RIGOL

MHO900 Series

Digital Oscilloscope

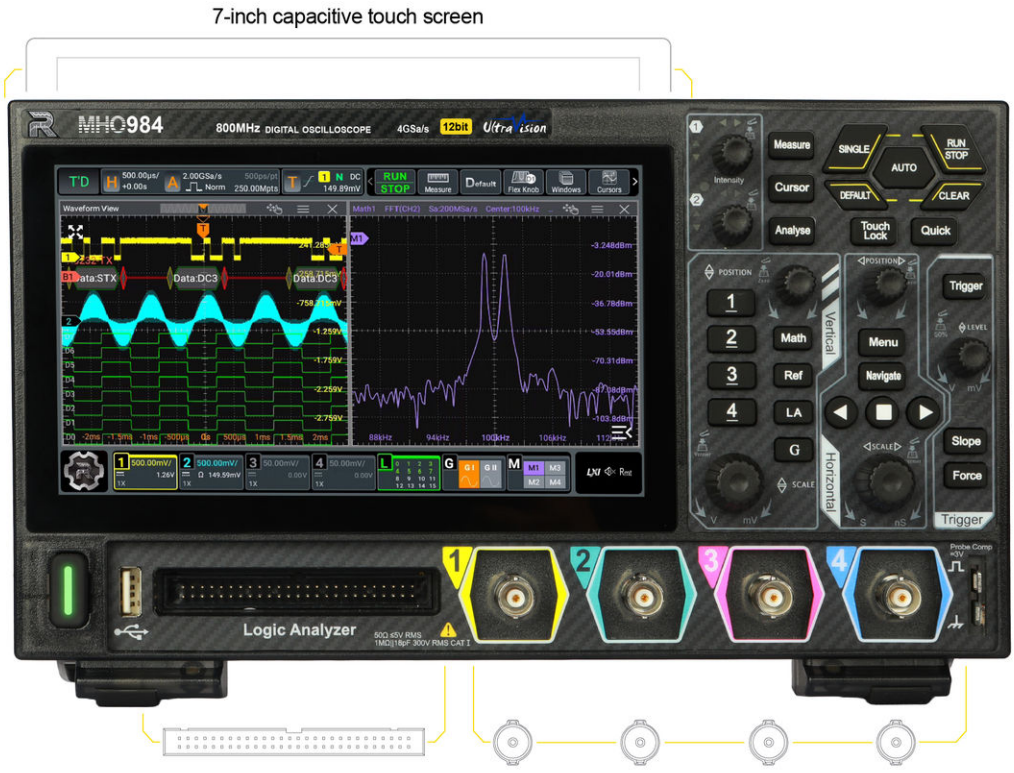
Data Sheet

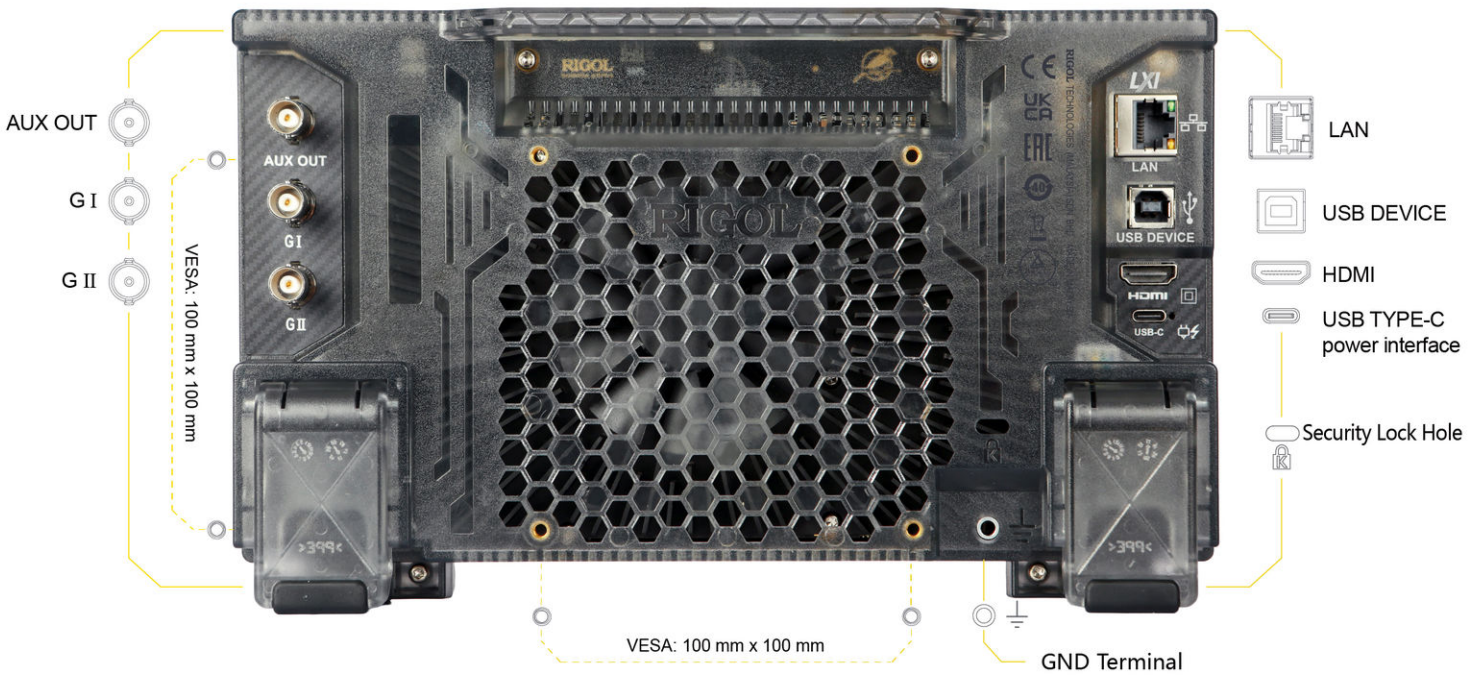
DSA46102-1110

Sept. 2025

MHO900 Series
Digital Oscilloscope

Exquisite Appearance, Abundant Functions





265.35 mm (W) × 161.75 mm (H) ×77.38 mm (D)

