

4457 SERIES DIGITAL OSCILLOSCOPE

4457E, 4457F, 4457G, 4457K



AnyAcquire Technology, More, Faster, Smarter

- ◇ All-in-one Instruments
- ◇ 1GHz, 2GHz, 3GHz, 4GHz bandwidth models
- ◇ 10GSa/s~20GSa/s sampling rate
- ◇ 8bit vertical resolution
- ◇ Up to 2Gpts depth storage
- ◇ 1,200,000 waveforms/sec waveform capture rate
- ◇ 400,000 times/sec FFT refresh rate
- ◇ Intelligent digital trigger
- ◇ Intelligent user experience

F.E.S. Co., Ltd.

1000/24, P.B. Tower, 8 floor, Sukhumvit 71 Rd., North Klongtan, Wattana, Bangkok 10110
 TEL: 02-064-4050 or 02-064-4051 | FAX: 02-010-4262 | Email: info@fesupply.com
 www.fesupply.com

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I. Product Overview

The 4457 series digital oscilloscope integrates oscilloscopes, logic analyzers (optional), function generators (optional), bus analyzers (optional), real-time spectrum analyzers (optional) and digital voltmeters. It features automatic waveform settings, automatic parameter measurements and statistics, cursor measurements, mathematical operations, FFT spectrum analysis, waveform recording and playback, and serial bus analysis (optional), limit template test (optional), power measurement and analysis (optional), baud chart analysis (optional), eye diagram and jitter analysis (optional) and other functions, and supports Ethernet programmed control, which is convenient for integrated development and use.

4457 series digital oscilloscopes have 4 product models, with bandwidths ranging from 1GHz to 4GHz, sampling rates of 10GSa/s and 20GSa/s, vertical resolutions of 8bit, memory depth of 2Gpts, and the fastest waveform capture rates of 1,200,000 waveforms/second. It adopts the original “Any Acquire” technology to provide users with a brand new experience of using oscilloscopes.

| Main technical indicators | | 4457E | 4457F | 4457G | 4457K |
|-----------------------------|--|----------------------------|--------|--------|----------------------|
| Oscilloscope | Number of channels | 4, 8 (optional) | | | 4 |
| | Bandwidth (50Ω) | 1GHz | 2GHz | 3GHz | 4GHz |
| | Bandwidth (1MΩ) | 500MHz | 500MHz | 500MHz | 500MHz |
| | Maximum sampling rate | 10GSa (full channel) | | | 20GSa (full channel) |
| | Memory depth | 2Gpts (full channel) | | | |
| | Vertical resolution | 8bit | | | |
| | Waveform capture rate | 1,200,000 waveforms/second | | | |
| | Gray scale level | Grade 256 | | | |
| Logic analyzer | Number of channels | 16 | | | |
| | Sampling rate | 2.5GSa/s | | | |
| | Memory depth | 160Mpts | | | |
| Function generator | Number of channels | 2 | | | |
| | BW | 50MHz | | | |
| | Sampling rate | 200MSa/s | | | |
| Bus analyzer | I2C, SPI, CAN, LIN, FlexRay, RS232, USB, Audio, MIL-STD-1553, ARINC429 | | | | |
| Real-time spectrum analyzer | 320MHz analysis bandwidth, 400,000 FFT refresh rate per second | | | | |

| | |
|-------------------|---|
| Digital voltmeter | 4-bit voltage, 8-bit frequency count |
| Display screen | 15.6-inch capacitive touch screen, resolution up to 1920 x 1080 |
| Interface | USB3.0, USB2.0, DP, VGA, LAN, SATA3.0 |

II. Main Features

- **All-in-one Instruments**

Oscilloscopes, logic analyzers, function generators, bus analyzers, real-time spectrum analyzers and digital voltmeters are all-in-one, providing more test functions to help you easily meet various challenges.

- **“Any Acquire” technology**

The unique “Any Acquire” technology provides you with higher sampling rates, faster waveform capture rates, flashier displays, deeper storage, more accurate digital trigger, and more comprehensive analysis.

- **Rich probe options**

It supports passive probes, high voltage single-ended probes, high voltage differential probes, current probes and active probes to meet your different probe testing needs.

- **High-definition touch integrated liquid crystal display**

15.6-inch high-definition LCD screen, resolution up to 1920 x 1080. The capacitive touch screen supports single and multi-touch to quickly realize waveform and menu operation.

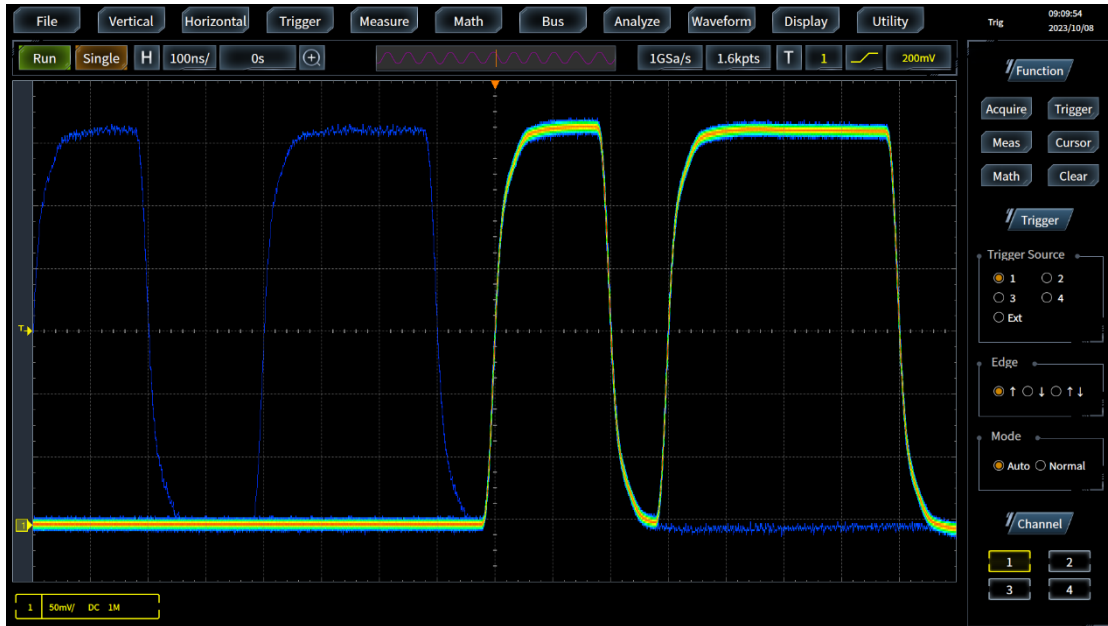
- **Portable structure, rich peripheral interface**

Portable structure, 8U standard rack mounting, rich peripheral interfaces, maximum weight 15kg.

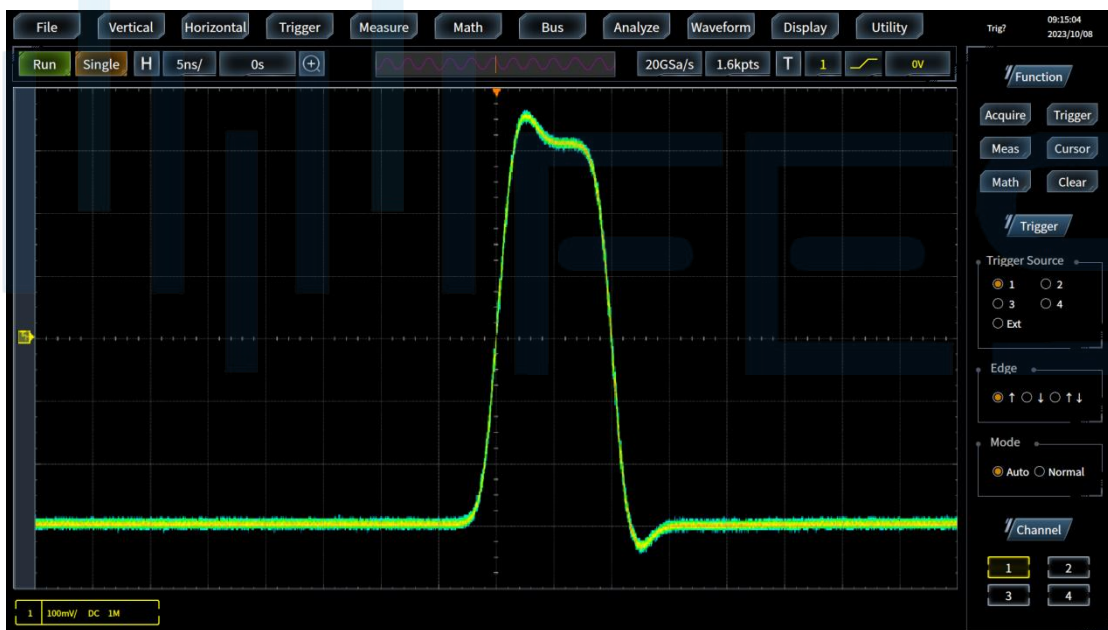
(1) Oscilloscope

- **Waveform capture rate of up to 1,200,000 waveforms/second helps to quickly detect and capture episodic events**

A waveform capture rate of up to 1,200,000 waveforms/second and a sampling rate of 20 GSa/s greatly improve the probability of glitch and episodic events capture, allowing you to view more waveform details over a longer acquisition time.



Waveform capture rate of to 1,200,000 waveforms/second helps to quickly detect episodic events



20GSa/s sampling rate helps to accurately reconstruct signal waveform

- **Up to 2Gpts memory depth can maintain longer recording time at high sampling rates**

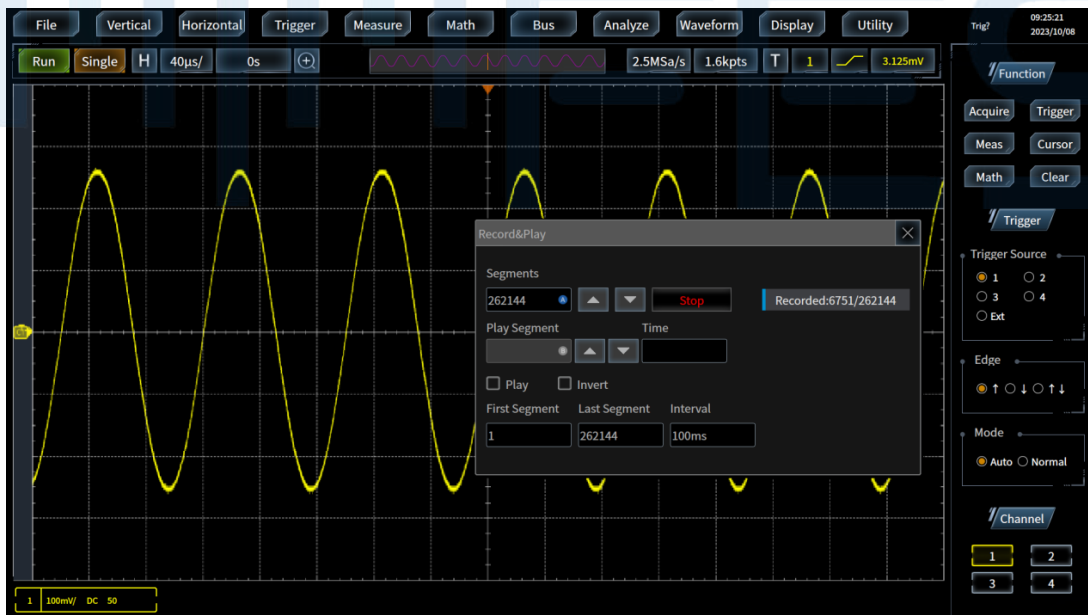
On the strength of 2Gpts depth memory, the oscilloscope can maintain high sampling rate and waveform capture rate even in slow time base scale. The full hardware window extension allows you to locally zoom in on the details of the waveform, providing you with a synchronized display of the waveform's global and detailed information.



2Gpts of depth memory to store more acquisition samples

- **The standard segmented memory acquisition captures and stores important signals more efficiently.**

The 4457 series oscilloscopes come standard with segmented memory acquisition, which maintains high response speed and screen update rate even when the oscilloscope is operating in depth memory mode.

