UNI-T

MSO7000X Series Mixed Signal Oscilloscope

10GSa/s | 2GHz | 1Gpts | 2,000,000wfms/s

Datasheet REV 3.0

2025.05

Extraordinary performance contributes to high-quality testing

The MSO7000X series consists of two models, with bandwidth ranging from 1GHz to 2GHz, sample rate up to 10GSa/s, all equipped with 4 analog channels, adopting the brand-new UltraAcq® technology to achieve the industry-leading waveform capture rate of 600,000wfms/s. The integration of all-in-one measurement instrument functions prepares you for future testing needs. The advanced measurement functions help you easily complete complex tests, and the simple and easy-to-use operation platform makes all the impossible possible.

The user-friendly and perfect design makes your experience easier

Ingenious product design, a brand-new touch and peripheral interaction mode, equipped with a 15.6-inch high-definition capacitive touch screen, an instrument control panel deeply optimized, shortcut keys that take into account the attributes of the instrument, an agile multi-window layout design to provide the maximum display for your waveforms and allow viewing multiple signals at once. At the same time, the easy-to-use WebServer remote debugging capability of MSO7000X, only requiring an instrument IP address, you will be able to debug the oscilloscope in any comfortable posture.

Rich-in-function test software speeds up your design pace

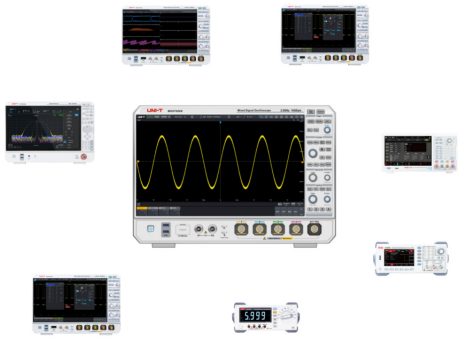
More than 6 kinds of advanced power analysis to accelerate the completion of the design and verification of power supply products. More than 11 kinds of industry protocol analysis to accelerate the diagnosis of system faults and the analysis of debugging. Jitter analysis and eye diagram test to accelerate the location of jitter in clock and data signals. Limit and mask tests to accelerate the incoming inspection at the production end.

MSO7000X Series key features	
Bandwidth	1GHz/2GHz
Sample rate	10GSa/s
Input channels	4+16
Maximum memory depth	1Gpts（standard）
Waveform capture rate	Up to 2,000,000wfms/s
Trigger type	22 +
Measurements	52+
Display	15.6-inch FHD capacitive touch screen
Cross-platform access	Webserver instrument access control, support for mobile devices
Advanced analysis tools	Power analysis、Jitter analysis and eye diagram、Mask and limit test、Histogram、Trace、and Tendency chart
Interface	USB Host 3.0×4，USB Device 3.0×1，10M Ref IN\Out，AUX In\Out，10/100/1000LAN、HDMI

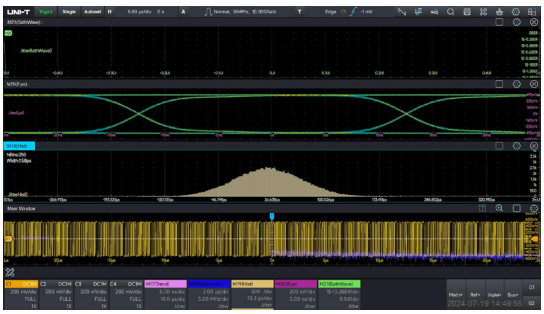
Integrated tools	Std/Option
Spectrum analyzer	Standard
Digital voltmeter	Standard
Frequency counter	Standard
Limit Template Testing	Standard
Function/Arbitray waveform generator	MSO7000X-AWG
Logic analyzer	MSO7000X-LA
Protocol Analyzer	Standard：RS232/422/485/UART、I²C、SPI、CAN、LIN
Protocol Analyzer	Optional: MSO7000X-CANFD MSO7000X-FLEX MSO7000X-SENT MSO7000X-AUDIO MSO7000X-AERO
Jitter analysis and eye diagram	MSO7000X-JITTER
Power analysis	MSO7000X-PWR
Advanced Filter Designer	MSO7000X-FILTER
Matlab Embedded Programming	MSO7000X-MAT
Upgrade suit	MSO7000X-BND
Bandwidth upgrade	MSO7000X-BW-10T20

Extraordinary performance contributes to high-quality testing

The integration of the functions of many independent measurement instruments, any measurement task can be easily handled, and preparations are made for your future testing needs.

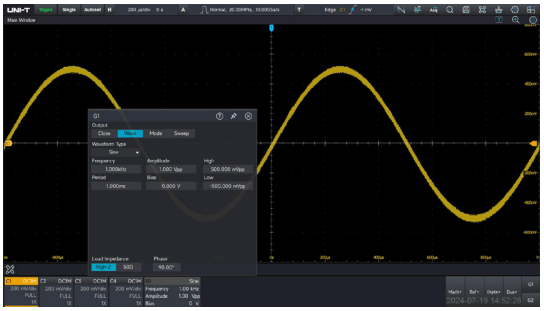


Oscilloscope



- Two bandwidth options: 1GHz/2GHz
- Input channel: 4+16
- Sample rate: 10GSa/S
- waveform capture rate reach to 600,000wfms/s at UltraAcq mode, 2,000,000wfms/s at sequence mode.
- The memory depth: 1Gpts (single channel),250Mpts (full channel)

Function/Arbitrary Waveform Generator (opt)



- dual-channel function/arbitrary waveform generator with equal performance.
- The maximum output frequency is 60MHz, and the sample rate is 625MSa/s.
- Vertical resolution is 16 bits.
- Built-in many kinds of standard waveforms: sine, square, pulse, ramp, noise, DC. Built-in more than 200 kinds of arbitrary waveforms. Support the modulation and sweep of various signals

Spectrum analyzer

- Enhanced FFT with a maximum of 1Mpts signal analysis
- Frequency analysis range: analog bandwidth of the oscilloscope
- Support multiple spectrum view displays: Amplitude spectrum, Power spectrum, Psd, Real part,

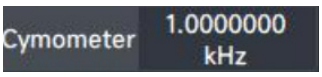
Imaginary part, Phase spectrum.

- Two spectrum analysis windows can be added simultaneously to meet the visual display under different window functions.

Digital voltmeter

- 4-digit DC/AC RMS/DC + AC RMS voltage measurement

Frequency counter

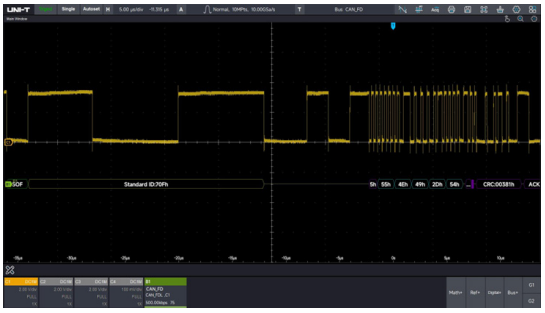


- 8-digit high-precision hardware frequency meter as standard

Logic analyzer (opt)

- The standard configuration includes a 16-channel logic analyzer. You only need to select MSO7000X-LA to obtain the service.
- Digital channel sample rate: 1.25GSa/s
- Digital channel memory depth: 125Mpts
- The minimum identifiable pulse width is as low as 3.2ns
- The digital probe provides a signal input socket with the upper eight bits separated from the lower eight bits, and simplifies the connection with the device under test. When connected with square pins, the UT-M15 can be directly connected to an 8X2 square pin header with pins of 2.54mm
- The UT-M15 provides excellent electrical characteristics, with an input impedance of 101kΩ ± 1%

Protocol analyzer (opt)



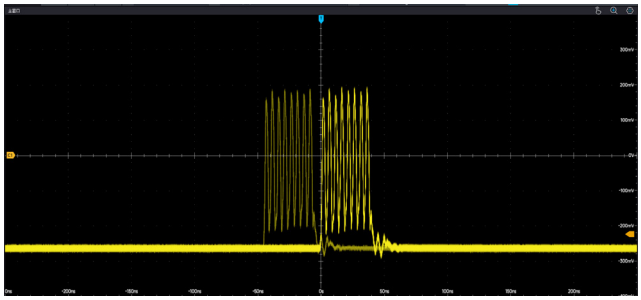
MSO7000X provides various serial bus analysis and multiple protocol trigger modes, which can trigger specific packet contents, identify polarities, chip selects, etc. The trigger events are displayed in a list, and protocol search can be performed to accurately locate protocol frames.

It covers commonly used protocols in Computer\Embedded\Automotive\Aero\Audio design.

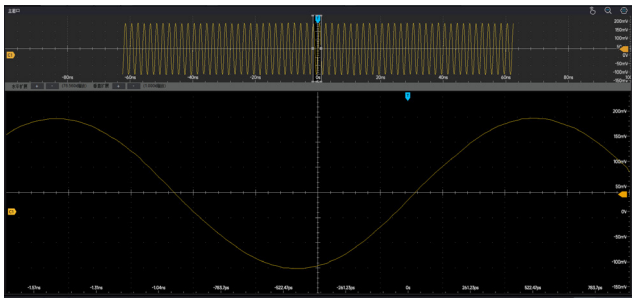
The patented UltraAcq® technology, perfectly captures, showing every detail

Different from before, the MSO7000X provides a unique physical button UltraAcq. With a gentle press, the oscilloscope enters the ultra-fast acquisition mode, increasing the real-time waveform capture rate to 600,000wfms/s, and reducing the dead time of the oscilloscope to the lowest < 1μs, which improves the probability of viewing common sporadic problems in digital systems, such as Runt pulses, Glitch, Timing issues etc. The MSO7000X can smoothly switch between DSO (Digital Storage) and UPO (Ultra Phosphor) through the UltraAcq mode. You can focus on

the superimposed waveforms to quickly discover sporadic signal abnormalities, or switch to a single waveform to focus on the true signal quality of the waveform.



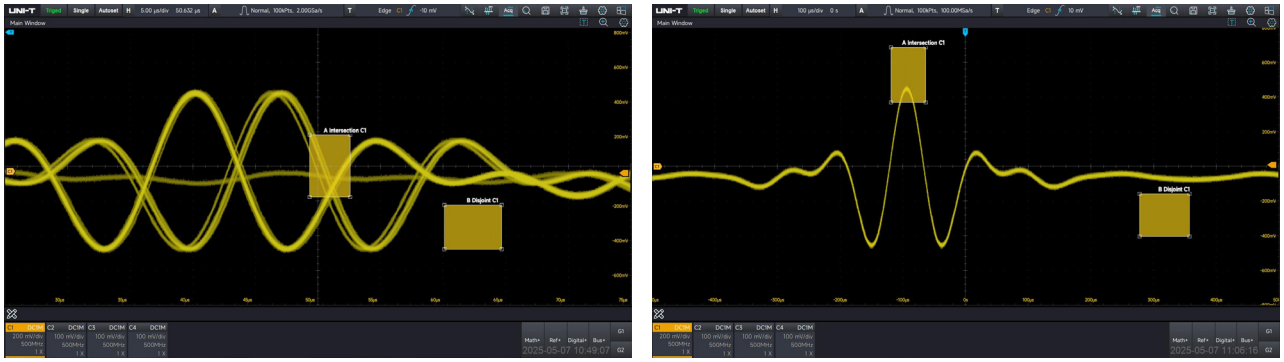
The high capture rate in the UPO mode makes the oscilloscope capture sporadic waveform reflections



Under the DSO mode, there is no envelope of the fast-acquired quickly waveform, and you can easily see the point details of the waveform

Unparalleled triggering capability, also handles complex debugging with ease

The MSO7000X series is equipped with more than 22 kinds of advanced trigger modes, and all modes is equipped with memory depth of 1Gpts as standard. When you are debugging complex systems, you can easily find abnormalities in extremely long data. More than 11 kinds of serial trigger modes help you quickly debug in complex bus debugging, enabling you to have unprecedented in-depth insight into signal details. The flexibly configured zone trigger allows the waveform to roam in the configured area, quickly isolating irrelevant signals. The area trigger can reduce the workload during capture or manual search, quickly find key events in a very short time, and complete the debugging and analysis work.