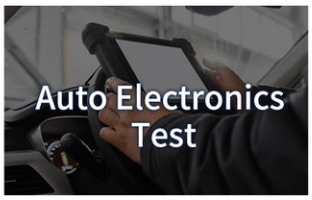
Application



- Loop Response Analysis
- Ripple and Noise Test
- Transient Response Test



- Serial Protocol Analysis
- Digital Signal Analysis



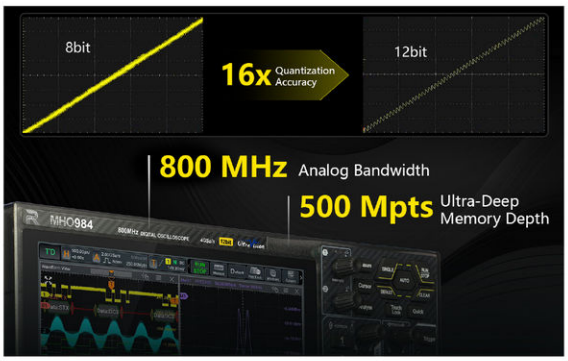
- Automobile Bus Debugging
- Sensor Test



- Analog Circuit Experiment
- High-Frequency Circuit Experiment
- Power and Electronics Experiment

High Performance Rebuilds the Entry-Level Standard

- 800 MHz BW & 4 GSa/s sample rate enable you to address the high-speed signal acquisition challenge.
- 12-bit high-precision ADC, 4096 vertical digitalizing levels, not missing any weak signals.
- Max. 500 Mpts memory depth enables you to record high-speed and complex events, giving you full insight into the full details of high-speed signals.
- Various protocol decodings



N-in-one Integrated Efficient Test Tool

- Standard 16 digital channels allows you to capture and analyze the digital signals together with the analog signals.
- Optional 2-channel, 100 MHz AFG option can output up to 100 MHz pure sine wave, with Bode plot supported for signal analysis.



Product Features

Product Features

- 12-bit resolution
- Max. 800 MHz analog bandwidth, 4 analog channels
- 16 digital channels, 200 MHz PLA2216 logic analyzer probe (opt.)
- Real-time sample rate: up to 4 GSa/s
- Max. memory depth of 500 Mpts (option)
- Vertical sensitivity 200 μV/div to 10 V/div
- Max. waveform capture rate: 1,000,000 wfms/s[1]
- Digital phosphor display with real-time 256-level intensity grading
- Optional 2-channel, 50 MHz/100 MHz Function/Arbitrary Waveform Generator (Bode plot supported)
- Supports histogram, digital signal analysis, etc.
- Supports waveform search and navigation function, capable of debugging the signal anomalies faster
- 7" (1024x600) HD touch screen
- Flex knob brings user-friendly experience
- Standard USB2.0 Device & Host, LAN (100M), and HDMI interfaces
- Novel and delicate industrial design, easy to operate
- Supports online upgrade of software version

MHO900 series is RIGOL's new launched economical oscilloscope. Compact in size, it features 1,000,000 wfms/s[1] capture rate, max. memory depth of 500 Mpts (option), 12-bit high resolution and low noise.

The product supports 16 digital channels. One instrument can make an analysis on both the analog and digital signals to meet the embedded design and test scenarios. With an affordable price equivalent to purchasing an entry-level instrument, you can access the auto serial and parallel bus analysis, bode plot analysis, and other functions to meet the test demands in the R&D, education, and scientific research fields.

NOTE:

[1]: Single-channel mode, recording mode, 20 ns/div, 1 kpts memory depth (or Auto memory depth).

RIGOL Probes and Accessories Supported

Model	Type	Description
Passive Probe		
 PVP2150	Passive 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	Passive 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
 PVP3150	Passive High-impedance Probe	• Attenuation Ratio: 10:1/1:1 • 1X BW: DC to 20 MHz • 10X BW: DC to 150 MHz • Compatibility: All models of RIGOL's digital oscilloscopes
 RP3500A	Passive Probe	• Attenuation Ratio: 10:1 • BW: DC to 500 MHz • Compatibility: MSO/DS7000, MSO8000/A, DHO4000/1000, MHO/DHO5000, MHO2000, DS70000/80000, MHO98, and MHO900 series
High-voltage Single-ended Probe		
 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

Model	Type	Description
 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
 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
High-voltage Differential Probe		
 PHA0150	High-voltage Differential Probe	• BW: DC to 70 MHz • Max. voltage ≤ 1500 Vpp • Compatibility: All models of RIGOL's digital oscilloscopes
 PHA1150	High-voltage Differential Probe	• BW: DC to 100 MHz • Max. voltage ≤ 1500 Vpp • Compatibility: All models of RIGOL's digital oscilloscopes
 PHA2150	High-voltage Differential Probe	• 50X BW: DC to 160 MHz • 500X BW: DC to 200 MHz • Max. voltage ≤ 1500 Vpp • Compatibility: All models of RIGOL's digital oscilloscopes
 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

Model	Type	Description
 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
Current Probe		
 RP1001C	Current Probe	• BW: DC to 300 kHz • Maximum Input DC: ±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 DC: ±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.
 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.