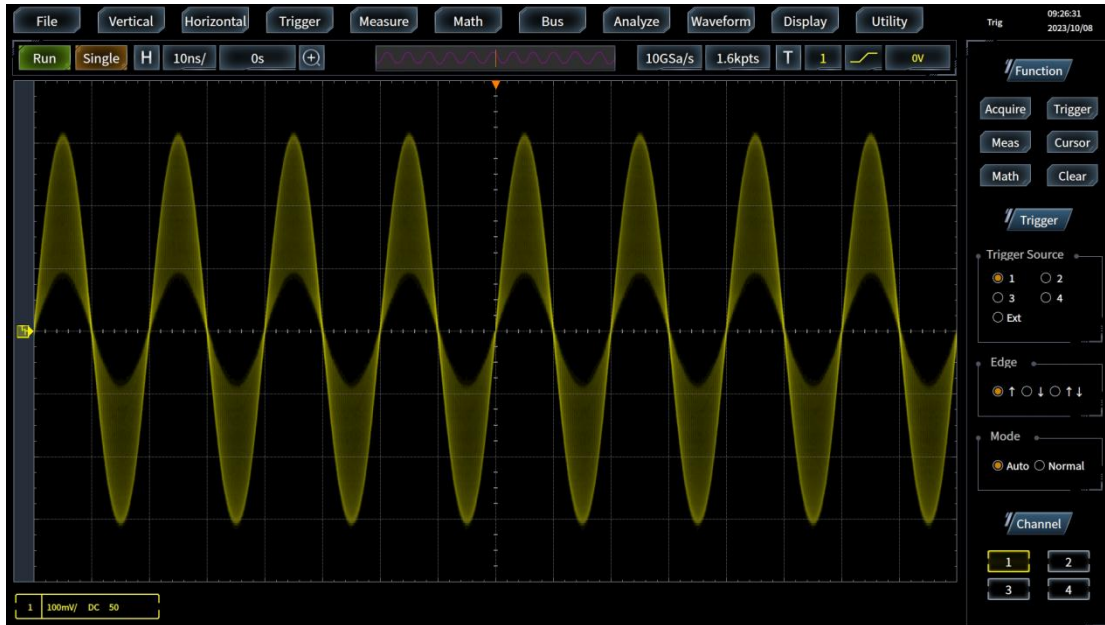


Segmented memory for more efficient capture of important signals

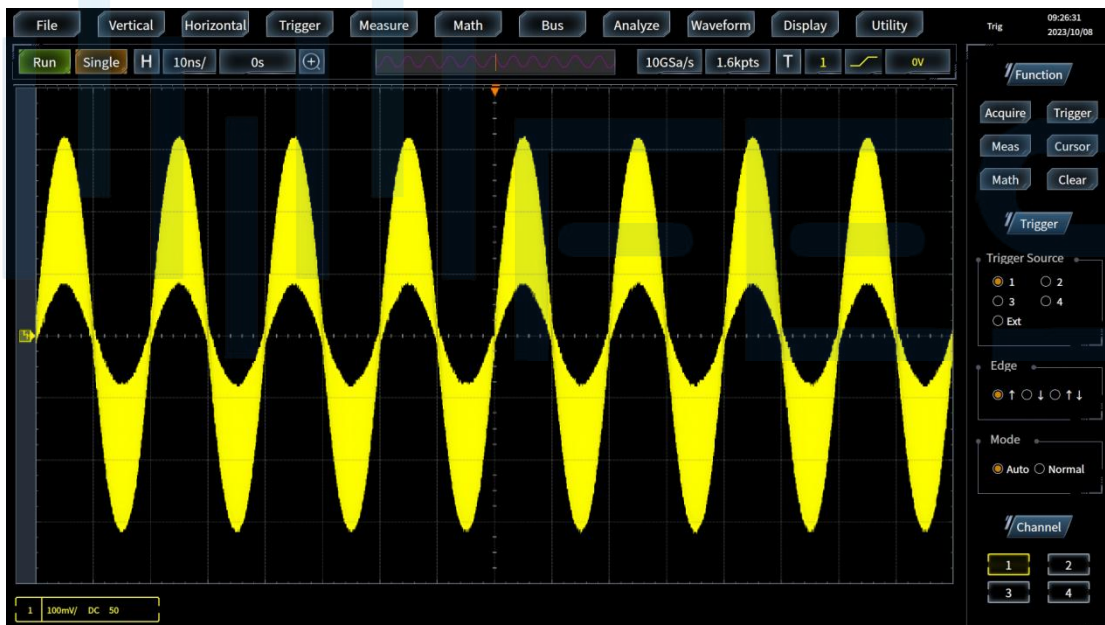
- **256 levels of grayscale and four waveform color displays provide an exceptional visual experience**

The 4457 series oscilloscope uses digital fluorescent 3D display technology to indicate the probability of an event occurring by the brightness or warmth of the color, and provides 4 waveform colors (normal, reversion, color temperature, and spectrum), which enhances the ability to view episodic

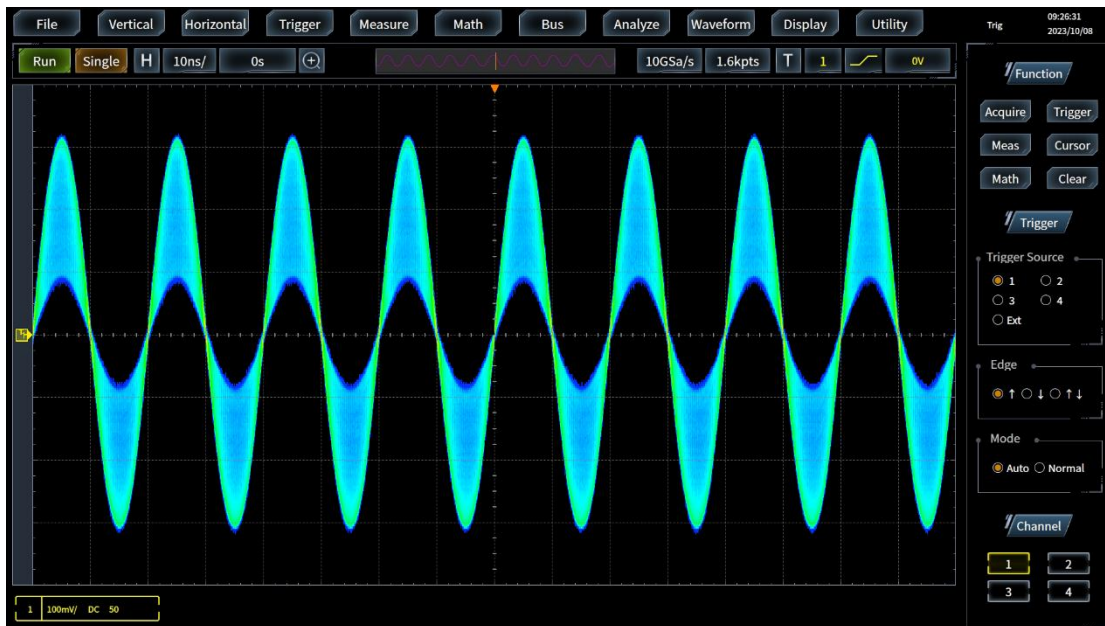
events.



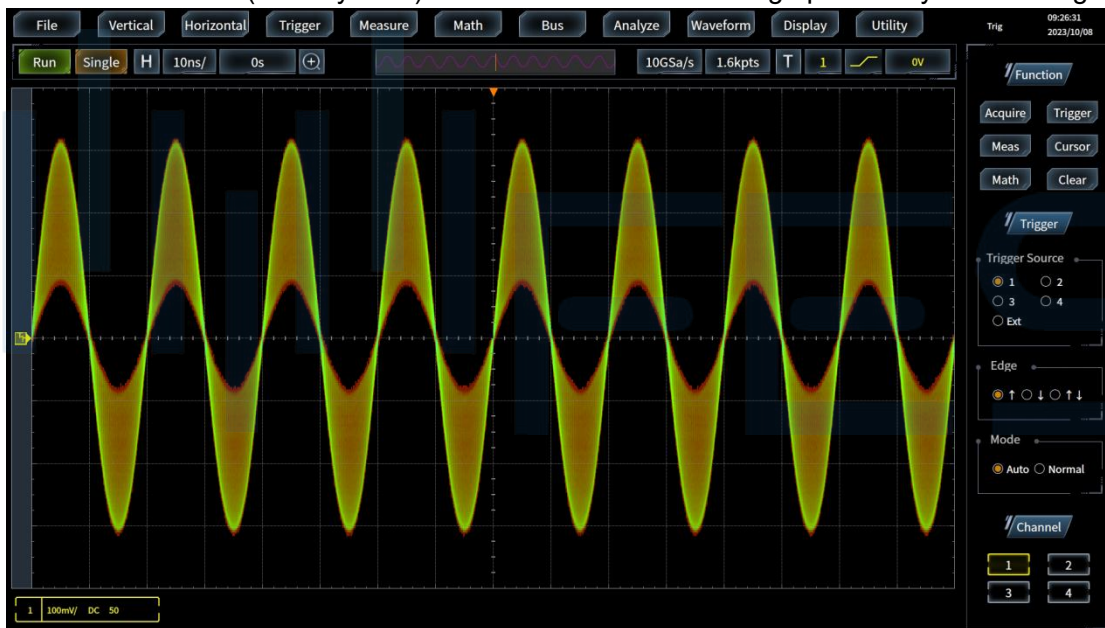
Normal: the default channel color and gray level are used to indicate the probability of an event occurring, and bright colors indicate events with a high probability of occurrence



Reversion: the default channel color and gray level are used to indicate the probability of an event occurring, and dark colors indicate events with a high probability of occurrence



Color temperature: the color level is used to indicate the probability of an event occurring, and a warm color (red or yellow) indicates an event with a high probability of occurring.



Spectrum: color levels are used to indicate the probability of an event occurring, and cold colors (blue or green) indicate a high probability of an event occurring.

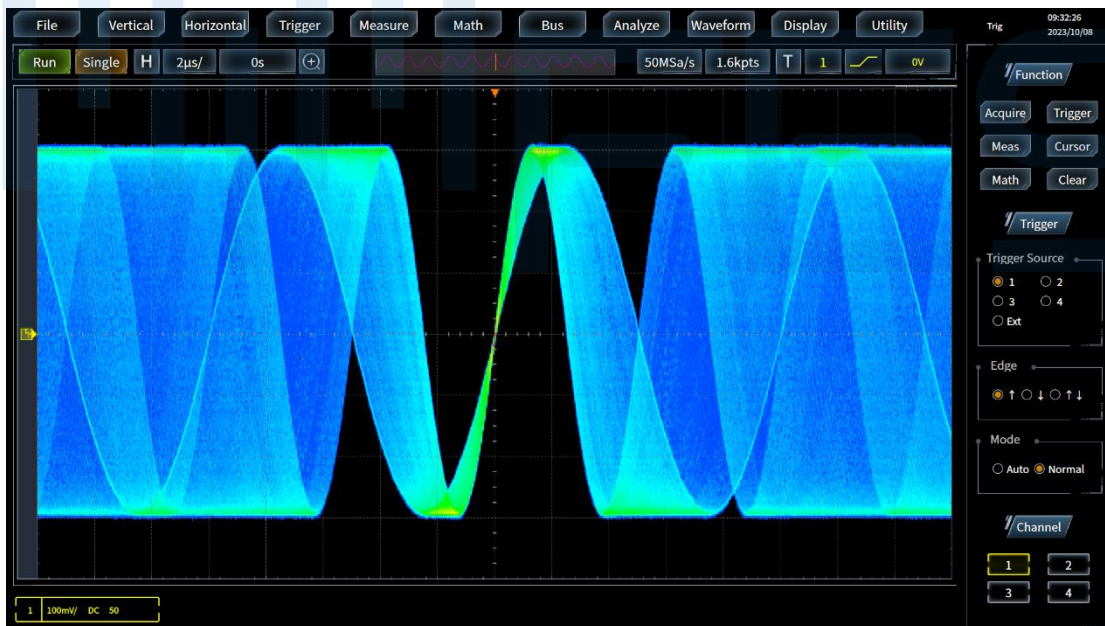
- **Rich trigger functions and precise digital trigger help to accurately lock trigger events**

4457 series oscilloscopes provide a rich set of trigger functions (including edge, edge transition, dual-edge time, dual-edge event, glitch, pulse width, short pulse, timeout, code pattern, status, establish hold, window, area trigger (visible trigger) etc.) to help you quickly lock the event of interest in the complex sampling information.

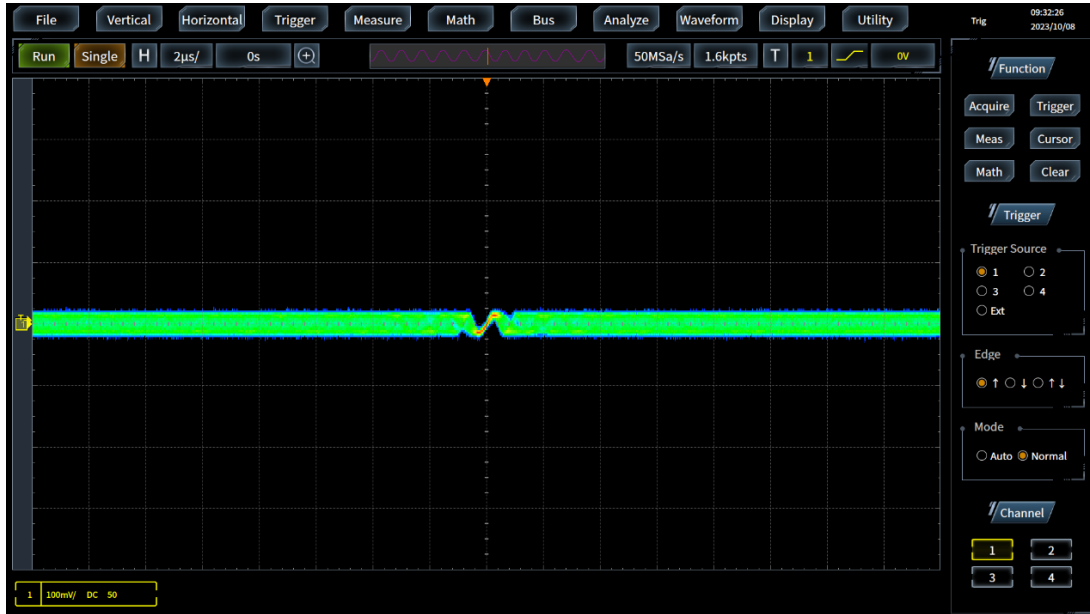


Rich trigger types to accurately lock trigger events

4457 series oscilloscopes use precise digital trigger technology to determine the trigger point directly on the ADC acquisition samples, which can suppress the influence of interference signals and quickly lock the trigger event, thus laying the foundation for the oscilloscope to accurately display and analyze the signal. The trigger sensitivity of digital trigger is up to 0.1 division.



Digital interpolation technology helps to realize accurate positioning of the trigger point



Continuously adjustable trigger sensitivity with up to 0.1 division

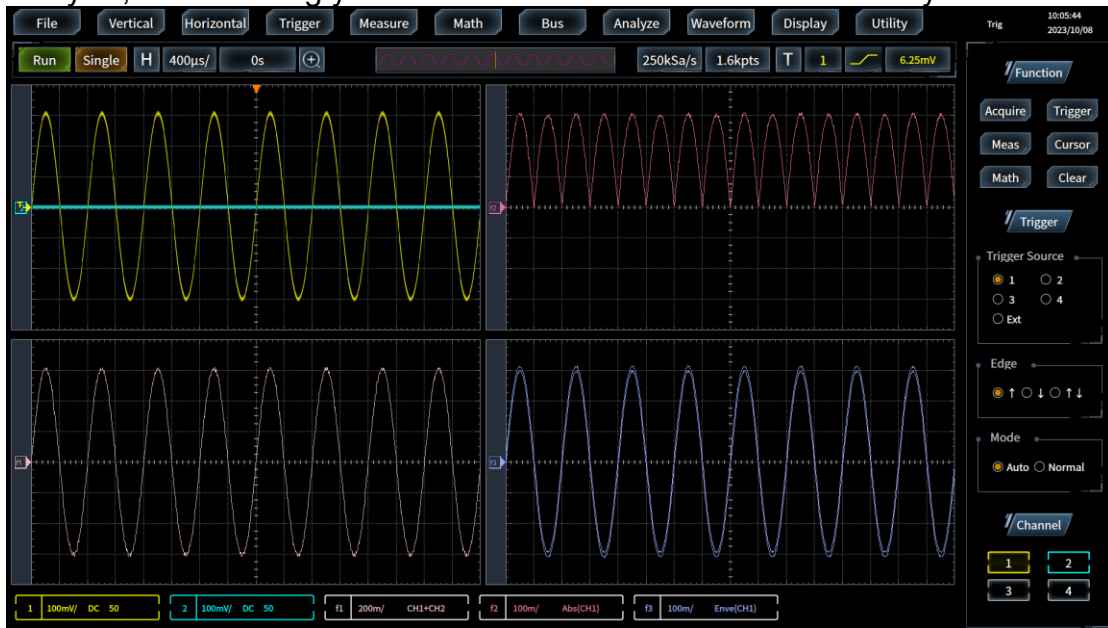
- Visual trigger to provide intelligent waveform trigger positioning**
 4457 series oscilloscopes are further designed with visual area trigger function on the basis of various types of rich trigger types such as edge and edge transition. You only need to observe the signal of interest on the screen and draw an area around it. Then, the oscilloscope can quickly and easily identify the desired trigger event by sweeping all captured waveforms and comparing them with the waveform area on the screen.



