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MSO1000HD Series

High-Resolution Oscilloscopes

Data Sheet

V1.0

Jan. 2025

Product Introduction

MSO1000HD series high-resolution oscilloscope has the maximum bandwidth of 250 MHz, the maximum sampling rate of 2.5 GSa/s, and is equipped with 4 analog channels and 16 digital channels, with the storage depth of up to 100 Mpts. MSO1000HD series adopts exclusive Ultra Phosphor 3.0 technology, achieving the waveform capture rate of up to 200,000 wfms/s, with 256 levels of gray temperature colors, and features an innovative digital trigger system with high trigger sensitivity and low jitter.

This oscilloscope supports multiple advanced triggers, serial bus triggering and decoding, and offers advanced sampling and analysis modes such as spectrum analysis, power analysis, histogram, waveform recording, enhanced resolution (ERES), hardware-accelerated template testing, and search and navigation. Additionally, this oscilloscope provides multiple measurements and mathematical operations.

MSO1000HD series features a 7-inch capacitive touch screen that supports multiple gestures for common waveform operations. Combined with multiple one-touch keys on the front panel, this greatly optimizes the efficiency of oscilloscope operation and improves the user experience.

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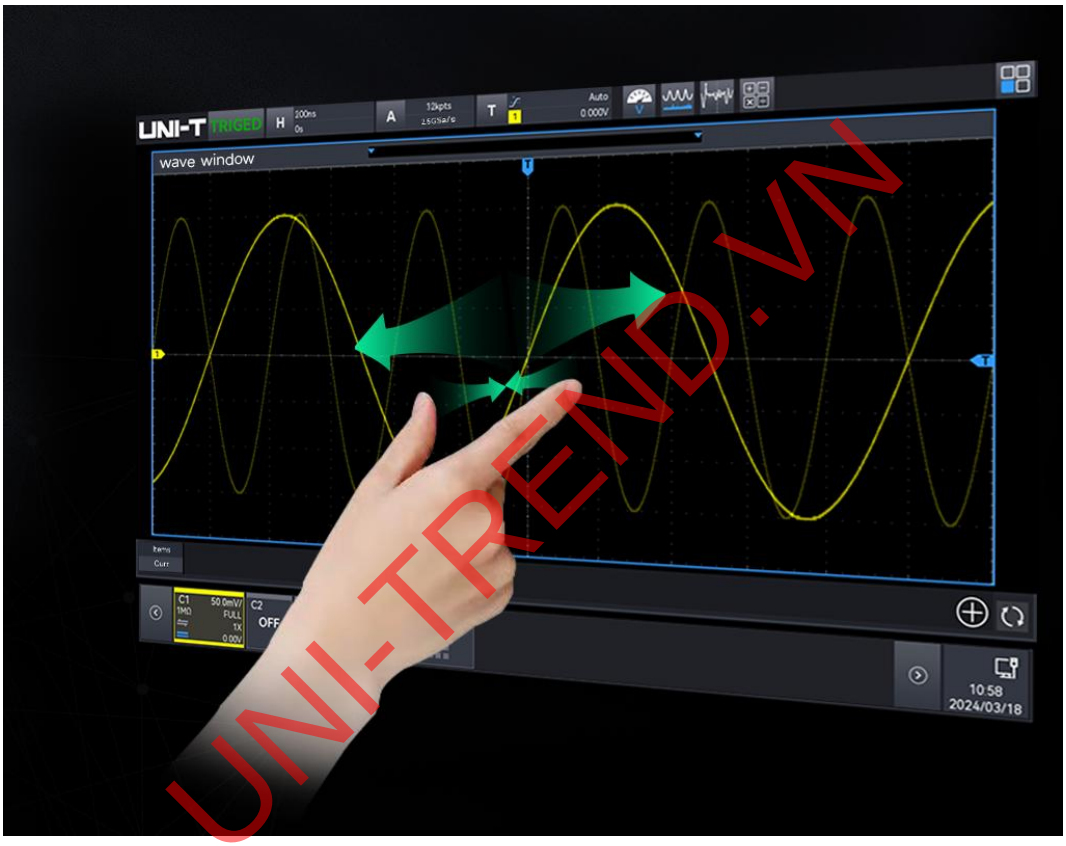
Mainstream Touchscreen Design Providing Intelligent Interactive Experience

Featuring a 7-inch HD capacitive multi-touch screen, it supports a variety of gesture operations such as touch, drag, zoom and rectangle drawing. This makes operation more convenient and smoother, and helps the user learn the instrument more easily. It retains the traditional key and knob operation while also supporting mouse and keyboard, making instrument operation more versatile and greatly improving the interactive experience.



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Brand New Appearance Design

MSO1000HD series features an innovative appearance with a double-sided thinning design. The display is aligned horizontally with the panel to enhance touch operation and visibility range. The black frame margin, combined with the metal grey and black body, enhances the overall sense of the instrument.

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Features and Advantages

- Analog channel bandwidth: 250 MHz/150 MHz
- Real-time sampling rate of the analog channel is up to 2.5 GSa/s. The maximum sampling rate of the digital channel is 1.25 GSa/s.
- 12-bit vertical resolution, with up to 4096 points, ensures that the waveform details are clearly visible.
- 4 analog channels, 16 digital channels, and the storage depth of up to 100 Mpts
- The maximum waveform capture rate is up to 200,000 wfms/s (sequence mode: 1,000,000 wfms/s)
- 9 instrument functions: Digital oscilloscope, logic analyzer, function/arbitrary waveform generator, spectrum analyzer, digital voltmeter, frequency meter, protocol analyzer, bode plot analyzer, and power analyzer.
- Built-in 25 MHz equivalent performance single-channel function/arbitrary waveform generator, supporting load the oscilloscope's on-screen data to Gen arbitrary waveform output in real time, and offering compatibility with multiple built-in arbitrary waveforms.
- Bode plot loop test analysis function designed to analyze the system stability.
- Parameter measurement adds Bar Chart and line graph display
- Uninterrupted hardware real-time waveform recording and analysis of up to 100,000 frames and supports USB memory export function.
- Enhanced FFT of up to 1M points, supporting the spectrum analyzer functions such as frequency setting, waterfall curve, detection setting, and marker.
- Supports ERES (enhanced resolution) of up to 4-bit
- 56 kinds of parameter measurements
- Multi-Windows display
- Multi-channel 7-digit hardware frequency meter, supporting frequency refresh time and adjustable effective digit settings.
- DVM multi-channel RMS measurement: DC, AC RMS, and DC+ACRMS
- Multiple trigger types: Edge, pulse width, video, ramp, runt pulse, over-amplitude pulse, delay, timeout, duration, setup & hold, Nth edge and, code pattern
- Protocol triggering and decoding function: RS232/UART, I^2C, SPI, CAN, CAN-FD, LIN, Audio
- Zone trigger for capturing sporadic signals and observing complicated signals.
- Ultra Phosphor3.0 provides a super fluorescent display effect with up to 256 levels of gray.
- 7-inch 1280x800 HD capacitive multi-touch screen, supporting gesture control such as click,

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slide, zoom, edit, and drag

- Multiple peripheral interfaces: USB Host, USB Device, LAN, AUX Out (Trig Out, Pass/Fail, DVM), Gen Out, HDMI
- Supports SCPI (Standard Command for Programmable Instrument)
- Built-in WebServer for accessing and controlling the instrument through a browser, supporting access from PC and mobile devices for cross-platform compatibility.
- Supports on-line update

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Design Features

High-resolution

12-bit high-resolution ADC sampling has a quantization level of up to 4096, which is 16 times that of a traditional 8-bit ADC, allowing for better restoration of waveform details.

8-bit

12-bit

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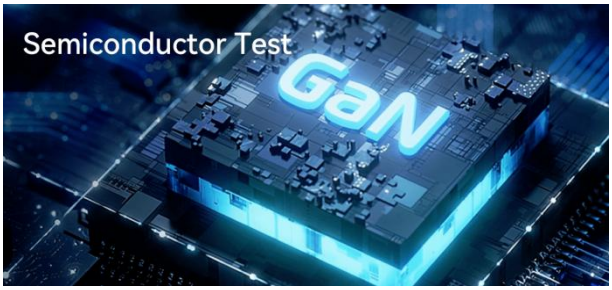
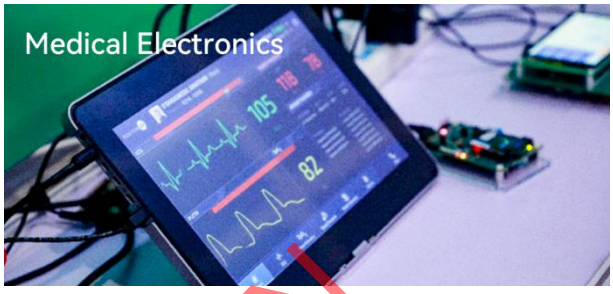
The excellent background noise, which is only 75 µVrms at the full bandwidth of 250 MHz, allows the 12-bit ADC to perform optimally.