Model	Type	Description
 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.
 RP1006C	Current Probe	• BW: DC to 2 MHz • Maximum Input AC P-P: 700 A peaks, non-continuous AC RMS: 500 A • Compatibility: All models of RIGOL's digital oscilloscopes • Required to order RP1000P power supply.
 RP1000P	4-CH Power Supply	Power supply for RP1003C, RP1004C, RP1005C, and RP1006C; supporting 4 channels.
Logic Analyzer Probe		
 PLA2216	Logic Analyzer Probe	MSO5000, DHO900, MHO900 series, MHO98 dedicated logic analyzer probe.

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. All the specifications are measured when the oscilloscope is grounded properly.

Overview of the MHO900 Technical Specifications

Technical Specifications

Model	MHO984	MHO954	MHO934
Max. Analog Bandwidth (50 Ω, -3 dB)	800 MHz (single-channel[1] & half-channel[2]) 400 MHz (all-channel[3])	500 MHz (single-channel[1] & half-channel[2]) 400 MHz (all-channel[3])	350 MHz (for any number of channels)
Max. Analog Bandwidth (1 MΩ, -3 dB)	500 MHz (single-channel[1] & half-channel[2]) 400 MHz (all-channel[3])	500 MHz (single-channel[1] & half-channel[2]) 400 MHz (all-channel[3])	350 MHz (for any number of channels)
Calculated Rising Time under 50 Ω (10%-90%, typical)	437 ps	700 ps	1 ns
No. of Analog Channels	4		
Function/Arbitrary Waveform Generator (AFG)[4]	2-Channel, 100 MHz, 1 GSa/s (Opt.) 2-Channel, 50 MHz, 1 GSa/s (Opt.)		
Bode Plot[5]	Sweep Range: 10 Hz to 30 MHz		

General Specifications

Specification	Specification
Sampling Mode	Real-time Sampling
Max. Real-time Sample Rate	4 GSa/s (single-channel[1]) 2 GSa/s (half-channel[2]) 1 GSa/s (all-channel[3])

Specification	Specification
Max. Memory Depth	Standard: 100 Mpts (single-channel[1]); 50 Mpts (half-channel[2]); 25 Mpts (all-channel[3]) Optional: with 500 Mpts memory depth option installed, 500 Mpts (single-channel[1]); 250 Mpts (half-channel[2]); 125 Mpts (all-channel[3])
Input Impedance	50 Ω ± 1%, 1 MΩ ± 1%
Max. Waveform Capture Rate	30,000 wfms/s (in Vector mode) 1,000,000 wfms/s[6] (in fast recording mode)
Vertical Resolution	12-bit (4,096 digitalizing levels)
Hardware Real-time Waveform Recording and Playing	Max. 500,000 frames
Peak Detection	Captures 500 ps glitches
LCD Size and Type	7-inch multi-touch screen, gesture enabled operation
Display Resolution	1024*600 (16:9)
Communication Interface	HDMI, LAN (100M), USB2.0 Host&Device
Programming Standard	Supports standard SCPI instruction sets
Digital Phosphor Display	256-level intensity grading

Vertical System Analog Channel

Vertical System Analog Channel	
Input Coupling	DC, AC, or GND
Input Impedance	1 MΩ ± 1% 50 Ω ± 1%
Input Capacitance	18 pF ± 3 pF
Probe Attenuation Coefficient	0.001X, 0.002X, 0.001X, 0.002X, 0.005X, 0.01X, 0.02X, 0.05X, 0.1X, 0.2X, 0.5X, 1X, 2X, 5X, 10X, 15X, 20X, 50X, 100X, 150X, 200X, 500X, 1000X, 1500X, 2000X, 5000X, 10000X, 15000X, 20000X, 50000X; user-defined

Vertical System Analog Channel		
Maximum Input Voltage		1 MΩ: CAT I 300 V_{rms}, 400 V_{pk} (DC + V_{peak}) 50 Ω: 5 V_{rms}
	Remarks	Whether the probe is used, the 50 Ω or 1 MΩ route does not allow transient overvoltage to occur. Please use the instrument dedicated for the specified measurement category (not applicable to CAT II, III, and IV)
Vertical Resolution		12-bit (up to 16-bit in high resolution mode)
Effective Number of Bits (ENOB) (typical)[7]		MHO984: 8 MHO954: 8.1 MHO934: 8.5
Vertical Sensitivity Range[8]		50 Ω: 200 μV/div to 1 V/div 1 MΩ: 1 mV/div to 10 V/div
Offset Range		1 MΩ: ±1 V (≥1 mV/div, ≤65 mV/div) ±10 V (>65 mV/div, ≤274 mV/div) ±20 V (>274 mV/div, ≤2.79 V/div) ±100 V (>2.79 V/div, ≤10 V/div) 50 Ω: ±1 V (≥ 1 mV/div, ≤136 mV/div) ±4 V (>136 mV/div)
Dynamic Range		±4 div
Bandwidth Limit (Typical)		20 MHz, 250 MHz, FULL
DC Gain Accuracy[8]		±1% (≥5 mV/div) ±2% (<5 mV/div)
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 (DC to full bandwidth)
ESD Tolerance		±8 kV

Vertical System Digital Channel

Vertical System Digital Channel	
Number of Channels	16 input channels (D0 to D15) (D0 to D7, D8 to D15)
Threshold Range	±15.0 V, in 10 mV step
Threshold Accuracy	±(100.00 mV + 3% of threshold setting)
Threshold Selection	User (adjustable threshold for 8 channels in a group)
Max. Input Voltage	± 40 V peak 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-bit