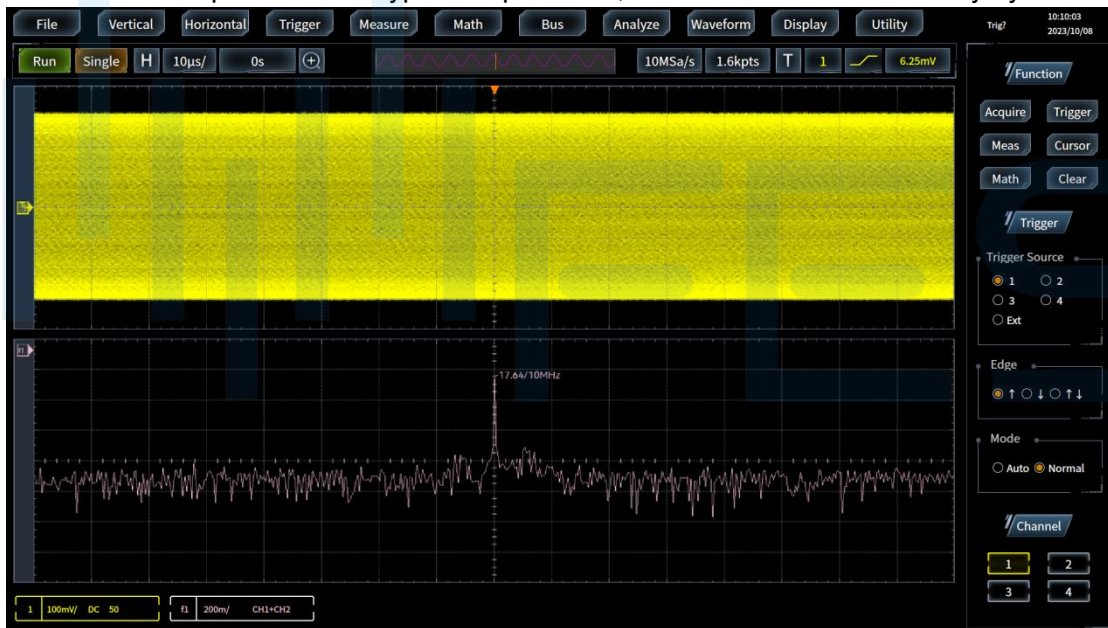
Visual trigger: quickly realize waveform trigger positioning

- Powerful calculation and analysis tools provide you with deep data mining and analysis**
 4457 series oscilloscopes provide a complete set of analysis tools (including waveform-based cursor and screen-based cursor, 42 kinds of automatic parameter measurements, mathematical operations, FFT analysis, statistics, limit template test, power measurement and analysis, waveform

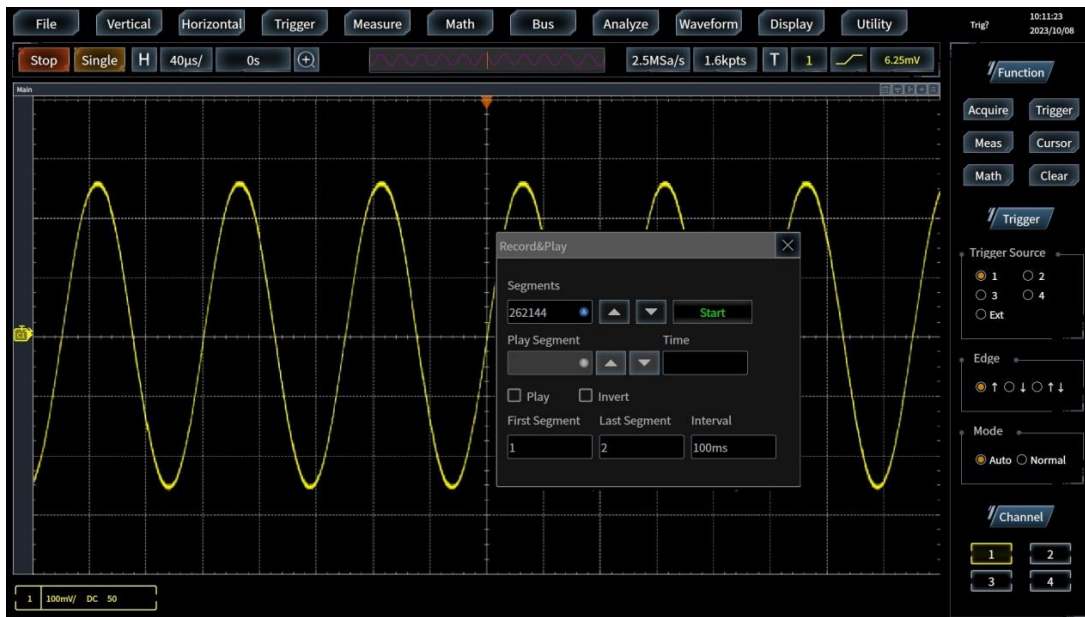
recording and playback, etc.) to provide you with deep data mining and analysis, thus meeting your multi-faceted measurement and analysis needs.



Mathematical operations: 27 types of operations, which can be selected freely by users

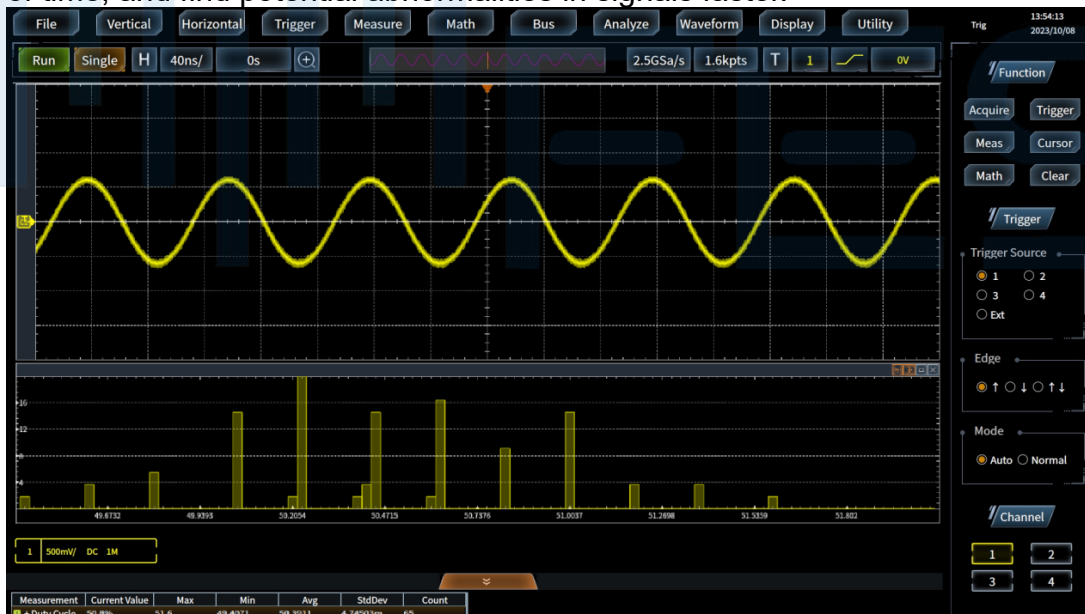


FFT analysis: Observe the frequency domain characteristics of the signal



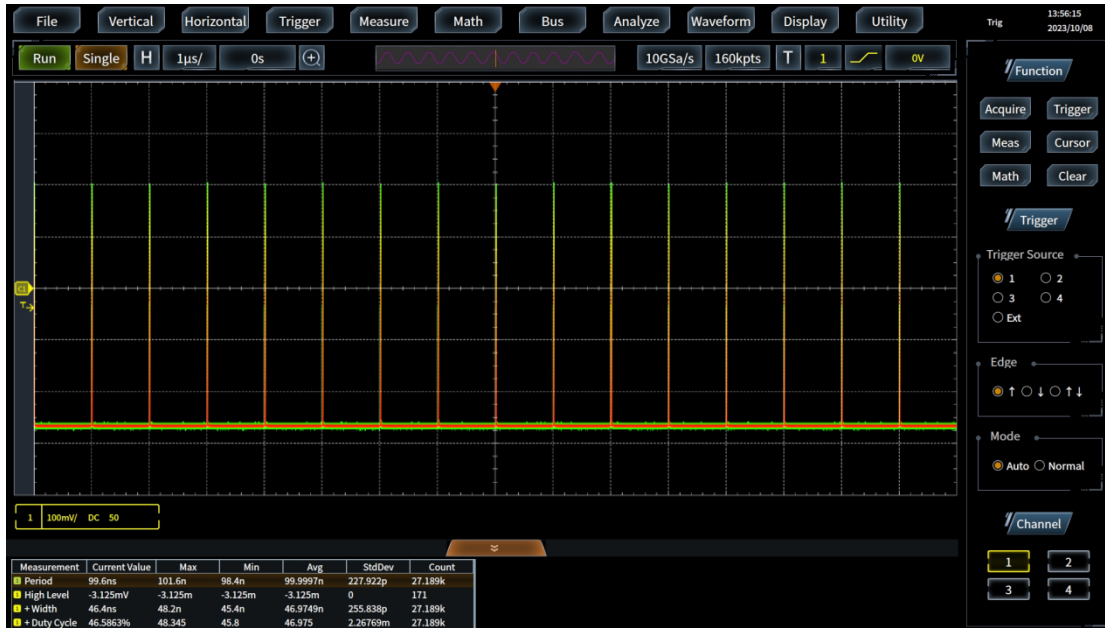
Waveform recording and playback: It is used for real-time recording of waveforms, and playback to view the details of waveforms

4457 series oscilloscopes support histogram analysis of parameter measurement results, which performs statistical processing of parameter measurement data and presents it in the form of a histogram to help users observe the distribution of parameter measurement results over a long period of time, and find potential abnormalities in signals faster.

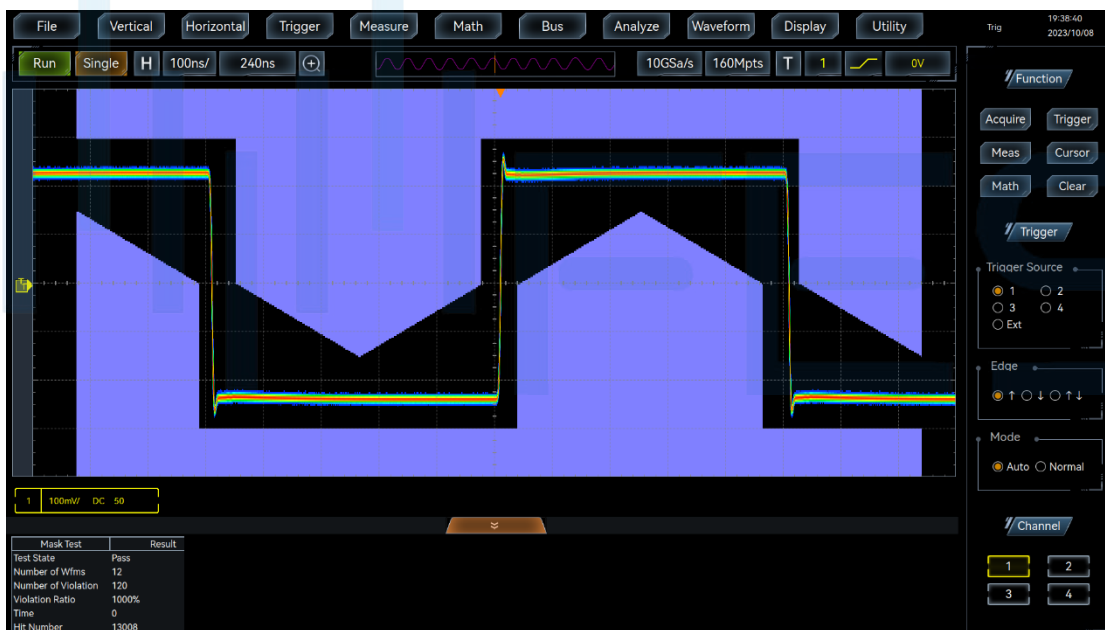


Parameter measurement histogram analysis: Observe the distribution of measurement results of the measured signal over a long period of time to help users find and judge signal anomalies.

