Ceyear

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

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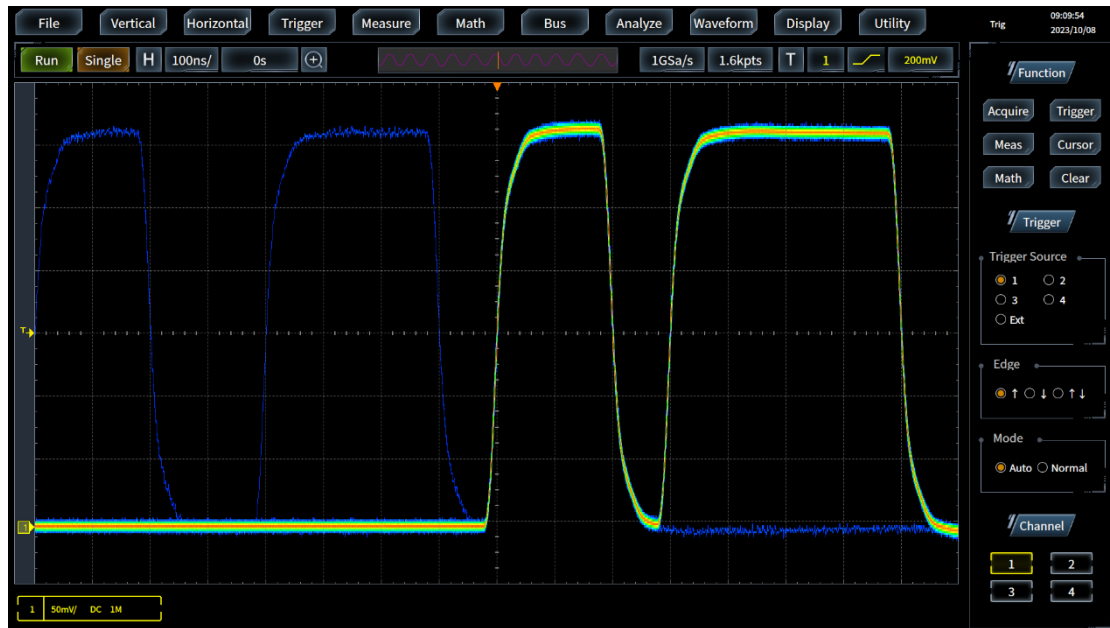
Waveform capture rate of to 1,200,000 waveforms/second helps to quickly detect episodic events

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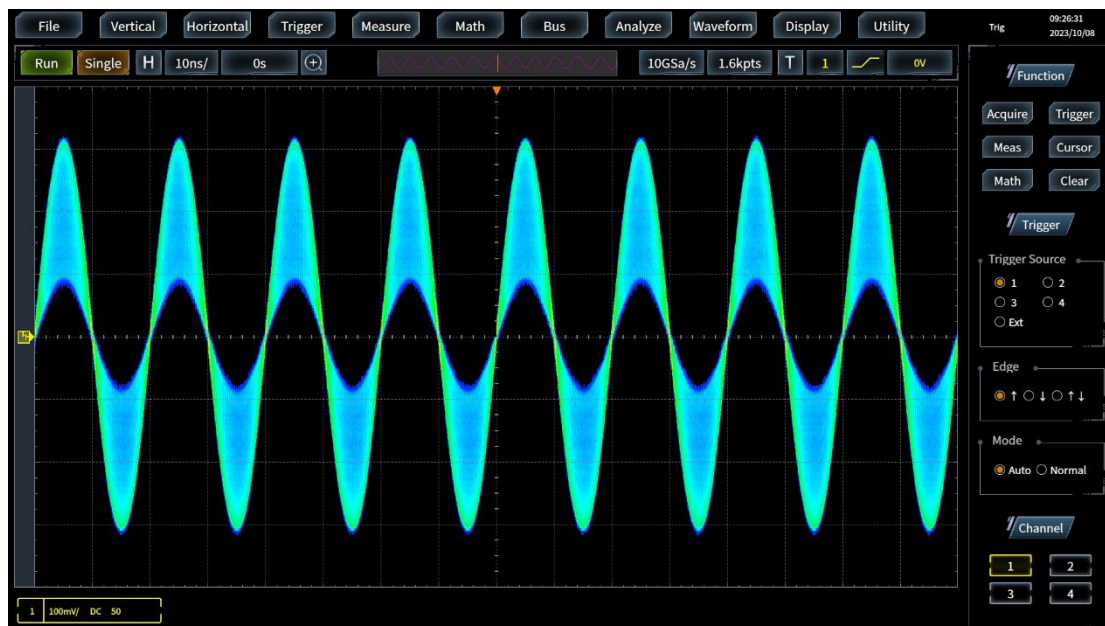
events.
