# MSO5000HD Series

# High-Resolution Oscilloscopes

## Data Sheet

V2.0

May 2025

# Product Introduction

MSO5000HD series high-resolution oscilloscope has the maximum bandwidth of 1 GHz, the maximum sampling rate of 5 GSa/s, and is equipped with 4 analog channels and 16 digital channels, with the memory depth of up to 500 Mpts. MSO5000HD series adopts exclusive Ultra Phosphor 3.0 technology, achieving the waveform capture rate of up to 1,500,000 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 measurement and mathematical operations.

MSO5000HD series features a 10.1-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.

# Mainstream touchscreen design providing intelligent interactive experience

Featuring a 10.1-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.
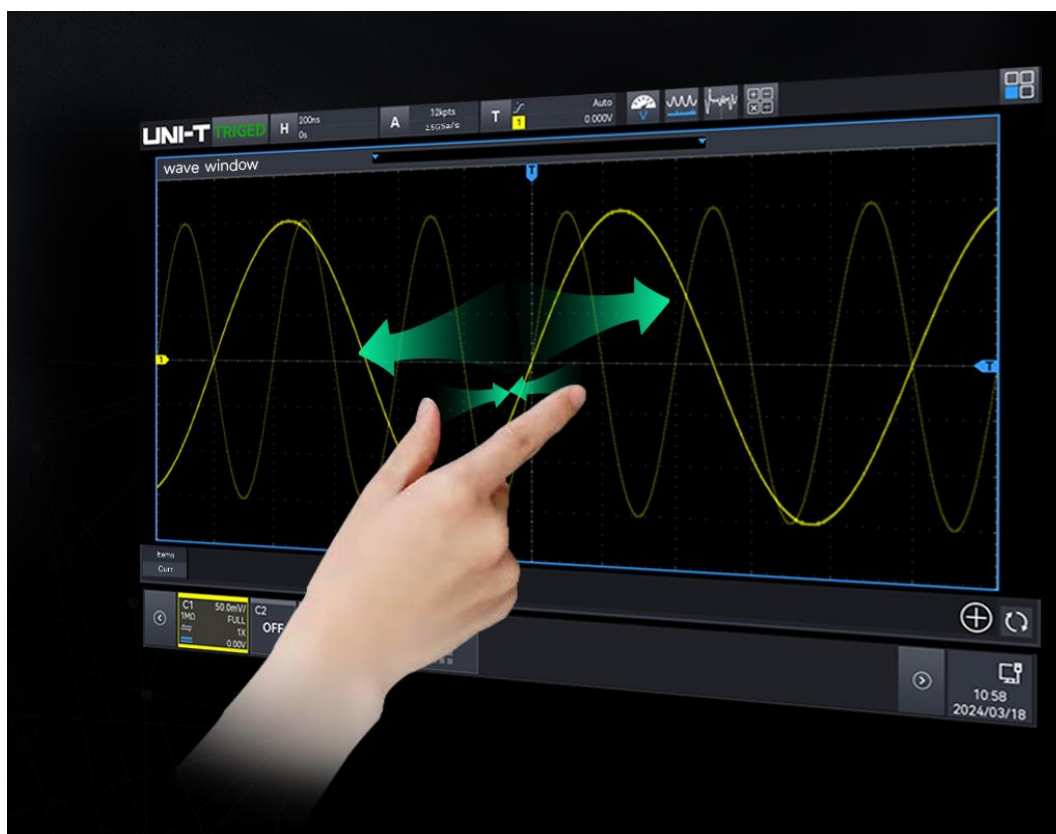
# Brand new appearance design

MSO5000HD 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.

# Features and Advantages

- Analog channel bandwidth: 1 GHz/500 MHz/350 MHz

- Real-time sampling rate of the analog channel is up to 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 memory depth of up to 500 Mpts

- The maximum waveform capture rate is up to 800,000 wfms/s (sequence mode: 1,500,000 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 50 MHz equivalent performance dual-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.

- Supports Timing analyzer for bus: $I^2C$, SPI, CAN

- Parameter measurement adds histogram and line graph display.

- Uninterrupted hardware real-time waveform recording and analysis of up to 400,000 frames and supports USB memory export function.

- Enhanced FFT of up to 4M 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 supports 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, FlexRay, Audio, MIL-STD-1553B, Manchester, SENT, ARINC429, 1-WIRE, CAN-XL, I3C.

- Zone trigger for capturing sporadic signals and observing complicated signals.

■   Ultra Phosphor 3.0 provides a super fluorescent display effect with up to 256 levels of gray.

■   10.1-inch **1280x800 HD capacitive multi-touch screen** supports gesture control such as click, slide, zoom, edit, and drag

■   Multiple peripheral interfaces: USB Host, USB Device, LAN, EXT Trig, AUX Out (Trig Out, Pass/Fail, DVM), Gen Out, HDMI

■   Supports SCPI (Standard Command for Programmable Instruments)