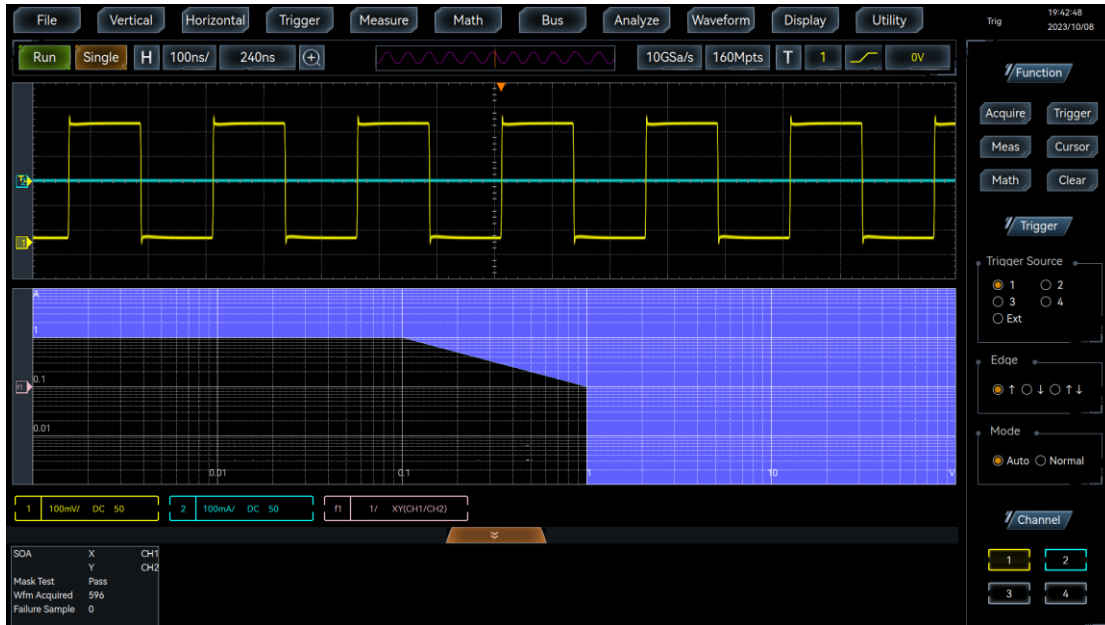
The 4457 series oscilloscope supports the parameter measurement function of hardware, the statistical analysis of 20 measurement items displayed at the same time, and the screen, cursor, and all-acquisition measurement range selection as well as automatic cursor tracking indication. In addition, it also supports full-memory automatic measurement in all acquisition modes, providing you with more accurate measurement results.



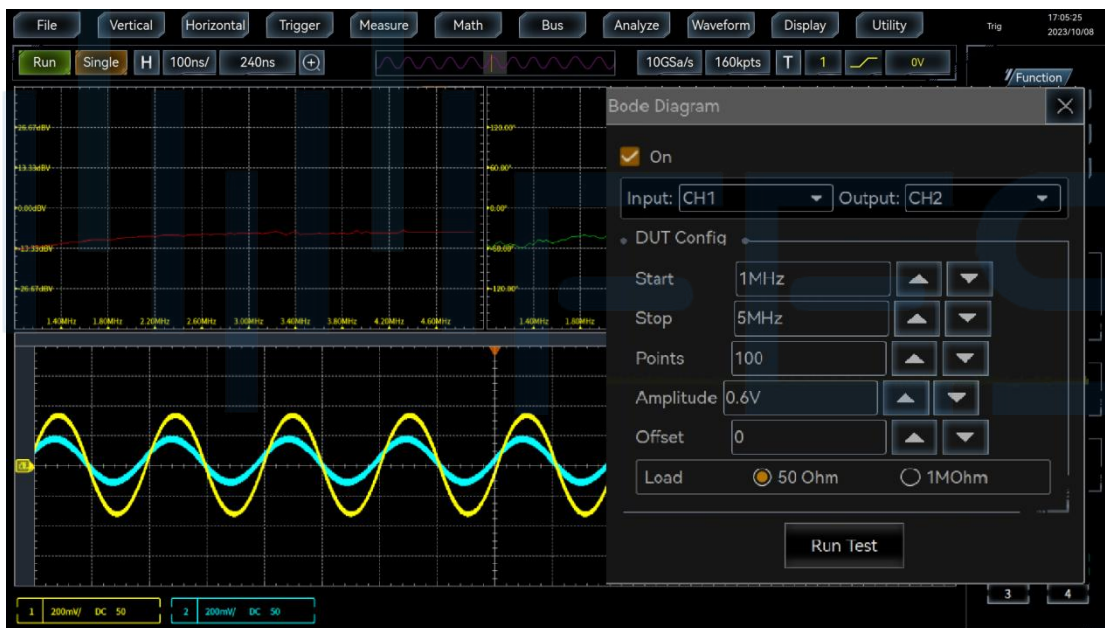
Full hardware parameter measurement to provide you with more accurate measurement results



Limit template test (option S01): standard and user-defined templates, pass/fail test, results display.

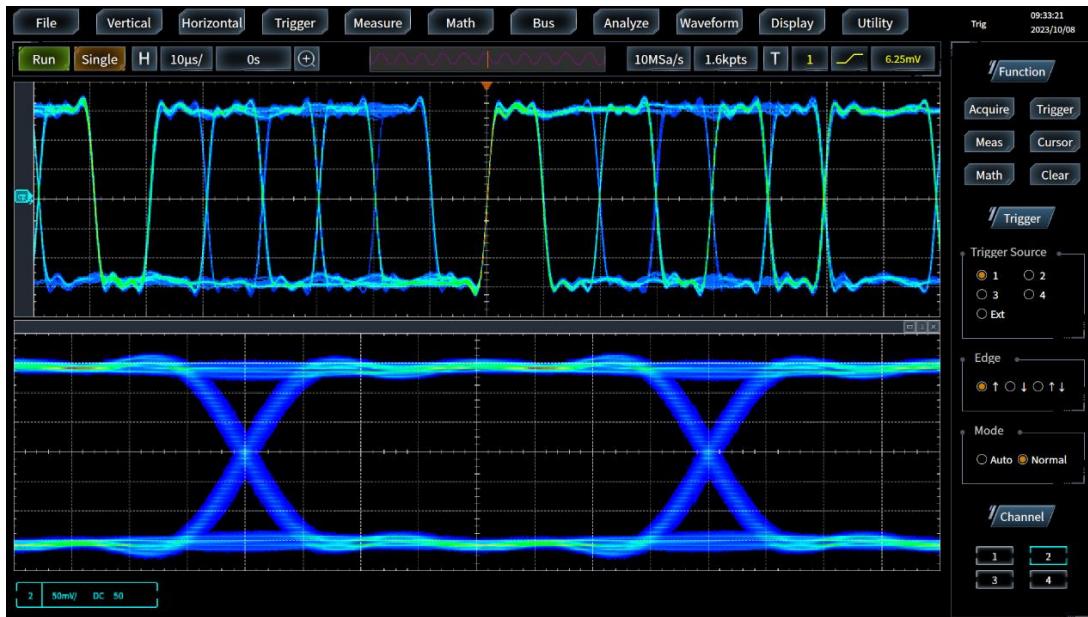


Power measurement (option S02): It is used for power quality, ON/OFF loss, harmonics, ripple, safe working area and other tests.



Baud chart analysis (option S03): detect the frequency response of the control loop, analyze the stability of the feedback system

The 4457 oscilloscopes have powerful eye diagram and jitter analysis functions, which can quickly overlay and display eye diagrams for eye diagram parameter measurements for all UIs captured each time. An in-depth jitter analysis is also performed to show histograms, spectrograms, and trend charts of the time interval error (TIE), calculate the magnitude of each component of the jitter decomposition, and plot the bathtub curves.



Eye diagram and jitter analysis (option S20-S21)

(II) Logic analyzer

The logic analyzer (option H01) provides 16 digital channels that are highly integrated with the oscilloscope user interface, thus simplifying operation and quickly solving problems in design and analysis of mixed analog-digital signals.

- **High sampling rate of 2.5 GSa/s for finer timing resolution**

The logic analyzer option can provide a 2.5GSa/s timing sampling rate and up to 400ps timing resolution for all digital channels, thus reflecting the timing relationship of the signal under test more realistically.

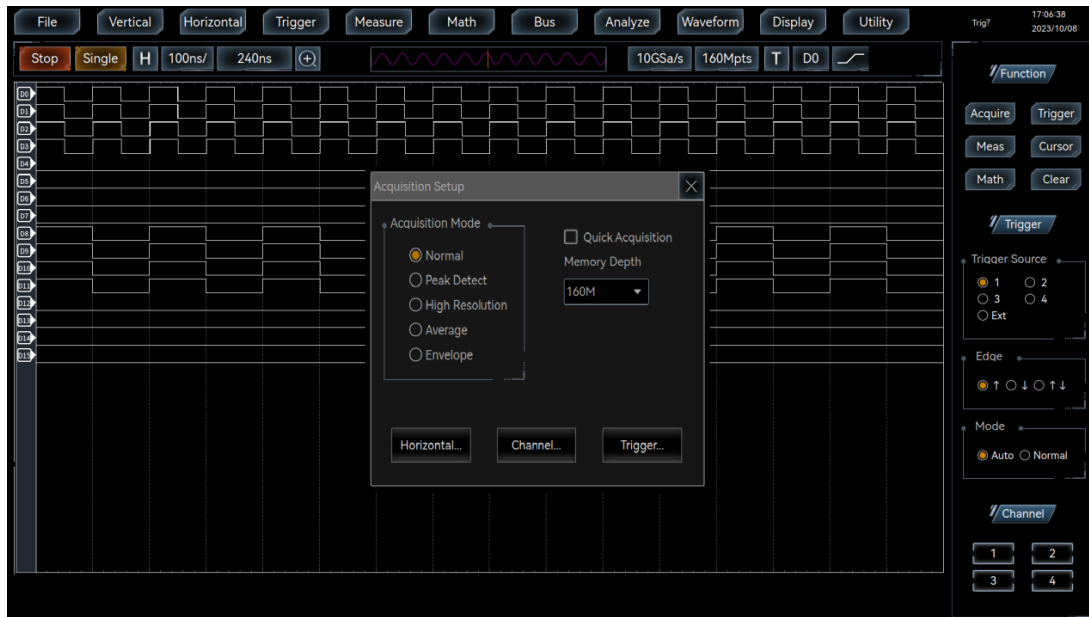


Higher sampling rate and finer time resolution

- **Up to 160Mpts of memory depth supports long-time tracking and recording**

Up to 160Mpts depth memory enables the logic analyzer to maintain a

high sampling rate while capturing long time records.



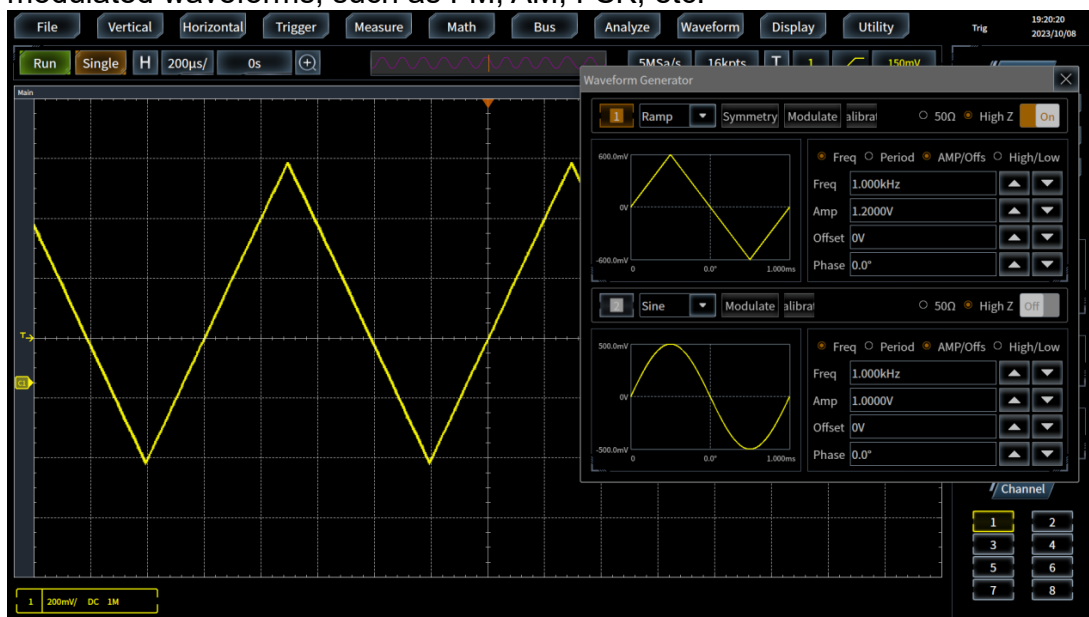
Deeper memory for longer recording capability

(3) Function generator

The function generator (option H02) features 2 output channels to help you simulate sensor signals or add noise to signals in your design, so as to perform margin test; it also allows you to transfer analog or digital signals captured by an oscilloscope to arbitrary waveform memory and copy the signals captured by the oscilloscope from the function generator.

- **Multiple predefined waveform outputs up to 50MHz**

The function generator option provides up to 50MHz sine waveform outputs (also including square waveforms, ramp waveforms, pulses, DC, noise, arbitrary waveforms, SinX/X, exponential rise/fall, Gaussian, Lorentzian curve, half-square curve, ECG and other waveforms), and supports the outputs of modulated waveforms, such as FM, AM, FSK, etc.