Use the zone trigger to quickly isolate unconcerned signals, quickly find key information, and there is no need to spend too much time learning advanced trigger mode

Powerful mathematical waveform operation to finely process your signal

Digital filter, User-defined filter design (opt)

Any signal processing system can be regarded as a filter. such as the 20MHz bandwidth limit of an oscilloscope, can be regarded as a low-pass filter, which is used to filter high-frequency noise in the signal. Compared with analog oscilloscopes, digital oscilloscopes have obvious advantages. For example, analog oscilloscopes are affected by circuit components, and it is costly and difficult to achieve high-order filter design. High-order filtering can be easily achieved by digital filter. Digital filter can be implemented as infinite impulse response (IIR) and finite impulse response (FIR), and you can choose which filter designer to apply according to the design requirements. The MSO7000X can specify the filter to be applied to the mathematical waveform

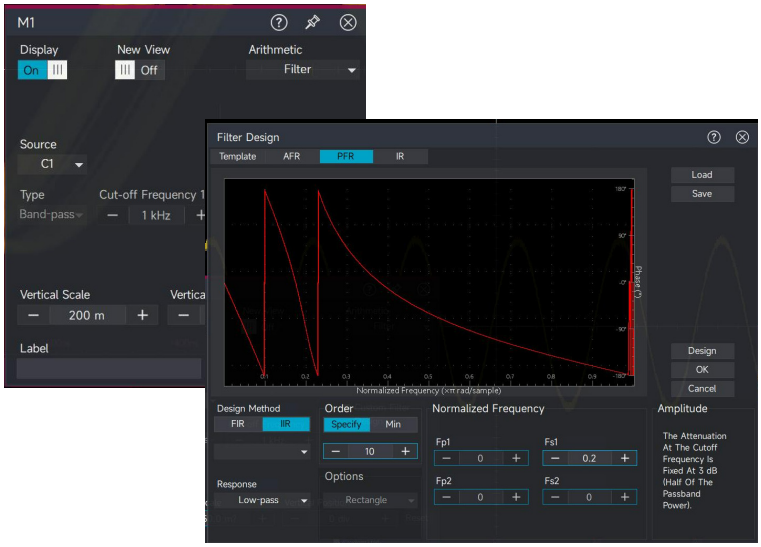
through the Math function, adding support for standard filters and user-defined application-centered filter designs.

The MSO7000X supports the filter response type:

- High pass
- Low pass
- Band pass
- Band stop

The MSO7000X supports the filter type

- Butterworth
- Chebyshev I
- Chebyshev II
- Elliptic
- Sampling
- Remez
- Window



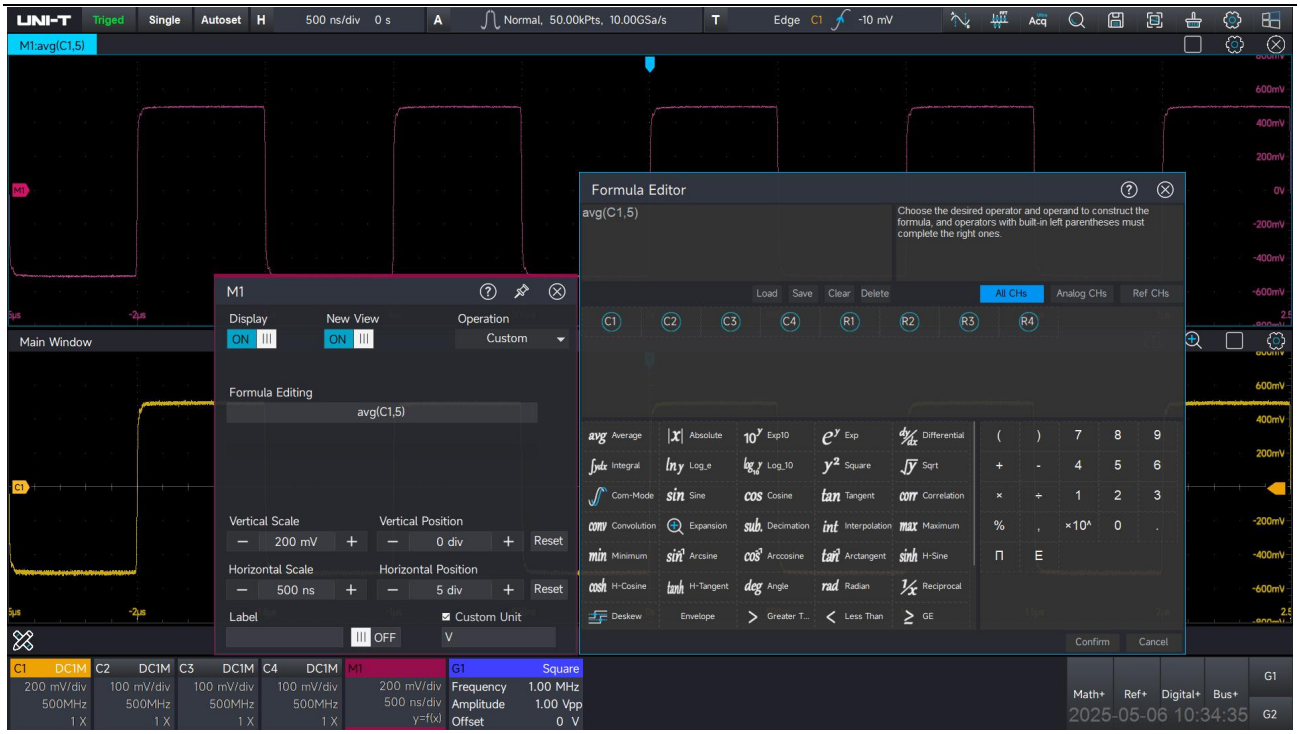
Use the user-defined filter creation dialog box to graphically display the filter type, response, order, etc., and the filter design can be saved and recalled

Eres mode

Eres itself is also a kind of filter, mainly used in small signal amplitude measurement. FIR filter is used to low-pass filter the captured signal. Users can adjust the enhancement bits to select the FIR filter with corresponding length and bandwidth, and adjust the bit within the maximum sampling bandwidth range to match the bandwidth of the low-pass filter. Each channel can be set independently, with a maximum enhancement of 3 bits. If the trade-off between resolution and bandwidth is acceptable, then filter is the best method.

User-defined advanced function operation

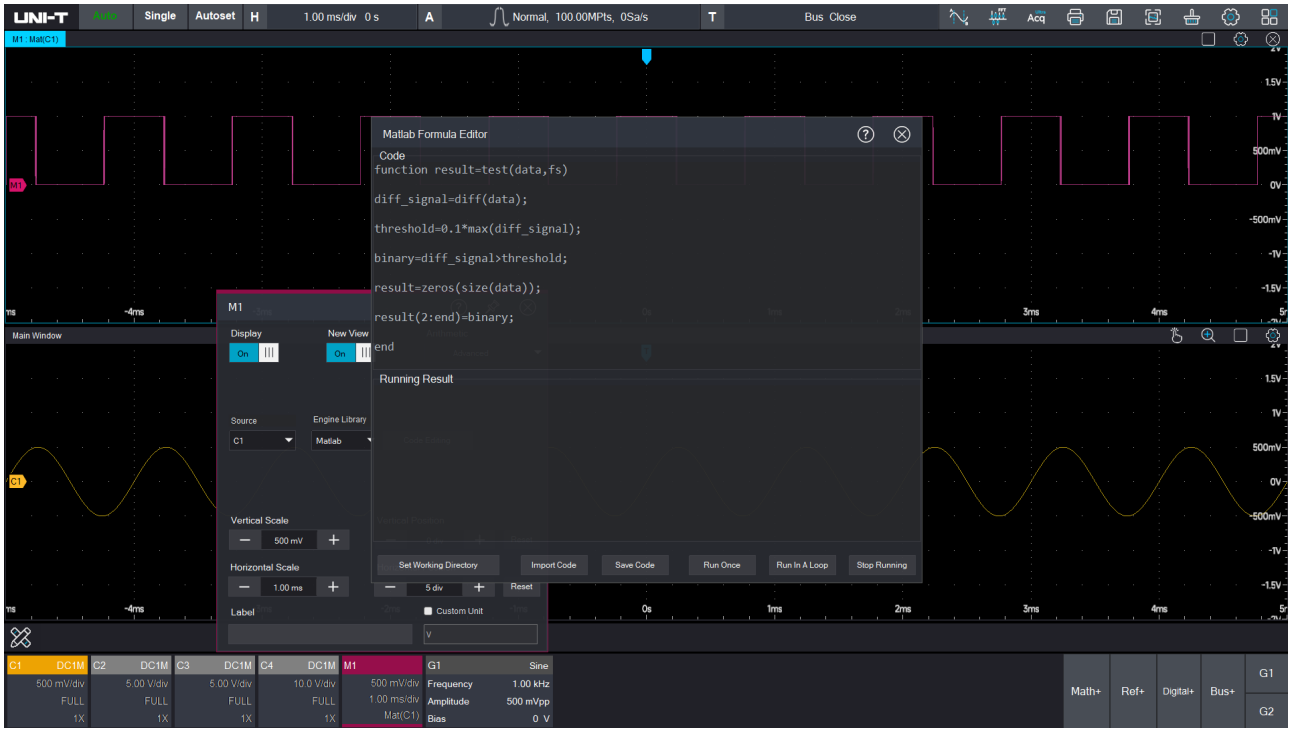
The MSO7000X creates dozens of advanced mathematical function operations for users. Users only need to input according to the function parameter prompts to call the function formula to perform operation processing on the waveform.



The above figure uses the AVG function to average the waveform of channel 1, with an average number of 5 times.

Matlab embedded programming (opt)

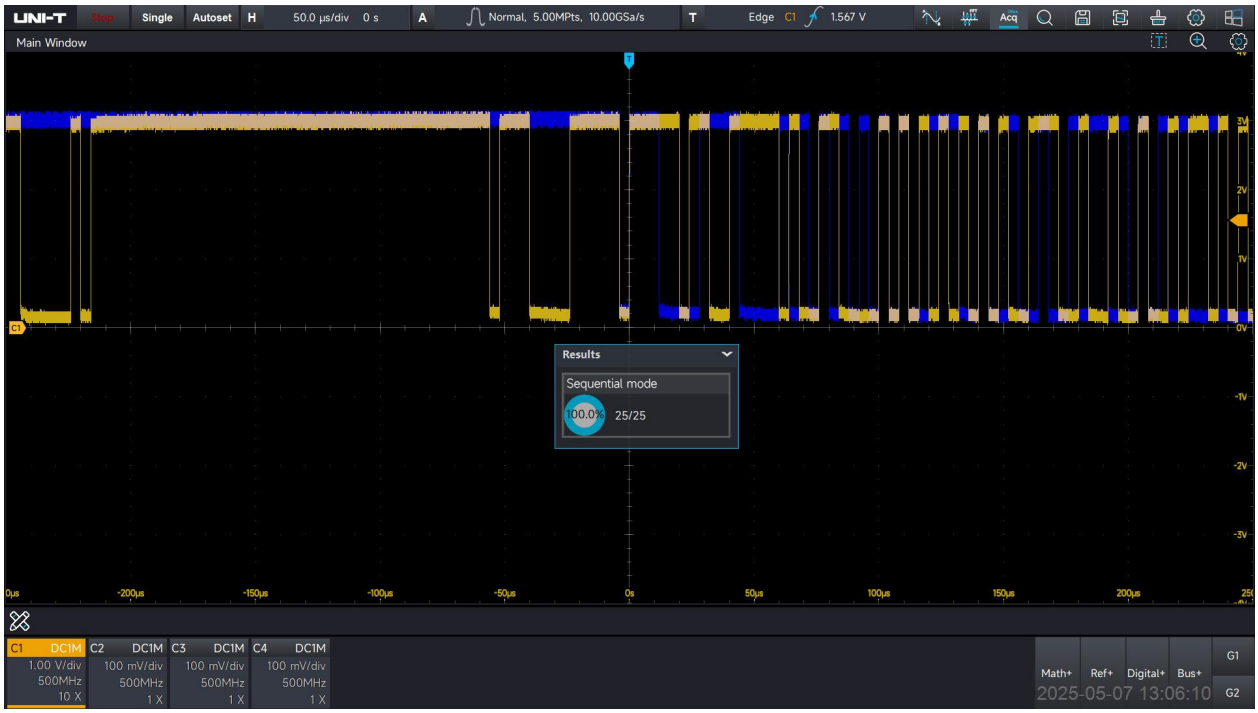
Using the Matlab code compiler embedded in MSO7000X, users can directly write Matlab language and run the script code, and return the running result of the script to render it into the mathematical waveform of the oscilloscope. When the above advanced formulas and basic operation formulas still cannot meet your needs, you can directly write a script for mathematical operations, and the script can also be saved for the next recall.