Application Scope





Cost-effective, Nine-in-one Integrated Oscilloscope

MSO1000HD series integrates nine instrument functions, including a digital oscilloscope, logic analyzer, function/arbitrary waveform generator, spectrum analyzer, digital voltmeter, high-precision frequency meter, protocol analyzer, Bode plot analyzer, and power analyzer. This is a cost-effective oscilloscope for users.

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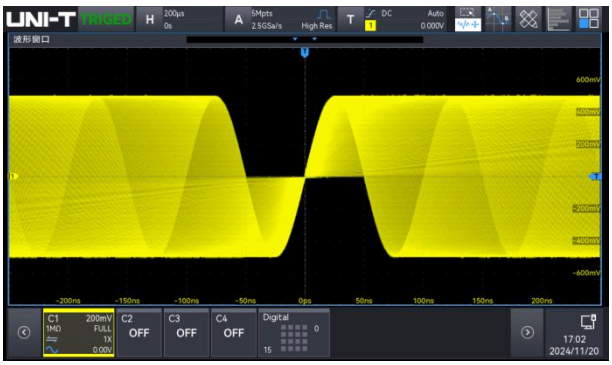
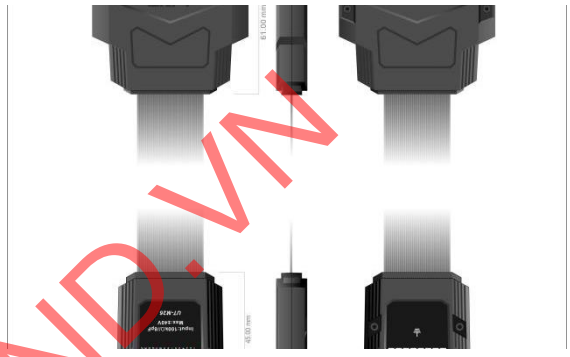
Digital Oscilloscope



- Bandwidth: 250 MHz/150 MHz
- Maximum real-time sampling rate: 2.5 GSa/s
- Maximum storage depth: 100 Mpts
- 4 analog channels

Logic Analyzer

- 16-channel logic analyzer (hardware standard) can be used with the purchase of a UT-M26 logic analyzer probe (optional).
- Maximum sampling rate: 1.25 GSa/s
- Maximum storage depth: 100 Mpts
- Minimum detectable pulse width: 5 ns
- Digital probe provides separate high 8-bit and low 8-bit connections, it simplifies the connection of DUT. When connecting to square pins, UT-M26 can be connected directly to 16x2 square pins (2.54 mm).



- Logic analyzer probe UT-M26 has great electrical characteristics, with the input impedance of 101 kΩ ± 1% and the capacitive load of only 9.0 pF.

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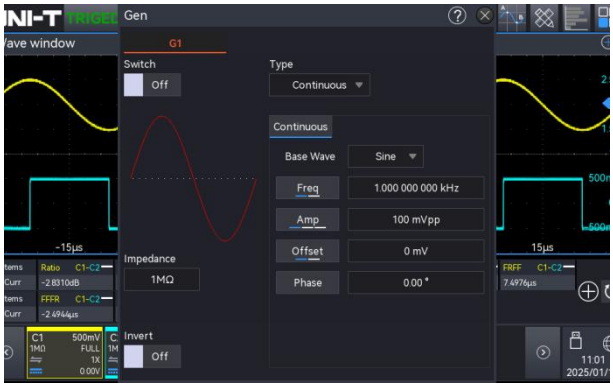
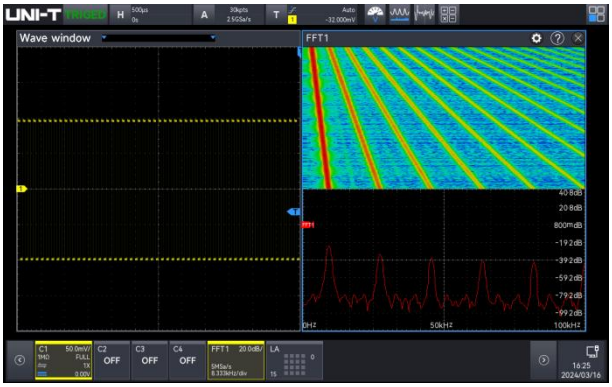
Function/Arbitrary Waveform Generator

- 25 MHz equivalent performance single-channel output
- Sampling rate: 200 MSa/s
- Vertical resolution: 14-bit
- Multiple built-in standard waves: Sine, square, pulse, ramp, arbitrary, noise, and DC
- AM, FM, ASK, FSK, and sweep frequency output



Spectrum Analyzer

- Standard enhanced FFT with up to 1 Mpts for 4-channel signal analysis
- Frequency range: 0 to 1.25 GHz
- Waterfall curve
- 4 traces and 4 detections
- Mark type: Auto, manual and threshold
- Marker point list

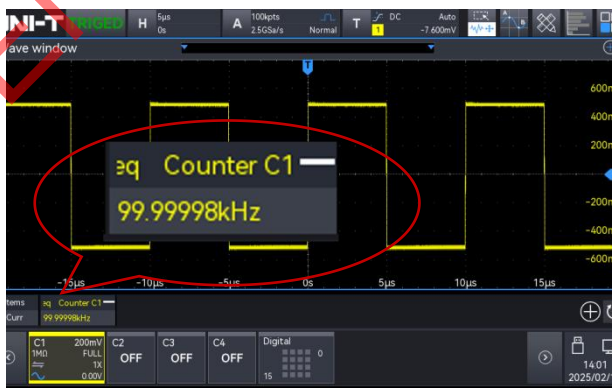


Digital Voltmeter

- 4-digit voltmeter
- Measurement: DC/AC RMS/AC+DCRMS
- Limit alarm

High-precision Frequency Meter

- 7-digit hardware frequency meter
- Frequency meter: Refresh time and adjustable effective digit settings
- Summary counter



Bode Plot Analyzer

- Built-in function/arbitrary waveform generator
- Frequency response analysis
- Loop stability analysis
- Filter analysis
- Amplifier analysis

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Protocol Analyzer

- 7 kinds of triggering and decoding protocols, including those for computers, embedded serial buses, automobile, and audio applications.
- Decoding can be operated in the pause and record modes.
- Supports event list and search function

Name	Description	Standard
Computer serial bus triggering and analysis	RS-232/422/485/UART	Standard
Embedded serial bus triggering and analysis	I^2C, SPI	Standard
Automobile serial bus triggering and analysis	CAN	Standard
Automobile serial bus triggering and analysis	LIN	Standard
Automobile serial bus triggering and analysis	CAN-FD	Standard
Audio serial bus triggering and analysis	Audio	Standard

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Power Analyzer

With the development of chip technology, the requirements for power supply systems are also increased. Nowadays, low-voltage, high-current power supply networks have become a trend. Especially for chips or networks composed of precision components, it is essential to ensure reliable power supply and noise suppression across various parts of the circuit, as well as to maintain the integrity of signal transmission between chips. This presents greater challenges for power supply testing. Designers are now more focused on energy-efficient power supplies and response speed to ensure the power supply remains stable and clean. Based on this, power integrity testing becomes particularly important. Power integrity directly affects signal integrity, and conversely, signal quality also reflects power quality. Furthermore, power quality can cause a series of electromagnetic interference issues, which can be a significant concern for designers. Therefore, having an oscilloscope capable of power analysis is undoubtedly your best choice.

MSO1000HD series provides a comprehensive set of power analysis tools and evaluation results. To use them, simply select the appropriate analysis type and connect the voltage probe and current probe to the power system test point or specified test fixtures, as shown in the diagram. Then, connect to the desired channel for observation and make any necessary fine-tuning adjustments to achieve your desired results.

- Power quality
- Harmonic analysis
- Switching loss *
- Ripple wave analysis
- Loop analysis
- Safety operation area *

"*" indicates features being added. Power analysis support is subject to the latest firmware available on the official website.