Standard waveform output: sine wave, square wave, ramp, pulse, DC, noise, and arbitrary waves



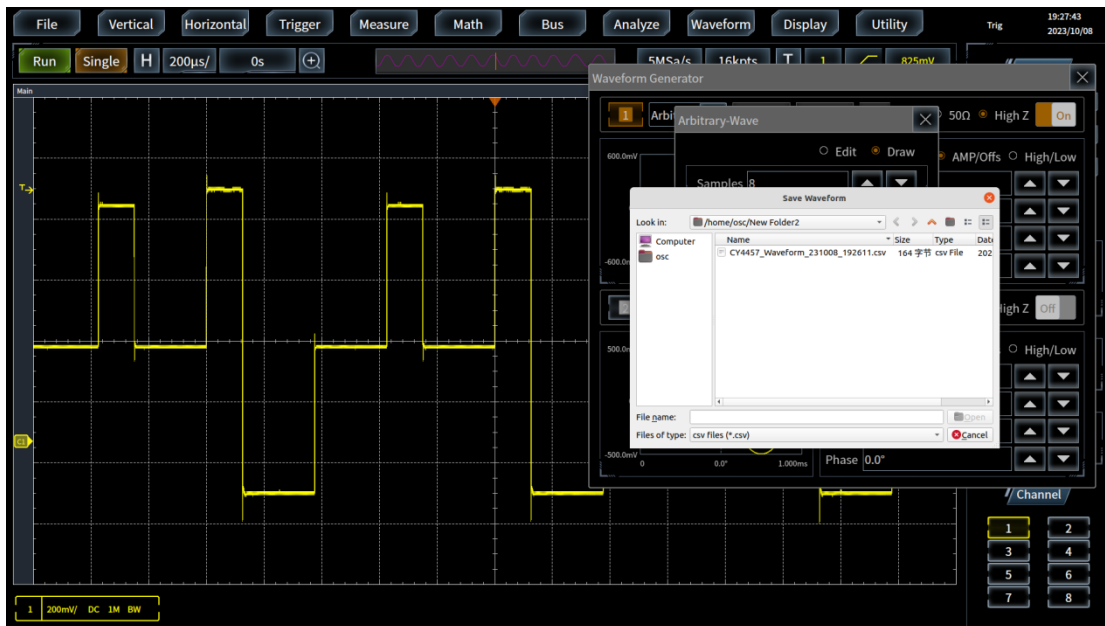
Built-in waveform output: SinC, exponential up-and-down, Gaussian, Lorentz curve, semi-positive curve



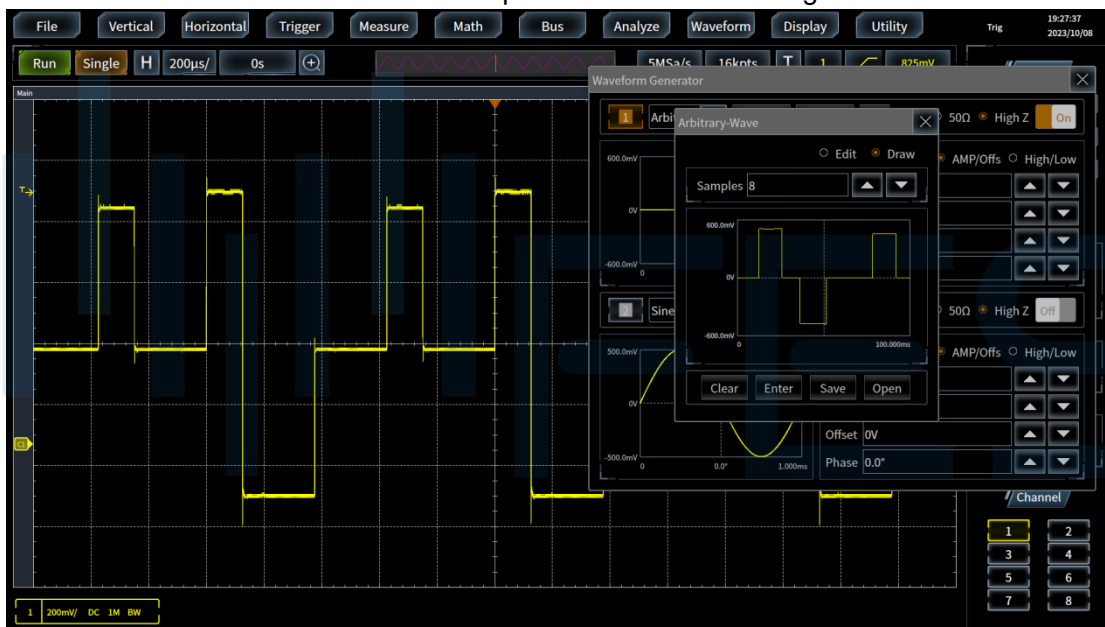
Modulated waveforms: FM, AM, FSK

- **Arbitrary waveform output up to 64k points, and capacitive screen touch input for waveforms**

The function generator option provides arbitrary waveform output function with 64k points recording length to copy waveforms from analog inputs, internal file save locations, USB disks, or external PCs from the waveform generator. You can also edit and modify the output waveforms via the capacitive touch screen to quickly generate the waveforms you need.



Stored waveforms are copied from the waveform generator.



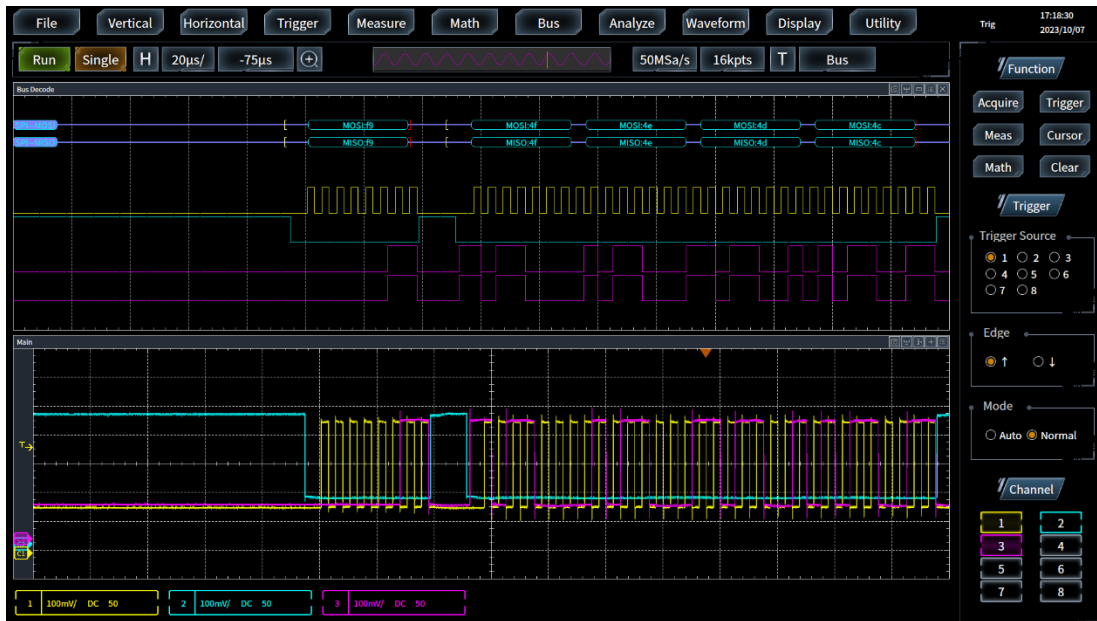
The capacitive screen can quickly draw arbitrary waveform outputs

(IV) Bus analyzer

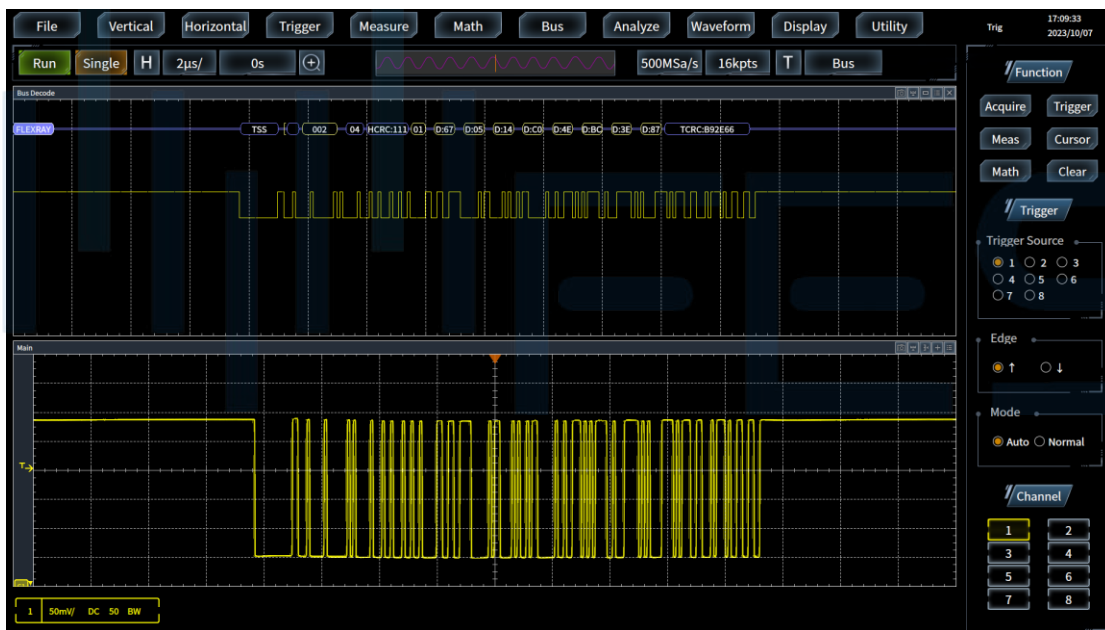
The bus analyzer option (options S04~S13) can be used to trigger and decode packet-level contents on commonly used serial bus (I2C, SPI, CAN, LIN, FlexRay, RS232, USB, Audio, MIL-STD-1553, ARINC429) standards.

- **Support the full hardware trigger and decoding of multiple buses**

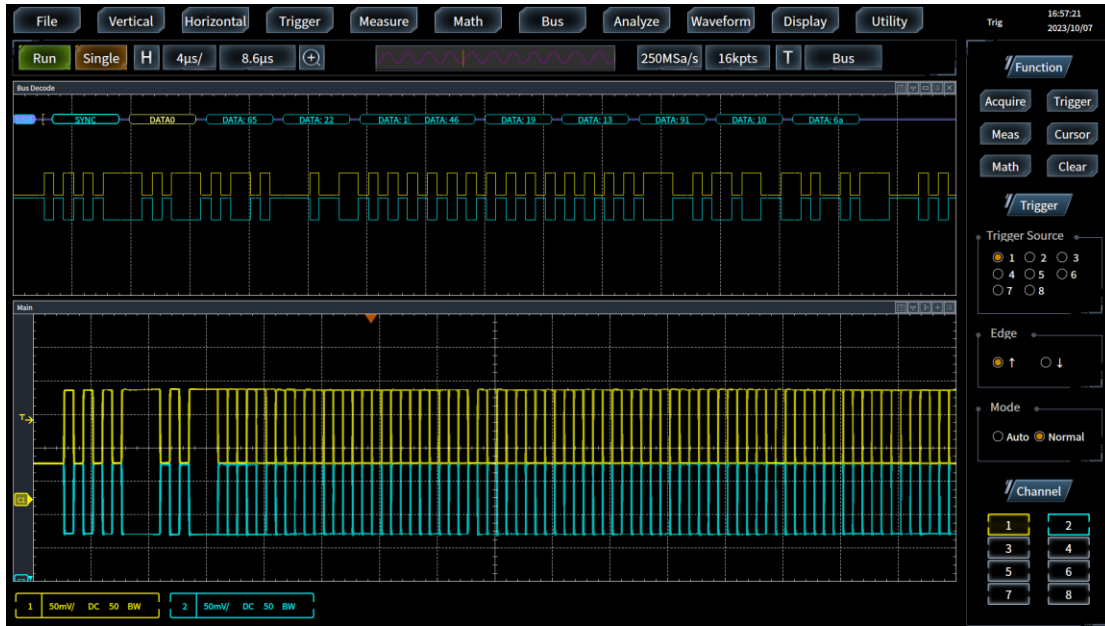
The bus analyzer option provides a set of powerful serial bus trigger and analysis tools, supporting automatic trigger and analysis of I2C, SPI, CAN, LIN, FlexRay, RS232, USB, Audio, MIL-STD-1553, ARINC429, etc. It also provides a test solution for serial buses, such as embedded, automotive, computer, and audio, etc. Besides, its all-hardware decoding technology based on FPGA enhances the probability of capturing the occasional serial communication error code.



I²C, SPI embedded buses



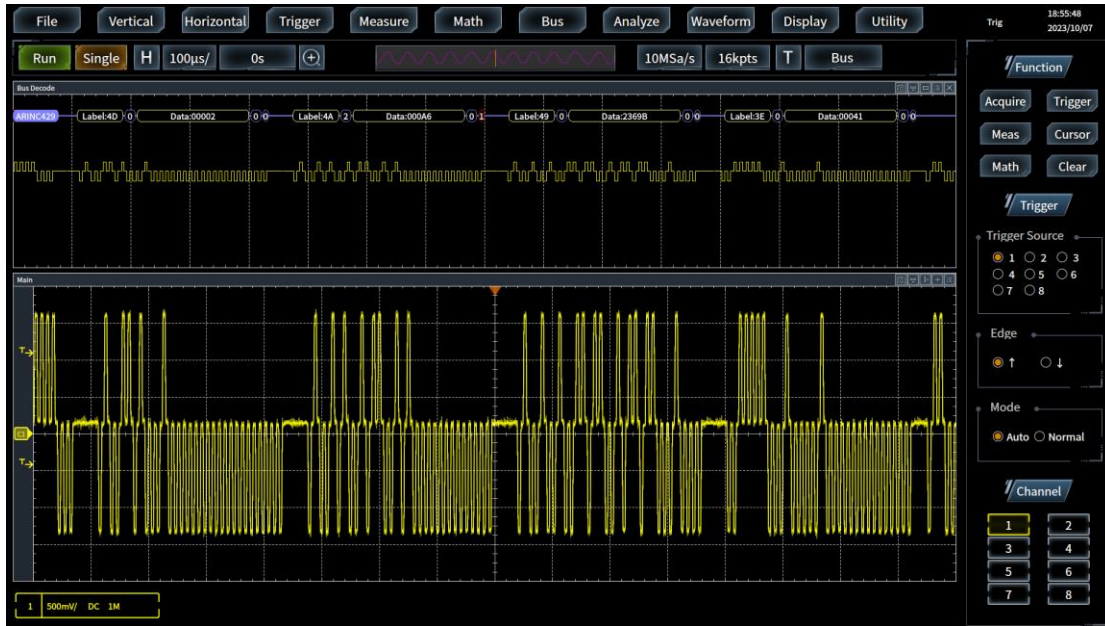
CAN, LIN, FlexRay automotive buses



RS232, USB computer bus



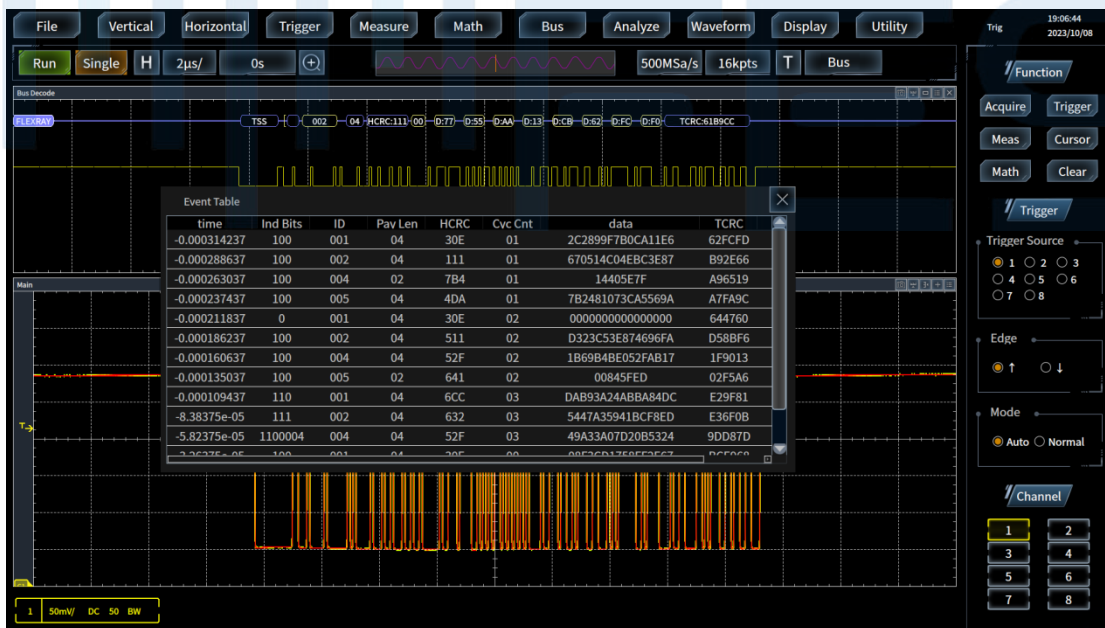
I²S, LJ, RJ, TDM audio buses



MIL-STD-1553, ARINC429 data buses

- **Support the display of multiple views**

In addition to the traditional digital view, the bus analyzer option provides a higher-level bus view display that allows you to identify various bus packet types, such as packet start, address, data, and packet end; you can also view captured bus packets in the form of a time-stamped event table.