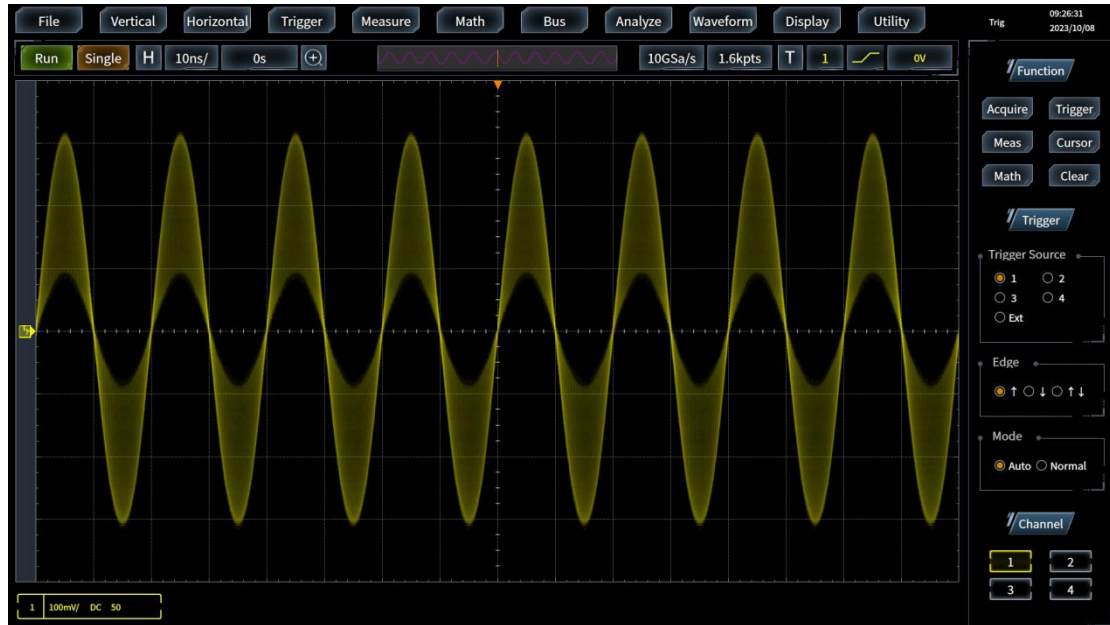
Normal: the default channel color and gray level are used to indicate the probability of an event occurring, and bright colors indicate events with a high probability of occurrence
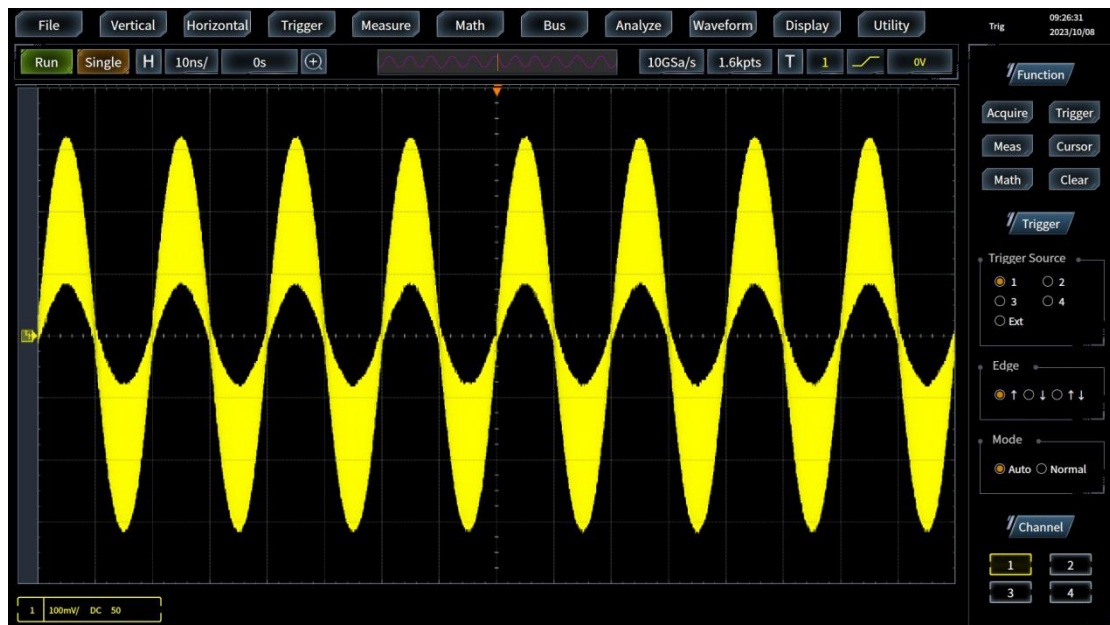
Reversion: the default channel color and gray level are used to indicate the probability of an event occurring, and dark colors indicate events with a high probability of occurrence

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.