Noise Floor

Noise Floor at 50 Ω (800 MHz BW)	
200 µV/div (20 MHz BW Limit)	66 μV_{rms}
500 µV/div (250 MHz BW Limit)	74.4 μV_{rms}
1 mV/div	139.2 μV_{rms}
2 mV/div	136.8 μV_{rms}
5 mV/div	145.2 μV_{rms}
10 mV/div	406.8 μV_{rms}
20 mV/div	465.6 μV_{rms}
50 mV/div	694.8 μV_{rms}
100 mV/div	1152 μV_{rms}
200 mV/div	4.92 mV_{rms}

Noise Floor at 50 Ω (800 MHz BW)	
500 mV/div	7.2 mV_{rms}
1 V/div	11.52 mV_{rms}

Noise Floor at 1 MΩ (500 MHz BW)	
1 mV/div	130.8 μV_{rms}
2 mV/div	127.2 μV_{rms}
5 mV/div	160 μV_{rms}
10 mV/div	270 μV_{rms}
20 mV/div	331.2 μV_{rms}
50 mV/div	614.4 μV_{rms}
100 mV/div	3 mV_{rms}
200 mV/div	3.6 mV_{rms}
500 mV/div	12.84 mV_{rms}
1 V/div	16.08 mV_{rms}
2 V/div	24.36 mV_{rms}
5 V/div	117.84 mV_{rms}
10 V/div	156.36 mV_{rms}

Horizontal System--Analog Channel

Horizontal System--Analog Channel	
Range of Time Base	500 ps/div to 500 s/div
	Fine adjustment supported
Time Base Resolution	100 ps
Time Base Accuracy	±1.5 ppm ± 1 ppm/year

Horizontal System--Analog Channel		
Time Base Delay Range	Pre-trigger	-5 div
	Post-trigger	1 s or 100 div, whichever is greater
Delta Time Accuracy		±(Time Base Accuracy x Readout) ± (0.001 x Screen Width) ± 20 ps
Channel-to-Channel Skew Correction		Channel-to-Channel Skew Correction Range ±100 ns, Accuracy ± 1 ps
Analog Channel-to-Channel Delay (Typical)[9]		≤200 ps
Horizontal Mode	YT	Default
	XY	Channel 1/2/3/4
	SCAN	Time base ≥ 200 ms/div
	ROLL	Time base ≥50 ms/div, available to enter or exit the ROLL mode by rotating the Horizontal SCALE knob

Horizontal System--Digital Channel

Horizontal System--Digital Channel	
Min. Detectable Pulse Width	5 ns
Maximum Input Frequency	200 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)
Channel-to-Channel Skew (Typical)[10]	±5 ns

Acquisition System

Acquisition System	
Max. Sample Rate of Analog Channel	4 GSa/s (single-channel[1]), 2 GSa/s (half-channel[2]), 1 GSa/s (all-channel[3])

Acquisition System		
Max. Memory Depth of Analog Channel	Standard: 100 Mpts (single-channel[1]); 50 Mpts (half-channel[2]); 25 Mpts (all-channel[3]) Optional: with 500 Mpts memory depth option installed, 500 Mpts (single-channel[1]); 250 Mpts (half-channel[2]); 125 Mpts (all-channel[3])	
Acquisition Mode	Normal	Default
	Peak Detection	Captures 500 ps glitches
	Average Mode	2, 4, 8, 16...65536 are available for you to choose
	High Resolution	14-bit, 16-bit

Trigger System

Trigger System		
Trigger Source		Analog channels (CH1-CH4), digital channels (D0-D15)
Trigger Mode		Auto, Normal, Single
Trigger Coupling	DC	DC coupling trigger
	AC	AC coupling trigger
	High Frequency Rejection	Cut-off frequency to 200 kHz ± 20% (internal trigger only)
	Low Frequency Rejection	Cut-off frequency to 180 kHz ± 20% (internal trigger only)
Noise Reject		Increases delay for the trigger circuit (internal trigger only), On/Off
Holdoff Range		8 ns to 10 s
Trigger Bandwidth		Internal trigger: analog bandwidth of the oscilloscope
Trigger Sensitivity		Internal trigger: 0.5 div, ≥50 mV/div; 0.7 div (with noise rejection enabled)

Trigger System	
Trigger Level Range	Internal trigger: ± 4 div from the center of the screen

Trigger Type

Trigger Type	
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, Nth Edge trigger, RS232, I2C, SPI, CAN, LIN Option: FlexRay, I2S, and MIL-STD-1553
Edge	Triggers on the threshold of the specified edge of the input signal. The edge types can be Rising, Falling, or Either. Source channel: CH1 to CH4, D0 to D15[11]
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 to CH4, D0 to D15[11]
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. Source channel: CH1 to 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 to 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, or Falling. Source channel: CH1 to CH4, D0 to D15[11]
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 to CH4, D0 to D15[11]
Timeout	Triggers when duration of a certain event exceeds the specified time. The event can be specified as Rising, Falling, or Either. Source channel: CH1 to CH4, D0 to D15[11]