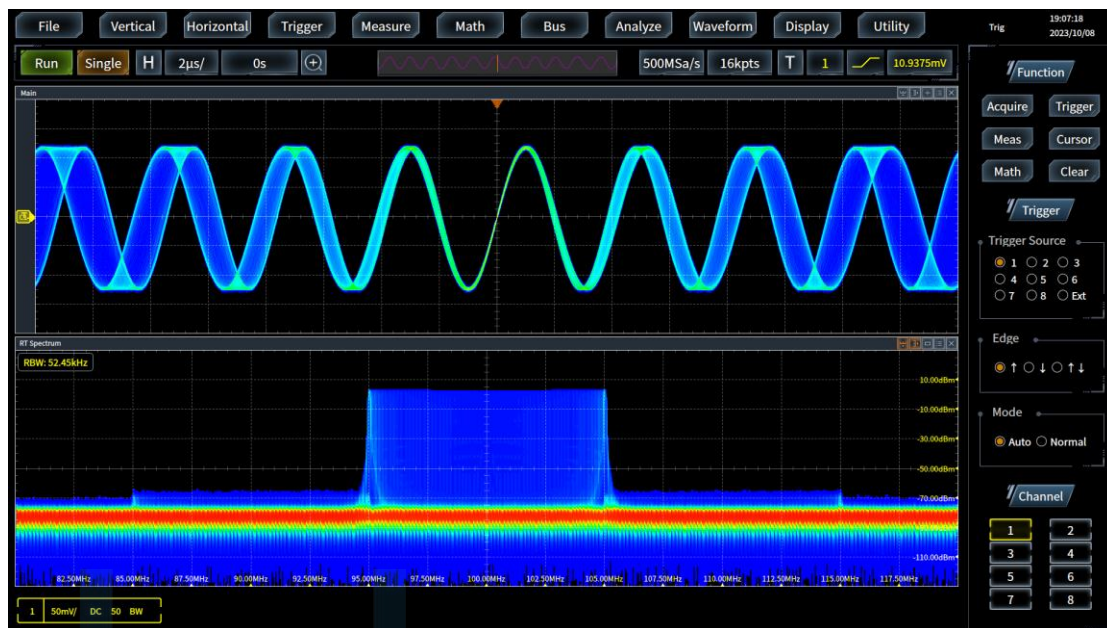


Multiple views: digital view, bus view, and event table

(5) Real-time spectrum analyzer

4457 series oscilloscopes have a built-in real-time spectrum analyzer function (option S22), with a maximum frequency range up to the oscilloscope bandwidth, and real-time analysis bandwidths of 10MHz, 20MHz, 40MHz, 80MHz, 160MHz and 320MHz. The use of superimposed FFT and digital

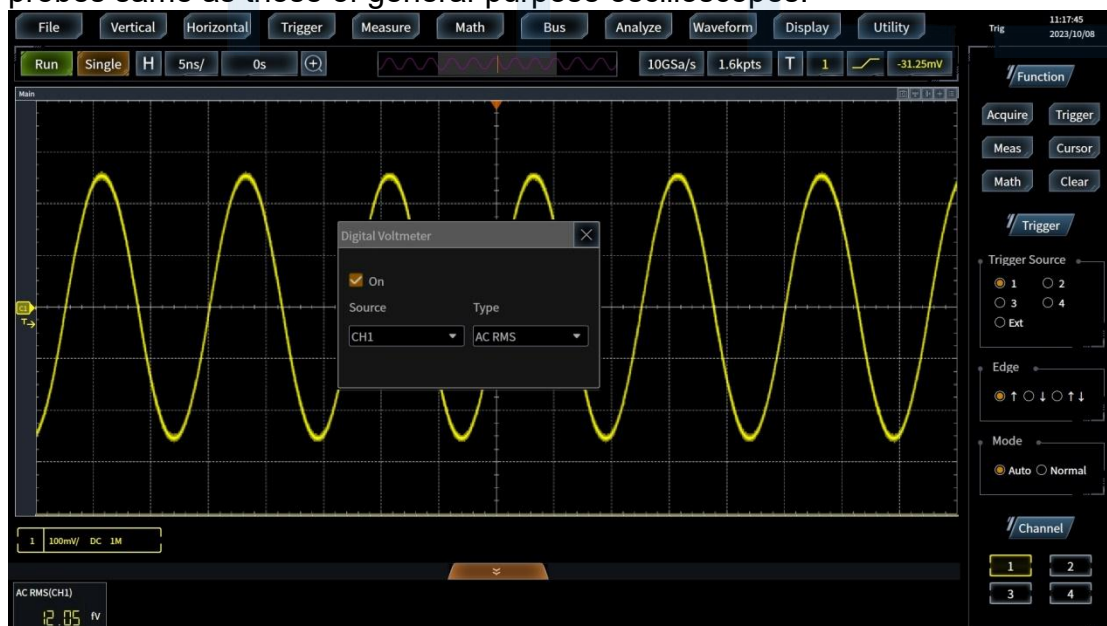
fluorescence display technology makes the FFT refresh frequency greater than 400,000 times / sec, thus greatly improving the probability of capturing narrow pulse or transient signals and enhancing the ability to view the occasional event.



Real-time spectrum analysis function

(VI) Digital voltmeter

The 4457 series oscilloscopes provide you with a 4-bit digital voltmeter and 8-bit frequency counter. The voltage and frequency measurement functions are realized by multiplexing the oscilloscope channels, with the probes same as those of general-purpose oscilloscopes.



4-bit voltage measurement, 8-bit frequency measurement

(VII) Easy-to-use performance

- **New capacitive touch screen, with intimate design and excellent experience**

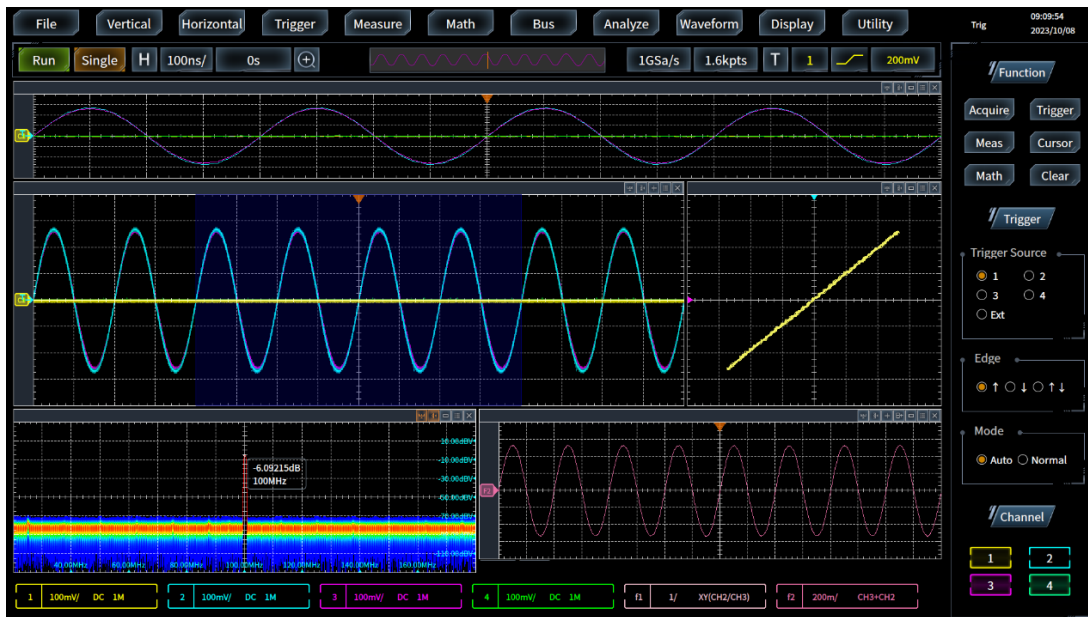
The 15.6-inch capacitive touch screen supports single and multi-touch, which can quickly realize the zoom and movement of waveforms. One-touch zeroing design simplifies operation by quickly zeroing horizontal, vertical and trigger positions. The numeric and bus keypad significantly speeds up input. 4457 series supports mouse and key operation options along with touch operation.



Capacitive screen multi-touch control to quickly realize the waveform zoom and movement

- **Multi-window free settings, which features beautiful view and is conducive to observation**

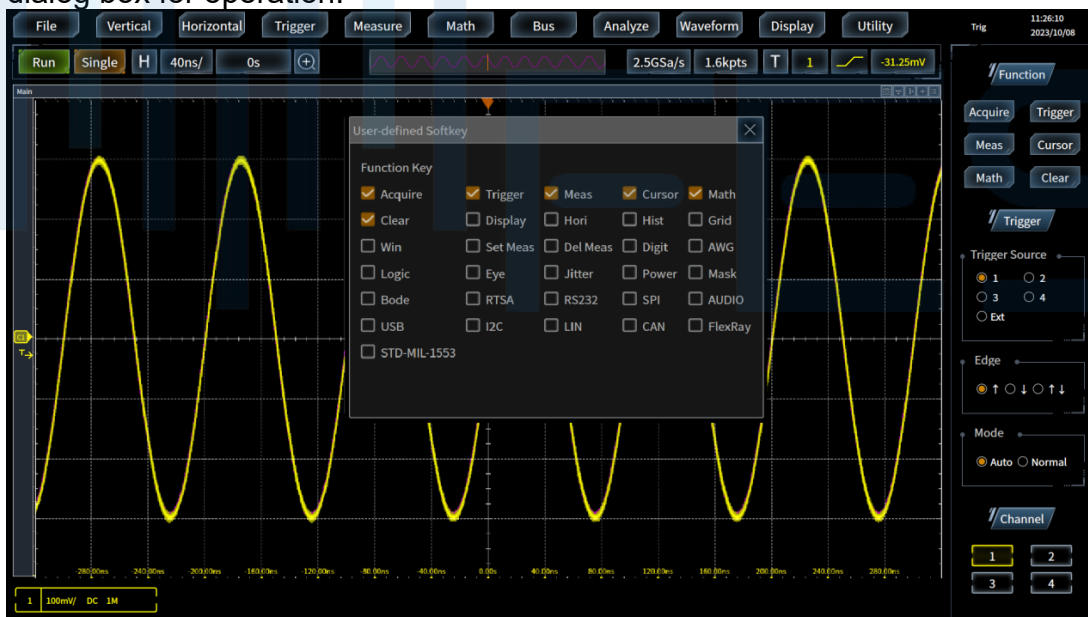
Users can freely hide, display, enlarge, shrink and split the open waveform windows according to their observation needs. You can operate multiple window waveforms at the same time, and freely add or delete waveforms in the window. Function windows can be dragged and docked around the main window, cascaded and tiled freely, or floated above other windows. After the instrument is connected to the extended display, the windows can be moved to the extended display, which is more convenient for waveform observation.



Multi-window display

- **Free definition of shortcut bar: fast and convenient**

Users can customize the right shortcut bar according to their own habits, and set the frequently-used function keys as shortcut keys in the function area, which helps users to quickly and directly open the corresponding function dialog box for operation.



Free definition of the right shortcut bar

- **Voice recognition control for smarter operation**

Users can send commands to the oscilloscope through voice. By using the deep learning-based method and the data intelligent processing technology, the oscilloscope can convert the user's oral commands into the oscilloscope's internal control commands to complete the user's desired operation, thus freeing up the hands and making the operation smarter and more convenient. In addition, the oscilloscope's voice recognition module also translates the user's operations into corresponding programmed control commands. Users can package multiple programmed control commands into

executable code in multiple languages as needed, and can directly use these codes to write programmed control programs.