■   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

# 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.
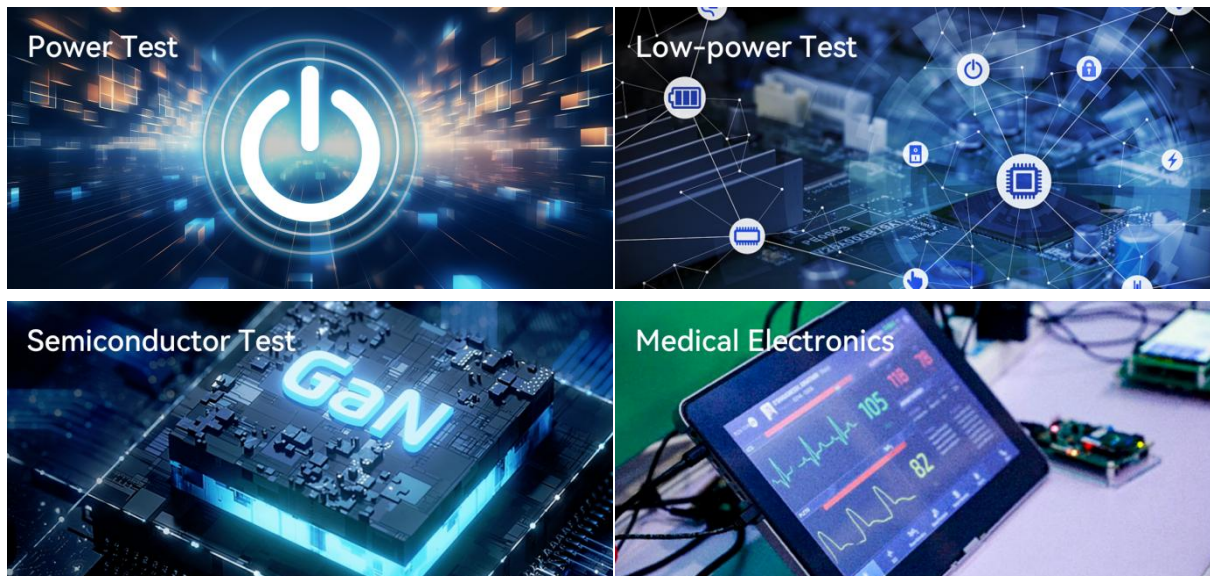


8-bit                                                                  12-bit



The excellent background noise, which is only 75 µVrms at the full bandwidth of 1 GHz, allows the 12-bit ADC to perform optimally.

## Application Scope



# Cost-effective, Nine-in-one Integrated Oscilloscope

MSO5000HD 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.
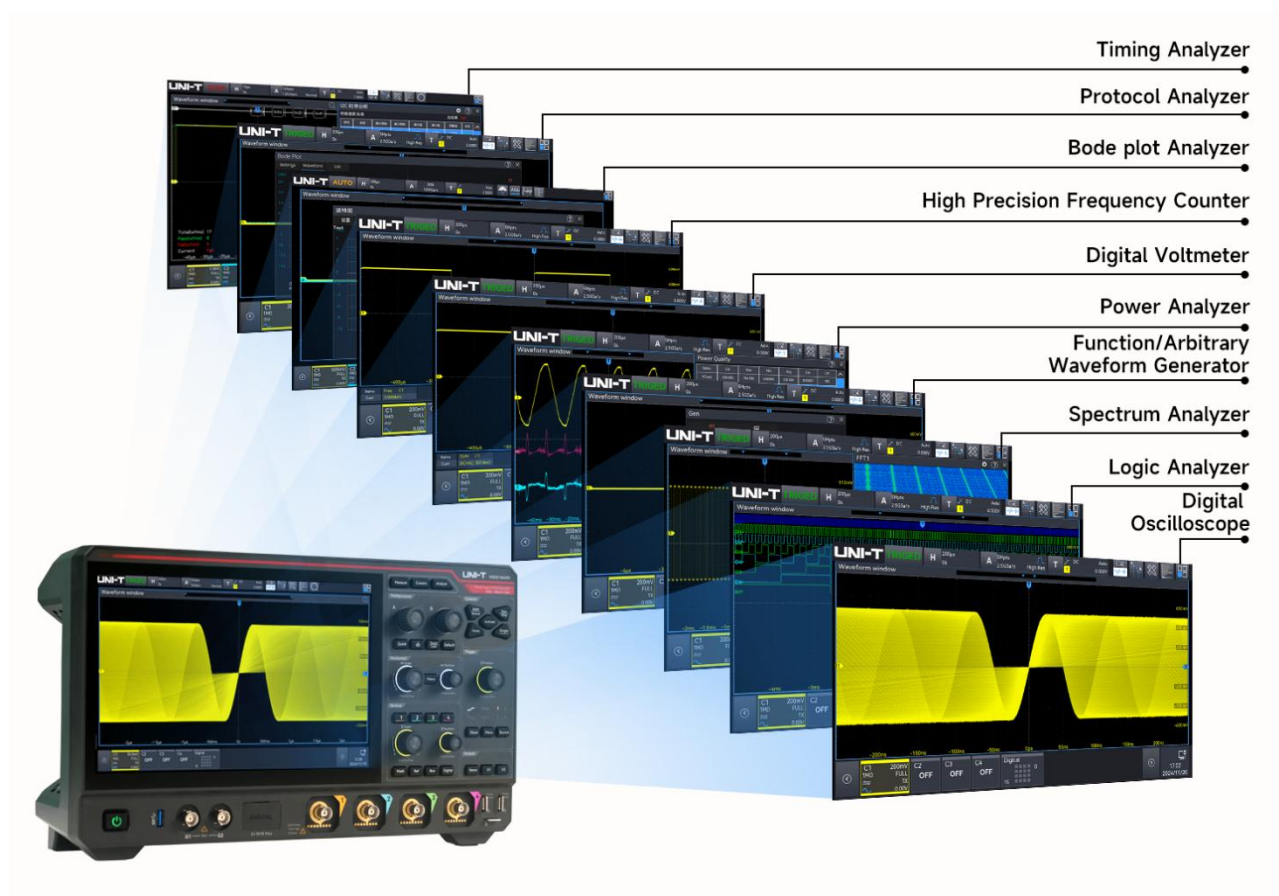
## Digital Oscilloscope

- Bandwidth:1 GHz/500 MHz/350 MHz

- Maximum real-time sampling rate: 5 GSa/s

- Maximum memory depth: 500 Mpts

- 4 analog channels, 1 external trigger channel



## Logic Analyzer (Option)

- 16-channel logic analyzer (hardware standard) can be used with the purchase of a UT-M15 logic analyzer probe (optional).

- Maximum sampling rate: 1.25 GSa/s

- Maximum memory depth: 500 Mpts

- Minimum detectable pulse width: 800 ps

- Digital probe provides separate high 8-bit and low 8-bit connections, it simplifies the connection of DUT. When connecting to square pins, UT-M15 can be connected directly to 8x2 square pins (2.54 mm).



- Logic analyzer probe UT-M15 has great electrical characteristics, with the input impedance of 101 kΩ ± 1% and the capacitive load of only 9.0 pF.