The above figure uses the matlab script to perform differential processing on the sine waveform of channel 1, and then converts it into a square wave

Sequence mode provides you with more signal information

The sequence mode adopts the segment storage technology to efficiently utilize the memory depth of the oscilloscope, allowing you to effectively save enough trigger events within 1Gpts memory space, while eliminating the long intervals between events. In this mode, the oscilloscope does not render the waveform before the acquisition stops, greatly reducing the acquisition time interval (dead time) of the oscilloscope and increasing the waveform capture rate to 2,000,000wfms/s. After the acquisition is completed, you can view the waveform in a single frame or playback it frame by frame, or view the waveform within up to 40 continuous frames in the form of 45°/Stack/Superposition/splicing. The sequence mode supports the acquisition of up to 520,000 frames of triggered waveforms

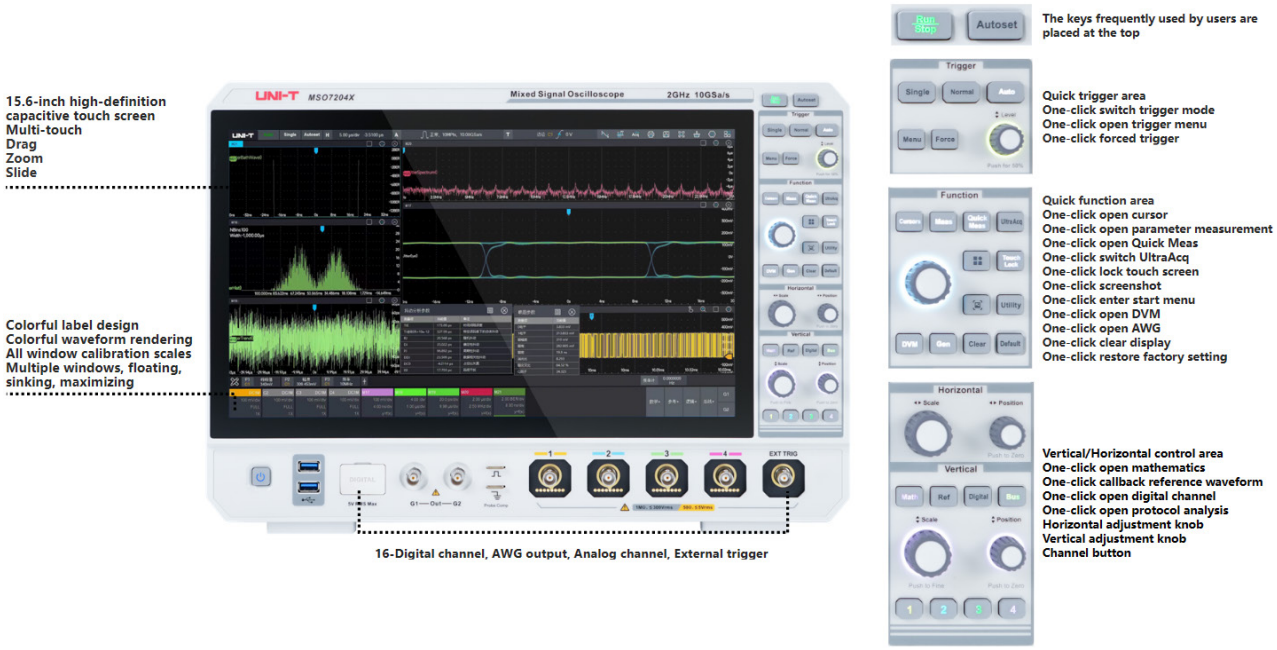


Utilize the fast capture rate of the sequence mode to effectively capture 25 complete CAN protocol frames, and compare each frame. It is found that there is a timing error in the transmission bit. The blue part in the figure is the reference frame, the maroon is completely overlapped, and the yellow part has deviations

The user-friendly and perfect design makes your experience easier

Truly born for product design, with a brand-new touch interaction experience

The use of touch screens on oscilloscopes is not uncommon, but most oscilloscopes still retain the original independent menu buttons and waste a lot of space. The MSO7000X provides a 15.6-inch high-definition capacitive touch screen, while optimizing the proprietary interface of the instrument. While providing the same touch experience as mobile phones and tablets, it retains the instrument's unique knobs and shortcut keys, taking into account the proprietary attributes of the instrument. It supports external Bluetooth mouse/keyboard, and easily turns into a personal workstation in seconds. At the same time, in terms of the instrument UI design, it is more in line with the thinking of engineers, and the expandability of multiple windows also enables engineers to handle measurement tasks more efficiently.



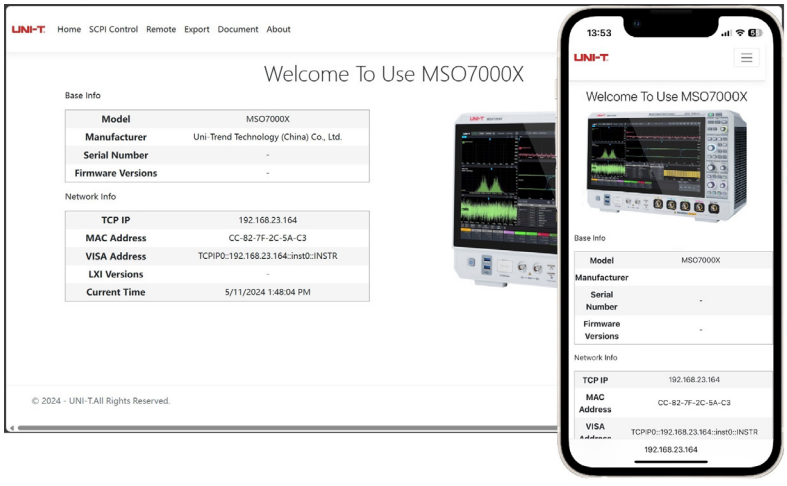
Multi-window, flexible layout, enhance cross-application collaboration capabilities

Have you ever been unable to switch between multiple tasks during the use of the oscilloscope; needed to frequently switch applications when multiple measurement items were carried out simultaneously; been distressed that the layout designed by the manufacturer did not meet your aesthetic standards; been limited by the number of windows and wanted to expand the task windows? The MSO7000X window design will help you solve such troubles. It is specially designed for engineers, and the thinking is more in line with the working habits of engineers. When using multiple windows, you can:

- Move and zoom the waveforms in a single window;
- Drag the window to change the layout and adjust the window size arbitrarily;
- Set the pop-up window to be pinned, the event table to be floating or embedded; reduce frequent switching between multiple windows;
- Set the pop-up window to be pinned, the event table to be floating or embedded; reduce frequent switching between multiple windows;
- Perform full screen/split screen for the independent window and maximize the display;
- Adjust the waveform brightness of the independent window arbitrarily;
- Perform cursor measurement on the waveform of the independent window;

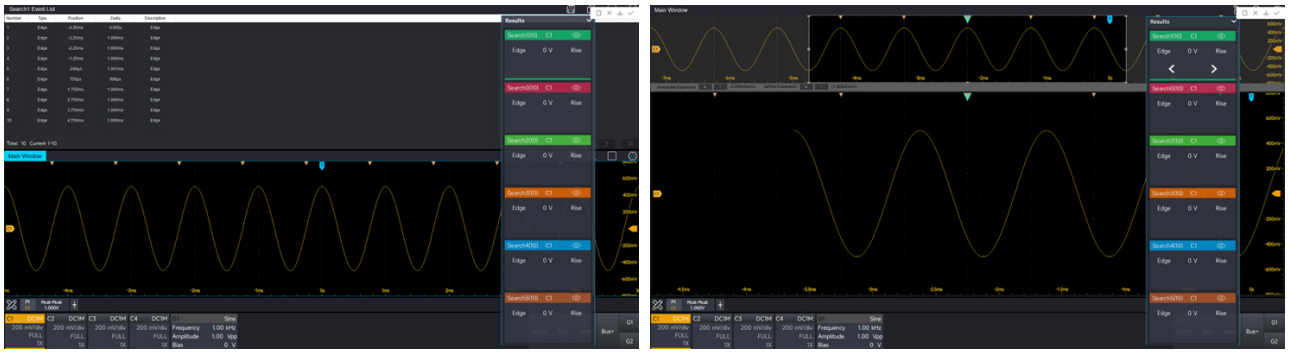
WebServer remote debugging. You can use the oscilloscope in any position

Using the MSO7000X WebServer, you can connect the oscilloscope to your local network. Just enter the IP address of the instrument in the browser, and you can use the oscilloscope for real-time control and analysis on mobile device/PC. At the same time, WebServer also supports online SCPI programming commands, and you can directly export waveform data, take quick screenshots, and browse the instrument manual online on the client side. As long as the network permits, you can even use all the functions of the oscilloscope in any comfortable position.



Search and navigation

If the appropriate search tools are lacking, finding the corresponding events in a 1Gpts long record waveform may consume a significant amount of time. MSO7000X provides search and navigation functions. All search events are highlighted with different colored search markers when they occur. During pauses, simple navigation can be achieved using the previous (←) and next (→) buttons on the search box or the search markers on the display screen. You can define multiple unique search conditions simultaneously for searching, and the event table will display the time of each search occurrence and the search measurement parameters. Up to 10 search settings can be made simultaneously.



Search for the set conditions, such as pulse width search, and all pulse widths that meet the conditions can be found. The triangles with colors mark the positions, and the lengths of the searched pulse widths are displayed. If you are interested in pulse widths with too large differences, you can pause and navigate to the pulse width position for further analysis.