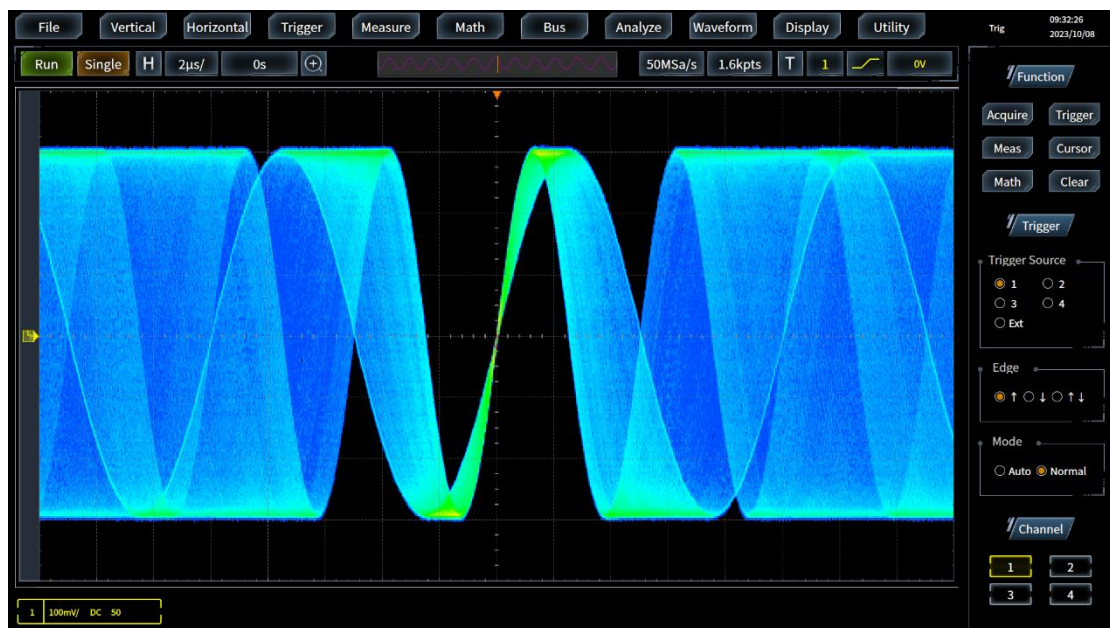
Digital interpolation technology helps to realize accurate positioning of the trigger point
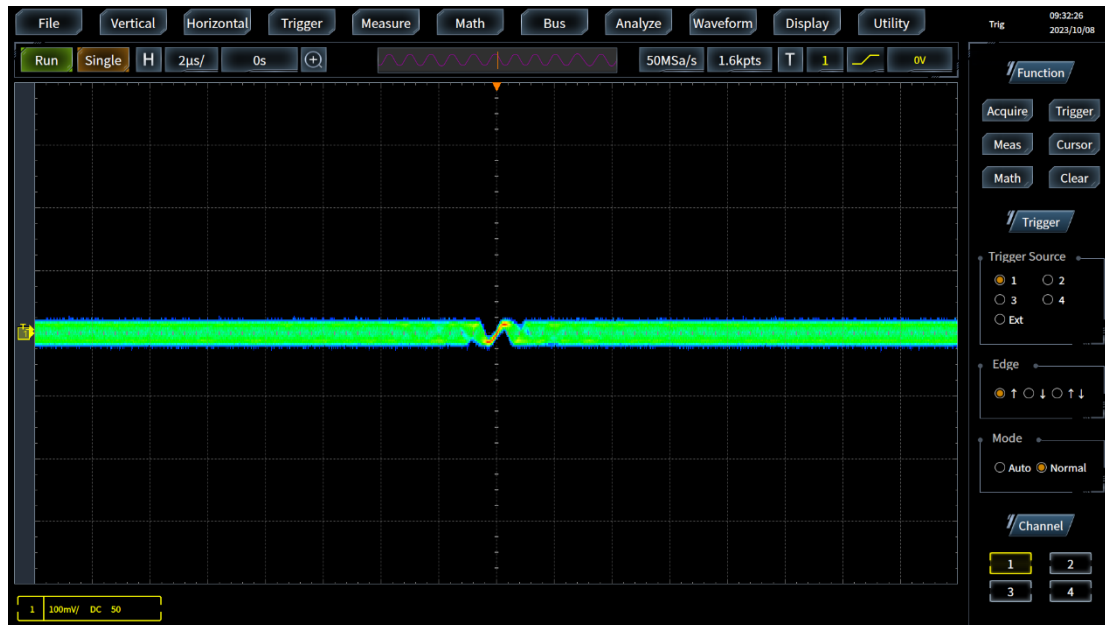
Continuously adjustable trigger sensitivity with up to 0.1 division

● **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
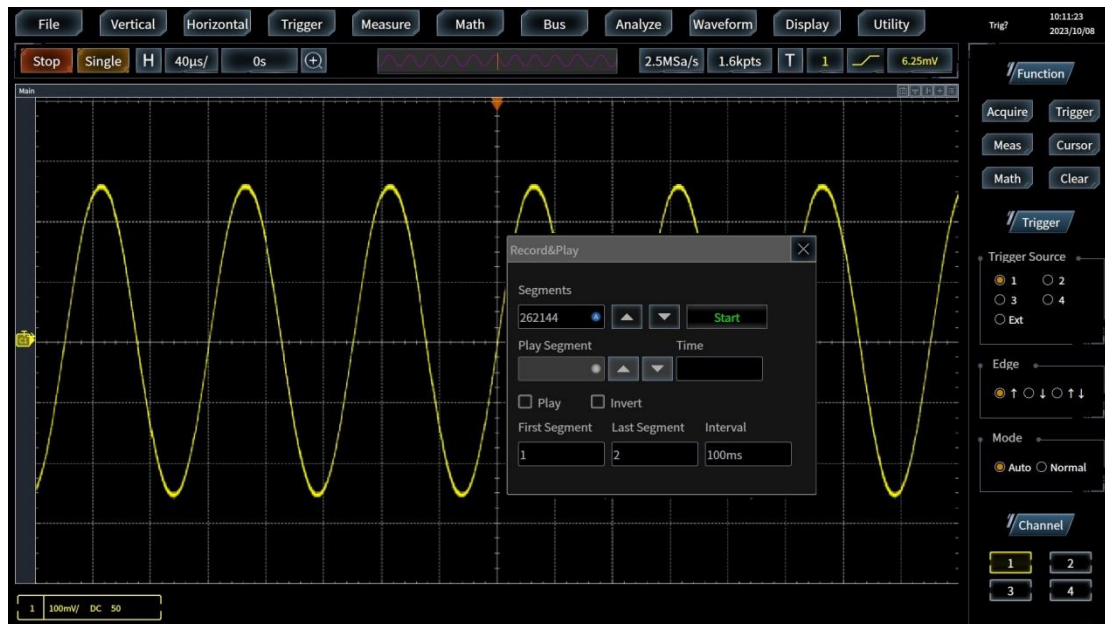
recording and playback, etc.) to provide you with deep data mining and analysis, thus meeting your multi-faceted measurement and analysis needs.