## Function/Arbitrary Waveform Generator (Option)

- 50 MHz equivalent performance dual-channel output

- Sampling rate: 312.5 MSa/s

- Vertical resolution: 16-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 4 Mpts for 4-channel signal analysis

- Frequency range: 0 to 2.5 GHz

- Waterfall curve

- 4 traces and 4 detections

- Mark type: Auto, manual, and threshold

- Marker point list
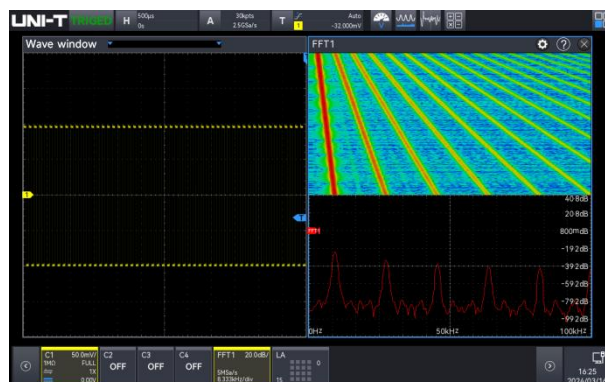
# Digital Voltmeter

- 4-digit voltmeter

- Measurement: DC, AC RMS, and 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 (Option)

- Built-in function/arbitrary waveform generator

- Frequency response analysis

- Loop stability analysis

- Filter analysis

- Amplifier analysis

## Protocol Analyzer

- 15 kinds of triggering and decoding protocols including those for computers, embedded serial buses, automobile, aerospace, and audio applications.

- Decoding can be operated in the pause and record modes.

- Supports event list and search function

| Option Name | Description | Option Model | Standard/Option |
|---|---|---|---|
| Computer serial bus triggering and analysis | RS-232/422/485/UART | - | Standard |
| Embedded serial bus triggering and analysis | I$^2$C, 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 | MSO5000HD-CANFD | Option |
| Automobile serial bus triggering and analysis | CAN-XL | MSO5000HD-CANXL | Option |
| Automobile sensor bus triggering and analysis | FlexRay | MSO5000HD-FLEX | Option |
| Computer serial bus triggering and analysis | SENT | MSO5000HD-SENT | Option |
| Audio serial bus triggering and analysis | Audio | MSO5000HD-AUDIO | Option |
| Aerospace serial bus triggering | MIL-STD-1553, ARINC 429 | MSO5000HD-AREO | Option |

| and analysis | | | |
|---|---|---|---|
| Wireless communication trigger and analysis | Manchester | MSO5000HD-MANCH | Option |
| Sensor bus triggering and decoding | 1-WIRE | MSO5000HD-1WIRE | Option |
| Mobile phone serial bus triggering and decoding | I3C | MSO5000HD-I3C | Option |

## Power Analyzer (Option)

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.

MSO5000HD 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
- Transient response*

- Surge Current
- Rds(on)
- Slew Rate
- Power efficiency*

- Safe Operating Area
- Modulation Analysis
- Ripple Analysis
- Turn On/Off

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

# Timing Analyzer

Intelligent products such as mobile phones, smart wearables, home appliances, multimedia audio-video equipment, and automobile electronic accessories have strict requirements for the consistency of internal bus communication timing. MSO5000HD timing analysis function can analyze parameters like pulse width, amplitude, edge, setup time, and hold time for signals for I²C, SPI, CAN，and I2S. Additionally, it supports exporting conformance test reports.

# 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. MSO5000HD 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 800,000 wfms/s, and up to 1.5 million 350 ps fast edge signals in sequence mode, facilitating easy and accurate capture of occasional signals.
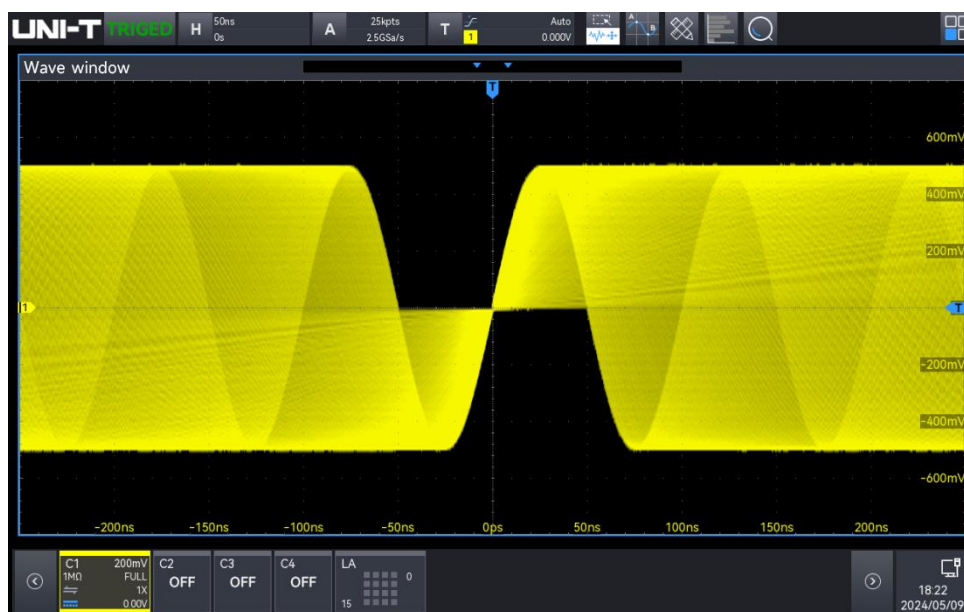


# Brand New Quick Autoset Strategy

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.

# Multiple Parameter Measurements

Parameter measurement is a crucial function for engineers when using an oscilloscope. MSO5000HD series provides 56 measurement parameters, with the capability to display up to 27 measurement parameters simultaneously. Each page of measurement statistics displays 9 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. MSO5000HD series introduces a new amplitude calculation strategy, incorporating top and bottom strategies, making it convenient for engineers to utilize the parameter measurement function. Additionally, MSO5000HD series now includes a burst function that displays burst parameters, enabling accurate and immediate analysis of channel measurement data.



# Region Histogram

The histogram performs probability statistics on the vertical and horizontal directions of the waveform, allowing for jitter analysis and signal integrity analysis.

**Jitter analysis**: The histogram plays a crucial role in jitter analysis. By using histograms, we can statistically analyze the range and distribution of many data samples, thereby verifying the performance and quality of the product, as well as identifying and diagnosing intermittent issues. Histograms are especially useful for analyzing random events such as noise or jitter, as they help in the analysis and verification of jitter.