Rich-in-function test software speeds up your design pace

Advanced Power Analysis- MSO7000X-PWR

With the development of chip technology, the requirements for power supply systems are getting higher and higher. Currently, small voltage and large current in power supply networks have become a trend, especially for power supply networks composed of chips or precision components. It is required to ensure reliable power supply and noise suppression for each part of the circuit, as well as complete signal transmission between each chip. Power supply testing also faces greater challenges. Designers are more concerned about the energy saving and response speed of the power supply to ensure the stability and cleanliness of the power supply. The rich advanced power analysis software of MSO7000X helps engineers complete reliable power supply design and power integrity testing. The complete advanced power analysis option for MSO7000X enables rapid and repeatable analysis of:

Input: Power quality, harmonic analysis, inrush current*

Output: Ripple analysis, efficiency*,Turn On/Off time*

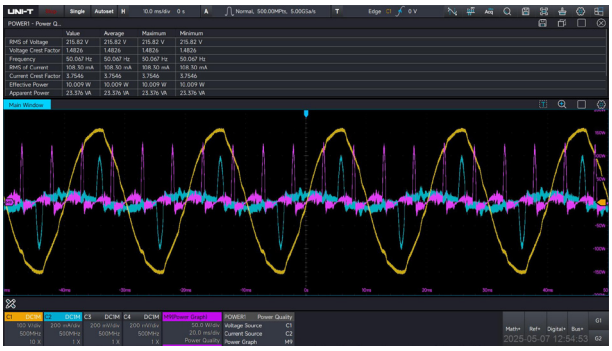
Switching analysis: Switching losses, safe operating area, di/dt*, dv/dt*, RDS(on), modulation analysis

Frequency response analysis: Control loop response (Bode), power supply rejection ratio (PSRR)*

Note: Items marked with * are new. The test diagrams below only show some of the test functions.

Input power quality test

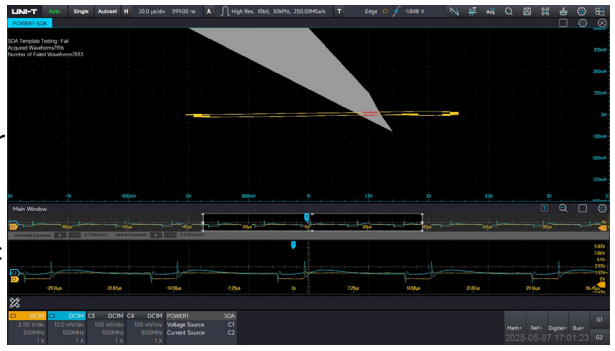
By testing the voltage, current and power at the input terminal, the quality of the input AC line can be effectively evaluated. This test is for the optimization design of the industrial frequency and is also the first hurdle for the quality of the power input.



The indicators of the input power supply are analyzed using MSO7000X-PWR. The yellow one is the voltage waveform, the blue one is the current waveform, and the purple one is the power graph.

Switching device evaluation test

The dynamic parameters of switching devices made of MOSFET/IGBT and third-generation semiconductor SiC and GaN are effectively evaluated, such as power/energy loss, safe working area (SOA), dynamic on-resistance Rds(on), di/dt, dv/dt, PWM modulation information and trends in the switch-on-on-turn-off

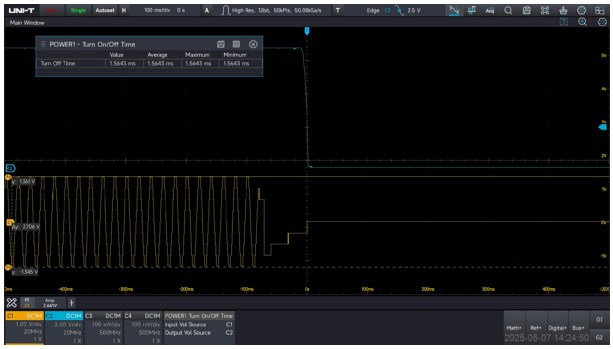


The SOA stress mask test is performed by MSO7000X-PWR software, and the waveform data is automatically collected and the Pass/Fail is judged

stage.

Output-side testing:

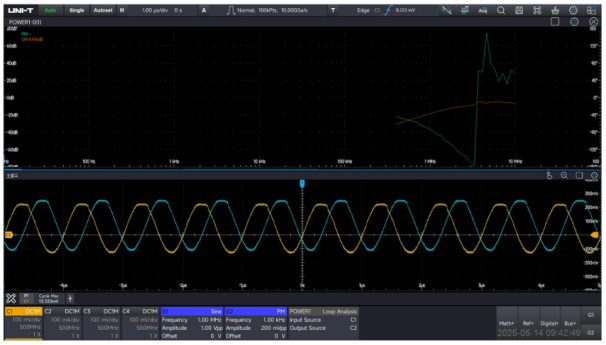
Ripple analysis: analyze the RMS and peak-to-peak value of the output ripple;
Efficiency: Analyze the percentage of AC-DC power conversion efficiency;
Start-up/Shutdown Time: Analyzes the time when the power supply is fully powered on/powered down



The turn-off event is used to evaluate the response time of a power device when, after removing the input voltage, the input voltage approaches zero.

SMPS Loop stability test

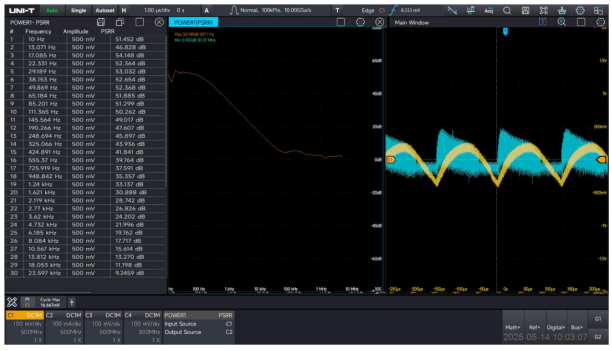
By injecting a disturbance signal with a constantly changing frequency into the switching power supply and based on its output situation, the dynamic modulation ability of the circuit system for each disturbance signal at each frequency point can be judged. By using the Bode plot and gain/phase margin measurement, designers can determine the stability of the power supply control loop.



The loop analysis test is automatically carried out through the MSO7000X-PWR software, and the software automatically evaluates the phase margin and gain margin. To complete the loop stability test, the MSO7000X-AWG signal generator option and the UT-ISOT isolation transformer need to be selected.

Power supply ripple suppression test

PSRR (Power Supply Rejection Ratio) is a term used to describe the amount of output signal that is affected by the power supply, and the larger the PSRR, the less the output signal is affected by the power supply. The PSL measures the modulated input and output AC voltage levels, and then calculates the rejection ratio at each frequency in the swept band. It is calculated as: PSRR = 20log[Ripple(in)/ Ripple(out)]



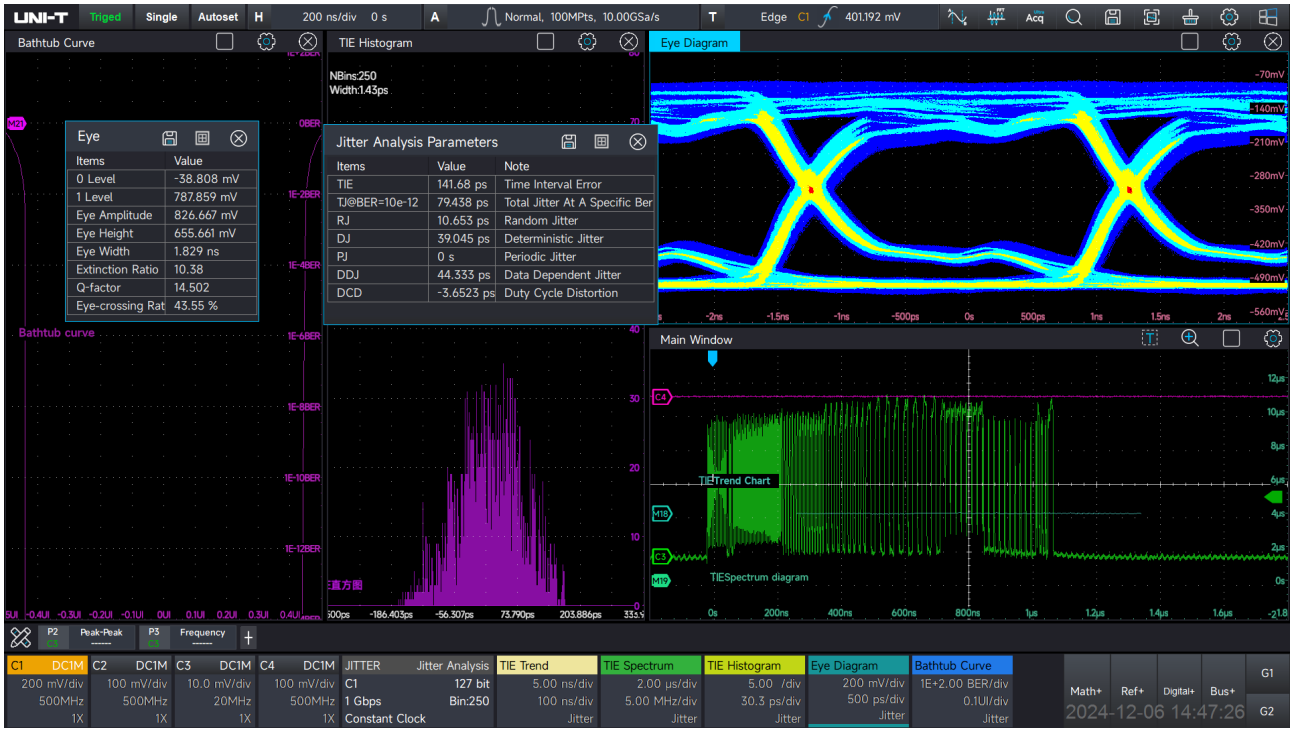
The ripple rejection capability of the power supply linear regulator module (LDO) can be analyzed using the PSRR scan curve, and as can be seen from the figure above, the power supply rejection capability is optimal at 17.1Hz at 54.14dB, and at about 1.3MHz, the worst is 0.907dB

Jitter analysis and eye diagram pre-test

In electronic devices and communication systems, jitter analysis and eye diagram pre-tests play important roles and their applications are also very extensive.

Using the MSO7000X-JITTER jitter analysis and eye diagram option, you can easily complete such as:

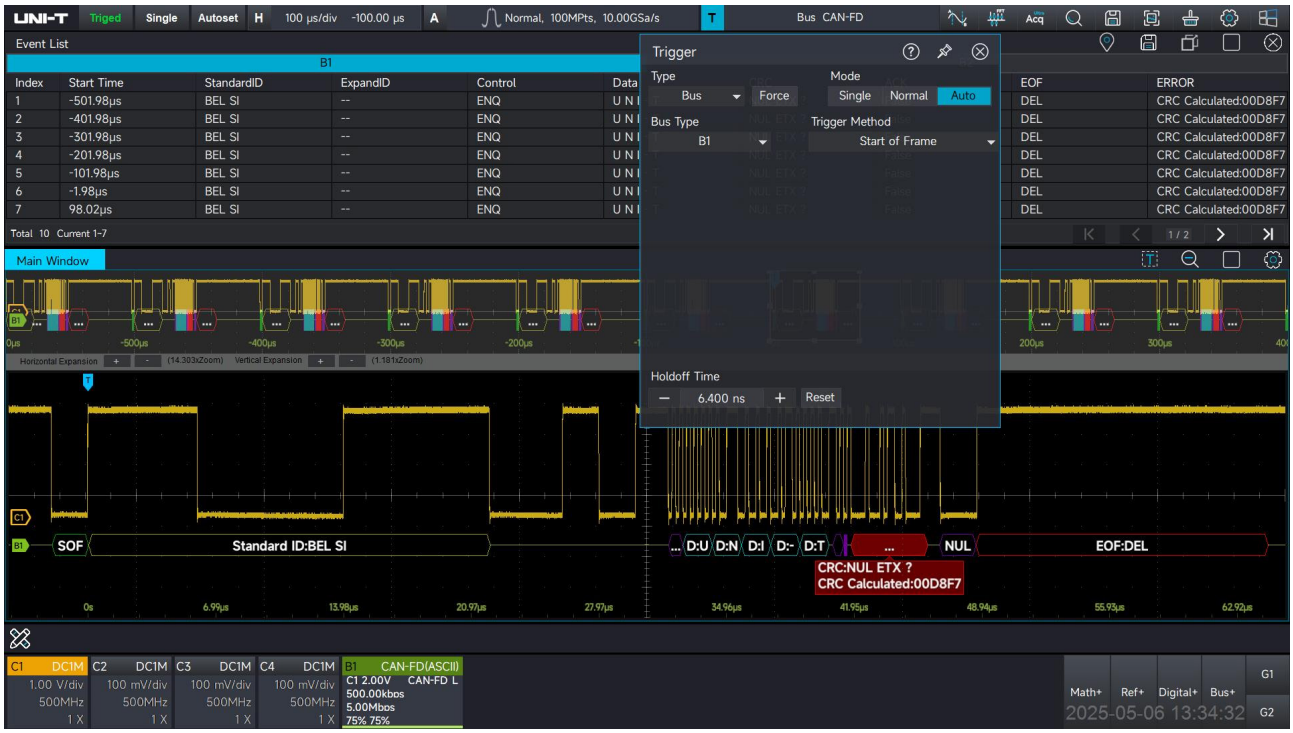
- Evaluate the clock jitter, data jitter and eye diagram openness of serial data communication systems;
- Test the signal integrity, clock synchronization and anti-interference ability of high-speed digital signal transmission systems;
- Evaluate the performance of clock and data recovery systems, including clock extraction, data demodulation and clock reconstruction, etc;
- Evaluate the transmission performance, timing consistency and signal integrity of high-speed interfaces;
- Locate clock jitter, signal distortion and frequency interference;