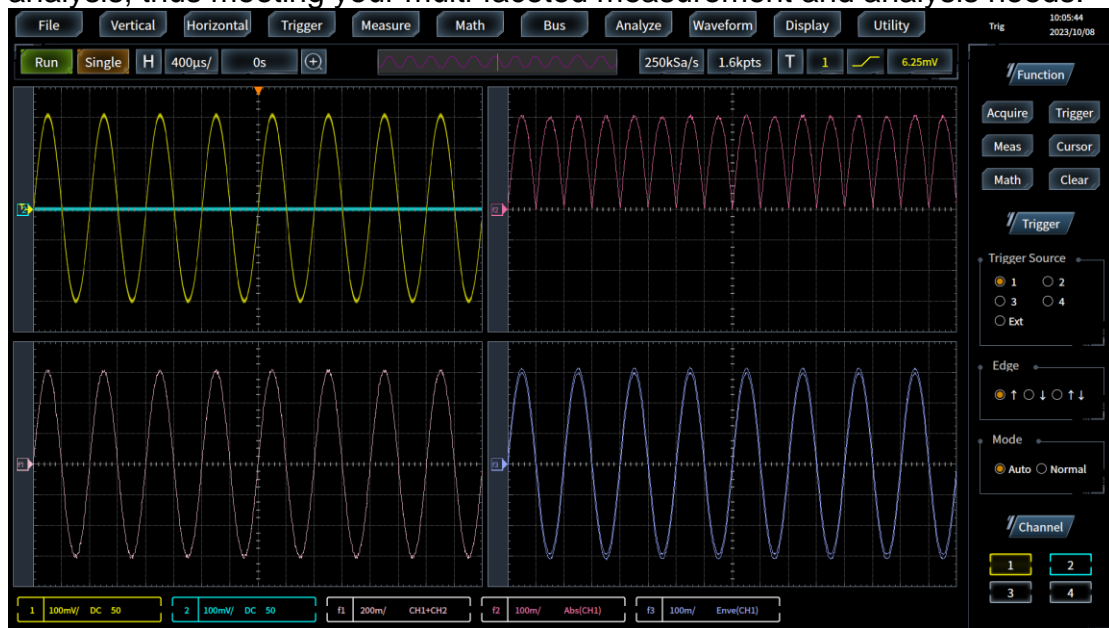
Mathematical operations: 27 types of operations, which can be selected freely by users
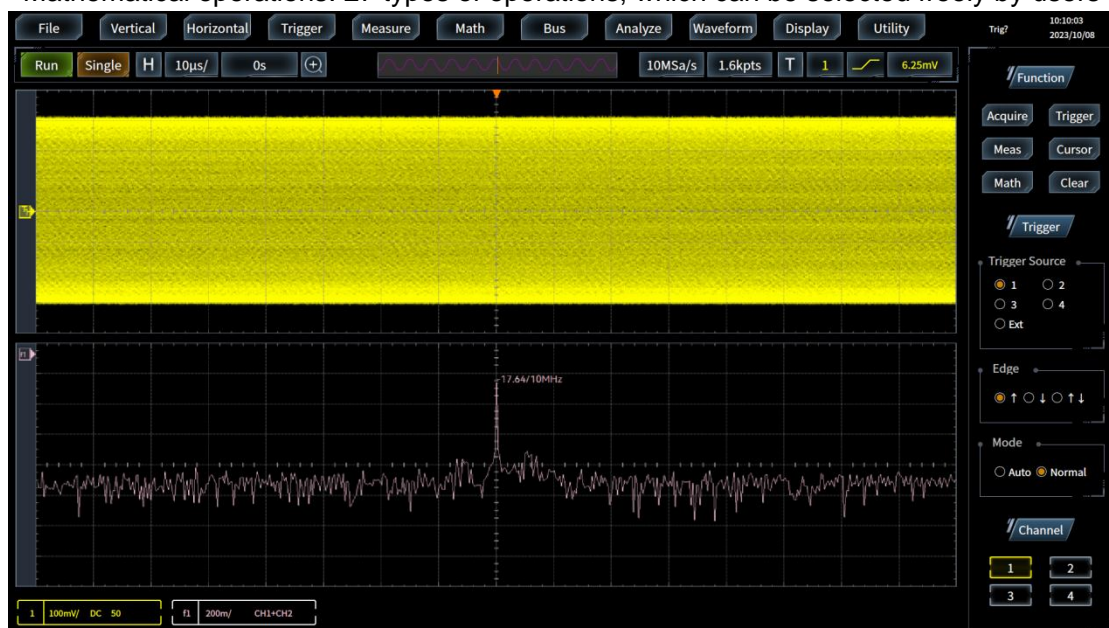

FFT analysis: Observe the frequency domain characteristics of the signal

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.