**Signal integrity analysis**: In signal integrity analysis, histograms are used to display the amplitude distribution of the signal. By observing the histogram, we can assess the stability and quality of the signal, promptly detect any abnormal values or fluctuations in the signal and ensure its integrity and reliability.

Observing itter in the horizontal direction



Observing jitter in the vertical direction

# Mathematical Operation

MSO5000HD 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
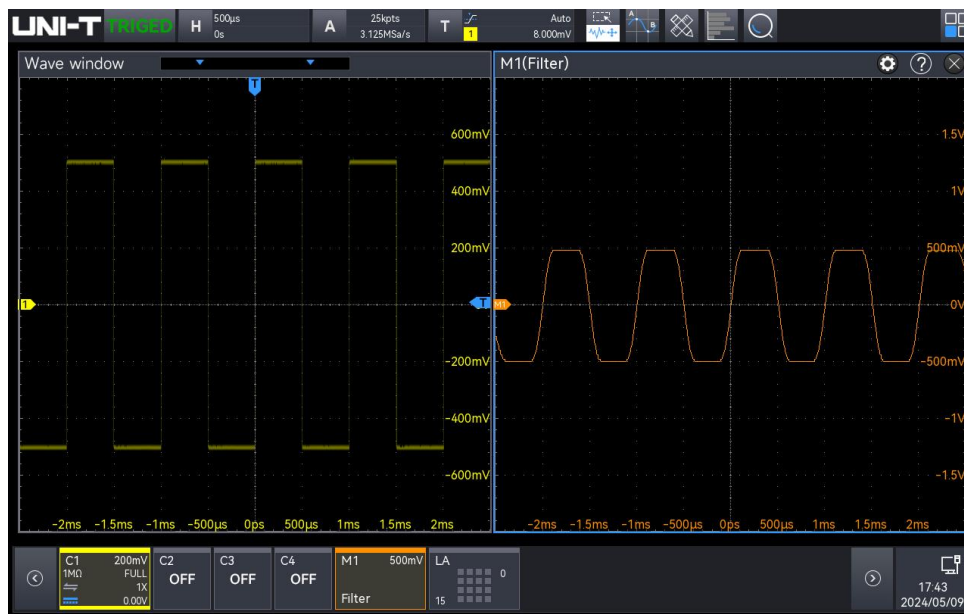


# Navigation and Search

The memory depth of MSO5000HD series is upgraded to 500 Mpts, allowing it to capture tens of thousands of waveforms in one capture. For engineers, manually searching for waveforms is highly time-consuming. The navigation and search function can improve efficiency and save time. MSO5000HD 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. The navigation and search function supports event navigation, time navigation, and marker navigation.
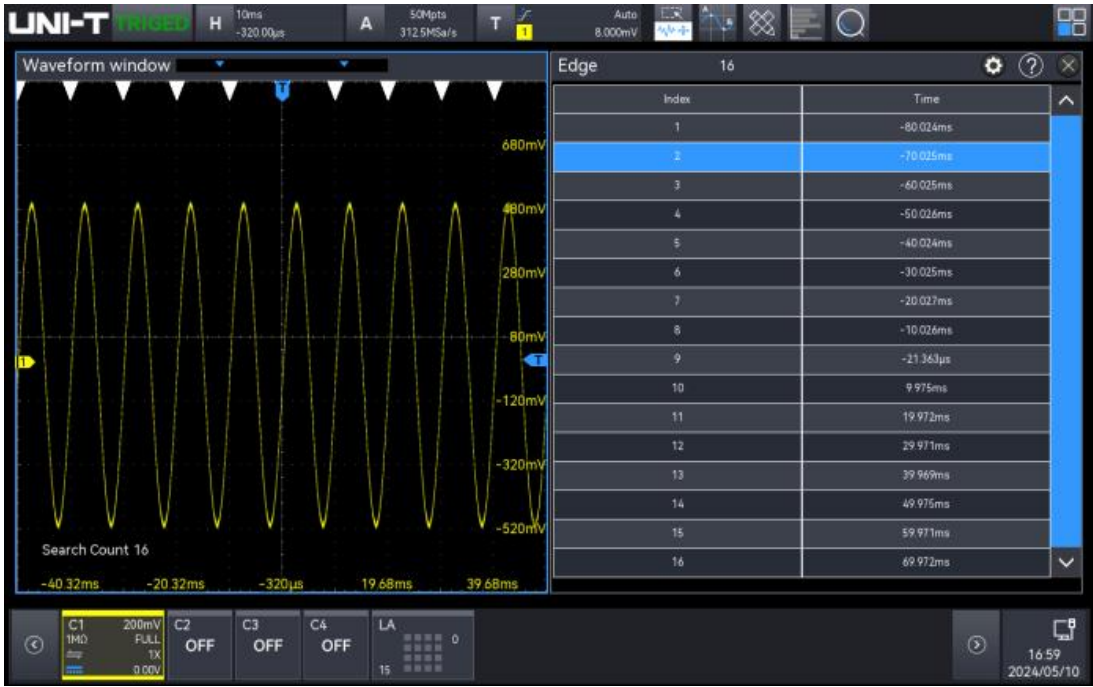
# Hardware-accelerated Template Test