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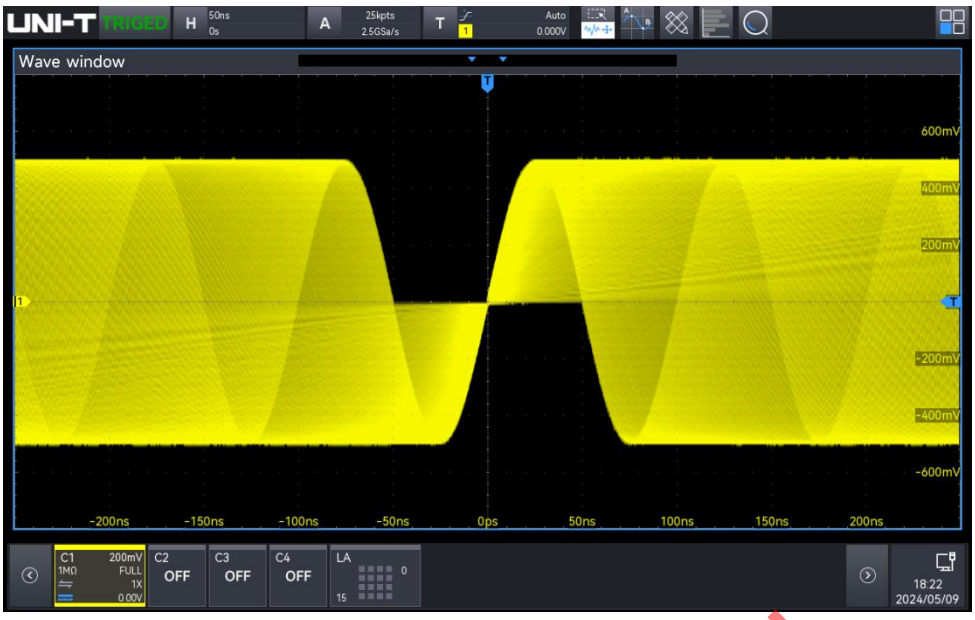
Ultra Phosphor 3.0

When attempting to identify and debug occasional or intermittent anomalies in signals, the waveform capture rate is a crucial indicator. This rate represents the oscilloscope's ability to capture waveforms per unit of time, reflecting its speed in processing and analyzing signals.

MSO1000HD series uses advanced software and hardware architecture to achieve 5 to 10 times higher data processing performance than previous generation products. Equipped with Ultra Phosphor 3.0, it supports 8-channel parallel graph mapping, with a processing rate of up to 20 Gbps and the waveform capture rate of up to 500,000 wfms/s, and up to 1 million 1.80 ns fast edge signals in sequence mode, facilitating easy and accurate capture of occasional signals.



Brand New Quick Autoset Strategy

Fuzzy control is an intelligent control method based on fuzzy set theory, fuzzy linguistic variables, and fuzzy logic reasoning. The advantages of the algorithm are fewer iterations, faster speed, and better anti-interference ability.

In the past, oscilloscopes performed Autoset to find the appropriate signal amplitude and frequency for display. However, the response speed varied significantly among oscilloscope manufacturers due to different solutions adopted. This inconsistency affected the user experience.

UNI-T has redefined Autoset execution by adopting a fast fuzzy algorithm based on analog signals and multi-channel parallel processing technology. This is complemented by a 7-bit high-precision hardware frequency counter, allowing the oscilloscope to quickly find and process the amplitude and frequency of unknown signals during Autoset execution. The entire channel can be opened in less than 1.5s, and a single channel in less than 1s, greatly enhancing working efficiency and reducing the risk of misuse for users who frequently change test objects and require rapid testing.

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Type-C for Power Supply

MSO1000HD series adopts the latest Type-C power supply method. When no power source is available outdoors, it can be powered by a portable charger.

Wall-mounted Interface

In a crowded laboratory or other limited-space environments, the wall-mounting option provides a more convenient and flexible way to use MSO1000HD series without occupying valuable workspace. The wall-mounted interface on the rear panel measures 100 mm x 100 mm.

Multiple Parameter Measurements

Parameter measurement is a crucial function for engineers when using an oscilloscope. MSO1000HD series provides 56 measurement parameters, with the capability to display up to 21 measurement parameters simultaneously. Each page of measurement statistics displays 7 parameters, which can be presented in histograms and trend charts. The histogram visually represents the probability distribution of the parameters, while the trend chart reflects parameter changes over time.

The parameter snapshot displays 39 test items for single-channel measurement. These include voltage and time measurement parameters, with measured results constantly refreshed during the process. MSO1000HD series introduces a new amplitude calculation strategy, incorporating both top and bottom measurement methods. Parameters related to RMS (root mean square), burst, setup, and hold can be configured, making it easier for engineers to utilize the parameter measurement function and enabling accurate, real-time analysis of channel measurement data.

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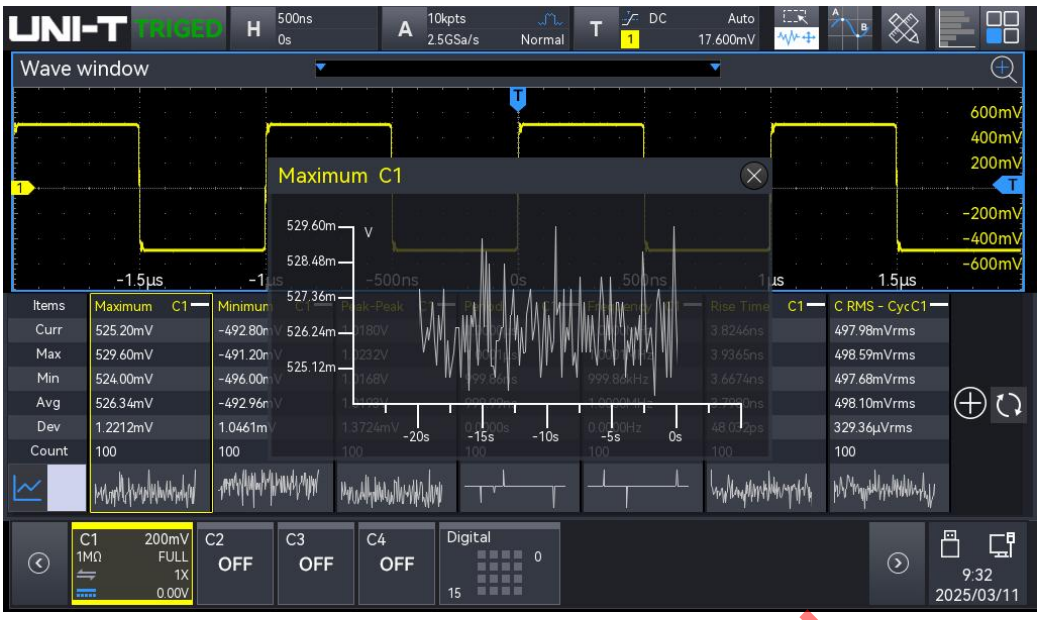
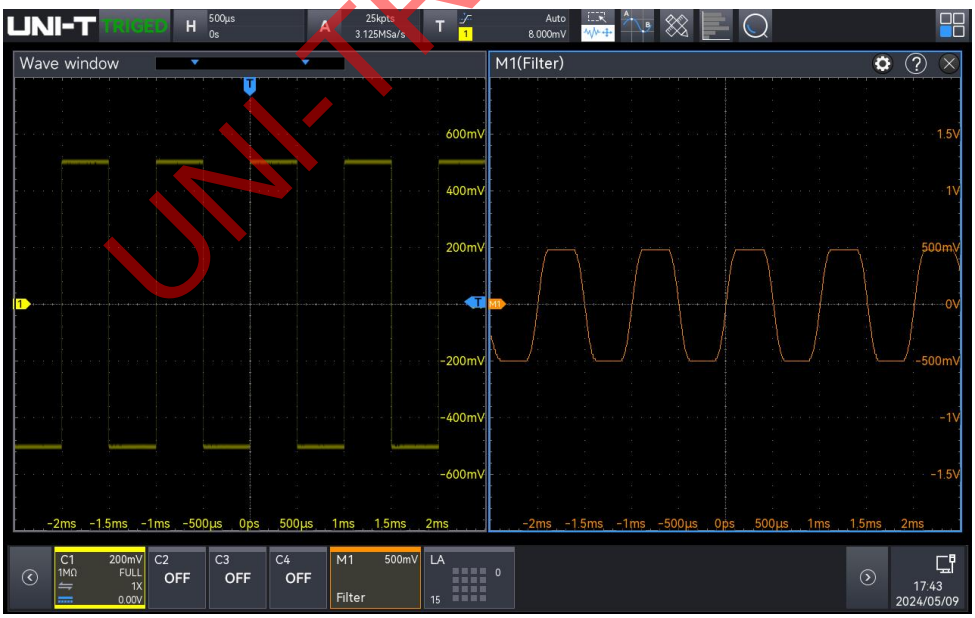


Mathematical Operation

MSO1000HD series provides a system of algorithms for complex waveform operations, allowing you to further process waveforms and display the results directly on the oscilloscope.