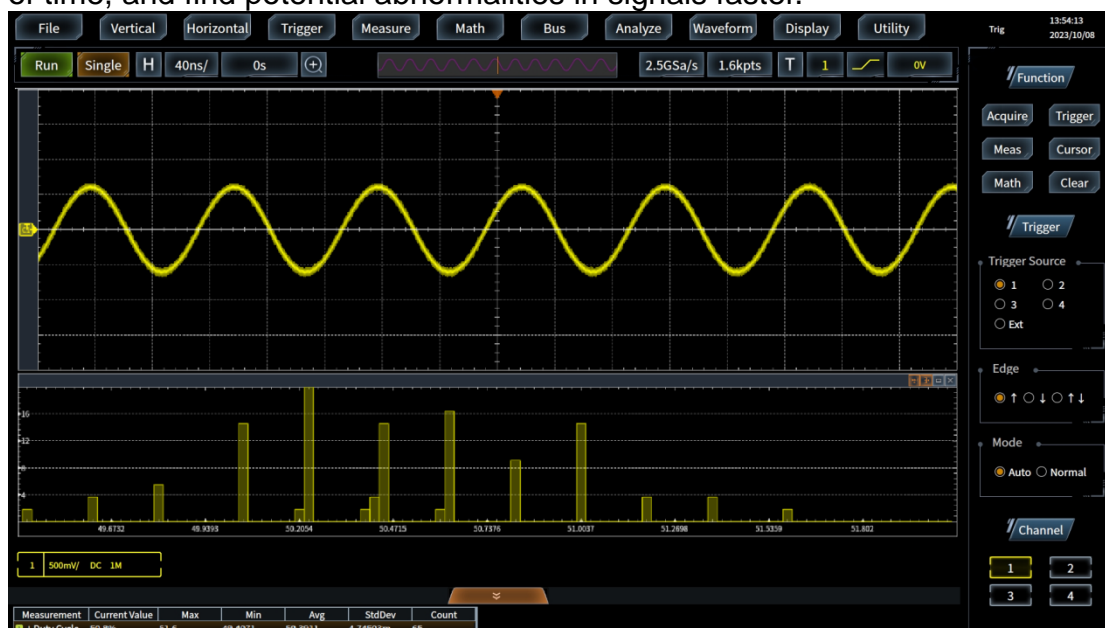

Parameter measurement histogram analysis: Observe the distribution of measurement results of the measured signal over a long period of time to help users find and judge signal anomalies.

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.
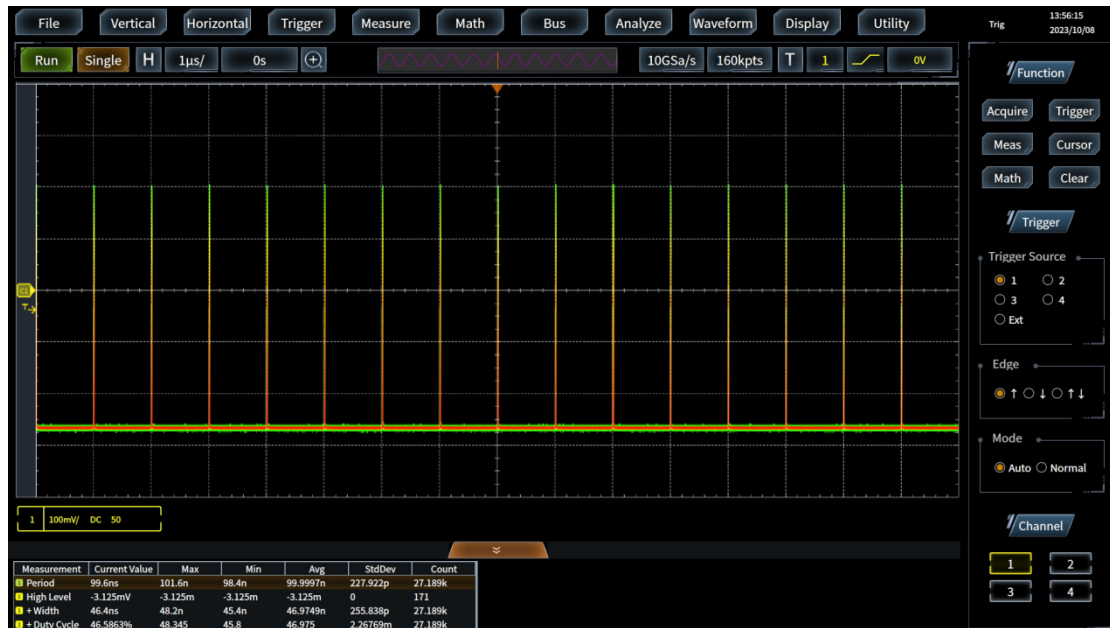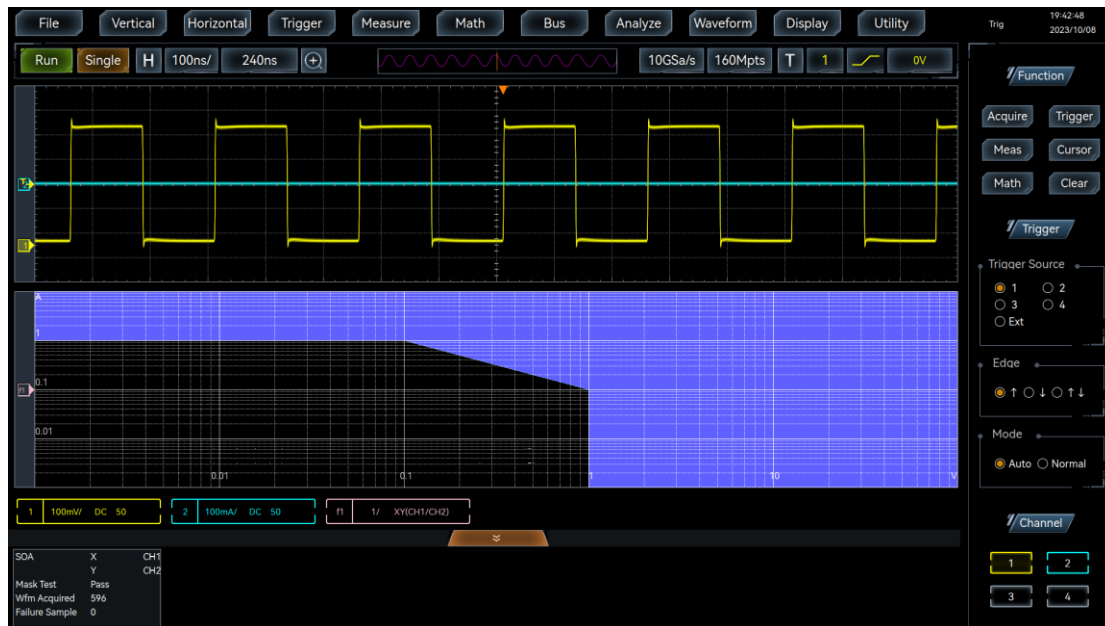