The MSO7000X-JITTER jitter analysis and eye diagram option has complete jitter measurement algorithms and rich jitter analysis views

Industry serial protocol test

The MSO7000X provides a kit for industry serial data bus decode and trigger, which can measure more than 11 protocols including low-speed/high-speed RS232/422/485/UART, I2C, SPI, CAN, CAN-FD, LIN, AUDIO BUS (I2S, LJ, RJ, TDM), MIL-STD-1553, ARINC 429, etc. Protocol search enables you to search the long acquisition data of serial packets to find the packet parameters of specific content. You can also use the standard serial trigger function to find such events and search and navigate in the event list.

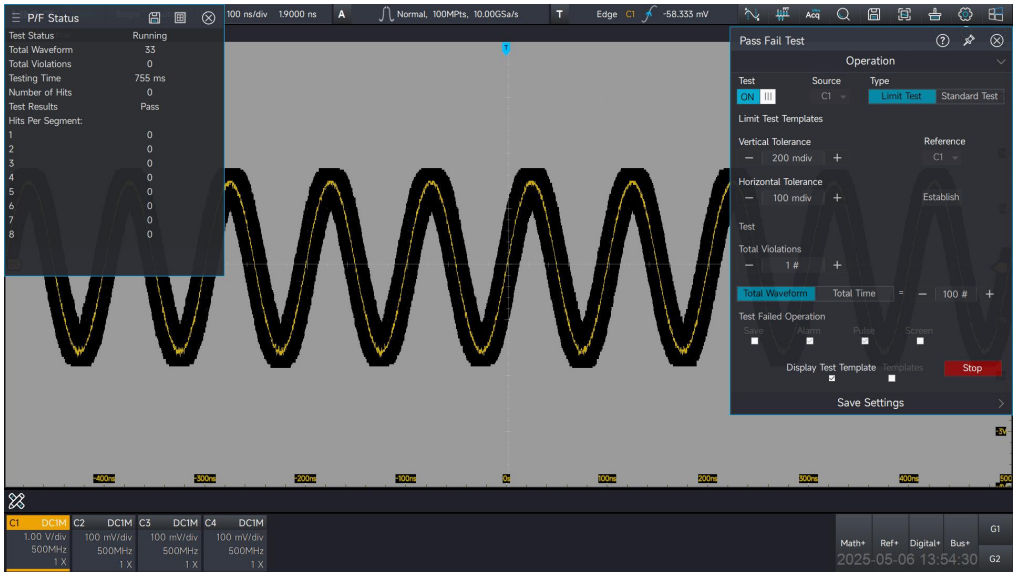


Trigger the CAN-FD bus. The bus waveform provides time-dependent decoded packet content, including standard ID, extension ID, control domain, data domain, check bit, answer bit, packet end frame, and check failure information, etc., and the event list will display all the collected packet content, triggering the CRC check error pattern.

Limit and mask test

The MSO7000X allows the creation of limit templates through standard waveforms to achieve functions such as incoming material screening or quality control in the production line, and improve the consistency and reliability of product design. For example, noise limit tests help evaluate the sensitivity and anti-interference performance of the receiver, the signal-to-noise ratio test of the sensor, the clarity and quality of the audio signal, the safety of medical equipment, etc.

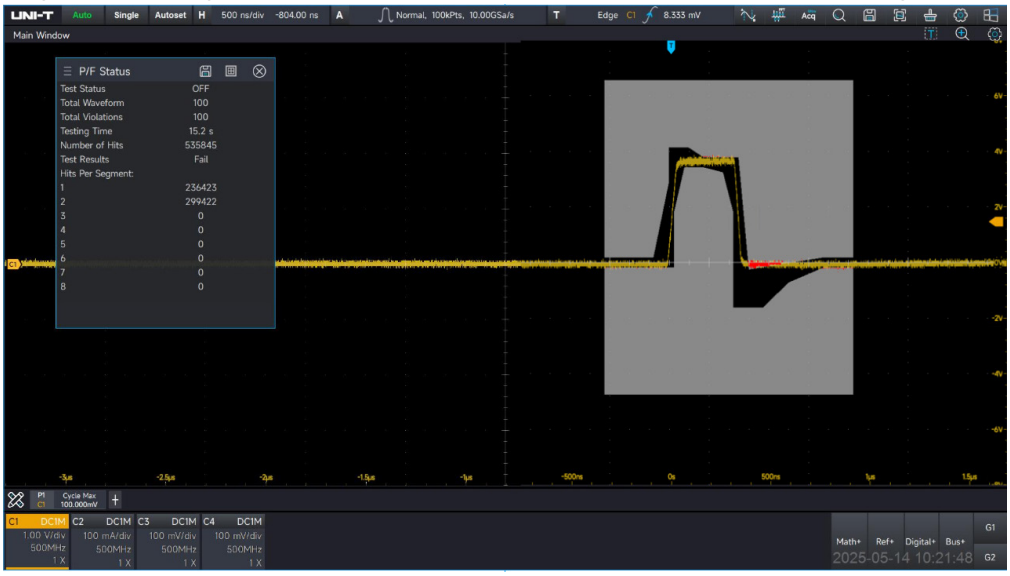
You can customize the vertical and horizontal capacity of the template test, set the total number of violations, set the number of waveforms or the total time of the test, and set the waveform to save, alarm, pulse or take a screenshot when the test fails.



Create a test template using the worst limit of noise, and the waveform screening that meets the standard can be completed in a few seconds

Standard mask test

For your particular attention to signal integrity testing, the MSO7000X also offers industry standard mask as judgment criteria. Use the standard mask to make judgments on the eye diagram opening or conduct standard evaluations on time-domain signals.



The carrier system uses a standard network transmission rate of 1.544Mb to test the signal edge to ensure that the bit transmission rate meets the standard

probe

UT-PA2000/1000 Active single-ended probe

The UT-PA2000/1000 are active, single-ended probes designed for high-frequency measurements, incorporating many of the features required for today's general-purpose high-speed probes. Active single-ended probes are widely used in high-speed digital circuits, bus analysis, signal integrity analysis and many other high-speed fields, UT-PA2000 can more accurately and quickly obtain signal information in the circuit, which helps to improve the efficiency and accuracy of engineers.

bandwidth	UT-PA2000:2GHz UT-PA1000:1GHz
Rise time	UT-PA2000:≤175ps UT-PA1000:≤350ps
Attenuation ratio	10:1±5%
dynamic range	±4V
Bias range	±4V
Input capacitance	≤1.3pF
Input resistance	1MΩ±1%
Output impedance	50Ω
Probe noise	＜7mV ACRMS

UT-PD2500 Active Differential Probe

bandwidth	2.5GHz
Rise time	≤150ps
Attenuation ratio	10:1±5%
dynamic range	±4V
Bias range	±4V
Input capacitance	≤1pF
Input resistance	200kΩ±2% (differential) 100kΩ±2% (single-ended)
Output impedance	50Ω
Probe noise	＜7mV ACRMS

Passive Probe

Model	Type	Description
UT-P07 	High impedance probe	1X: DC ~ 8MHz 10X: DC ~ 500MHz Oscilloscope compatibility: all series of **UNI-T**
UT-P20 	High impedance probe	DC ~ 100MHz Probe coefficient: 100:1 Maximum operating voltage: 1500Vrms Oscilloscope compatibility: all series of **UNI-T**
UT-V23 	High voltage probe	DC ~ 100MHz Probe coefficient: 100:1 Input resistance: 100MΩ ± 2% Maximum operating voltage: 2000Vpp Oscilloscope compatibility: all series of **UNI-T**
UT-P21 	High voltage probe	DC ~ 50MHz Probe coefficient: 1000:1 Maximum operating voltage: DC 15kVrms, AC 10kV (sine wave) Oscilloscope compatibility: all series of **UNI-T**

Current Probe

Model	Type	Description
UT-P40 	Current probe	DC ~ 100kHz Range: 50mV/A, 5mV/A Current Range: 0.4A ~ 60A Maximum operating voltage: 600Vrms Oscilloscope compatibility: all series of **UNI-T**
UT-P41 	Current probe	DC ~ 100kHz Range: 100mV/A, 10mV/A Current Range: 0.4A ~ 100A Maximum operating voltage: 600Vrms Oscilloscope compatibility: all series of **UNI-T**
UT-P42 	Current probe	DC ~ 150kHz Range: 100mV/A, 10mV/A Current Range: 0.4A ~ 200A Maximum operating voltage: 600Vrms Oscilloscope compatibility: all series of **UNI-T**
UT-P43 	Current probe	DC ~ 25MHz Range: 100mV/A Maximum measuring current: 20A Rise time: 14ns Oscilloscope compatibility: all series of **UNI-T**
UT-P44 	Current probe	DC ~ 50MHz Range: 50mV/A Maximum measuring current: 40A Rise time: 7ns Oscilloscope compatibility: all series of **UNI-T**

UT-P4030D 	Current probe	Bandwidth: DC ~ 100MHz Range: 1X:5A, 10X:30A Rise time: ≤3.5ns Maximum continuous current: 30Arms Resolution: 5A:1mA, 30 A:10mA Oscilloscope compatibility: all series of **UNI-T**
UT-P4150 	Current probe	Bandwidth: DC ~ 12MHz Range: 10X:30A, 100X: 150A Rise time: ≤29ns Maximum continuous current:150Arms Resolution: 30A:10mA, 150A:100mA Oscilloscope compatibility: all series of **UNI-T**
UT-P4500 	Current probe	Bandwidth: DC ~ 5MHz Range: 10X:75A, 100X:500A Rising time: ≤70ns Maximum continuous current:500Arms Resolution:75A: 10mA, 500A:100mA Oscilloscope compatibility: all series of **UNI-T**
UT-P4100A 	Current probe	Bandwidth: DC ~ 600kHz Current range: low-scale 50mA-10A, high-scale 1A-100A Range sensitivity: low-scale 0.1V/A, high-scale 0.01V/A Oscilloscope compatibility: all series of **UNI-T**
UT-P4100B 	Current probe	Bandwidth: DC ~ 2MHz Current range: low-scale 50mA-10A, high-scale 1A-100A Range sensitivity: low-scale 0.1V/A, high-scale 0.01V/A Oscilloscope compatibility: all series of **UNI-T**

High voltage differential probe

Model	Type	Description
UT-P30 	High voltage differential probe	DC ~ 100MHz Attenuation ratio: 100:1, 10:1 Differential input voltage: ±800Vpp Oscilloscope compatibility: all series of **UNI-T**
UT-P31 	High voltage differential probe	DC ~ 100MHz Attenuation ratio: 1000:1, 100:1 Differential input voltage: ±1.5kVpp Oscilloscope compatibility: all series of **UNI-T**
UT-P32 	High voltage differential probe	DC ~ 50MHz Attenuation ratio: 1000:1, 100:1 Differential input voltage: ±3kVpp Oscilloscope compatibility: all series of **UNI-T**
UT-P33 	High voltage differential probe	DC ~ 120MHz Attenuation ratio: 100:1, 10:1 Differential input voltage: ±14kVpp Oscilloscope compatibility: all series of **UNI-T**

UT-P35		DC ~ 50MHz Attenuation ratio 500:1, 50:1 Rise time: 7ns Accuracy: 2%
	High voltage differential probe	Differential input voltage: 1/50: 130 (DC + peak AC); 1/500: 1300 (DC + peak AC); Common input voltage: 100Vrms, CATI; 600Vrms, CATII Oscilloscope compatibility: all series of **UNI-T**
UT-P36		DC ~ 50MHz Attenuation ratio 2000:1, 200:1 Rising time 3.5ns Accuracy: 2%
	High voltage differential probe	Differential input voltage: 1/200:560 (DC + peak AC); 1/2000:5600 (DC + peak AC); Common input voltage: 2800Vrms, CATI; 1400Vrms, CATII; Oscilloscope compatibility: all series of **UNI-T**

Technical Parameter

All specifications are guaranteed, except those marked "typical". The instrument must be operated continuously for at least thirty minutes at the specified operating temperature.