- Basic operation: +, -, *, ÷
- Digital filter: High-pass, low-pass, band-pass, and band-limit
- Custom function operation: Analog channel and reference waveform



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Navigation and Search

The storage depth of MSO1000HD series is 100 Mpts, allowing it to capture tens of thousands of waveforms in one capture. Searching for waveforms manually can be time-consuming for engineers. MSO1000HD series provides customizable search conditions, which are very useful for locating sampled signals and finding waveforms of interest. With the analysis function, events can be analyzed in detail, eliminating the time-consuming and inconvenient process of manual searches.

Hardware-accelerated Template Test

Using hardware-accelerated template testing, the waveform test can be completed in a few seconds to meet special standards.

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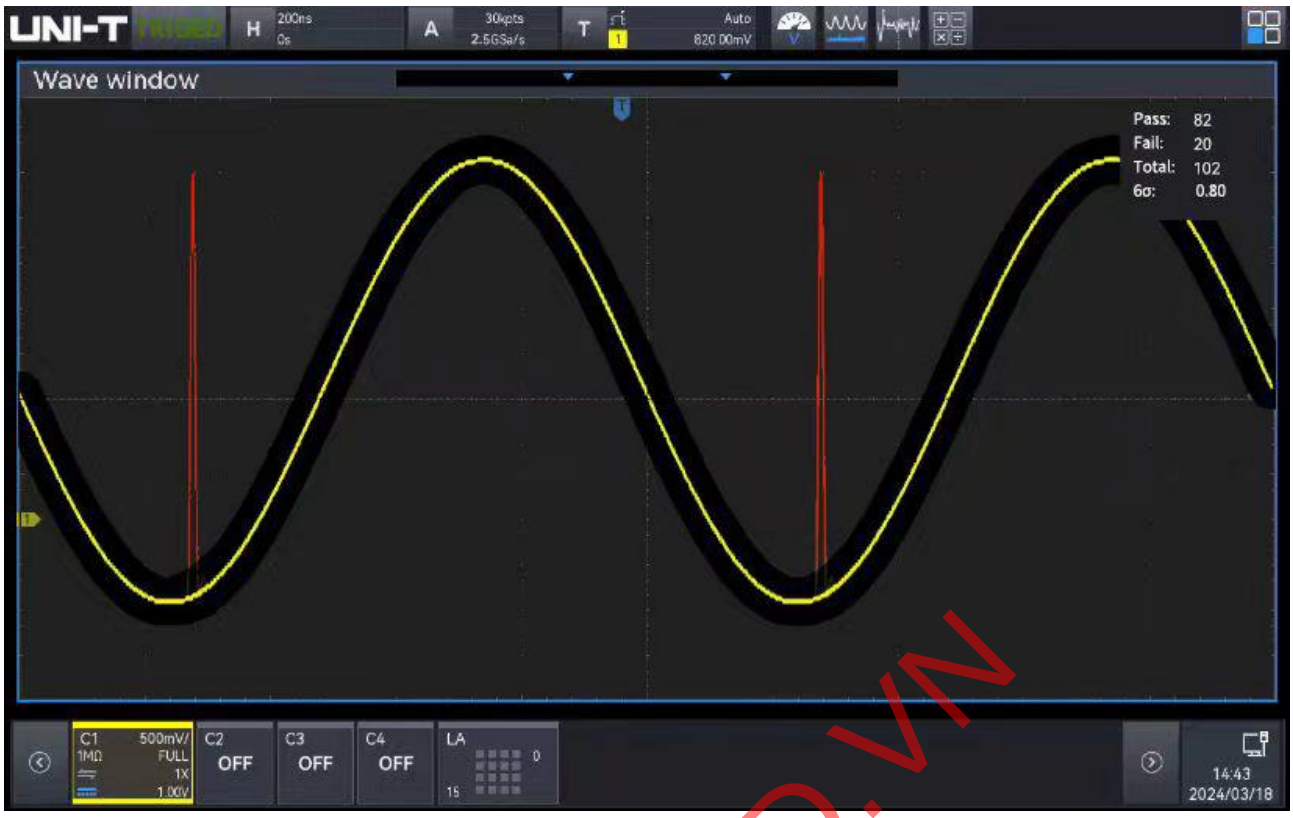

Zone Trigger

The zone trigger function serves two purposes: firstly, to isolate occasional abnormal signals, and secondly, to stabilize the waveform display. Only a stable trigger can provide a stable waveform display. With this function, engineers can handle complex and variable signals during debugging. The zone trigger function is easy to use, so engineers don't have to spend time learning how to use it.

A rectangle drawing gesture can quickly isolate a signal to be observed. The waveform does not have to be completely stable to trigger; the zone trigger function can capture a waveform that meets the specified conditions and stabilize it for triggering.

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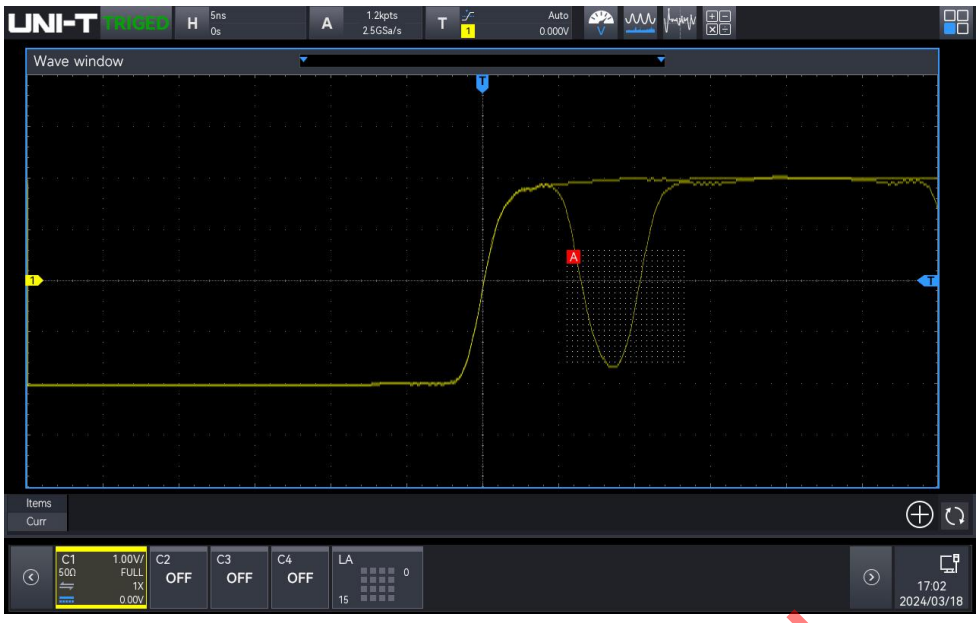

Various Connection

MSO1000HD series offers a wide range of connections with flexibility and convenience.