Full hardware parameter measurement to provide you with more accurate measurement results
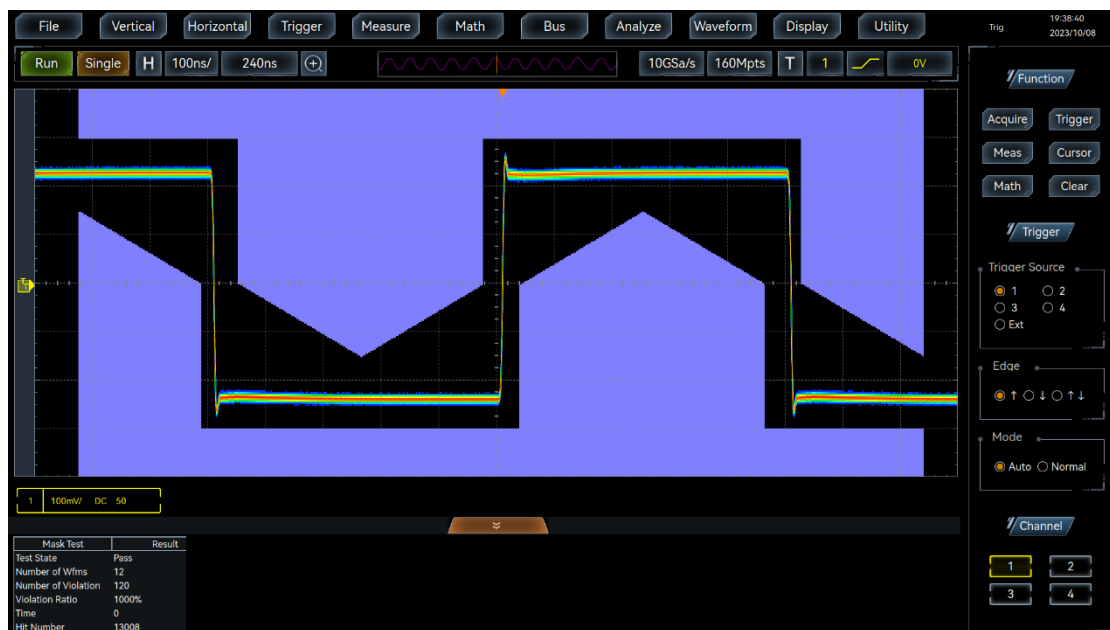
Limit template test (option S01): standard and user-defined templates, pass/fail test, results display.

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.