Trigger Type	
Runt	Triggers when the pulses pass through one threshold but fail to pass through another threshold. Source channel: CH1 to 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 to CH4
Delay	Triggers when the time difference between the specified edges of Source A and Source B meets the preset time. 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 to CH4, D0 to D15[11]
Setup/Hold	When the setup time or hold time between the input clock signal and the data signal is smaller than the specified time. Source channel: CH1 to CH4, D0 to D15[11]
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 to CH4, D0 to D15[11]
RS232/UART	Triggers on the Start, Error, Check Error, or Data frame of the RS232/UART bus (up to 20 Mb/s). Source channel: CH1 to CH4, D0 to D15[11]
I2C	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 to CH4, D0 to D15[11]
SPI	Triggers on the specified pattern of the specified data width (4~32) of SPI bus. CS and Timeout are supported. Source channel: CH1 to CH4, D0 to D15[11]
CAN	Triggers on the start of a frame, end of a frame, Remote ID, Overload, Frame ID, Frame Data, Data&ID, Frame Error, Answer Error, Check Error, Format Error, Bit Fill, and Random 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 to CH4, D0 to D15[11]
LIN	Triggers on the Sync, ID, Data (length settable), Data&ID, Wakeup, Sleep, and Error of the LIN bus signal (up to 20 Mb/s). Source channel: CH1 to CH4, D0 to D15[11]

Trigger Type	
FlexRay (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 to CH4, D0 to D15[11]
I2S (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 to CH4, D0 to D15[11]
MIL-STD-1553B (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-1553B bus. Source channel: CH1 to CH4, D0 to D15[11]

Search & Navigation

Search & Navigation	
Type	Edge, Pulse
Source	Analog channel
Copy	Copies the search settings from or to the trigger settings mutually, including threshold setting and search condition settings
Save	Saves the search event to the internal or external memory
Navigation	Time navigation: navigates to the acquired waveforms in time order.
	Event navigation: uses the navigation keys to scroll through the event search results and navigates to the specified event.

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

Waveform Measurement		
Auto Measurement	Number of Measurements	41 auto measurements; and up to 14 measurements can be displayed at a time.
	Measurement Source	CH1 to CH4, D0 to D15[11], Math1 to Math4
	Measurement Range (Region)	Main, Zoom, and Cursor
	All Measurement	Displays 33 measurement items (vertical and horizontal) for the current measurement channel; the measurement results are updated continuously.
	Vertical	Vmax, Vmin, Vpp, Vtop, Vbase, Vamp, Vupper, Vmid, Vlower, Vavg, VRMS, Per. VRMS, AC. RMS, Overshoot, Preshoot, Area, and Period Area.
	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↓)
	Statistics	Items: Current, Average, Max, Min, Standard Deviation, Count Statistical times settable

Waveform Calculation

Waveform Calculation		
No. of Math Functions		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
Color Grade		FFT supported
FFT	Record Length	Max. 1 Mpts; for FFT operation, max. 1 Mpts for analysis
	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, that is, saves all the sampled waveform data as a segment to the RAM for each trigger event. The maximum number of the sampled segments reaches 500,000.
	Source	All enabled analog channels and digital channels
	Analysis	Supports playing waveforms frame by frame or continuous playing; capable of calculating, measuring, and decoding the played waveforms
PassFail		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
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, auto measurement item
	Type	Horizontal, vertical, and measure histogram
	Measure	Measure histogram statistics: Type, Sum, Peaks, Max, Min, Pk_Pk, Mean, Median, Mode, Bin Width, Sigma, and XScale Histogram statistics: Sum, Peaks, Max, Min, Pk_Pk, Median, Mode, Bin Width, Sigma, μ±σ, μ±2σ, and μ±3σ
	Sampling Mode	Supports all modes, except the Zoom, XY, and ROLL modes
Color Grade		Provide a dimensional view for color grade waveforms, color grade >16, 256-level color scale display
	Source	Any analog channel
	Color Theme	Temperature and intensity
	Sampling Mode	Supports all modes

Serial Decoding

Serial Decoding	
Number of Decodings	Four protocol types can be decoded and enabled at the same time
Decoding Type	Standard: Parallel, RS232/UART, I2C, SPI, LIN, CAN Option: CAN-FD, FlexRay, I2S, and MIL-STD-1553B
Parallel	Up to 4 bits of Parallel decoding, supporting any analog channel Supports user-defined clock and auto clock settings. Source channel: CH1 to CH4, D0 to D15[11]
RS232/UART	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 to CH4, D0 to D15[11]
I2C	Decodes the address (with or without the R/W bit) of the I2C bus, data, and ACK. Source channel: CH1 to CH4, D0 to D15[11]
SPI	Decodes the MISO/MOSI data (4-32 bits) of the SPI bus. The available mode includes "Timeout" and "CS". Source channel: CH1 to CH4, D0 to D15[11]
CAN	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. Source channel: CH1 to CH4, D0 to D15[11]
LIN	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 to CH4, D0 to D15[11]
CAN-FD (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-FD bus (up to 10 Mb/s). The supported CAN bus signal types include CAN_H, CAN_L, TX/RX, and DIFF. Source channel: CH1 to CH4, D0 to D15[11]
FlexRay (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 to CH4, D0 to D15[11]

Serial Decoding	
I2S (Option)	Decodes I2S audio bus left channel data and right channel data, supporting 4-32 bits. The alignment modes include I2S, LJ, and RJ. Source channel: CH1 to CH4, D0 to D15[11]
MIL-STD-1553B (Option)	Decodes the MIL-STD-1553B bus signal's data word, command word, and status word (address+last 11 bits). Source channel: CH1 to CH4, D0 to D15[11]

Bode Plot[5]

Bode Plot	
Start Freq	10 Hz to 3 MHz
Stop Freq[12]	100 Hz to 30 MHz
Points/Decade	10 to 100
Output Amplitude	20 mV to 10 V

Function/Arbitrary Waveform Generator (AFG)[4]