Main parameters	MSO7204X	MSO7104X
Bandwidth (-3dB) @50Ω★1	2GHz	1GHz
Bandwidth (-3dB) @1MΩ	500MHz	
Rise time @50Ω(typical)	175ps	350ps
Analog channels	4+EXT	
Digital channels (opt)	16 (option of MSO7000X-LA is required to purchase)	
Sample rate★2	10GSa/s (Single channel);5GSa/s (Dual channel); 2.5GSa/s (Full channel)	
Vertical resolution	8-bit (HD12-bit)	
Maximum memory depth	1Gpts (Single channel); 500Mpts (Dual channel); 250Mpts (Full channel)	
Waveform capture rate★3	2,000,000wfms/s	
Function/Arbitrary waveform generator (opt)	The Maximum frequency output of waveform: 60MHz, Sample rate: 625MSa/s, Supports arbitrary waveform and provides arbitrary waveform editor, Supports modulation and sweep.	
Digital voltmeter	4-bit, DC, AC RMS, DC+AC RMS	
Frequency counter	8-bit	
Serial protocol analysis	Standard: RS-232/422/485/UART, SPI, I^2C, CAN, LIN Option: CAN-FD, SENT, FlexRay, AudioBus(I^2S/LJ/RJ/TDM), MIL-STD-1553, ARINC429	
Measurement	Supports 52 kinds of automatic parameter measurement, quick Meas; and statistical analysis, histogram, trend chart and trace analysis	
Mathematical operation	Up to 8 number of math waveforms at same time, Enhanced FFT, Basic mathematical operation, Filter, Advanced function editor, Embedded matlab programming operation and render(opt), Advanced Filter Designer (opt)	
Analysis tool	Histogram, Area histogram, Trend chart, Trace	

Advanced analysis function	Power analysis (option), Jitter analysis and eye diagram (opt), Mask and limit test, Sequence mode, Search and navigation	
Interface	USB Device, USB Host*4, LAN (10/100/1000Mb/s), HDMI, AuxIn (trigger sync input, AWG external trigger input), AuxOut (trigger sync output, pass the test result, AWG trigger output), 10MHz REF In/Out	
Display screen	15.6-inch FHD capacitive touch screen (1920*1080) + Gesture touch	
Analog channel	**MSO7204**	**MSO7104X**
Channels	4+EXT	
Bandwidth limit @50Ω (typical)	1GHz, 500MHz, 20MHz	500MHz, 20MHz
Bandwidth limit @1MΩ (typical)	20MHz	
Input sensitivity range★4	1MΩ: 1mV/div ~ 10V/div	
	50Ω: 1mV/div ~ 1V/div	
Input coupling	AC, DC, GND	
Input impedance	1MΩ ± 1% (15 ± 3pF), 50Ω ±2%	
DC gain accuracy ★4	**50Ω:** ± 1.5% (± 2.0% at ≤5mV/div) ± full scale division of 1% (≤5mV/div: ± full scale division of 1.5%) **1MΩ:** ± 1.2% (± 1.5% at ≤5mV/div) ± full scale division of 1% (≤5mV/div: ± full scale division of 1.2%)	
Offset range	**1MΩ:**1mV/div-50mV/div:±2V; 100mV/div-500 mV/div:±20V; 1V/div:±40V; 2V/div-10V/div:±100V	
	50Ω: 1mV/div-100mV/div:±2V; 200mV/div-1V/div:±5V	
DC offset accuracy	≤ 200mV/div (± 0.1div ±2mV ± offset of 1.5%) > 200mV/div (± 0.1div ±2mV ± offset of 1.0%)	
Probe attenuation coefficient	1X, 10X, 100X, User: 0.001X~1000X	
Maximum input voltage	1MΩ:≤300Vrms, CAT I; 50Ω:≤5Vrms	
Channel-to-channel isolation	≥500:1 (DC ~ 1GHz)	

★ 1. The 2G bandwidths are only available in single-channel mode

★ 2. Dual channel mode: it can only open C1 and C2; or C3 and C4.

★ 3. The highest waveform capture rate is available for sequential mode on, single channel mode settings

★ 4. 1mV/div is a digital amplification of 2mV/div. For the calculation of vertical accuracy, the 1mV/div vertical sensitivity should be calculated using 16mV at the full scale of 2mV/div

Digital channel (opt)	
Digital input channels	16
Sample rate	1.25GSa/s
Memory depth	125Mpts
Maximum input toggle rate	500MHz
Minimum detectable pulse width	3.2ns
Thresholds	A total of 4 groups are adjustable, each group has 4 channels
Threshold selection	TTL (1.4V) /5.0V CMOS (+2.5V), 3.3V CMOS (+1.65V) /2.5V CMOS (+1.25V), 1.8V CMOS (+0.9V) ECL (-1.3V) / PECL (+3.7V) / LVDS (+1.2V) / 0V / User-defined (4 channel in one group, and the threshold can be adjusted)
Threshold range*	± 20.0V, 20mV stepping
Threshold resolution*	20mV
Threshold accuracy*	±(100mV + 3% of threshold setting after calibration)
Maximum input voltage*	±40Vpeak
Maximum input dynamic range*	±10V + threshold
Minimum voltage swing *	500mVpp
Input impedance*	101kΩ ± 1%
Vertical resolution	1bit
Inter-channel delay*	1.6ns (typical value)
Notes: * indicates the indicator after the oscilloscope is connected to the digital probe	

Horizontal System		
Time base range	100ps/div - 1000s/div	
Time base accuracy	± (1.6+0.5* the number of years after calibration) ppm	
Time base delay time range	Pre-trigger:≥0.5 screen width; Post-trigger:≤5000s	
Channel-to-channel deskew range	± 100ns	
Channel-to-channel synchronization accuracy	≤100ps	
Horizontal mode	Y-T/X-Y/ROLL	
Acquisition System		
Peak detect	Captures glitches as narrow as 400ps	
High resolution	High resolution mode: 8~12 bits	
Averaging	2 ~ 65536	
UltraAcq®	In UltraAcq mode, the waveform capture rate can reach to 600,000wfms/s	
ERes	Enhance bits: 0.5,1,1.5,2,2.5,3	
Trigger System		
Trigger modes	Auto, Normal, Single	
Trigger coupling	HF rejection	Suppresses high-frequency signals above 40kHz
	LF rejection	Suppresses low-frequency signals smaller than 40 kHz
	Noise rejection	Trigger hysteresis to turn on or off
	DC	DC-coupled trigger
	AC	AC-coupled trigger
Trigger holdoff range	6.4ns ~ 10s	
Trigger sensitivity	Internal:C1 ~ C4	≤5mV: 1div; > 5mV: 0.5div

	External	EXT: 100mVpp DC ~ 100MHz, 150mVpp 100MHz ~ 200MHz EXT/5:500mVpp DC ~ 100MHz, 750mVpp 100MHz~200MHz
Trigger level range	Internal	±4divs from the center of the screen
	External	EXT: ±1V; EXT/5: ±5V
	AC Line	Fixed at about 50% of line voltage
Trigger Type		
Zone trigger	Source	C1-C4
	Zone	Up to 2 zones
	attribute	Intersect/Non-intersect
Edge trigger	Source	C1 ~ C4/EXT/(EXT/5)/D0 ~ D15/AC
	Slope	Rising edge, Falling edge, Any edge
Pulse width trigger	Source	C1 ~ C4/D0~D15
	Polarity	Positive pulse width, Negative pulse width
	Limit condition	Less than, greater than, within range
	Pulse width	3.2ns ~ 10s
Slope trigger	Source	C1 ~ C4
	Slope	Rise, Fall
	Limit condition	Less than, greater than, within range
	Time setting	3.2ns ~ 10s
Video trigger	Source	C1 ~ C4
	Standard	NTSC, PAL
	Trigger condition	All lines, specified line, odd field or even field
Pattern trigger	Source	C1 ~ C4
	Pattern setting	H, L, X, rising edge, falling edge
Timeout trigger	Source	C1 ~ C4/D0~D15

	Edge type	Rising edge, Falling edge, Any edge
	Time setting	3.2ns ~ 10s
Runt trigger	Source	C1 ~ C4
	Polarity	Positive pulse width, negative pulse width
	Limit condition	Less than, greater than, within range, outside the range
	Time setting	3.2ns ~ 10s
Setup/Hold trigger	Clock source	C1 ~ C4
	Clock edge	Rising edge, falling edge
	Data source	C1 ~ C4
	Condition	Setup, hold, setup & hold
	Time setting	3.2ns ~ 10s
Delay trigger	Source	C1 ~ C4
	Edge type	Rising edge, falling edge
	Delay type	Less than, Greater than, Within range, Outside the range
	Delay time	3.2ns to 10s
Duration trigger	Source	C1 ~ C4
	pattern setting	H, L, X
	Trigger condition	Greater than, Less than, Within range
	Duration	3.2ns to 10s
Nth edge trigger	Source	C1 ~ C4/D0~D15
	Edge type	Rising edge, Falling edge
	Free time	3.2ns to 10s
	Edge number	1 to 65535
RS-232/422/485/UART trigger	Trigger mode	Start bit, Parity error, Data content, Stop bit
I^2C trigger	Trigger mode	Start, Restart, Stop, Missing Acknowledge, Address, Data, Address and Data