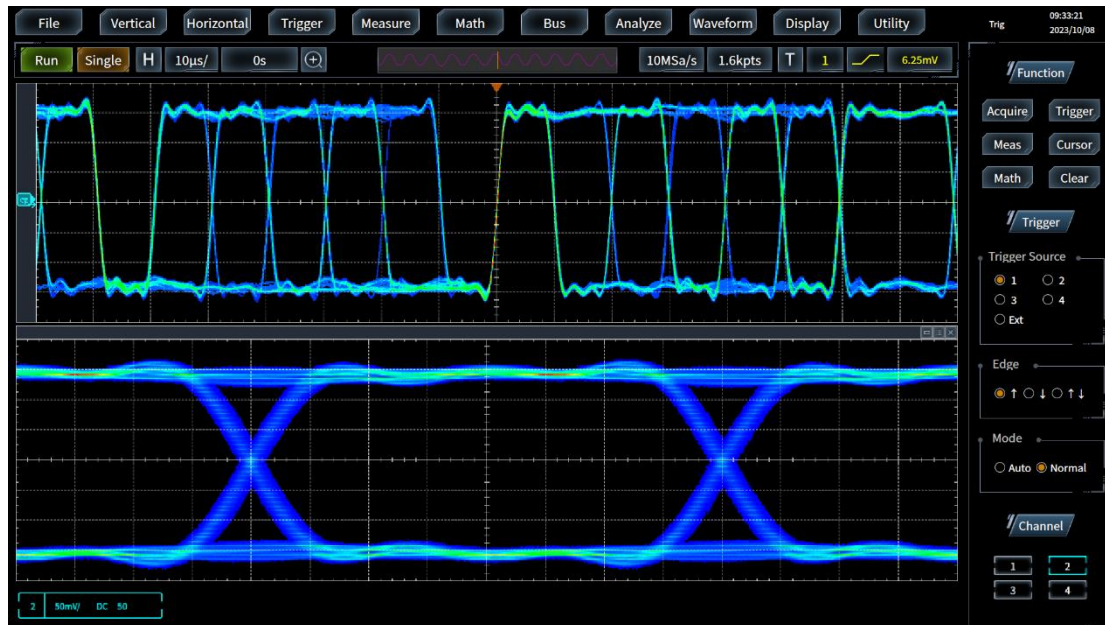
Eye diagram and jitter analysis (option S20-S21)

(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.
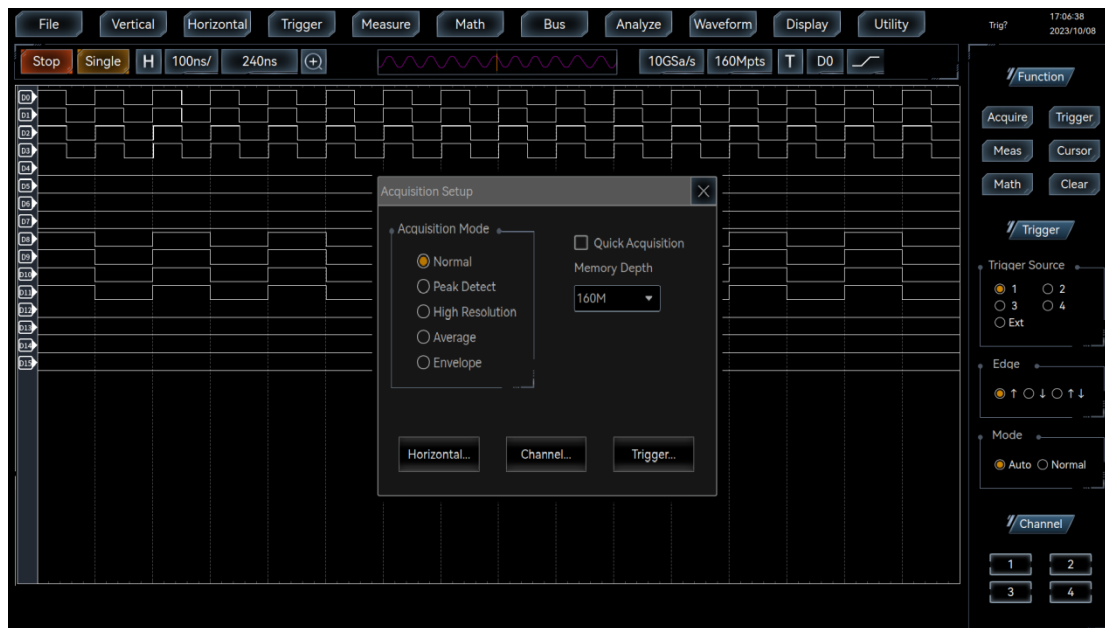

Higher sampling rate and finer time resolution

● **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
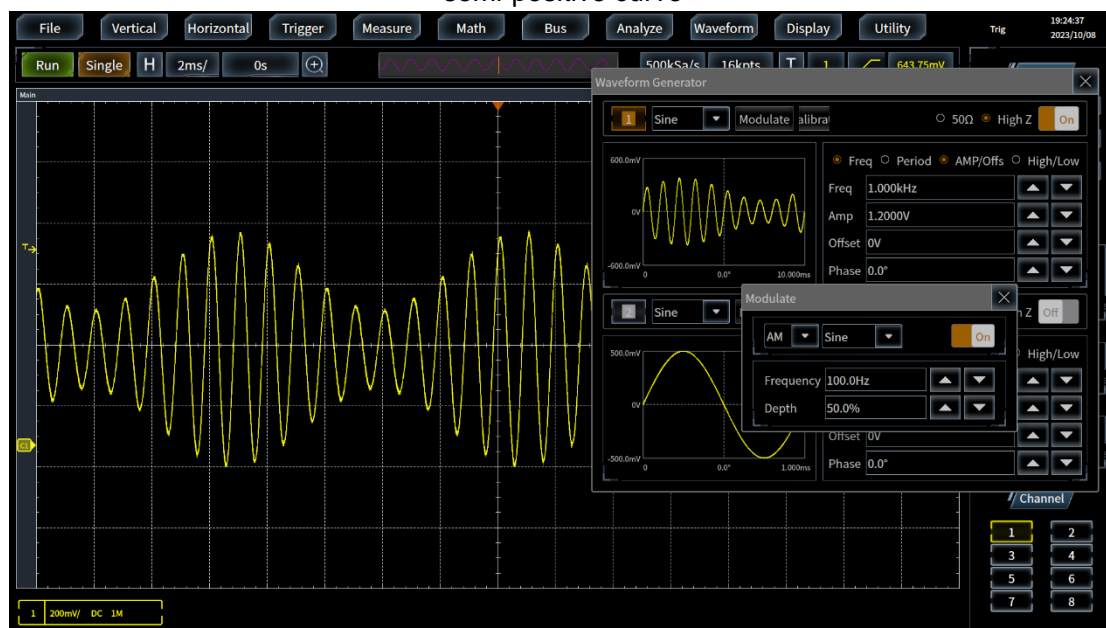
Modulated waveforms: FM, AM, FSK

● **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.