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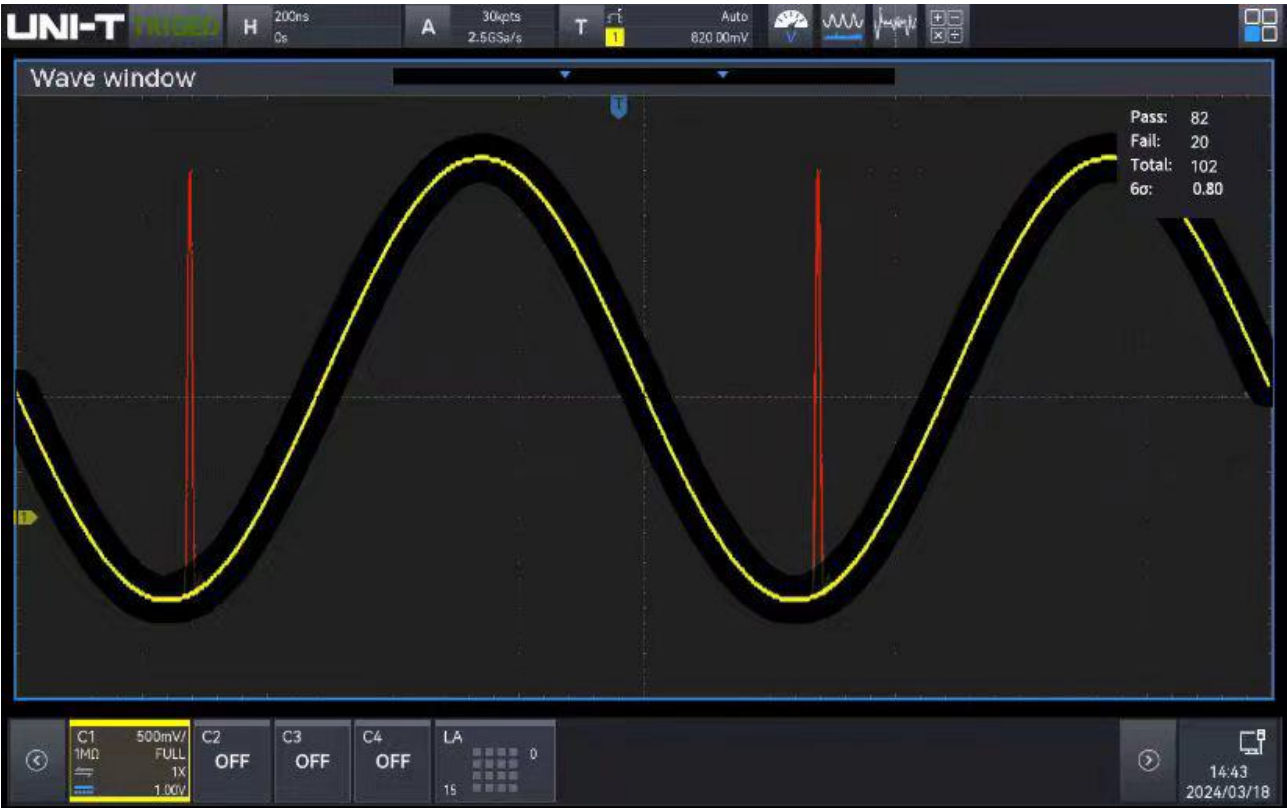
# Zone Trigger

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.



# Various Connection

MSO5000HD series offers a wide range of connections with flexibility and convenience.

# Multiple Control Methods

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



## 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.

## WebServer

SCPI for remote checking and control

Export waveform files

Browsing the user manual online

PC/Mobile phone access
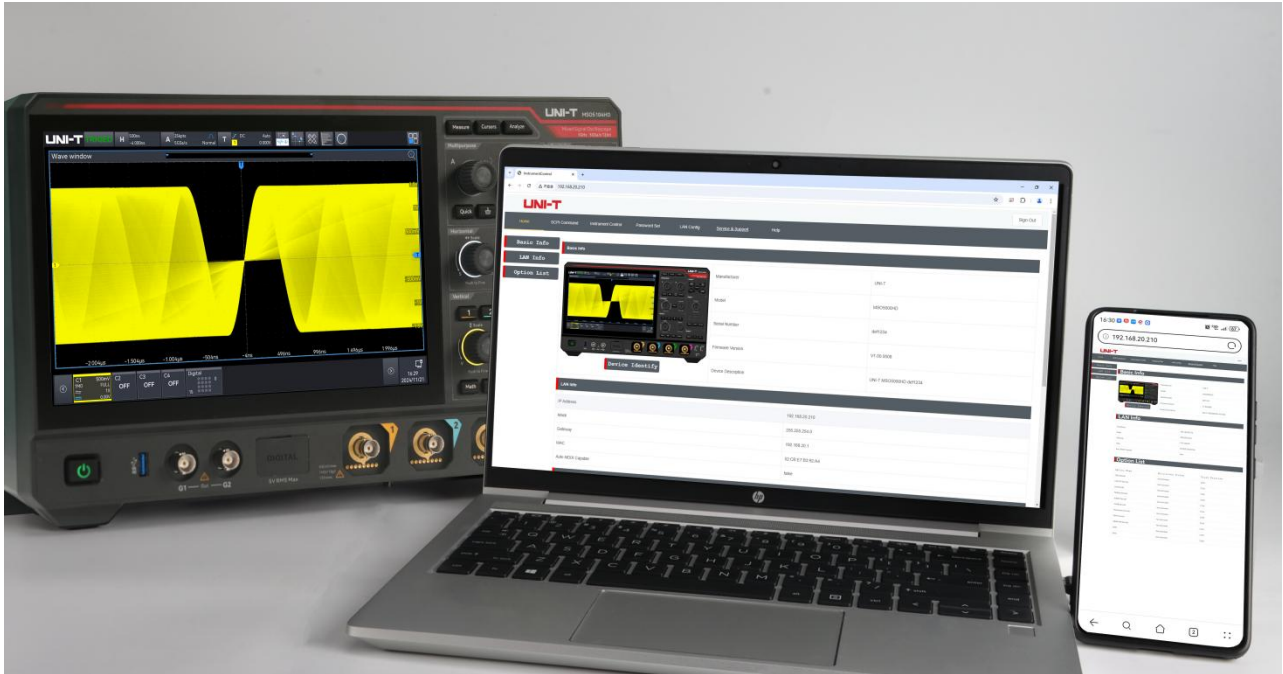
# Document Version Revision Notes

| Document Version | V1.0 |
|---|---|
| Document Revision Content | Initial version |
| Firmware Version: V1.00.0018   Logical Version: V1.00.0003 Hardware Version: V1.01.0000 | |
| Document Version | V1.1 |
| Document Revision Content | Modified channel offset range<br>Modified Gen sampling rate<br>Added Bode plot mode<br>Added 1 MΩ  analog bandwidth<br>Added digital bandwidth adjustment range |
| Firmware Version: V1.00.0042   Logical Version: V1.00.0003 Hardware Version:V1.01.0000 | |

# Technical Specifications

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 MSO5000HD series mixed signal oscilloscope.

