
Recommended Accessories	
16-channel Logic Analyzer Probe	RPL2316
Active Single-ended/Differential Probe (2.5 GHz BW)	PVA7250
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
Near-field Probe	NFP-3
Power Analysis Phase Deviation Correction Jig	RPA246
Digital Oscilloscope Demonstration Plate	DK-DS6000
USB-GPIB Adaptor	USB-GPIB
Bandwidth Upgrade Option	
Bandwidth Upgrades from 600 MHz to 1 GHz	MSO8000-BW6T10
Bandwidth Upgrades from 600 GHz 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

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Order Information	Order No.
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, CAN-FD, LIN)	MSO8000-AUTO
FlexRay Serial Bus Trigger and Analysis (FlexRay)	MSO8000-FLEX
Audio Serial Bus Trigger and Analysis (I2S)	MSO8000-AUDIO
MIL-STD-1553 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

NOTE:

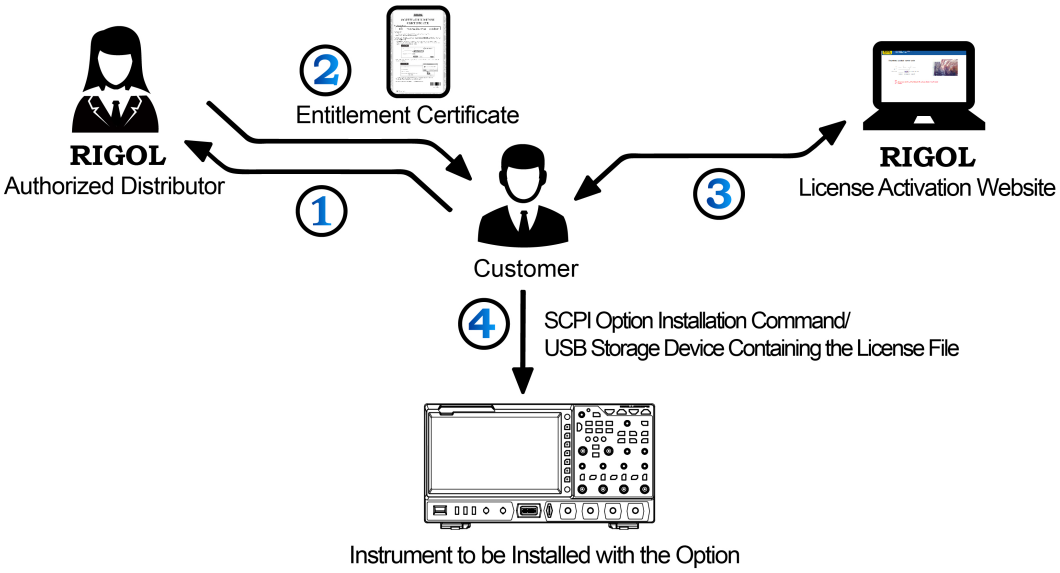
For all the accessories and options, please contact the local office of RIGOL.

Warranty Period

Three years for the mainframe, excluding the probes and accessories.

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Option Ordering and Installation Process



1. According to the usage requirements, please purchase the specified function options from **RIGOL Sales Personnel**, and provide the serial number of the instrument that needs to install the option.
2. After receiving the option order, the **RIGOL** factory will mail the paper software product entitlement certificate to the address provided in the order.
3. Log in to **RIGOL** official website for registration. Use the software key and instruments serial number provided in the entitlement certificate to obtain the option license code and the option license file.
4. Download the option license file to the root directory of the USB storage device, and connect the USB storage device to the instrument properly. After the USB storage device is successfully recognized, the **Option install** menu is activated. Press this menu key to start installing the option.

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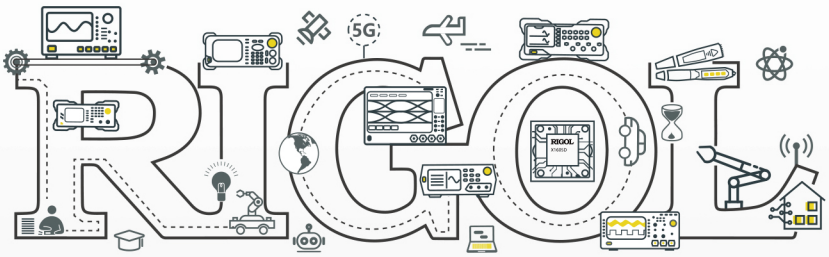




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