SPI trigger	Trigger mode	Start bit, Data
CAN trigger	Trigger mode	Start of frame, Frame type, Identifier ID, Data, Identifier ID & Data, End of Frame, Error
LIN trigger	Trigger mode	Frame start, ID, data, ID and data, wake-up frame, sleep frame, synchronization error, ID check error, checksum error
CAN-FD trigger (opt)	Trigger mode	Start of frame, Frame type, Identifier ID, Data, Identifier ID & Data, End of Frame, Error
SENT trigger (opt)	Trigger mode	Fast Channel: Sync, Status, Data, CRC, Status + Data, Status + Data + CRC, Error Slow Channel: ID, Data, CRC, ID Data, Slow Channel CRC Error
AudioBus trigger (opt)	Trigger mode	Data, Sync， Channel + Data
FlexRay trigger (opt)	Trigger mode	Frame head, indicator, ID, Cycle count, data, ID & data, End of Frame, error
MIL-STD-1553 trigger (opt)	Trigger mode	Command/Status Word, Data, Error, Synchronization
ARINC 429 trigger (opt)	Trigger mode	Frame Start, Frame End, Label, SDI, Data, SSM, Label & Data, Error
Waveform Measurement		
Cursor Measurement		
Source	C1 ~ C4, Math, Ref	
Type	Vertical cursor measuring time and voltage (X,Y), reciprocal of △X (Hz) (1/△X), △Y/△X (V/s); Horizontal cursor measuring voltage (Y) and △Y; Supports automatic trace cursor;	
Automatic Measurement		
Vertical measurement parameters	Maximum, Minimum, Peak-to-Peak, Top, Base, Middle, Amplitude, Average, RMS, AC RMS, Positive overshoot, Negative overshoot, Maximum cycle, Minimum cycle, Cycle RMS, Cycle average, Cycle Peak-to-Peak, Cycle middle, Positive pre-shoot, Negative pre-shoot	

Horizontal measurement parameters	Period, Frequency, Rise time, Fall time, + pulse width,- pulse width, + duty cycle, - duty cycle, Time @Max, Time @Min, Rise time @Lv, Fall time @Lv, Period @Lv, Frequency @Lv, Pulse width @Lv, Duty cycle @Lv, Phase different @Lv, RRD @Lv, FFD @Lv, RFD @Lv, FRD @Lv, Skew, Data count, Setup time, Hold time, Cycle count，The number of rising edges, the number of falling edges, the number of positive pulses, the number of negative pulses
Other measurements	Area, Periodic area
Histogram parameter	μ±1σ, μ±2σ, μ±3σ, mode, mean, standard deviation, maximum, minimum, median, peak-to-peak, peak count, total sample size
Measurement source	C1 ~ C4，R1~R4
Number of measurements	52 kinds of automatic measurement, it can display 10 parameters at the same time
Measurement range	Screen or Cursor
Quick Meas	Display 38 measurement items of the current measurement source, the source can be switched
Measurement statistics	Current value, Average value, Maximum value, Minimum value, Standard deviation, Measure the count, Histogram, Trend chart, Trace

Waveform math		
Number of math waveforms	Supports 8 math waveforms and it can display at the same time	
Source	C1 ~ C4, R1 ~ R4	
Advanced operation	supporting matlab embedded programming and data presentation	
Basic operation	Add, Subtract, Multiply, Divide, AND, OR, NOT, XOR, Average, Absolute value, Exp10, Exp, Differential, Integral, Ln, Lg, Square, Square root, common, Sine, cos, tan, Correlation, Convolution, extended-value, Extraction, Interpolation, maximum, minimum, user-defined function expression (editable and performs composite formula operations)	
FFT	Function	Amplitude spectrum, Power spectrum, Psd, Real part, Imaginary part, Phase spectrum
	Window functions	Rectangular/Hanning/Blackman-Harris/

		Hamming/Flat top
	Display	Full screen (spectrum view), multi-window
	Vertical units	Vrms/dBrms
Digital filter	Filters type	Low pass, High pass, Band pass, Band stop, User-defined filters
	User-defined the filter design method	FIR,IIR
	User-defined the filter type	Sampling, Window function, Lemmez, Butterworth, Chebyshev I, Chebyshev II, Elliptical
	Response type	Low pass, High pass, Band pass, Band stop
	Filter order	FIR:2-1000; IIR:2-50;
	Filter characteristics	Amplitude-Frequency response, Phase-Frequency response, Impulse response
Measurement Analysis		
Digital voltmeter	Source	C1 ~ C4
	Mode	DC, AC RMS, DC+AC RMS
	Voltage resolution	4 digits
Frequency counter	Frequency resolution	8 digits
Mask and limit testing	Source	C1 ~ C4
	Test mask	User-defined test mask or load standard test mask
	Test failure	Stop, Save, Alarm, Pulse, Take a screenshot
Histogram	Source	P1 ~ P10
	Type	Horizontal, vertical and measurement
	Measurement item	μ±1σ, μ±2σ, μ±3σ, mode, mean, standard deviation, maximum, minimum, median, peak-to-peak, peak count, total sample size

Jitter analysis and eye diagram	Source	C1 ~ C4, Ref
	Clock recovery	Constant frequency: automatic/user-defined PLL: First-order phase locked loop; Second-order phase-locked loop;
	Jitter View	TIE histogram, TIE trend chart, TIE spectrum, Bath-Tub Curve
	Jitter Measurement parameter	TIE, TJ@BER, RJ, DJ, PJ, DDJ, DCD, Cycle-Cycle
	Eye diagram measurement parameter	Eye amplitude, Eye Height, Eye Width, Level 1, Level 0, Q factor, Eye crossover ratio, Extinction ratio
Power analysis (opt)	Analysis item	Input Analysis: Power Quality, Harmonic Analysis, Inrush Current Output Analysis: Ripple Analysis, Modulation Analysis, Efficiency, Start - up/Shutdown Time Frequency Response Analysis: Control Loop Response (Bode), Power Supply Rejection Ratio (PSRR) Switching Analysis: Switching Losses, Safe Operating Area, di/dt, dv/dt, RDS(on)
Loop analysis (optional power analysis)	Start frequency	50Hz~50MHz
	Stop frequency	60Hz~50MHz
	Points	1~1000
	Output amplitude	High Z: 20mVpp to 6Vpp
		50Ω: 10mVpp to 3Vpp
Serial Bus Decode		
Channels of decode	2-channel	
RS-232/422/485/UART decode	Source	C1 ~ C4, R1-R4
	Data width	5-bit, 6-bit, 7-bit, 8-bit
	Parity check	Odd parity, even parity or no parity

	Stop bit	1-bit, 2-bit
	Polarity	Positive, Negative
	Bit sequence	LSB, MSB
	Baud rate	2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, User-defined
I²C decode	Source	C1 ~ C4，R1-R4
	Signal	SCL, SDA
	Address length	7-bit, 10-bit
SPI decode	Source	C1 ~ C4，R1-R4
	mode	TIMEOUT，CS
	Signal	Clock, word selection, data
	Clock edge	Rise edge, Fall edge
	Chip selection Polarity	High level, Low level
	Data polarity	Positive, Negative
	Data bit width	4-32
	Bit sequence	Least significant bit (LSB), highest significant bit (MSB)
CAN decode	Source	C1 ~ C4，R1-R4
	Signal	CAN_H, CAN_L, Differential
	Sampling points	Positive, Negative
	Sampling points	30%-90%
	Signal rate	10kbps，19.2kbps，20kbps，33.3kbps，38.4kbps，50kbps，57.6kbps，62.5kbps，83.3kbps，100kbps，115.2kbps，125kbps，230.4kbps，250kbps，490.8kbps，500kbps，800kbps，

		921.6kbps，1Mbps 2Mbps，3Mbps，4Mbps， 5Mbps User-defined
LIN decode	LIN protocol version	1.0，2.0，Both
	Source	C1～C4，R1-R4
	Baud rate	2400bps, 4800bps, 9600bps, 19200bps, User-defined
	Polarity	Positive, Negative
	Sampling points	50%-90%
	ID include parity bits	Yes/No
CAN-FD decode (opt)	Source	C1～C4，R1-R4
	Signal type	CAN-FD_H, CAN-FD_L, differential
	Quorum domain sampling points	30-90%
	Data domain sampling points	30-90%
	SD signal rate	10kbps，19.2kbps，20kbps，33.3kbps，38.4kbps，50kbps，57.6kbps，62.5kbps，83.3bps，100kbps，115.2kbps，125kbps，230.4kbps，250kbps，490.8kbps ， 500kbps，800kbps，921.6kbps，1Mbps，2Mbps，3Mbps，4Mbps，5Mbps User-defined
	FD signal rate	250kbps，500kbps，800kbps，1Mbps，1.5Mbps，2Mbps，3Mbps， 4Mbps，5Mbps，6Mbps，7Mbps，8Mbps User-defined

SENT decode (opt)	Source	C1 ~ C4，R1-R4
	polarity	Positive polarity, negative polarity
	Clock cycles	1us，3us，10us，30us，100us，300us User-defined
	Clock tolerance	1%-30%
	mode	Fast Channel/Slow Channel
	Pause bits	None/Yes
	Segment format	Nibble, fast lane
	The length of the data	1Nibbles，2Nibbles，3Nibbles，4Nibbles，5Nibbles，6Nibbles
AudioBus decode (opt)	Source	C1-C4，R1-R4
	Protocol type	I2S, LJ, RJ, TDM
	The word selects polarity	Positive polarity, negative polarity
	Clock edges	Rising edge, falling edge
	Data polarity	Positive polarity, negative polarity
	Positional order	MSB，LSB
	Channel type	Left and right channels/Left channels/Right channels
	The number of bits of data per channel	2-64bit
	The number of channels per frame	4-32
	The number of clock bits per channel	4-32
	Bit delay	0-31 bits
FlexRay decode (opt)	Source	C1 ~ C4，R1-R4
	Signal	BP, BM
	Baud rate	1Mbps, 5Mbps, 10Mbps, User defined

	Channel type	A/B
MIL-STD-1553 decode (opt)	Source	C1 ~ C4，R1-R4
	Baud rate	1Mbps, 10Mbps, User-defined
	polarity	Positive/negative polarity
ARINC 429 decode (opt)	Source	C1 ~ C4，R1-R4
	Signal rate	12.5kbps, 100kbps, User defined
	polarity	Positive/negative polarity
	Decoding mode	9-bit,21-bit,23-bit
Function/Arbitrary Waveform Generator (opt)		
Channels	2	
Sample rate	625MSa/s	
Vertical resolution	16-bit	
Maximum frequency	60MHz	
Standard waveform	Sine, Square, Pulse, Ramp, Noise and DC	
Modes of operation	Continuous, Modulation, Sweep	
Built-in Wave		
Sine	Frequency range: 1μHz to 60MHz	
	Amplitude flatness: typical value (sine waveform, 0dBm) ≤30MHz:± 0.5dB ≤60MHz:±0.8dB	
	Harmonic distortion: -40dBc	
	Spurious(nonharmonic):-40dBc	
	Total harmonic distortion: 1% (DC ~ 20kHz, 1Vpp)	
	SNR (Signal to Noise Ratio):40dB	
Square wave/Pulse	Frequency range: Square wave: 1μHz to 25MHz; Pulse : 1μHz to 25MHz;	
	Rise/Fall time: <7ns	
	Overshoot: <2% (1kHz, 1Vpp, 50Ω)	
	Duty cycle: 0.01% to 99.99%, it can be adjusted	

	Minimum pulse width: 20ns	
	Jitter: 2ns	
Ramp wave	Frequency range: 1μHz to 1MHz	
	Variable symmetry: 0.01% ~ 99.99%	
	Linearity: < 1% of peak output (typical value, 1kHz, 1Vpp, symmetry 100%)	
Noise	Bandwidth: 60MHz (typical value)	
Arbitrary waveform	Frequency range: 100mHz to 5MHz	
	Waveform length: 8 to 512k points	
	Type: supports over 200 kinds of arbitrary waveforms, such as Sinc/ Exponential Rise/Fall/Cardiac/Gaussian/Lorentz/Haversine and etc.	
Modulation		
AM modulation	Carrier waveform	Sine/Square/Ramp/Arbitrary waveform
	Source	Internal
	Modulation waveform	Sine/Square/Ramp/Noise/ Arbitrary waveform
	Modulation frequency	2mHz ~ 200kHz
	Modulation depth	0% ~ 120%
FM modulation	Carrier waveform	Sine/Square/Ramp/Arbitrary waveform
	Source	Internal
	Modulation waveform	Sine/Square/Ramp/Noise/ Arbitrary waveform
	Modulation frequency	2mHz ~ 200kHz
	Frequency deviation	DC ~ 30MHz
PM modulation	Carrier waveform	Sine/Square/Ramp/Arbitrary waveform
	Source	Internal
	Modulation waveform	Sine/Square/Ramp/Noise/ Arbitrary waveform