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 | MSO5104HD | MSO5054HD | MSO5034HD |
|---|---|---|---|
| Analog bandwidth (50 Ω, -3 dB) | 1 GHz | 500 MHz | 350 MHz |
| Analog bandwidth (1 MΩ, -3 dB) | 500MHz | 500MHz | 350MHz |
| Calculated rise time (10 to 90%) (Typ.) | ≤ 0.35ns | ≤ 0.70ns | ≤ 1.00ns |
| Input/output channel number | 4 analog channels | | |
| | 16 digital channels | | |
| | 2-channel signal output | | |
| Sampling mode | Real-time sampling | | |
| Acquisition mode | Normal, peak detect, high resolution, averaging, enhanced resolution | | |
| ERES | Enhanced bit: 1 , 1.5 , 2 , 2.5 , 3 , 4 (12 to 16-bit) | | |
| Maximum sample rate | Analog channel: 5 GSa/s (interweave mode), 2.5 GSa/s (non-interweave mode) 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, 500 Mpts | | |
| Maximum waveform capture rate | 800,000 wfms/s | | |
| | 1,500,000 wfms/s (sequence mode) | | |
| Sequential sampling | Maximum 400,000 frames, minimum two trigger intervals < 700 ns | | |
| Hardware real-time waveform recording | 400,000 frames | | |

| | |
|---|---|
| and playing | |
| Screen | 10.1 - inch 1280x800 HD capacitive touch screen (fully laminated) |

**Vertical System (Analog channel)**

| | |
|---|---|
| Input coupling | DC, AC, GND |
| Input impedance | (1 MΩ ± 2%) ‖ (16 pF ± 2 pF) <br> 50 Ω ± 1% |
| Probe attenuation factor | Voltage probe ratio：0.001X, 0.01X, 0.1X, 1X, 10X, 100X, 1000X, Custom <br> Current probe ratio：5 mV/A, 10 mV/A, 50 mV/A, 100 mV/A, 200 mV/A, 500 mV/A，1 V/A, Custom |
| Maximum input voltage | 1 MΩ: 400 V (DC+ACVpk) 135 $V_{RMS}$ <br> 50 Ω: 5 $V_{RMS}$ Max |
| Vertical resolution | 12-bit (ERES is enabled with a maximum of 16-bit) |
| Vertical scale | 500 µV/div to 10 V/div（1 MΩ) <br> 500 µV/div to 1 V/div（50 Ω) |
| Offset range | 500 µV/div to 100 mV/div：± 2 V（50 Ω and 1 MΩ) <br> 101 mV/div to 1 V/div：± 5 V（50 Ω) <br> 101 mV/div to 1 V/div：± 20 V（1 MΩ) <br> 1.01 V/div to 10 V/div：± 200 V（1 MΩ) <br> Vertical offset reading: V |
| Band limit (typical) | 50 Ω: 20 MHz, Full, Digital BW <br> 1 MΩ: 20 MHz, Full, Digital BW <br> Digital bandwidth processing is handled at the back-end of digital signal processing, with an adjustable range: 50Hz - maximum analog bandwidth |
| 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 (Typ.) | DC to maximum bandwidth: > 40 dB |

**Digital channel**

| | |
|---|---|
| Threshold | 8-channel in one group |
| Threshold selection | TTL (1.4 V) <br> 5.0 V CMOS (+2.5 V), 3.3 V CMOS (+1.65 V) <br> 2.5 V CMOS (+1.25 V), 1.8 V CMOS (+0.9 V) <br> ECL (-1.3 V) <br> PECL (+3.7 V) <br> 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) |
| Maximum input voltage | ± 20 V |
| Minimum voltage swing | 500 mVpp |
| Minimum detectable pulse width (Typ.) | 800 ps |
| Vertical resolution | 1 bit |
| Channel-to-channel deskew range | ± 100 ns |
| **Horizontal System (Analog channel)** | |
| Time base range | 500 ps/div to 1 ks/div<br>Fine tuning<br>(simultaneously display the current sampling rate and memory depth) |
| Time base accuracy | ± 1 ppm (initial accuracy); ± 1 ppm (the aging rate of first year); ± 3.5 ppm (the aging rate of ten years) |
| Time base delay time range | Pre-trigger (negative delay): ≥ 1 screen width<br>Post-trigger (positive delay): 1 s to 5 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：<br>≤ 10 mV/div, The larger value of 1 div or 5 mVpp<br>> 10 mV/div, 0.5 div<br>EXT：<br>400 mVpp, DC to 10 MHz<br>800 mVpp, 10 MHz to External trigger bandwidth frequency（250 MHz） |
| | Enable the noise rejection, with trigger sensitivity reducing half |
| Trigger level range | Internal：± 4 div from the center of the screen<br>EXT：± 9 V |

| | |
|---|---|
| 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 |
| **Zone Triggering** | |
| Zone | 2 zones; source: CH1-CH4; Feature: Must Intersect, Must Not Intersect |
| **Edge** | |
| Slope | Rising, Falling, Either |
| Source | CH1-CH4, AC Line, EXT, 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 |
| Source | CH1-CH4, D0-D15 |
| **Pulse width** | |
| Polarity | Positive, Negative |
| Trigger condition | >, <, ≤ ≥ |
| Pulse Width | 0.8 ns to 4 s |
| Source | CH1-CH4, AC Line, EXT, D0-D15 |
| **Slope** | |
| Slope | Positive, Negative |
| Trigger condition | >, <, ≤ ≥ |
| Time | 0.4 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 |
|---|---|
| **I²C** | |
| 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 | 100 ns to 1 s |
| Data bit | 4 bits to 32 bits |
| 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 |
| **FlexRay** | |
| Trigger condition | Start, Indicators, Identifier, Cycle, Heade, Data, Identifier & data, End frame, Error |
| Polarity | BM, BDiff/BP |
| Baud rate | 2.5 Mbps, 5 Mbps, 10 Mbps, custom |
| Source | CH1-CH4, D0-D15 |
| **Audio** | |
| Trigger condition | Word, Left, Right, Any |
| Format | Standard, Left Aligned, Right Aligned, TDM |
| Source | CH1-CH4, D0-D15 |
| **MIL-STD-1553B** | |
| Trigger condition | Sync, Command, Status, Data, Error |
| Polarity | Positive, Negative |
| Source | CH1-CH4 |
| **SENT** | |
| Trigger condition | Fast：Sync, Status, Data, CRC, STAT+Data, S&D +CRC, F_ CRC Error, CONT Pul Err<br>Slow： Sync, Short ID, Short Data, Short CRC, Short ID & data, Enh ID, Enh Data, Enh CRC, Enh ID & data, SLO CH CRC error |
| Source | CH1-CH4, D0-D15 |
| **Manchester** | |
| Trigger condition | Start, Header SEG, Data SEG, Tail SEG, Error |
| Baud rate | 500 bps to 10 Mbps |
| Source | CH1-CH4, D0-D15 |
| **ARINC 429** | |
| Trigger condition | Start bits, End bits, Label, Source/Destination Identifier, Data, Signal/Status Matrix, Label & bits, Parity Error, Bit Error, Gap Error, All Error |
| Source | CH1-CH4 |
| **1-WIRE** | |
| Trigger Condition | Start, Command, Set Command, ID, Data, Custom |
| Source | CH1-CH4, D0-D15 |