AFG (technical specifications are typical values)	
Number of Channels	2
Output Mode	Normal 2-channel output
Sample Rate	1 GSa/s
Vertical Resolution	16-bit
Max. Frequency	Option AFG100: 100 MHz Option AFG50: 50 MHz
Output Waveform	Basic waveforms: Sine, Square, Ramp, DC, Noise, Arb; built-in waveforms: Sinc, Exp.Rise, Exp. Fall, ECG1, Gauss, Lorentz, and Haversine User-defined waveform: supported

AFG (technical specifications are typical values)		
Sine	Frequency Range	Option AFG100: 2 mHz to 100 MHz Option AFG50: 20 mHz to 50 MHz
	Flatness	Typical (in relative to 1 kHz Sine, 0 dBm) <10 MHz: ±0.2 dB ≥10 MHz to <100 MHz: ±0.5 dB
	Harmonic Distortion	Typical (0 dBm) 10 Hz to <10 MHz: <-55 dBc ≥10 MHz to <50 MHz: <-50 dBc ≥50 MHz: <-40 dBc
	Spurious (non-harmonics)	Typical (1 Vpp) 10 Hz to <10 MHz: <-60 dBc ≥10 MHz to <50 MHz: <-50 dBc ≥50 MHz: < -50 dBc + 6 dBc/Octave
	Total Harmonic Distortion (THD)	Typical (1 Vpp) 10 Hz to 20 kHz: <0.1%
	Phase Noise	Typical (1 Vpp amplitude, 10 kHz offset) 20 MHz: <-110 dBc/Hz
	Residual Clock Noise	Typical (0 dBm), -50 dBm
	Channel-to-Channel Crosstalk	Typical (1 Vpp amplitude, 0 V offset) <100 MHz: <-35 dBc
	Phase	0° to 360°, 0.01° resolution
Square	Frequency Range	Option AFG100: 2 mHz to 20 MHz Option AFG50: 20 mHz to 10 MHz
	Rise/Fall Time	Typical (amplitude ≤ 2 Vpp, 50 Ω load), < 10 ns
	Overshoot	Typical (0 dBm amplitude, frequency > 1 MHz), <5%
	Duty Cycle	1% to 99%, adjustable
	Jitter (rms)	Typical (0 dBm amplitude, frequency >1 kHz), 500 ps
	Phase	0° to 360°, 0.01° resolution

AFG (technical specifications are typical values)		
Ramp	Frequency Range	Option AFG100: 2 mHz to 2 MHz Option AFG50: 20 mHz to 1 MHz
	Linearity	Typical (frequency 1 kHz, amplitude 1 Vpp, symmetry 100%) ≤1% of peak output (within the 10%~90% amplitude range)
	Symmetry	0% to 100%
	Phase	0° to 360°, 0.01° resolution
Noise	Type	White Noise
	-3 dB Bandwidth	Typical (0 dB), > 100 MHz
Arbitrary Waveforms	Frequency Range	Option AFG100: 2 mHz to 20 MHz Option AFG50: 20 mHz to 10 MHz
	Waveform Length	16 kpts
	File Type	CSV
Built-in Waveform	Frequency Range	Option AFG100: 2 mHz to 20 MHz Option AFG50: 20 mHz to 10 MHz
Frequency	Accuracy	±1.5 ppm ± 1 ppm/year (@10 MHz)
	Resolution	0.1 Hz or 10 digits, whichever is greater
Amplitude	Output Range (into 50 Ω)	1 mVpp to 10 Vpp (≤50 MHz) 1 mVpp to 5 Vpp (≤100 MHz)
	Output Range (into HighZ)	2 mVpp to 20 Vpp (≤50 MHz) 2 mVpp to 10 Vpp (≤100 MHz)
	Resolution	0.1 mVpp or 3 digits, whichever is smaller
	Accuracy	±(1.5% of the setting value + 5 mVpp) (1 kHz Sine, 0 V offset)
	Unit	Vpp

AFG (technical specifications are typical values)		
DC Offset	Range	±5 Vpk (AC + DC) (into 50 Ω) ±10 Vpk (AC + DC) (into HighZ)
	Resolution	1 mV or 4 digits
	Accuracy	±(1.5% of |offset setting value| + 5 mV + 0.5% of amplitude (Vpp)) (into 50 Ω) ±(1.5% of |offset setting value| + 5 mV + 1% of amplitude (Vpp)) (into HighZ)
Output Impedance	Typical (0 dBm amplitude, 0 Vdc offset), 50 Ω ± 1%	
Modulation	AM	Modulating waveform: Sine, Square, Triangle, UpRamp, DnRamp, Noise Carrier waveform: Sine, Square, Ramp Modulation Source: Internal Modulation Depth: 0% to 120% Modulation Frequency: 2 mHz to 1 MHz
	FM	Modulating Waveform: Sine, Square, Triangle, UpRamp, DnRamp, and Noise Carrier Waveform: Sine, Square, Ramp Modulation Source: Internal Frequency Deviation: 2 mHz to set carrier frequency (limited by the carrier frequency setting; the sum of the frequency deviation and carrier frequency shall not exceed the upper limit of the carrier frequency) Modulation Frequency: 2 mHz to 1 MHz
	PM	Modulating Waveform: Sine, Square, Triangle, UpRamp, DnRamp, Noise Carrier Waveform: Sine, Square, Ramp Modulation Source: Internal Phase Shift: 0° to 360°, default 90° Modulation Frequency: 2 mHz to 1 MHz

Auto

Auto	
AutoScale	Min voltage > 10 mVpp, duty cycle > 1%, frequency > 35 Hz

Digital Voltmeter

Digital Voltmeter	
Source	Any analog channel
Function	DC, AC+DC_{rms}, AC_{rms}
Resolution	ACV/DCV: 3 digits
Limits Beeper	Sounds an alarm when the voltage value is within or outside of the limit range