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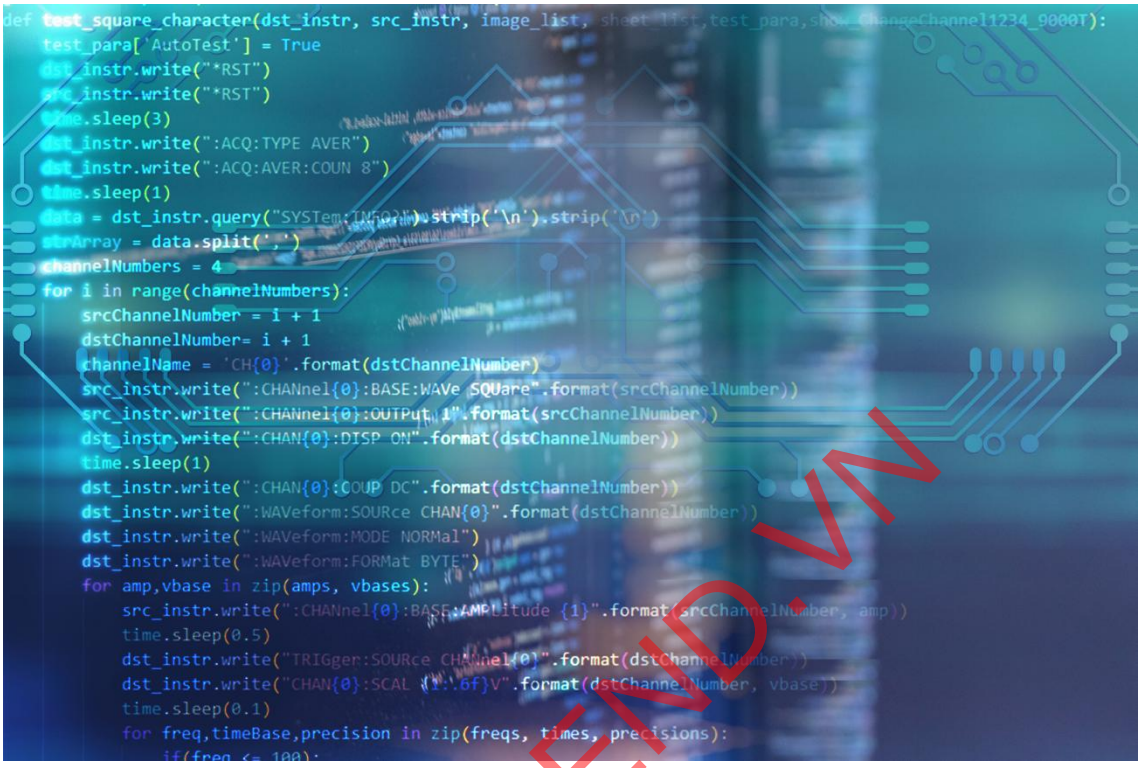
Multiple Control Methods

Control or secondary development through the instruction set conforming to the SCPI standard.



Use UNI-T free instrument manager for control.

It can be controlled by installing instrument management software on the PC side through LAN or USB Device.

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WebServer

SCPI for remote checking and control

Export waveform files

Browsing the user manual online

PC/Mobile phone access

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Document Version and Revision

Document Version	**V1.0**
Document Revision	Original version
Firmware version: V1.00.0042 Logic version: V1.00.0024 Hardware version: V1.03.0000	

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Performance Characteristics

All specifications are guaranteed, except those marked "Typical (Typ.)".

Unless otherwise stated, all the performance characteristics are suitable for the probe attenuation ratio is set to 10x and MSO1000HD series high-resolution oscilloscopes.

To meet these specifications, the oscilloscope should first meet the following conditions.

- The instrument must be operated continuously for at least thirty minutes at the specified operating temperature.
- The self-calibration must be performed when the operating temperature reaches or exceeds 5 °C.

Model	**MSO1254HD**	**MSO1254HD-S**	**MSO1154HD**	**MSO1154HD-S**
Analog bandwidth	250 MHz		150 MHz	
Calculated rise time (10 to 90%) (typical)	≤1.40 ns		≤ 2.20 ns	
Input/output channel number	4 analog channels			
	16 digital channels			
	1 channel signal output (Only MSO1154HD-S, MSO1254HD-S)			
Sampling mode	Real-time sampling			
Acquisition mode	Normal, peak detect, high resolution, averaging, enhanced resolution			
ERES	Enhanced bit: 1, 1.5, 2, 2.5, 4 (12 to 16-bit)			
Maximum sample rate	Analog channel: 2.5 GSa/s (single channel), 1.25GSa/s (dual channels), 625MSa/s (four channel) Digital channel: 1.25 GSa/s			
Average	After all channels have reached N samples simultaneously, the number of N times can be selected from 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192.			
Memory depth	Auto (limit to 5 Mpts), 25 kpts, 250 kpts, 500 kpts, 5 Mpts, 50 Mpts, 100 Mpts			
Maximum waveform capture rate	200,000 wfms/s			
	1,000,000 wfms/s (sequence mode)			
Sequential sampling	Maximum 100,000 frames, minimum two trigger intervals < 1000 ns			
Hardware real-time waveform recording and playing	100,000 frames			
Screen	7 - inch 1024x600 HD capacitive touch screen			
Vertical System (Analog channel)				

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Input coupling	DC, AC, GND
Input impedance	(1 MΩ ± 2%) ‖ (17 pF ± 2 pF)
Probe attenuation factor	Voltage probe ratio: 0.001X, 0.01X, 0.1X, 1X, 10X, 100X, 1000X, Custom Current probe ratio: 5 mV/A, 10 mV/A, 50 mV/A, 100 mV/A, 200 mV/A, 500 mV/A, 1V/A, Custom
Maximum input voltage	400 V (DC+ACVpk) 135 V_{RMS}
Vertical resolution	12-bit (ERES is enabled with a maximum of 16-bit)
Vertical scale	500 μV/div to 10 V/div
Offset range	500 μV/div to 50 mV/div: ± 2 V 51 mV/div to 1 V/div: ± 25 V 1.02 V/div to 10 V/div: ± 250 V Vertical offset reading: V
Band limit (typical)	20 MHz, Full
Low-frequency response	(AC coupling, -3 dB); ≤ 5 Hz (on BNC)
DC gain accuracy	< 5 mV: ± 2% full scale, ≥ 5 mV: ± 1.5% full scale
DC offset accuracy	± (2% + 0.1 div + 2 mV)
Unit	W, A, V, and U, default: V
Channel-to-channel isolation(typical)	DC to maximum bandwidth: > 40 dB
Digital channel	
Threshold	8-channel in one group
Threshold selection	TTL (1.4 V) 5.0 V CMOS (+ 2.5 V), 3.3 V CMOS (+ 1.65 V) 2.5 V CMOS (+ 1.25 V), 1.8 V CMOS (+ 0.9 V) ECL (-1.3 V) PECL (+ 3.7 V) LVDS (+ 1.2 V) 0 V Custom
Threshold range	± 20.0 V, 20 mV stepping
Threshold accuracy	± (100 mV + threshold setting of 3%)
Dynamic range	± 10 V + threshold
Input impedance	(101 kΩ ± 1%) ‖ (9 pF ± 1 pF)
Minimum voltage swing	500 mVpp

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Minimum detectable pulse width(typical)	5 ns
Vertical resolution	1 bit
Channel-to-channel deskew range	± 100 ns
Horizontal System (Analog channel)	
Time base range	2 ns/div to 1 ks/div (simultaneously display the current sampling rate and memory depth)
Time base accuracy	± 5 ppm (initial accuracy); ± 2.5 ppm (the aging rate of first year); ± 4ppm (the aging rate of ten years)
Time base delay time range	Pre-trigger (negative delay): ⩾ 1 screen width Post-trigger (positive delay): 1 s to 4 ks
Time base mode	Y-T (default)
	X-Y (CH1-CH2, CH1-CH3, CH1-CH4, CH2-CH3, CH2-CH4, CH3-CH4)
	Roll, time base ⩾ 50 ms/div, using the horizontal rotary knob to enter or exit Roll mode
	Scan, time base ⩾ 50 ms/div, user can select Roll or Scan mode
Trigger	
Trigger Sensitivity	CH1-CH4: ⩽ 10 mV/div, The larger value of 1div or 5 mVpp > 10 mV/div, 0.5 div
	Enable the noise rejection, with trigger sensitivity reducing half
	Trigger sensitivity can be customized, with the default set to 50%
Trigger level range	Internal: ± 4 div from the center of the screen
Trigger modes	Auto, Normal, Single
Trigger holdoff range	0.0 ps to 10 s
Trigger coupling (Typ.)	DC: Allows all signals to pass
	AC: Blocks the DC component of the input signal
	HF reject: Suppresses high-frequency components of signals above 40 kHz
	LF reject: Suppresses low-frequency components of signals below 40 kHz
Noise reject	Suppress the high-frequency noise of signal, to reduce the error-touched possibility Enable the noise rejection, with trigger sensitivity reducing half
Zone Triggering	
Zone	2 zones; source: CH1-CH4; Feature: Must Intersect, Must Not Intersect
Edge	