**I3C**

| | |
|---|---|
| Trigger Condition | I3C：SDR Start, SDR Restart, SDR Stop, SDR Global Broadcast Address, SDR General Command Code, SDR Address, SDR Data, SDR Address & Data, SDR End of Target Reading, SDR Target Reset, SDR Loss Acknowledgment, SDR Checksum Error, HDR Enter, HDR Restart, HDR Exit, HDR_DDR Global Broadcast Address, HDR_DDR General Command Code, HDR_DDR Command Bit, HDR_DDR Data Bit, HDR_DDR Command Bit & Data Bit, HDR_DDR Loss Acknowledgment | Interrupt, HDR_DDR Checksum Error, HDR_DDR CRC Error |
| | I2C: SDR Start, SDR Restart, SDR Stop, SDR Address, SDR Data, SDR Address & Data, SDR Loss Acknowledgment |
| Source | CH1-CH4, D0-D15 |

**CAN-XL**

| | |
|---|---|
| Trigger Condition | Frame Start, Frame Format, Identifier, Data, ID & Data, SDT, VCID, AF, End of Frame, Loss Acknowledgment, Format Error, CRC Error, All Error |
| Source | CH1-CH4, D0-D15 |

**Decoding**

| | |
|---|---|
| Number of decodes | 4 |
| Decoding type | Standard: RS232/UART, I2C, SPI, CAN, LIN |
| | Option: CAN-FD, FlexRay, Audio, MIL-5TD-1553B, SENT, Manchester, ARINC 429, 1-WIRE, I3C, CAN-XL |
| 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 |

**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, +Pulse count, -Pulse count, FRFR, FRFF, FFFR, FFFF, FRLF, FRLR, FFLR, FFLF, 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 27 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, Power Analysis, Timing 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 |
| 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, sign |

**FFT**

| | |
|---|---|
| Channel number | 4 |
| Window types | Hanning, Hamming, Rectangle, Blackman |
| FFT count | Up to 4 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（Option)** | |
| Channel | 2 |
| Sample rate | 312.5 MSa/s |
| Vertical resolution | 16-bit |
| Maximum frequency | 50 MHz |
| Standard | Sine, Square, Ramp, 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 50 MHz |
| | Flatness: ± 0.5 dB（relative to 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<br>Square wave: 1 µHz to 15 MHz; Pulse wave: 1 µHz to 15 MHz |
| | Rising/falling time: < 13 ns (Typ.1 kHz, 1 Vpp. 50 Ω) |
| | Overshoot：Typ. 2% (1 kHz, 1 Vpp, 50 Ω) |
| | Duty ratio<br>Square wave: 1% to 99%, adjustable; Pulse wave: 1% to 99%, adjustable |
| | Resolution of duty ratio: 1% or 10 ns (take the greater value of both) |
| | Minimum pulse width: 20 ns |
| | Resolution of pulse width: 10 ns |
| | Jitter: 2 ns |
| Ramp wave | Frequency range: 1 µHz to 400 kHz |
| | Linearity: 1% |
| | Symmetry: 0.1% to 99.9% |
| Noise | Bandwidth: 50 MHz (Typ.) |
| Arbitrary wave | Frequency range: 1 µHz to 5 MHz |
| | Waveform length: 8 k |
| | Internal save position: 200 |

| | |
|---|---|
| Frequency | Accuracy: ±1 ppm (initial accuracy); ±1ppm (the aging rate of first year); ± 3.5ppm (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) |
| **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 | 10.1 - inch multi-touch capacitive screen (fully laminated) |
| Resolution | 1280×RGB×800 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（option）** | |
| Mode | Bode, PSRR |
| Start frequency | 50 Hz to 50 MHz |
| Stop frequency | 60 Hz to 50 MHz |
| Count | 1 to 1000 |
| Amplitude | High resistance: 20 mVpp to 6 Vpp<br>50Ω: 10 mVpp to 3 Vpp |
| **DVM (Typ.)** | |
| Source | Analog channel |
| 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: ± 1 ppm (initial accuracy); ±1ppm (the aging rate of first year); ± 3.5ppm (the aging rate of ten years) |
| **Interface** | |

| USB-Host 3.0 | 1 on the front panel, 2 on the rear panel |
|---|---|
| USB-Device 3.0 | 1 on the rear panel |
| LAN | LAN (VXI11), 10/100/1000 Base, RJ-45 |
| AUX Out | Trig Out, Pass/Fail, DVM |
| Gen Out | 2 on the front panel |
| 10MHz reference input | 50 Ω, amplitude 400 mVpp to 4.5 Vpp (-3.979 dBm, 17.044 dBm), frequency 10 MHz ± 10 ppm |
| 10MHz reference output | 50 Ω, 1.65 Vpp square wave |
| HDMI[1] | 1 port for external display or projector |

**General technical specification**

**Probe compensator output**

| Output voltage | 3 Vp-p |
|---|---|
| Frequency | 10 Hz ,100 Hz, 1 kHz (default), 10 kHz, 3V-REF |