High-precision Frequency Counter

High-precision Frequency Counter		
Source		Any Analog Channel and digital channel[11]
Measure		Frequency, period, totalizer
Counter	Resolution	3-6 digits, user-defined
	Max. Frequency	Max. analog bandwidth
Totalizer		48-bit totalizer
		Counts the number of the rising edges
Time Reference		Internal reference

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	7-inch capacitive multi-touch screen, gesture enabled operation
Resolution	1024×600 (Screen Region) 16:9

Display		
Graticule		(10 horizontal divisions) x (8 vertical divisions)
Persistence		Min, Infinite, variable persistence (100 ms to 10 s)
Brightness		256 intensity levels (LCD, HDMI)

Processor System

Processor System		
Processor		Cortex-A72 up to 1.8 GHz, 6-core processor
System Memory		4 GB RAM
Operating System		Android
Internal Non-volatile Memory		32 GB

I/O

I/O		
USB2.0 Host		1 on the front panel, 500 mA
USB2.0 Device		1 on the rear panel
LAN		1 on the rear panel, 10/100 Base-T, supporting LXI-C
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)
AFG OUT	Waveform Output	2 on the rear panel, BNC connector
AUX OUT Output	Interface	1 on the rear-panel, BNC connector 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 rise time ≤ 1.5 ns
	Trig Out	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)
HDMI HD	Video Output	1 on the rear panel, HDMI 1.4, A plug. Used to connect to an external monitor or projector

I/O	
Probe Compensation Output	1 kHz frequency, 0 to 3 V_{pp} amplitude, Square, rise time < 1 μs

Power Supply

Power Supply	
Power Interface	Type-C interface
Power Voltage	DC 20 V, 5 A
Power	70 W (connect to various interfaces, USB)

Environment

Environment		
Temperature Range	Operating	0℃ to +50℃
	Non-operating	-30℃ to +60℃
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 60℃: ≤90% RH (without condensation)
Altitude	Operating	Below 3,000 m
	Non-operating	Below 15,000 m

Warranty and Calibration Interval

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

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	

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	265.35 mm (W) x 161.75 mm (H) x 77.38 mm (D)
Weight[13]	Package excluded: approximately 1.6 kg
	Package included: approximately 2.6 kg

Non-volatile Memory

Non-volatile Memory		
Data/File Storage	Setup/Image	setup (*.stp), image (*.png, *.bmp, *.jpg)
	Waveform Data	CSV waveform data (*.csv), binary waveform data (*.bin), list data (*.csv), and reference waveform data (*. ref)
Internal Capacity		32 GB
Reference Waveform		Displays 10 internal waveforms
Setting		Storage is limited by the capacity
USB Capacity		Supports the USB storage device that conforms to the industry standard

Note:

[1]: Single-channel mode: If any one of the channels is enabled, it is called single-channel mode.

[2]: Half-channel mode: If any two channels are enabled, it is called half-channel mode.

[3]: All-channel mode: If all of the channels are enabled or any three of the channels are enabled, it is called all-channel mode.

[4]: Optional configuration of AFG100 (2-channel, 100 MHz, 1 GSa/s Function/Arbitrary Waveform Generator) or AFG50 (2-channel, 50 MHz, 1 GSa/s Function/Arbitrary Waveform Generator).

[5]: The optional two-channel Function/Arbitrary Waveform Generator (AFG) supports Bode plot function.

[6]: Single-channel mode, recording mode, 20 ns/div, 1 kpts memory depth (or Auto memory depth).

[7]: 10 MHz signal input, 100 mV/div.

[8]: 200 μV/div and 500 μV/div is a magnification of 1 mV/div setting. For vertical accuracy calculations, use full scale of 8 mV.

[9]: For any channel, under the same input impedance with DC-coupled, the Volts/div setting is the same for 100 mV/div and 200 mV/div.

[10]: The channel-to-channel skew is ±5 ns when the sample rate of the digital channel is 1 GSa/s and the period is 1 ns.

[11]: The digital channels are available to choose when the logic analyzer probe is connected.

[12]: The stop frequency shall be greater than the start frequency.

[13]: Standard configuration.

Order Information and Warranty Period

Order Information

Order Information	Order No.
Model	
800 MHz, 4 GSa/s, 100 Mpts, 4-CH digital oscilloscope	MHO984
500 MHz, 4 GSa/s, 100 Mpts, 4-CH digital oscilloscope	MHO954
350 MHz, 4 GSa/s, 100 Mpts, 4-CH digital oscilloscope	MHO934
Standard Accessory	
Power Adapter Conforming to the Standard of the Destination Country	— —
Ground Cable	— —
USB Cable	— —
4 Passive Probes (350 MHz) (Standard Configuration for MHO934)	PVP2350
4 Passive Probes (500 MHz) (Standard Configuration for MHO984 and MHO954)	RP3500A
Performance Upgrade Option	
500 Mpts Memory Depth Option	MHO900-RLU-05
350 MHz-500 MHz Bandwidth Upgrade Option	MHO900-BWU03T05
350 MHz-800 MHz Bandwidth Upgrade Option	MHO900-BWU03T08
500 MHz-800 MHz Bandwidth Upgrade Option	MHO900-BWU05T08
Function Upgrade Option	
50 MHz Function/Arbitrary Waveform Generator (AFG) option (Bode plot supported)	MHO900-AFG50