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Slope	Rising, Falling, Either
Source	CH1-CH4, D0-D15
Runt	
Trigger condition	>, <, ≤ ≥, None
Polarity	Positive, Negative
Pulse width	3.2 ns to 10 s
Source	CH1-CH4, D0-D15
Window	
Polarity	Rising, Falling, Either
Trigger condition	Enter, Exit, Time
Set	3.2 ns to 10 s
Source	CH1-CH4
Nth edge	
Slope	Rising, Falling
Idle time	3.2 ns to 10 s
Edge number	1 to 65535
Source	CH1-CH4, D0-D15
Delay	
Edge type	Rising, Falling
Trigger condition	>, <, ≤ ≥, > <
Delay time	3.2 ns to 10 s
Source	CH1-CH4, D0-D15
Timeout	
Slope	Rising, Falling, Either
Timeout	3.2 ns to 10 s
Source	CH1-CH4, D0-D15
Duration	
Code pattern	H, L, X
Trigger condition	>, <, ≤ ≥
Duration	3.2 ns to 10 s
Source	CH1-CH4, D0-D15
Setup and Hold	
Clock edge	Rising, Falling
Data type	H, L
Setup	3.2 ns to 10 s
Hold	3.2 ns to 10 s

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Source	CH1-CH4, D0-D15
Pulse Width	
Polarity	Positive, Negative
Trigger condition	>, <, ≤ ≥
Pulse Width	1.6 ns to 4 s
Source	CH1-CH4, D0-D15
Slope	
Slope	Positive, Negative
Trigger condition	>, <, ≤ ≥
Time	3.2 ns to 1 s
Source	CH1-CH4
Video	
Standard	PAL, NTSC, SECAM, 525 p/60, 625 p/50, 720 p/24, 720 p/25, 720 p/30, 720 p/50, 720 p/60, 1080 i/25, 1080 i/30, 1080 p/24, 1080 p/25, 1080 p/30, 1080 pfs/24
Source	CH1-CH4
Pattern	
Code pattern	H, L, X, Rising, Falling
Source	CH1-CH4, D0-D15
RS232/UART	
Trigger condition	Start, FrameErr, CheckErrr, Data
Baud rate	2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, custom
Data bit	5 bits, 6 bits, 7 bits, 8 bits
Source	CH1-CH4, D0-D15
I^2C	
Trigger condition	Start, Restart, Stop, Loss, Address, Data, Address & Data
Addr mode	7 bits, 10 bits
Addr range	0 to 7F, 0 to 3 FF
Byte length	1 to 5
Source	CH1-CH4, D0-D15
SPI	
Mode	Timeout, CS
Trigger condition	Start, Data
Timeout	99.2 ns to 1 s
Data bit	4 bits to 32 bits

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Source	CH1-CH4, D0-D15
CAN	
Signal type	CAN_H, CAN_L
Trigger condition	Start, Data Frame, Remote Frame, Error Frame, Over-Load, Identifier, Data, Identifier&Data, End of Frame, Missing Ack, Biterror, CRC, Error, ALL Errors
Data rate	10 kbps, 19.2 kbps, 20 kbps, 33.3 kbps, 38.4 kbps, 50 kbps, 57.6 kbps, 62.5 kbps, 83.3 kbps, 100 kbps, 115.2 kbps, 125 kbps, 230.4 kbps, 250 kbps, 490.8 kbps, 500 kbps, 800 kbps, 921.6 kbps, 1 Mbps, 2 Mbps, 3 Mbps, 4 Mbps, 5 Mbps, custom
Source	CH1-CH4, D0-D15
CAN-FD	
Signal type	CAN_H, CAN_L
Trigger condition	Start, Data Frame, Remote Frame, Error Frame, Over-Load, Identifier, Data, Identifier&Data, End of Frame, Missing Ack, Bit Error, CRC Error, ALL Errors
Data rate	10 kbps, 19.2 kbps, 20 kbps, 33.3 kbps, 38.4 kbps, 50 kbps, 57.6 kbps, 62.5 kbps, 83.3 kbps, 100 kbps, 115.2 kbps, 125 kbps, 230.4 kbps, 250 kbps, 490.8 kbps, 500 kbps, 800 kbps, 921.6 kbps, 1 Mbps, 2 Mbps, 3 Mbps, 4 Mbps, 5 Mbps, custom
FD data rate	250 kbps, 500 kbps, 800 kbps, 1 Mbps, 1.5 Mbps, 2 Mbps, 4 Mbps, 6 Mbps, 8 Mbps, custom
Source	CH1-CH4, D0-D15
LIN	
Trigger condition	Sync, Identifier, Data, Identifier & Data, Wake Frame, Sleep Frame, Error
Version	v1.x, v2.x, Either
Baud rate	1.2 kbps, 2.4 kbps, 4.8 kbps, 9.6 kbps, 10.417 kbps, 19.2 kbps, 20 kbps, custom
Data length	1 to 8
Source	CH1-CH4, D0-D15
Audio	
Trigger condition	Word, Left, Right, Any
Format	Standard, Left Aligned, Right Aligned, TDM
Source	CH1-CH4, D0-D15
Decoding	
Number of decodes	4
Decoding type	Standard: RS232/UART, I2C, SPI CAN, CAN-FD, LIN, Audio
Parallel	Up to 18 bits parallel bus decoding, supports the combination of analog channel and digital channel and supports custom time setting
Source	CH1-CH4, D0-D15

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Measurement	
Cursor	Voltage difference between cursors (△Y) Time difference between cursors (△X) Reciprocal of △X (Hz) (1/△X)
	Voltage and time of waveform point
	Display the cursor in the automatic measurement
Automatic measurements	**Analog channel: 56 kinds of parameter** Maximum, Minimum, Top, Base, Amplitude, Middle, Peak-Peak, Average, Average-Cycles, RMS, RMS-Cycles, AC RMS, AC RMS-Cycles, Area, Area-Cycles, +Area, -Area, +Area-Cycles, -Area-Cycles, +Overshoot, -Overshoot, +Preshoot, -Preshoot, Period, Frequency, Rise time, Fall time, +Width, -Width, +Duty, -Duty, +Pulse count, -Pulse count, Rising edge count, Falling edge count, Burst width, Burst Interval, Burst Period, Burst Per count, Ratio, Period Ratio, Setup time, Hold time, Setup & Hold Ratio, FRFR, FRFF, FFFR, FFFF, FRLF, FRLR, FFLR, FFLF, Delay(r-r), Delay(f-f),Phase(r-r), Phase(f-f) **Digital channel**: Frequency, Period, +Width, -Width, +Duty, -Duty, Rising delay A→B, Falling delay A→B, Phase A→B, Phase B→A
Measurement mode	Common measurement and accuracy measurement (Full memory hardware measurements)
Measurement type	Simultaneously display 21 kinds of parameter measurement
Measurement range	Main time base, Zoom time base, Cursor area
Measurement statistics	Mean, Maximum, Minimum, Std Dev, Count, Tendency chart, Bar Chart
XY measurement	Time, Cartesian, Polar, Product, Ratio
Analysis	Frequency Counter, DVM, Pass/Fail, Waveform recording, Bode plot, Power Analysis
Power Analysis	
Measure	Power quality, Current harmonics, Surge current, Rds(on), Switching Loss, Conversion rate, Safe operating area, Modulation analysis, Output ripple, Startup/shutdown time, Transient response, Power efficiency
Histogram	
Source	CH1 to CH4
Type	Horizontal, Vertical
Math	
Waveform math	A+B, A-B, A×B, A÷B, Advanced, Filter
Filter	Low pass, High pass, Band pass, Band stop

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Operation	0,1,2,3,4,5,6,7,8,9 (+, -, *, /, ^, >, <, &&, ||, ==, !=)
Function	sin, cos, sinc, tan, sqrt, exp, lg, ln, floor, abs, acos, asin, atan, sinh, tanh, ceil, cosh, fabs, intg, diff
FFT	
Channel number	4
Window types	Hanning, Hamming, Rectangle, Blackman
FFT count	Up to 1 Mpts
FFT vertical scale	Vrms, dB
FFT	Waterfall: ON, OFF
	Spectrum range: Start frequency, Stop frequency, Center frequency, Span
	Four traces: Normal, Average, Max Hold, Min Hold
	Marker: Marker type, Marker Points, Marker list
Storage	
Setting	Set Status (.set)
Waveform	Waveform data (*.dat) (*.csv) (*.bsv)
Image	Image storage (*.bmp) (*.png) (*.jpg)
Report	Decoding Event List (*.csv) (*.pdf) (*.html)
Gen (Only MSO-S)	
Channel	1
Sample rate	200 MSa/s
Vertical resolution	14-bit
Maximum frequency	25 MHz
Standard	Sine, Square, Ramp, Pulse, Noise, DC and Arbitrary wave
Built-in arbitrary	200 types including Sinc, ExpRise, ExpFall, Cardiac, Gauss, Lorentz, and HaverSine
Sine wave	Frequency range: 1 μHz to 25 MHz
	Flatness: ± 0.5 dB (relative 1 kHz)
	Harmonic distortion: -40 dBc
	Non-harmonic spurious (typ): -40 dBc
	Total harmonic distortion: 1% (DC to 20 kHz, 1 Vpp)
	SNR: 40 dB
Square wave/Pulse wave	Frequency range Square wave: 1 μHz to 10 MHz; Pulse wave: 1 μHz to 10 MHz
	Rising/falling time: <16 ns (Typ.1 kHz, 1 Vpp. 50 Ω)
	Overshoot: Typ. 2% (1 kHz, 1 Vpp, 50 Ω)
	Duty ratio