**Power Source**

| Power source voltage | 100 V to 240 VAC (fluctuation: ± 10%), 50 Hz/60 Hz |
|---|---|
|  | 100 V to 120 VAC (fluctuation: ± 10%), 400 Hz |
| Power consumption | 120 W Max |
| Fuse | 3 A, F-class, 250 V |

**Environmental**

| Temperature | Operating: 0°C to + 40°C |
|---|---|
|  | Non-operating: -20°C to +70°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 |
| Operating environment | In-door |

**Mechanical Specifications**

| Dimension (W×H×D) | 361 mm×209 mm×106 mm |
|---|---|
| Weight | 3.97 kg |

**Calibration interval**

| Calibration interval | 1 year |
|---|---|

**Safety Regulations**

| Electromagnetic | Compliance with EMC directive (2014/30/EU), compliance with or superior |
|---|---|

| compatibility | 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 | 2 kV (AC input) |
| | Surge | IEC 61000-4-5/EN 61000-4-5 | 1 kV (live to zero) 2 kV (live/zero to ground) |
| | Radio continuous sensitivity | IEC 61000-4-6/EN 61000-4-6 | 3 V, 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 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 | MSO5104HD（1 GHz, 4 analog channels+16 digital channels, Gen） | MSO5104HD |
| | MSO5054HD（500 MHz, 4 analog channels+16 digital channels, Gen） | MSO5054HD |
| | MSO5034HD（350 MHz, 4 analog channels+16 digital channels, Gen） | MSO5034HD |
| Standard accessories | National standard cable x 1 | |
| | USB3.0 cable x 1 | UT-D30 |
| | BNC-BNC direct-through line x 1 | UT-L45 |
| | BNC-red and black alligator connecting wire x 1 | UT-L02A |
| | Passive probe (500 MHz) x 4 | UT-P07A |
| Optional accessories | 350MHz Upgrade to 1 GHz Bandwidth | MSO5000HD-BW3M5T1G |
| | 350MHz Upgrade to 500MHz Bandwidth | MSO5000HD-BW3M5T5M |
| | 500MHz Upgrade to 1 GHz Bandwidth | MSO5000HD-BW5MT1G |
| | All serial bus triggering and decoding options | MSO5000HD-BND |
| | Automobile serial bus triggering and decoding option（CAN-FD, FlexRay, SENT） | MSO5000HD-AUTO |
| | CAN-FD: Automotive serial bus triggering and decoding | MSO5000HD-CAN-FD |
| | FlexRay: Automotive Serial Bus Trigger and decoding | MSO5000HD-FLEX |
| | SENT: Automotive sensor serial bus triggering and decoding option | MSO5000HD-SENT |
| | Audio: Audio serial bus triggering and decoding option | MSO5000HD-AUDIO |
| | MIL-STD-1553: Aerospace serial bus triggering and decoding | MSO5000HD-MIL1553 |
| | ARINC429: Aerospace serial bus triggering and decoding | MSO5000HD-ARINC429 |
| | MANCHESTER: Wireless communication serial bus triggering and decoding | MSO5000HD-MANCH |
| | 1-WIRE: Triggering and decoding | MSO5000HD-1WIRE |
| | I3C: Triggering and decoding | MSO5000HD-I3C |
| | CAN-XL: Triggering and decoding | MSO5000HD-CANXL |

| | |
|---|---|
| Dual channel function/arbitrary waveform generator (includes Bode Plot) | MSO5000HD-AWG |
| Power analysis | MSO5000HD-PWR |
| Time sequence analyzer | MSO5000HD-TIME |
| Isolation transformer | UT-ISOT |
| 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 |
| Active probe (single-ended) | UT-PA2000 |
| Current probe | UT-P40/UT-P41/UT-P42/ UT-P43/UT-P44/UT-P4030 D/UT-P4150/UT-P4500/UT -P4100A/UT-P4100B |
| 16-channel logic analyzer probe | UT-M15 |
| Deskew Fixture | UT-DF01 |

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

# Oscilloscope Probes and Accessories

## Passive Probe

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

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

# Current Probe

| Model | Type | |
| --- | --- | --- |
| UT-P40 | | DC to 100 kHz |
|  | Current probe | 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 | | DC to 100 kHz |
|  | Current probe | 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 |

| 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 CATI |
| | | 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 |

| | | 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-PA2000 | Active single-ended probe | 10X: DC to 2 GHz |
| | | Input capacitance: ≤ 1 pF |
| | | Dynamic range: ± 7 V（DC or peak AC） |
| | | Oscilloscope compatibility: MSO7000X/MSO5000HD/MSO3000HD/MSO3000X series |
| 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<br>Attenuation ratio 1000:1,100:1<br>Input differential-mode voltage: ± 1.5 kVpp<br>Oscilloscope compatibility: All UNI-T series |
| UT-P32 | | |
|  | High voltage differential probe | DC to 50 MHz<br>Attenuation ratio 1000:1,100:1<br>Input differential-mode voltage: ± 3 kVpp<br>Oscilloscope compatibility: All UNI-T series |
| UT-P33 | | |
|  | High voltage differential probe | DC to 120 MHz<br>Attenuation ratio 100:1,10:1<br>Input differential-mode voltage: ± 14 kVpp<br>Oscilloscope compatibility: All UNI-T series |
| UT-P35 | | |
|  | High voltage differential probe | DC to 50 MHz<br>Attenuation ratio 500:1, 50:1<br>Rising time: 7 ns<br>Accuracy: 2%<br>Input differential-mode voltage:<br>1/50:130 (DC+peakAC)<br>1/500:1300 (DC+peakAC)<br>Input common-mode voltage:<br>100 Vrms, CATI<br>600 Vrms, CATII<br>Oscilloscope compatibility: All UNI-T series |
| UT-P36 | | |
|  | High voltage differential probe | DC to 50 MHz<br>Attenuation ratio 2000:1, 200:1<br>Rising time: 3.5 ns<br>Accuracy: 2%<br>Input differential-mode voltage:<br>1/200:560 (DC+peakAC)<br>1/2000:5600 (DC+peakAC)<br>Input common-mode voltage:<br>2800 Vrms, CATI<br>1400 Vrms, CATII<br>Oscilloscope compatibility: All UNI-T series |

# 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.

# 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/

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