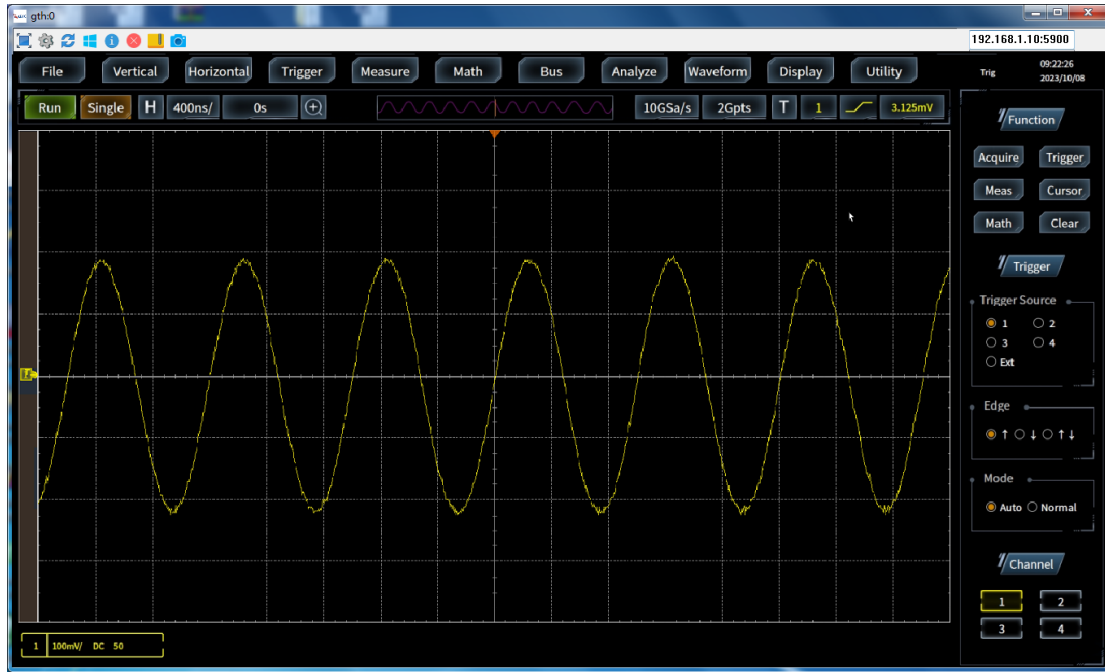
- **Standard 8U rack, with rich peripheral interfaces and powerful connection capability**

The four USB3.0 master control ports and two USB2.0 master control ports at the front and rear allow easy transfer of screenshots, instrument settings and waveform data to a USB disk. They can also connect a USB keyboard or mouse to a USB host port for input, or connect a USB printer for screen image printing. The DP and VGA video output ports on the back of the instrument can export the displayed images to an external monitor or projector for teaching or demonstration of the oscilloscope.



Rear panel interface,

The 8U standard rack and the 10/100/1000BASE-T Ethernet port at the back of the instrument can be easily connected to the network to realize remote programmed control of the network, which is convenient for function expansion and system establishment. With the oscilloscope same screen client, when controlling an oscilloscope over a network connection, you only need to enter the IP address and port number of the oscilloscope to provide a copy of the instrument's touch screen display area to the upper computer. You can transfer and save settings, waveforms, and screenshots directly from the upper computer, or control the oscilloscope in real time and use the mouse to operate in the copy display area, which is equivalent to operating the instrument's touch screen display area directly.



WEB terminal software interface

III. Typical Applications

The 4457 series digital oscilloscope is a multifunctional and comprehensive test instrument integrating oscilloscope, logic analyzer, function generator, real-time spectrum analyzer, bus analyzer and digital voltmeter. It is a universal debugging and verification tool, which can help you quickly identify, locate, analyze and solve problems. It is widely used in the design and debugging of analog and digital circuits, circuit diagnostics and transient signal capture, design of power devices and power electronics, embedded design and debugging, testing of automotive electronics, product testing and quality control, education and training, and other fields.

IV. Technical Specification

| Indicator | | Model | 4457E | 4457F | 4457G | 4457K |
|----------------------|---|------------------------------|--|---------------------|---------------------|---------------------|
| Vertical system | Number of channels | | 4, 8 (optional) | | | 4 |
| | Bandwidth ($\geq 10\text{mV/div}$, 50Ω) | | 1GHz | 2GHz | 3GHz | 4GHz |
| | Bandwidth ($\geq 10\text{mV/div}$, $1\text{M}\Omega$) | | 500MHz | 500MHz | 500MHz | 500MHz |
| | Rising time (50Ω) | | $\leq 450\text{ps}$ | $\leq 225\text{ps}$ | $\leq 150\text{ps}$ | $\leq 113\text{ps}$ |
| | Bandwidth limit | | 20MHz, 500MHz, 1GHz, 2GHz, full bandwidth (Note: bandwidth limiting scale does not exceed the bandwidth of each model) | | | |
| | Input impedance | | E/F/G: $50\Omega \pm 2\%$, $1\text{M}\Omega \pm 1\%$ // $24\text{pF} \pm 3\text{pF}$ | | | |
| | | | K: $50\Omega \pm 2\%$, $1\text{M}\Omega \pm 1\%$ | | | |
| | Input coupling | | 50 Ω :DC | | | |
| | | 1M Ω : DC, AC | | | | |
| Vertical sensitivity | | 50 Ω : 1mV/div~1V/div | | | | |

| | | |
|---|----------------------------|--|
| | range | 1MΩ: 1mV/div~10V/div |
| | Vertical gain accuracy | ±3% (Note: ≥ 10mV/div), ±5% (Note: <10mV/div) |
| | Vertical resolution | 8bit |
| | Dynamic range | ±4 divisions from the center of the screen |
| | Maximum input voltage | 50Ω:5Vrms |
| | | 1MΩ:300Vrms |
| | Offset range | 50Ω: ±0.5V (1mV/div~10mV/div), ±1V (20mV/div~100mV/div), ±4V (200mV/div~1V/div) |
| | | 1MΩ: ±0.5V (1mV/div~10mV/div), ±1V (20mV/div~100mV/div) ±10V (200mV/div~1V/div), ±100V (2V/div~10V/div) |
| | Isolation between channels | ≥30 dB |
| Level | Maximum sampling rate | E/F/G: 10GSa/s (full channel) |
| | | K: 20GSa/s (full channel) |
| | Max. memory depth | 2Gpts (full channel) |
| | Acquisition mode | Normal: Acquisition and sampling values |
| Peak: sampling glitch is 100ps at least | | |
| High resolution: Vertical resolution increase to reduce noise | | |

| | | |
|--------------------------------------|-----------------------|--|
| | | Envelope: Minimum and maximum envelope responds to peak data on multiple acquisitions |
| | | Average: average contains 2-512 waveforms |
| | | Scroll: Scroll the waveform from right to left on the screen, with time base 100ms/div~1000s/div |
| | | Segmentation: Standard capture memory is divided into up to 262,144 segments |
| Fastest waveform capture rate | | Fast sampling mode: 1,200,000 waveforms/second |
| | | Segmented mode: 450,000 waveforms/second |
| Time base range | | 10ps/div~1000s/div |
| Time base accuracy | | $\pm (1\text{ppm}+1\text{ppm/year aging rate})$ |
| Time base delay range | | 1 screen before trigger, maximum 5000s after trigger |
| Inter-channel delay adjustment range | | $\pm 150\text{ns}$, step 100ps |
| Trigger | Trigger source | Analog channels CH1~CH4, external, digital channels D0~D15 (optional H01), analog channels CH5~CH8 (optional eight-channel option) |
| | Trigger mode | Auto, normal, single |
| | Trigger holdoff range | 6.4ns to 200s |
| | Trigger level range | Internal: ± 4 divisions External: $\pm 0.4\text{V}$, external/10: $\pm 4\text{V}$ |

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| | Trigger sensitivity | Internal: user adjustable, 0.1 division step |
| | | External: 50mV, external/10: 500mV |
| | Trigger type | Edge: Trigger on the rising edge, falling edge, or any edge of any channel or auxiliary input |
| | | Edge transition: Trigger when a rising or falling edge spanning two voltage levels is encountered within or outside a specified period of time |
| | | glitch: Specify the glitch width (less than the narrowest pulse width) and slope to trigger when a glitch is encountered |
| | | Pulse width: Trigger on positive or negative pulse width at >, <, = or ≠ specific time period; pulse width range: 6.4ns~12.8s; resolution 1.6ns |
| | | Short pulse: trigger when the pulse exceeds one threshold but fails to exceed another threshold |
| | | Timeout: trigger when the event stays high, low, or high-low for a specified period of time |
| | | Code pattern/status: Identify the trigger condition by looking up the specified code pattern or code pattern and edge (status) on the input channel |
| | | Video trigger: trigger on line, odd field, even field, or full field of NTSC, PAL, and SECAM signals |
| | | Edge-to-edge: Prepare on a selected edge on any channel and wait for a specified time or event to trigger on another selected edge, including dual edge times and dual edge events |
| | | Build and hold: trigger in case of a violation of the build time or hold time between clock and data present on any channel |

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| | | Window: trigger acquisition when an event enters, leaves, or holds within or outside a window determined by two user-adjustable thresholds. Events can be limited by time or logic value |
| | | Burst pulse: trigger on the N th edge of a burst pulse that occurs after a certain amount of idle time |
| | | Cascade: "B" event is triggered after "A" event has been triggered N times or for a certain period of time. The "A" and "B" events do not support video trigger and bus trigger. |
| Measurement and analysis system | Auto Meas | There are 42 types, but up to 20 types can be displayed on the screen. The include period, frequency, delay, top fluctuation, rising time, falling time, positive duty cycle, negative duty cycle, positive pulse width, negative pulse width, burst width, burst interval, burst period, phase, positive overshoot, negative overshoot, peak-to-peak, amplitude, high level, low level, maximum, minimum, mean, cycle mean, root mean square, cycle mean square, number of positive pulses, number of negative pulses, number of rising edges, number of falling edges, area, cycle area, pulse top, pulse bottom, pulse amplitude, crosspoint voltage, specified voltage time, top, middle, bottom, maximum time, and minimum time. |
| | Cursor | Waveform and screen |
| | Measurement statistics | Mean value, minimum, maximum, standard deviation |
| | Ref Level | User-definable reference level for automatic measurements, which can be specified as a percentage or in units |
| | Range | Selectable screen or waveform cursor |
| | Waveform histogram | The waveform histogram provides a data value indicating the total number of hits within the user-defined area of the display screen |

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| | Signal source: CH1~CH4 |
| | Type: vertical, horizontal |
| | Measurement types: 12 types, including number of waveforms, number of hits in the box, number of peak hits, median, maximum, minimum, peak-to-peak, mean value, standard deviation, Sigma1, Sigma2, Sigma3 |
| Waveform math | Supported math functions at one time: 27 |
| | Math functions: add, subtract, multiply, divide, absolute value, square, square root, exponential (natural number base, 10 base), logarithmic (natural number base, 10 base), mean, maximum, minimum, envelope, interpolation, comparison, inverse, reverse, integral, sum of square roots, differential, FFT, XY |
| | Filter: high-pass filter, low-pass filter, smoothing filter |
| | FFT: Vertical scale is set to linear RMS or dBm, dBmV; window is set to rectangular, Hamming, Hanning, Blackman-Harris |
| Limit and template test (Option S01) | Select template: standard, customized, limit test |
| | Test source: CH1~CH4 |
| | Template ratio: lock to source ON, lock to source OFF |
| | Test stop conditions: no stop, waveform (1~1,000,000), time (1 second~48 hours) |
| | Failure action: stop acquisition, save waveform, save screen, auxiliary output |
| | Result display: display results, display detailed results |
| Power measurement | Supported measurement types: 5 |

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| | and analysis (Option S02) | Measurement types: power quality, ripple, harmonics, ON/OFF loss, safe operating area |
| | Baud chart analysis (Option S03) | It is necessary to procure H02 function generator option |
| | | Detect the frequency response of the control loop, analyze the stability of the feedback system |
| | Eye diagram analysis (Option S20) | Eye diagram display |
| | | Eye diagram measurement: mainly including eye height, eye width, 0 level, 1 level, Q factor, etc. |
| | Jitter analysis (Option S21) | Jitter display: histogram, trend graph, spectrogram, bathtub curve. |
| | | Jitter decomposition: Tj, Rj, Dj, Pj, DDj, ISI, DCD |
| Real-time spectrum analyzer (Option S22) | Real-time spectrum analyzer | Number of analyzing channels: 1 |
| | | Analysis frequency range: DC ~ oscilloscope bandwidth |
| | | Real-time analysis bandwidth: 10 MHz, 20 MHz, 40 MHz, 80 MHz, 160 MHz and 320 MHz |
| | | Window type: rectangular window, Hanning window, Hamming window, black-man window, flat-top window, triangular window, Kessel window |
| | | FFT waveform refresh rate: >400,000 times/sec |
| Bus analyzer | Decoding channel | 1 |
| | Display Format | Binary, hexadecimal |
| | Display mode | Bus view, digital view, event table with timescale information |

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| I2C trigger and analysis option S04 | Trigger on Start, Repeat Start, Stop, Acknowledge Loss, Address, Data, Address/Data on I2C bus up to 10 Mbps, support 7-bit/10-bit address protocol type |
| RS232 trigger and analysis option S05 | Trigger on transmit bit start, transmit data, Tx parity error, transmit packet end, receive bit start, receive data, Rx parity error, receive packet end within 50bps to 2Mbps. |
| SPI trigger and analysis option S06 | Trigger on SS valid, MOSI, MISO, MOSI and MISO on SPI bus within 10Mbps rate |
| CAN trigger and analysis option S07 | Trigger on frame start, frame end, bit fill error, response error, ID, data, ID and data, frame type on CAN signals within 10kbps to 1Mbps |
| LIN trigger and analysis option S08 | Trigger on synchronization, identifier, data, identifier/data, wake-up frame, sleep frame and error on LIN signals up to 800bps to 100kbps; protocol standard supported: V1.0, V2.0 |
| FlexRay trigger and analysis option S09 | Trigger on frame header, indicator bit, identifier, loop count, header field, data, identifier and data, end of frame, and error within 2.5Mbps, 5Mbps and 10Mbps |
| Audio trigger and analysis option S10 | Trigger on word select, data within 10Mbps; protocol types supported: I2S, LJ, RJ, TDM |
| USB trigger and analysis option S11 | Trigger on synchronization, reset, abort, resume, end-of-packet, token packet, data packet, handshake packet, special packet, and error on USB signals at low speed 1.5Mbps or full speed 12Mbps |
| MIL-STD-1553 trigger and analysis option S12 | Trigger on synchronization, command, status, data, time, parity error, synchronization error, manchester error, discontinuity error on MIL-STD-1553 signal at 1Mbps. |

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| | ARINC429 trigger and analysis module option S13 | Trigger on word start, word stop, tab, tab+ bits, tab range, error, all 0 bits, all 1 bits, all bits (eye) of ARINC 429 bus signals within 1 Mbps rate |
| Logic analyzer Min lysis Option H01 | Number of digital channels | 16 |
| | Threshold selection | TTL (1.4V), 5VCMOS (2.5V), 3.3VCMOS (1.65V), 2.5VCMOS (1.25V), ECL (-1.3V), PECL (3.7V), user defined |
| | Custom threshold range | ±20V in 10mV increments |
| | Threshold accuracy | ±(150mV + 3% of threshold settings) |
| | Maximum input voltage | ±40V peak |
| | Input dynamic range | ±10V relative to threshold |
| | Minimum voltage swing | 500mVpp |
| | Maximum input switching rate | 400MHz |
| | Input impedance | 100kΩ±2% |
| Vertical resolution | 1bit | |

F.E.S. Co., Ltd.