UNI-TREND.VN

	Square wave: 1% to 99%, adjustable; Pulse wave: 1% to 99%, adjustable
	Resolution of duty ratio: 1% or 22 ns (take the greater value of both)
	Minimum pulse width: 22 ns
	Resolution of pulse width: 10 ns
	Jitter: ≤ 5 MHz: 2 ppm + 200 ps > 5 MHz: 200 ps
Ramp wave	Frequency range: 1 μHz to 400 kHz
	Linearity: 1%
	Symmetry: 0.1% to 99.9%
Noise	Bandwidth: 25 MHz
Arbitrary wave	Frequency range: 1 μHz to 5 MHz
	Waveform length: 4 k
	Internal save position: 200
Frequency	Accuracy: ± 5 ppm (initial accuracy); ± 2.5 ppm (the aging rate of first year); ± 4 ppm (the aging rate of ten years)
	Resolution: 1 μHz
Amplitude	Output range: 20 mVpp to 6 Vpp (high resistance); 10 mVpp to 3 Vpp (50 Ω)
	Resolution: 1 mV
	Accuracy (Typical value: 1 kHz, sine wave, 0V, deviation): ± (5%+2 mVpp)
DC offset	Range: ± 3 V (high resistance); ± 1.5 V (50 Ω)
	Resolution: 1 mV
	Accuracy: ± (offset set value 5% + 2 mV)
AM	
Carrier wave	Sine, Square, Ramp, Arbitrary wave
Source	Internal
Modulated wave	Sine, Square, Rising ramp, Falling ramp, Noise, Arbitrary wave
Modulation frequency	2 mHz to 50 kHz
Modulation depth	0% to 120%
FM	
Carrier wave	Sine, Square, Ramp, Arbitrary wave
Source	Internal
Modulated wave	Sine, Square, Rising ramp, Falling ramp, Noise, Arbitrary wave
Modulation frequency	2 mHz to 50 kHz
Deviation	12.5 MHz (maximum)

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ASK	
Carrier wave	Sine, Square, Ramp, Arbitrary wave
Modulated wave	Square wave (Duty ratio 50%)
Modulation frequency	2 mHz to 50 kHz
FSK	
Carrier wave	Sine, Square, Ramp, Arbitrary wave
Modulated wave	Square wave (Duty ratio 50%)
Modulation frequency	2 mHz to 50 kHz
Hopping frequency	Any frequency within the range of the Carrier wave signal
Sweep	
Mode	Linear, Logarithmic
Sweep time	1 ms to 500 s
Start and stop frequency	Any frequency within the range of the waveform
Display	
Screen	7 - inch multi-touch capacitive screen
Resolution	1024×RGB×600 vertical pixel
Color	24-bit true colors
Persistence	Auto, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 5 s, 10 s, 20 s, infinite, close
Display type	Point, Vector
Real-Time clock	Time and data (user-defined)
Waveform Intensity	1% to 100% (default 50%)
Grid Intensity	0% to 100% (default 50%)
Backlight Intensity	1% to 100% (default 50%)
Transparent	0% to 100% (default 50%)
Bode plot (Only MSO-S)	
Mode	Bode, PSRR
Start frequency	50 Hz to 25 MHz
Stop frequency	60 Hz to 25 MHz
Count	1 to 1000
Amplitude	High resistance: 20 mVpp to 6 Vpp 50Ω: 10 mVpp to 3 Vpp
DVM (typical)	
Source	Analog channel

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Mode	DC, AC+DC RMS, AC RMS
Resolution	4-bit
Buzzer	Beeps when the specified limit values are reached or exceeded
Frequency Counter	
Source	Any analog channel and digital channel
Measurement	Frequency, Period, Totalizer
Counter	The maximum effective digits are 7, and the refresh time and effective digits are adjustable.
Maximum measurement frequency	Maximum bandwidth of analog channel
Time reference	Internal reference: ± 5 ppm (initial accuracy); ± 2.5 ppm (the aging rate of first year); ± 4 ppm (the aging rate of ten years)
Interface	
USB-Host 2.0	1 on the front panel
USB-Device 2.0	1 on the rear panel
LAN	LAN (VXI11), 10/100 Base-T, RJ-45
AUX Out	Trig Out, Pass/Fail, DVM
Gen Out	1 on the rear panel (Only MSO-S)
HDMI[1]	1 port for external display or projector
General technical specification	
Probe compensator output	
Output voltage	3 Vpp
Frequency	10 Hz ,100 Hz, 1 kHz (default), 10 kHz
Power Source	
Power source voltage	Power is greater than or equal to 12 V/3 A Supports Type-C or a portable charger with PD protocol
Power consumption	65 W Max
Fuse	1.6 A
Environmental	
Temperature	Operating: 0°C to +40°C
	Non-operating: -20°C to +60°C
Cooling	Forced cooling by fan
Humidity	Operating: below +35 °C, relative humidity ≤90% non-operating: +35 °C to +40 °C, relative humidity ≤60%
Altitude	Operating: below 3,000 meters; non-operating: below 15,000 meters
Pollution degree	2

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Operating environment	In-door		
Mechanical Specifications			
Dimension (W×H×D)	282 mm×175 mm×49 mm		
Weight	1.56 kg		
Calibration interval			
Calibration interval	1 year		
Safety Regulations			
Electromagnetic compatibility	Compliance with EMC directive (2014/30/EU), compliance with or superior to IEC 61326-1:2021/ EN61326-1:2021, IEC 61326-2-1:2021/ EN61326-2-1:2021		
	Conducted disturbance	CISPR 11/EN 55011	CLASS B group 1, 150 kHz-30 MHz
	Radiation disturbance	CISPR 11/EN 55011	CLASS B group 1, 30 MHz-1 GHz
	(ESD)	IEC 61000-4-2/EN 61000-4-2	4.0 kV (contact), 8.0 kV (air)
	Radio sensitivity	IEC 61000-4-3/EN 61000-4-3	0V/m (80 MHz to 1 GHz) 3V/m (1.4 GHz to 2 GHz) 1V/m (2.0 GHz to 2.7GHz)
	Electrical fast transient (EFT)	IEC 61000-4-4/EN 61000-4-4	2kV (AC input)
	Surge	IEC 61000-4-5/EN 61000-4-5	1kV (live to zero) 2kV (live/zero to ground)
	Radio continuous sensitivity	IEC 61000-4-6/EN 61000-4-6	3V, 0.15-80 MHz
	Voltage dip and short-term interruption	IEC 61000-4-11/EN 61000-4-11	Voltage dip: 0% UT during 1 cycle 40% UT during 10/12 cycles 70% UT during 25/30 cycles Short-term interruption: 0% UT during 250/300 cycles
Safety specification	EN 61010-1:2010+A1:2019 EN IEC61010-2-030:2021+A11:2021 UL61010-1:2012 Ed.3+ R:19 Jul2019 UL61010-2-030:2018 Ed.2 CSA C22.2#61010-1:2012 Ed.3+U1;U2;A1		

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	CSA C22.2#61010-2-030:2018 Ed.2

Remarks

1: only support standard HDMI, not support other adapters.

Order Information

	Description	Order No.
Model	MSO1154HD (150 MHz, 4 analog channels+16 digital channels)	MSO1154HD
	MSO1154HD-S (150 MHz, 4 analog channels,16 digital channels, Gen)	MSO1154HD-S
	MSO1254HD (250MHz, 4 analog channels+16 digital channels)	MSO1254HD
	MSO1254HD-S (250MHz, 4 analog channels,16 digital channels, Gen)	MSO1254HD-S
Standard accessories	National standard cable x 1	
	USB2.0 cable x 1	UT-D14
	Passive probe (300 MHz/200 MHz) x 4	UT-P06/UT-P05
Optional accessories	Isolation transformer	UT-ISOT
	Deskew Fixture	UT-DF01
	High voltage probe	UT-V23/UT-P21/UT-P20
	High voltage differential probe	UT-P30/UT-P31/UT-P32/ UT-P33/UT-P35/UT-P36
	Current probe	UT-P40/UT-P41/UT-P42/ UT-P43/UT-P44/UT-P4030D/UT-P 4150/UT-P4500/P4100A/P4100B
	16-channel logic analyzer probe	UT-M26

Remarks: Please order all hosts, accessories and options from your local UNI-T distributor.