	Modulation frequency	2mHz ~ 200kHz
	Phase deviation	0° ~ 360°
Sweep		
Sweep	Carrier wave	Sine/Square/Ramp/Arbitrary waveform
	Type	Lin, log
	Sweep time	1ms ~ 500s
	Trigger source	Internal, external, manual
Frequency Characteristics		
Signal frequency	Accuracy: ± 0.5ppm, 25°C Annual aging rate ± 1ppm temperature coefficient < ± 0.5 ppm/°C	
	Resolution: 1μHz	
Output Characteristics		
Signal amplitude	Amplitude (50Ω)	≤30MHz: 10mVpp ~ 3Vpp
		≤60MHz: 10mVpp ~ 1.5Vpp
	Amplitude (High Z)	≤30MHz: 20mVpp ~ 6Vpp
		≤60MHz: 20mVpp ~ 3Vpp
	Resolution: 1mV	
	Accuracy: typical value (sine waveform of 1kHz, 0V offset, > 20mVpp) ± (2% of setting value + 2mVpp)	
DC offset	Range (Peak AC + DC)	±1.5V (50Ω)
		±3V (High Z)
	Resolution: 1mV	
	Offset accuracy: ±2% of offset setting value ± 2%±2mV of amplitude setting value	
Waveform output	Impedance: 50Ω (typical) Protection: over voltage protection (the waveform output is closed when overvoltage occurs, and reminder will prompt in the screen)	

Display	
Display type	15.6-inch FHD capacitive touch screen
resolution	1920*1080 (H*V)
Zoom	Horizontal and vertical zooming is supported in all waveform,supports gesture control and zooming
Graticules	10 horizontal scale division × 8 vertical scale division
Intensity gradation	256
Display mode	Point, Vector
Waveform color	Waveform color can set by user-defined
Persistence	Off, automatic, infinite
Computer	
CPU	Inter® core™ i5-6500（3.2GHz，64-bit）
Operating system	Windows 10 IoT Ent LTSC（64bit）
Memory	8GB
Hard disk (SSD)	128GB
Interface and Protocol	
High-definition audio/video output	One HDMI interface on the rear panel
USB host	Four interfaces, two interface on the front panel and two on the rear panel
USB device	One USB device interface on the rear panel
LAN port	One Ethernet interface (10/100/1000Mb/s) on the rear panel
Probe compensator output	Frequency: 1kHz ± 0.01%, Voltage: 3Vpp ± 3%, Square wave
10 MHz reference clock Input/output	In/Out can be opened individually and simultaneously In: BNC connector on the rear panel, A reference clock that provides sampling for the oscilloscope. Out: BNC connector on the rear panel, It can output its own 10MHz reference clock and provide it to other external instruments for inter-instrument clock synchronization.

Aux output	BNC connector on the rear panel 1. Trigger sync output; 2. Pass the test result; 3. AWG trigger output
Aux input	1. Trigger sync output 2. AWG external trigger output
EXT Trig	BNC connector on the front panel
Lock of Kensington	Standard lock key of Kensington
Remote control	Built-in WebServer: Support to input the oscilloscope IP address to enter the web interface through the web browser, it can view the instrument state, view and update the network state, view help manual and programming manual, download drive program, save the oscilloscope setting, export waveform, screenshot and remote control the instrument by keyboard and mouse
USBTMC	Supports standard USBTMC interface protocol
SCPI	Supports standard SCPI
Power Supply	
Power voltage	100V ~ 240VAC (fluctuate ± 10%) 50Hz/60Hz
Power	Maximum 200W
Fuse	6.3A, T - class，250V
Environment	
Temperature range	Operating: 0°C ~ + 40°C；non-operating: -20°C ~ + 70°C
Cooling method	Forced fan cooling
Humidity range	Operating: below +35°C, relative humidity ≤90%; non-operating: +35°C ~ +40°C, relative humidity ≤60%
Altitude	Operating: below 2000 meters；non-operating: below 15000 meters
Mechanical Specifications	
Dimension (W×H×D)	Size that not count foot pad and outer protective cover: 445mm×302mm×200mm Size that count foot pad and outer protective cover: 452mm×309mm×216mm Size that adding rack accessories:

	485mm×356mm×209mm	
Weight	＜10.5kg	
Installation	7U (Optional MSO7000X-RM setup suit of rack mounting)	
Standard		
Electromagnetic compatibility	Compliance with EMC directive (2014/30/EU), compliance with or better than IEC 61326-1:2021/ EN61326-1:2021, IEC 61326-2-1:2021/ EN61326-2-1:2021	
	CISPR11/EN 55011	Conducted disturbance CLASS B group1, 150kHz-30MHz
		Radiation disturbance CLASS B group 1, 30MHz-1GHz
	IEC 61000-4-2/EN 61000-4-2	Electrostatic discharge (ESD) 4.0kV (contact), 8.0kV (air)
	IEC 61000-4-3/EN 61000-4-3	Radio-frequency electromagnetic field immunity 0V/m (80MHz to 1GHz) 3V/m (1.4GHz to 2GHz) 1V/m (2.0GHz to 2.7GHz)
	IEC 61000-4-4/EN 61000-4-4	Electrical fast transient (EFT) 2kV (Input AC Power ports)
	IEC 61000-4-5/EN 61000-4-5	Surges 1kV (live line to zero line); 2kV (live/zero to ground)
	IEC 61000-4-6/EN 61000-4-6	Radio-frequency continuous conducted Immunity 3V, 0.15-80MHz
	IEC 61000-4-11/EN 61000-4-11	Voltage dips: 0% UT during 1 cycle; 40% UT during 10/12 cycles; 70% UT during 25/30 cycles Short interruption: 0% UT during 250/300 cycles
Safety specification	EN 61010-1:2010+A1:2019 EN IEC61010-2-030:2021+A11:2021 BS EN61010-1:2010+A1:2019 BS EN IEC61010-2-030:2021+A11:2021 UL 61010-1:2012 Ed.3+ R:19 Jul2019 UL 61010-2-030:2018 Ed.2	

	CSA C22.2#61010-1:2012 Ed.3+U1;U2;A1 CSA C22.2#61010-2-030:2018 Ed.2
Warranty and Calibration Service	
Calibration interval	1 year
Warranty	1 years
Order Information	
Product Model	
MSO7204X	Bandwidth of 2GHz, the maximum sample rate is 10GSa/s (single channel 10GSa/s, dual channel 5GSa/s, 4-channel 2.5GSa/s), 4-channel oscilloscope
MSO7104X	Bandwidth of 1GHz, the maximum sample rate is 10GSa/s (single channel 10GSa/s, dual channel 5GSa/s, 4-channel 2.5GSa/s), 4-channel oscilloscope
Standard Accessories	
UT-D30	USB3.0 data cable x 1
UT-P07	500MHz passive high impedance probe x 4
UT-L45	BNC-BNC straight-through cable x 2
--	Protective cover of front panel x 1
--	National standard cable x 1
--	Calibration certificate
Standard Software	
RS-232/422/485/UART	Embedded Serial Bus Triggering and Analysis (RS-232/422/485/UART)
SPI	Embedded Serial Bus Triggering and Analysis (SPI)
I2C	Embedded Serial Bus Triggering and Analysis (I2C)
CAN	Automotive Serial Bus Triggering and Analysis (CAN)
LIN	Automotive Serial Bus Triggering and Analysis (LIN)
Extreme-template testing	Extreme test, standard template test

Spectrum analyzer	Enhanced FFT
Digital voltmeter	4-bit, DC, AC RMS, DC AC RMS
Frequency meter	8 bits
Trigger software	Edge, Pulse Width, Slope, Video, Pattern, Timeout, Runout, Setup/Hold, Delay, Persistence, N-Edge, Zone Trigger
WebServer	SCPI remote control, remote viewing and control, exporting waveform files, online browsing manuals
Advanced analytics	Statistical Histograms, Trend Charts, Tracking, Area Histograms

Option

Option - Bandwidth Upgrade	
MSO7000X-BW-10T20	MSO7000X series 1GHz upgrade to 2GHz bandwidth
Option - Rack mount kit	
MSO7000X-RM	MSO7000X rack-mount kit
Option - Upgrade 16-channel logic analyzer	
MSO7000X-LA	16-channel logic analyzer option
Options - Function/Arbitrary Waveform Generator	
MSO7000X-AWG	Dual 60MHz arbitrary wave generator option
Option - Advanced Jitter Analysis and Eye Diagram	
MSO7000X-JITTER	Advanced jitter and eye diagram analysis
Option - Advanced Power Analysis	
MSO7000X-PWR	Advanced power analysis
Options - Protocol Triggering and Analysis	
MSO7000X-CANFD	Automotive serial bus trigger and analysis (CAN-FD)
MSO7000X-FLEX	Automotive serial bus trigger and analysis (FlexRay)
MSO7000X-SENT	Automotive sensor bus trigger and analysis (SENT)
MSO7000X-AUDIO	Audio serial bus trigger and analysis (I^2S, LJ, RJ, TDM)
MSO7000X-AREO	Aerospace serial bus trigger and analysis (MIL-STD-1553, ARINC 429)
Option - Advanced Filter Designer	

MSO7000X-FILTER	Advanced Filter Designer
Option - Matlab Embedded Programming	
MSO7000X-MAT	The Matlab embedded programming option allows users to create Matlab code to customize mathematical functions
Upgrade the set	
MSO7000X-BND	Upgrade Kits (JITTER, PWR, CANFD, FLEX, SENT, AUDIO, AERO)
Probe	
UT-PA2000	Active single-end probe (2GHz;10X)
UT-PA1000	Active single-ended probe (1GHz; 10X)
UT-PD2500	Active Differential Probes (2.5GHz; 10X)
UT-P07A	Passive high impedance probe (1X: 8MHz; 10X: 500MHz)
UT-P20	Passive high voltage probe (100MHz; probe coefficient 100:1, 1.5kVrms)
UT-V23	Passive high voltage probe (100MHz; 2kVpp)
UT-P21	Passive high voltage probe (50MHz; maximum of operating voltage DC 15kVrms)
UT-P40	Current probe (100kHz; 0.4A ~ 60A)
UT-P41	Current probe (100kHz; 0.4A ~ 100A)
UT-P42	Current probe (150kHz; 0.4A ~ 200A)
UT-P43	Current probe (25MHz; maximum of measurement current 20A)
UT-P44	Current probe (50MHz; maximum of measurement current 40A)
UT-P4030D	Current probe (100MHz; maximum of measurement current 30A)
UT-P4150	Current probe (12MHz; maximum of measurement current 150A)
UT-P4500	Current probe (5MHz; maximum of measurement current 500A)
UT-4100A	Current probe (600kHz; maximum of measurement current 100A)
UT-4100B	Current probe (2MHz; maximum of measurement current 100A)
UT-P30	High voltage differential probe (100MHz; ±800Vpp)
UT-P31	High voltage differential probe (100MHz; ±1.5kVpp)

UT-P32	High voltage differential probe (50MHz; ±3kVpp)
UT-P33	High voltage differential probe (120MHz; ±14kVpp)
UT-P35	High voltage differential probe (50MHz; 1.3kV)
UT-P36	High voltage differential probe (50MHz; 5.6kV)
UT-M15	16-channel logic analyzer probe
Notes: Please order all hosts, accessories and options from your local UNI-T distributor.	

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 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.instruments.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.

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

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