Order Information	Order No.
100 MHz Function/Arbitrary Waveform Generator (AFG) option (Bode plot supported)	MHO900-AFG100
Audio Serial Bus Trigger and Analysis Option	MHO900-AUDIOA
CAN Serial Bus Analysis with Flexible Data Rate	MHO900-AUTOA
FlexRay Serial Bus Trigger and Analysis Option	MHO900-FlexA
MIL-STD-1553 Bus Trigger and Analysis Option	MHO900-AEROA
Function and Application Bundle Options, including AFG100, AUDIOA, AUTOA, FlexA, and AEROA.	MHO900-BND
Recommended Accessories	
16-channel Logic Analyzer Probe	PLA2216
Portable Instrument Bag	BAG-800

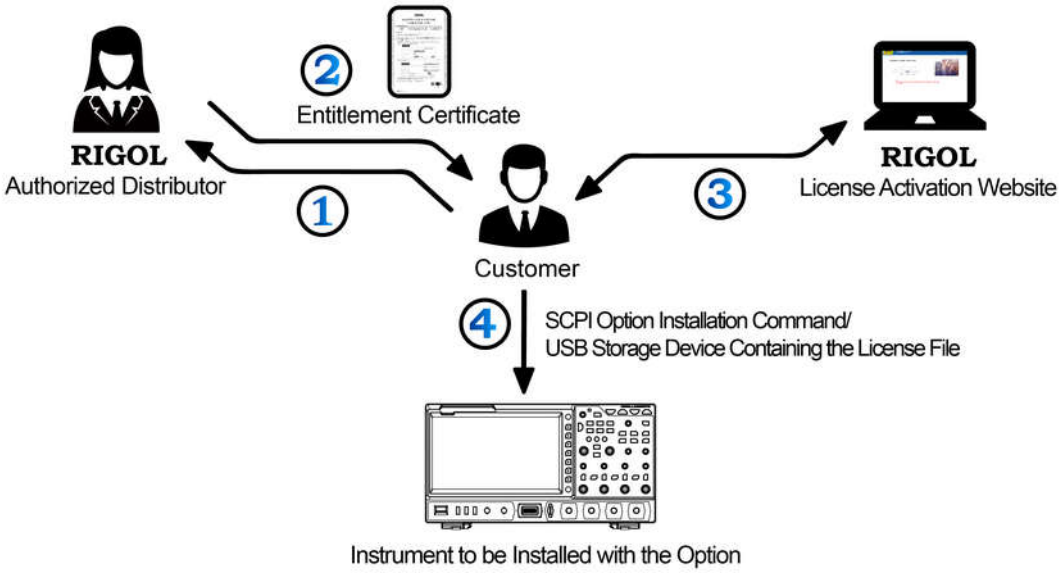
NOTE:

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

Warranty Period

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

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. Install the option by running the SCPI command concerning the option installation. You can also save the option license file to the root directory of the USB storage device. Then insert it to the instrument. After being recognized, follow the instructions to install the option.

NOTE:

If any problems occur during the option installation process, please contact **RIGOL** technical team.

Boost Smart World and Technology Innovation

Industrial Intelligent Manufacturing

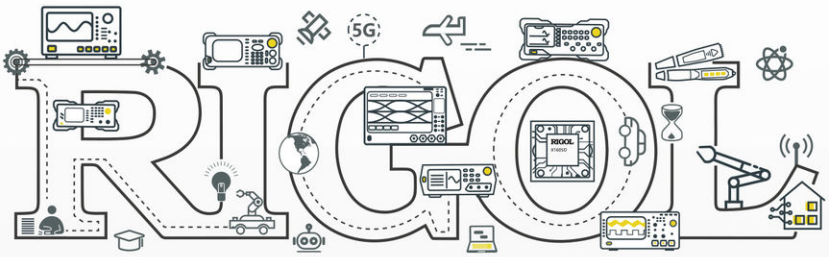




Semiconductors



Education& Research





Communication

System Integration





New Energy

- Cellular-5G/WIFI
- UWB/RFID/ ZIGBEE
- Digital Bus/Ethernet
- Optical Communication

- Digital/Analog/RF Chip
- Memory and MCU Chip
- Third-Generation Semiconductor
- Solar Photovoltaic Cells

- New Energy Automobile
- PV/Inverter
- Power Test
- Automotive Electronics

Provide Testing and Measuring Products and Solutions for Industry Customers

HEADQUARTER

RIGOL TECHNOLOGIES CO., LTD.
No.8 Keling Road, New District,
Suzhou,JiangSu, P.R.China
Tel: +86-400620002
Email: info-cn@rigol.com

EUROPE

RIGOL TECHNOLOGIES EU GmbH
Friedrichshafener Str. 5
82205 Gilching
Germany
Tel: +49(0)8105-27292-21
Email: info-europe@rigol.com

NORTH AMERICA

RIGOL TECHNOLOGIES, USA INC.
10220 SW Nimbus Ave.
Suite K-7
Portland, OR 97223
Tel: +1-877-4-**RIGOL**-1
Email: sales@rigol.com

JAPAN

RIGOL JAPAN CO., LTD.
5F,3-45-6,Minamiotsuka, Toshima-Ku,
Tokyo,170-0005,Japan
Tel: +81-3-6262-8932
Fax: +81-3-6262-8933
Email: info.jp@rigol.com

KOREA

RIGOL KOREA CO,. LTD.
5F, 222, Gonghang-daero,
Gangseo-gu, Seoul, Republic of Korea
Tel: +82-2-6953-4466
Fax: +82-2-6953-4422
Email: info.kr@rigol.com

For Assistance in Other Countries

Email: info.int@rigol.com

RIGOL® is the trademark of **RIGOL** TECHNOLOGIES CO., LTD. Product information in this document is subject to update without notice. For the latest information about **RIGOL**'s products, applications and services, please contact local **RIGOL** channel partners or access **RIGOL** official website: **www.rigol.com**