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Oscilloscope Probes and Accessories

Passive Probe

Model	Type	
UT-P01	High resistance probe	1X: DC to 8 MHz 10X: DC to 25 MHz Oscilloscope compatibility: All UNI-T series
UT-P03	High resistance probe	1X: DC to 8 MHz 10X: DC to 60 MHz Oscilloscope compatibility: All UNI-T series
UT-P04	High resistance probe	1X: DC to 8 MHz 10X: DC to 100 MHz Oscilloscope compatibility: All UNI-T series
UT-P05	High resistance probe	1X: DC to 8 MHz 10X: DC to 200 MHz Oscilloscope compatibility: All UNI-T series
UT-P06	High resistance probe	1X: DC to 8 MHz 10X: DC to 300 MHz Oscilloscope compatibility: All UNI-T series
UT-P07A	High resistance probe	10X: DC to 500 MHz Input resistance:10 MΩ Maximum operating voltage: < 600V pk Oscilloscope compatibility: All UNI-T series

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UT-P08A 	High resistance probe	10X: DC to 350 MHz Input resistance: 10 MΩ Maximum operating voltage: < 600V pk Oscilloscope compatibility: All UNI-T series
UT-P20 	High resistance probe	DC to 100 MHz Probe coefficient 100:1 Maximum operating voltage: 1500 Vrms Oscilloscope compatibility: All UNI-T series
UT-V23 	High voltage probe	DC to 100 MHz Probe coefficient 100:1 Input resistance: 100 MΩ ± 2% Maximum operating voltage: 2000 Vpp Oscilloscope compatibility: All UNI-T series
UT-P21 	High voltage probe	DC to 50 MHz Probe coefficient 1000:1 Maximum operating voltage: DC 15 kVrms, AC 10 kV (sine wave) Oscilloscope compatibility: All UNI-T series

Current Probe

Model	Type	
UT-P40 	Current probe	DC to 100 kHz Range: 50 mV/A, 5 mV/A Current range: 0.4 A to 60 A Maximum operating voltage: 600 Vrms Oscilloscope compatibility: All UNI-T series
UT-P41 	Current probe	DC to 100 kHz Range: 100 mV/A, 10 mV/A Current range: 0.4 A to 100 A Maximum operating voltage: 600 Vrms Oscilloscope compatibility: All UNI-T series

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UT-P42	Current probe	DC to 150 kHz Range: 100 mV/A, 10 mV/A Current range: 0.4 A to 200 A Maximum operating voltage: 600 Vrms Oscilloscope compatibility: All UNI-T series
UT-P43	Current probe	DC to 25 MHz Range: 100 mV/A Maximum test current: 20 A Rising time: 14 ns Oscilloscope compatibility: All UNI-T series
UT-P44	Current probe	DC to 50 MHz Range: 50 mV/A Maximum test current: 40 A Rising time: 7 ns Oscilloscope compatibility: All UNI-T series
UT-P4030D	High-frequency current probe	Bandwidth: DC to 100 MHz Rising time: ≤ 3.5 ns Range selection: 30 A/5 A Maximum test current: 30 A Voltage of insulated line: 300 V CAT I Oscilloscope compatibility: All UNI-T series
UT-P4150	High-frequency current probe	Bandwidth: DC to 12 MHz Rising time: ≤29 ns Range selection: 150 A/30 A Maximum test current: 150 A Voltage of insulated line: 600 V CATII 300 V CATIII Oscilloscope compatibility: All UNI-T series
UT-P4500	High-frequency current probe	Bandwidth: DC to 5 MHz Rising time: ≤ 70 ns Range selection: 500 A/75 A Maximum test current: 500 A Voltage of insulated line: 600V CATII 300 V CATIII

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		Oscilloscope compatibility: All UNI-T series
UT-P4100A 	Low-frequency current probe	Bandwidth: DC to 600 kHz Rising time: ≤ 583 ns Maximum test current: 100 A Range selection: 100 A/10 A Range sensitivity: 0.1 V/A, 0.01 V/A Common-mode voltage RMS: CATI 600 V CATII 600 V CATIII 300 V Oscilloscope compatibility: All UNI-T series
UT-P4100B 	Low-frequency current probe	Bandwidth: DC to 2 MHz Rising time: ≤ 175 ns Maximum test current: 100 A Range selection: 100 A/10 A Range sensitivity: 0.1 V/A, 0.01 V/A Common-mode voltage RMS: CATI 600 V CATII 600 V CATIII 300 V Oscilloscope compatibility: All UNI-T series

Active Probe

Model	Type	
UT-P30 	High voltage differential probe	DC to 100 MHz Attenuation ratio 100:1,10:1 Input differential-mode voltage: ± 800 Vpp Oscilloscope compatibility: All UNI-T series
UT-P31 	High voltage differential probe	DC to 100MHz Attenuation ratio 1000:1,100:1 Input differential-mode voltage: ± 1.5 kVpp Oscilloscope compatibility: All UNI-T series

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UT-P32	High voltage differential probe	DC to 50 MHz Attenuation ratio 1000:1,100:1 Input differential-mode voltage: ± 3 kVpp Oscilloscope compatibility: All UNI-T series
UT-P33	High voltage differential probe	DC to 120 MHz Attenuation ratio 100:1,10:1 Input differential-mode voltage: ± 14 kVpp Oscilloscope compatibility: All UNI-T series
UT-P35	High voltage differential probe	DC to 50 MHz Attenuation ratio 500:1,50:1 Rising time: 7 ns Accuracy: 2% Input differential-mode voltage: 1/50:130 (DC+peakAC) 1/500:1300 (DC+peakAC) Input common-mode voltage: 100 Vrms, CATI 600 Vrms, CATII Oscilloscope compatibility: All UNI-T series
UT-P36	High voltage differential probe	DC to 50 MHz Attenuation ratio 2000:1,200:1 Rising time: 3.5 ns Accuracy: 2% Input differential-mode voltage: 1/200:560 (DC+peakAC) 1/2000:5600 (DC+peakAC) Input common-mode voltage: 2800 Vrms, CATI 1400 Vrms, CATII Oscilloscope compatibility: All UNI-T series

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Options Ordering and Installation

1. **Purchase options:** Based on your requirements, please purchase the specified function options from UNI-T Sales Personnel and provide the serial number of the instrument that needs the option installed.
2. **Receive certificate:** You will receive the license certificate based on the address provided in the order.
3. **Register and obtain license:** Visit the UNI-T official website license activation session for registration. Use the license key and instrument serial number provided in the certificate to obtain the option license code and license file.
4. **Install the option:** Download the option license file to the root directory of a USB storage device and connect the USB storage device to the instrument. Once the USB storage device is recognized, the Option Install menu will be activated. Press this menu key to begin installing the option.

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Limited Warranty and Liability

Uni-T guarantees that the Instrument product is free from any defect in material and workmanship within three years from the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination, or improper handling. If you need a warranty service within the warranty period, please contact your seller directly. Uni-T will not be responsible for any special, indirect, incidental, or subsequent damage or loss caused by using this device. For the probes and accessories, the warranty period is one year. Visit instrument.uni-trend.com for full warranty information.

Learn more at: www.uni-trend.com

Register your product to confirm your ownership. You will also get product notifications, update alerts, exclusive offers and all the latest information you need to know.

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https://instruments.uni-trend.com/ContactForm/

Headquarter
UNI-TREND TECHNOLOGY (CHINA) CO., Ltd.
Address: No.6, Industrial North 1st Road, Songshan Lake Park, Dongguan City, Guangdong Province, China
Tel: (86-769) 8572 3888

Europe
UNI-TREND TECHNOLOGY EU GmbH
Address: Affinger Str. 12
86167 Augsburg Germany
Tel: +49 (0)821 8879980

North America
UNI-TREND TECHNOLOGY US INC.
Address: 3171 Mercer Ave STE 104, Bellingham, WA 98225
Tel: +1-888-668-8648

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