1000/24, P.B. Tower, 8 floor, Sukhumvit 71 Rd., North Klongtan, Wattana, Bangkok 10110

TEL: 02-064-4050 or 02-064-4051 | FAX: 02-010-4262 | Email: info@fesupply.com

www.fesupply.com



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| | Timed sampling rate | 2.5GSa/s |
| | Memory depth | 160Mpts |
| | Minimum detection pulse width | 2ns |
| Function generator Option H02 | Number of channels | 2 |
| | Max. output frequency | 50MHz |
| | Maximum sampling rate | 200MSa/s |
| | Vertical resolution | 14bit |
| | Output impedance | 50Ω (typical value), high impedance |
| | Output waveform | Standard waveforms: sine wave, square wave, ramp, pulse, DC, noise, and arbitrary waves |
| | | Built-in waveforms: SinX/X, exponential up-and-down, Gaussian, Lorentz curve, semi-positive curve, electrocardiogram |
| | Modulation | FM, AM, FSK |
| | Sine wave | Frequency range: 0.1Hz~50MHz |
| | | Harmonic distortion: -40dBc (>200mVpp @50Ω, 1kHz) |
| Spurious: -40dBc (>200mVpp @50Ω, 1kHz) | | |
| Total harmonic distortion: 1% (>200mVpp @50Ω, 1kHz) | | |

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| | | Signal-to-noise ratio: 40dB (>200mVpp @50Ω, 1kHz) |
| Square wave/pulse | | Frequency range: 0.1Hz~10MHz |
| | | Duty cycle: 0.1%~99.9 |
| | | Duty cycle resolution: 0.1% or 5ns (whichever is greater) |
| | | Minimum pulse width: 40ns |
| | | Pulse width resolution: 0.1% or 5ns (whichever is greater) |
| Ramp/triangle wave | | Frequency range: 0.1Hz~1MHz |
| | | Linearity: 1% |
| | | Variable symmetry: 0 to 100% |
| Noise | | Bandwidth: 50MHz |
| Built-in waveform frequency | | 0.1Hz~1MHz |
| Arbitrary waveform | | Waveform length: 1~64k |
| | | Frequency range: 0.1Hz~25MHz |
| Frequency | | Accuracy: ±25ppm |
| | | Resolution: 0.1Hz or 4 bits (whichever is greater) |
| Amplitude | | Output range: 10mVpp~2.5Vpp (50Ω), 20mVpp~5Vpp (high resistance) |
| | | Accuracy: ± (1.5% amplitude settings + 1.5% DC bias settings + 2mV) (@1kHz) |

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| | DC offset | Bias range: $\pm 1.25\text{V}$ (50 Ω), $\pm 2.5\text{V}$ (high resistance) |
| | | Bias resolution: 1mV (50 Ω), 2mV (high resistance) |
| | | Bias accuracy: $\pm (1.5\% + 3\text{mV of DC bias setting value})$ |
| Digital voltmeter | Measurement source | CH1~CH4, CH5~CH8 (optional eight-channel option) |
| | Measurement type | AC effective value, DC, DC+AC effective value, frequency |
| | Resolution | Voltage measurement: 4 bits |
| | | Frequency counter: 8 bits |
| Display system | Display type | 15.6-inch color LCD display |
| | Display resolution | 1920×1080 |
| | Scale | Full, grid, crosshair, frame |
| | Touch screen | Capacitive touch screen, support waveform and menu operation |
| | Waveform window | It can be set by users |
| | Waveform type | Dot, vector, afterglow |
| | Gray scale level | Grade 256 |
| | Waveform color | Normal, reversion, color temperature, spectrum |
| | Brightness | Waveform, scale and screen brightness can be freely adjusted. |



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| | USB master controls | A total of 6 on the front and rear, which are used for screen snapshots, instrument settings and waveform data storage |
| | Ethernet | RJ-45 connector, 10/100/1000Mbps, support network programmed control. |
| | VGA video output port | DB-15 hole connector for connecting the oscilloscope to an external monitor |
| | DP video output port | DP connector for connecting the oscilloscope to an external monitor |
| | Auxiliary input | Rear panel BNC, input impedance $1M\Omega \pm 2\%$; maximum input 300Vrms |
| | Auxiliary output | Rear panel BNC, event output for trigger signal output or limit template test |
| | Reference input | Rear panel BNC, input of time base system for reference clock, frequency 10MHz, amplitude 0.4Vpp~5Vpp (50 Ω) |
| | Reference output | Rear panel BNC, output of time base system for reference clock, frequency 10MHz, amplitude 1.3Vpp (50 Ω) |
| | Probe compensator output | Front panel pin, frequency 1kHz, amplitude approx. 3V |
| | Ground port | Rear panel for chassis grounding |
| Structure | Structure pattern | Portable |
| | Power supply | Operating voltage: 198Vac to 242Vac, operating frequency: 47.5Hz to 52.5Hz |
| | | Power consumption: ≤ 400 W |
| Working temperature: | 0 $^{\circ}$ C~+40 $^{\circ}$ C | |

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| Boundary dimension (Width×Height×Depth) | (426±2)mm × (310.3±1.2)mm × (200±1.2)mm (excluding knobs, bottom corners and handles, etc.) |
| Weight | ≤15kg |

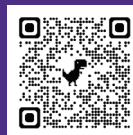


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V. Order Information

- **Mainframe:**

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| 4457E digital oscilloscope | 4CH, 1GHz, 10GSa/s, 8bit |
| 4457F digital oscilloscope | 4CH, 2GHz, 10GSa/s, 8bit |
| 4457G digital oscilloscope | 4CH, 3GHz, 10GSa/s, 8bit |
| 4457K digital oscilloscope | 4CH, 4GHz, 20GSa/s, 8bit |

- **Standard configuration**

| No. | Name | Description |
|-----|------------------------------|--|
| 1 | High resistance probe P9500A | 4 (standard), 8 (eight-channel option) |
| 2 | Power cord | 1 piece, standard 3-core power cord |
| 3 | User's Manual | 1 book |
| 4 | Programming Guide | 1 book |
| 5 | Certificate of conformity | 1 |




- **Options**

| Option No. | Name | Function | Remarks |
|------------|------------------------------------|--|---------|
| 4457-H01 | Logic analyzer option | Number of channels: 16 Including 1 LAP500 logic probe | |
| 4457-H02 | Function generator option | 2-channel, 50MHz function generator | |
| 4457-H03 | Solid-state electronic disk | 256GB removable SSD | |
| 4457-H04 | Rack mounting kit | Rack mounting kit | |
| 4457-H05 | Aluminum alloy transportation case | Aluminum alloy transportation case | |
| 4457-H06 | Configuration option in English | User's Manual and Programming Manual in English | |
| 4457-H07 | BNC to SMA cable kit | BNC male to SMA female adapter SMA male to SMA male cable | |
| 4457-H08 | P9501 high resistance probes | Bandwidth: DC~500MHz Attenuation: 10:1, 1:1 Maximum voltage: 300V (DC+ACpk) Auto-recognition function not | |

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| | | supported | |
| 4457-H09 | P9500A high resistance probes | Bandwidth: DC~500MHz Attenuation: 10:1 Maximum voltage: 300V (DC+ACpk) Automatic recognition function supported Default standard probe | |
| 4457-H10 | P9558 high voltage single-ended probe | Bandwidth: DC~250MHz Attenuation: 100:1 Maximum voltage: 3000V (DC+ACpk) Length: 200cm | |
| 4457-H11 | P4080 high voltage single-ended probe | Bandwidth: DC~80MHz Attenuation: 1000:1 Accuracy: ±2% Maximum voltage: 20kVDC, 40kVpkAC | |
| 4457-H12 | P4220 high voltage single-ended probe | Bandwidth: DC~220MHz Attenuation: 1000:1 Accuracy: ±3% Maximum voltage: 39kV (DC+ACpk) | |
| 4457-H15 | P8200 high voltage differential probe | Bandwidth: DC~200MHz Attenuation: 25:1, 250:1 Accuracy: ±2% Maximum voltage: ±750V(DC+ACpk) | |
| 4457-H16 | P8200A high voltage differential probe | Bandwidth: DC~200MHz Attenuation: 50:1, 500:1 Accuracy: ±2% Maximum voltage: ±1500V(DC+ACpk) | |
| 4457-H17 | P8100H high voltage differential probe | Bandwidth: DC~100MHz Attenuation: 100:1, 1000:1 Accuracy: ±2% | |

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| | | Maximum voltage: ±6000V(DC+ACpk) | |
| 4457-H18 | P5020 high voltage differential probe | Bandwidth: DC~20MHz Attenuation: 500:1, 5000:1 Accuracy: ±2% Maximum voltage: 40kV(DC+ACpk-pk) | |
| 4457-H20 | AP621 current probe | Bandwidth: 10Hz~100kHz Measuring range: 2000A peak Range: 100mV/A, 10mV/A, 1mV/A | |
| 4457-H21 | AP622 current probe | Bandwidth: DC~100kHz Measuring range: 50mA~100A peak Range: 10mV/A, 100mV/A | |
| 4457-H22 | AP622D current probe | Bandwidth: DC~1.5MHz Measuring range: 1mA~40A peak Range: 100mV/A, 1V/A | |
| 4457-H23 | AP8500 current probe | Bandwidth: DC~5MHz Accuracy: ±1% Max. current: 500A | |
| 4457-H24 | AP8150 current probe | Bandwidth: DC~10MHz Accuracy: ±1% Max. current: 150A | |
| 4457-H25 | AP8050 current probe | Bandwidth: DC~50MHz Accuracy: ±1% Max. current: 50A | |
| 4457-H26 | AP8030D current probe | Bandwidth: DC~100MHz Accuracy: ±1% Max. current: 30A | |
| 4457-H30 | 4457E eight-channel option | Number of analog channels: 8 Bandwidth: 1GHz Vertical resolution: 8bit | |

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| 4457-H32 | 4457F eight-channel option | Number of analog channels: 8 Bandwidth: 2GHz Vertical resolution: 8bit | |
| 4457-H34 | 4457G eight-channel option | Number of analog channels: 8 Bandwidth: 3GHz Vertical resolution: 8bit | |
| 4457-H37 | 87121PB probe adapter | Used for current probe and high-voltage differential probe to take electricity from oscilloscope, supply voltage 5V±0.3V | |
| 4457-H38 | 87121PC probe adapter | Used for current probe and high-voltage differential probe to take electricity from oscilloscope, supply voltage 9V±0.5V | |
| 4457-H39 | 87121PD probe adapter | Used for current probe and high-voltage differential probe to take electricity from oscilloscope, supply voltage 12V±1V | |
| 4457-H40 | 87121EA active single-ended probe | Bandwidth: 1GHz Attenuation ratio: 10:1 DC gain accuracy: ±3% | |
| 4457-H41 | 87121FA active single-ended probe | Bandwidth: 2GHz Attenuation ratio: 10:1 DC gain accuracy: ±3% | |
| 4457-H42 | 87121GA active single-ended probe | Bandwidth: 3GHz Attenuation ratio: 10:1 DC gain accuracy: ±3% | |
| 4457-H43 | 87121KA active single-ended probe | Bandwidth: 4GHz Attenuation ratio: 10:1 DC gain accuracy: ±3% | |
| 4457-H44 | 87121EB active differential probe | Bandwidth: 1GHz Attenuation ratio: 10:1 DC gain accuracy: ±3% | |

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| 4457-H45 | 87121FB active differential probe | Bandwidth: 2GHz Attenuation ratio: 10:1 DC gain accuracy: $\pm 3\%$ |  |
| 4457-H46 | 87121GB active differential probe | Bandwidth: 3GHz Attenuation ratio: 10:1 DC gain accuracy: $\pm 3\%$ |  |
| 4457-H47 | 87121KB active differential probe | Bandwidth: 4GHz Attenuation ratio: 10:1 DC gain accuracy: $\pm 3\%$ |  |



| Option No. | Name | Function | Remarks |
|------------|--|---|---------|
| 4457-S01 | Limit template test module | Support standard templates such as ITU-T, ANSI T1.102, USB, or user-created templates | |
| 4457-S02 | Power measurement and analysis module | Support power quality, ON/OFF loss, harmonics, ripple, modulation and other tests | |
| 4457-S03 | Baud chart analysis module | It is necessary to purchase a function generator option to detect the frequency response of the control loop and analyze the stability of the feedback system | |
| 4457-S04 | I2C trigger and analysis module | Signal rate: ≤ 10Mbps Protocol type: 7-bit/10-bit address Signal type: single-ended | |
| 4457-S05 | RS232 trigger and analysis module | Signal rate: 50~2Mbps Signal type: single-ended | |
| 4457-S06 | SPI trigger and analysis module | Signal rate: ≤ 10Mbps Signal type: single-ended | |
| 4457-S07 | CAN trigger and analysis module | Signal rate: 10kbps~1Mbps Signal type: Single-ended, differential, CAN_L, CAN_H | |
| 4457-S08 | LIN trigger and analysis module | Signal rate: 800bps~100kbps Protocol standard: 1.X, 2.X Signal type: single-ended | |
| 4457-S09 | FlexRay trigger and analysis module | Signal rate: 2.5/5/10Mbps Signal type: BP, BM, TX/RX | |
| 4457-S10 | Audio trigger and analysis module | Signal rate: ≤ 10Mbps Protocol type: I ² S, LJ, RJ, TDM Signal type: single-ended | |
| 4457-S11 | USB trigger and analysis module | Signal rate: 1.5Mbps, 12Mbps Signal type: single-ended, differential | |
| 4457-S12 | MIL-STD-1553 trigger and analysis module | Signal rate: 1Mbps Signal type: single-ended, differential | |
| 4457-S13 | ARINC429 trigger and analysis module | Signal rate: 1Mbps Signal type: single-ended | |
| 4457-S20 | Eye diagram analysis module | Eye diagram display and measurement: mainly including eye height, eye width, 0 level, 1 level, Q factor, etc. | |
| 4457-S21 | Jitter analysis module | Histogram, trend graph, spectrogram, bathtub curve and so on | |
| 4457-S22 | Real-time spectrum | Frequency range: DC ~ oscilloscope | |

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| | analysis module | bandwidth Maximum real-time bandwidth: 320MHz | analysis | |
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