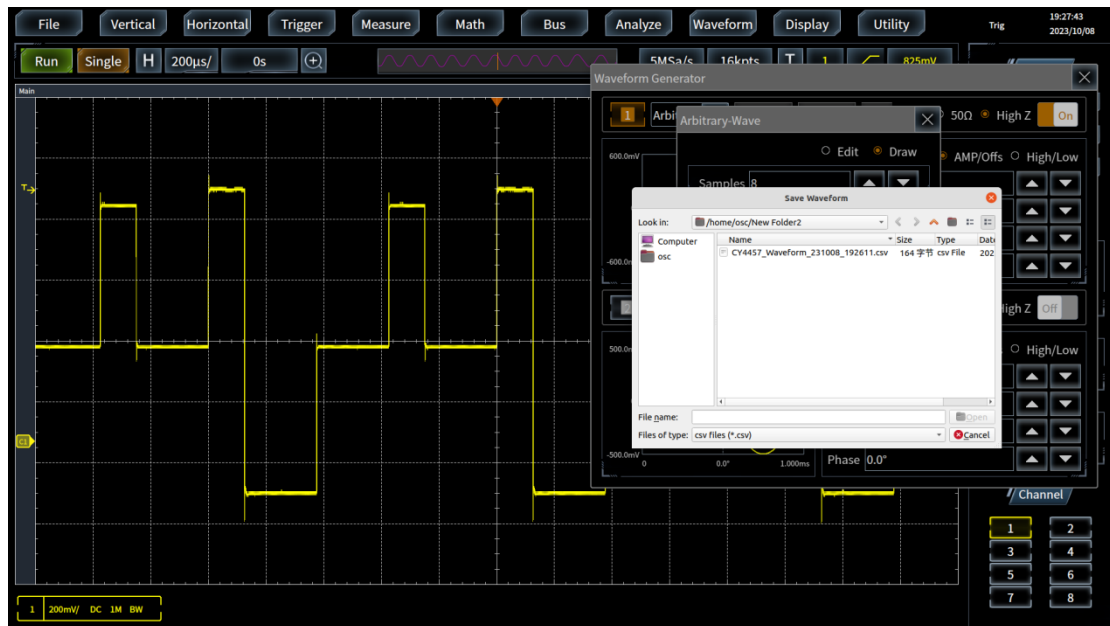
Stored waveforms are copied from the waveform generator.
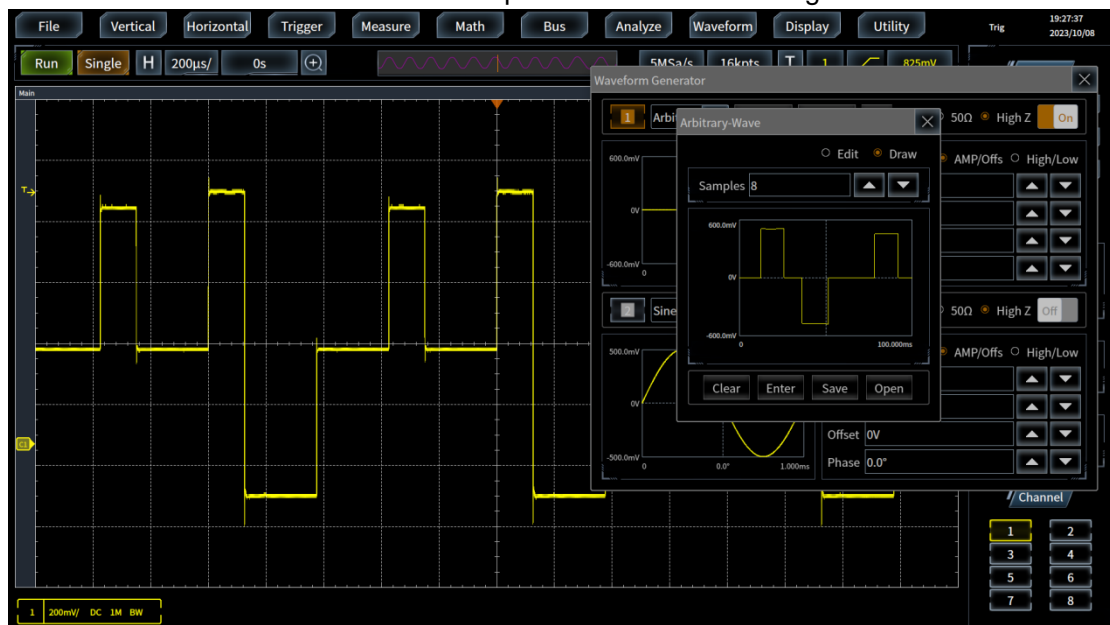
The capacitive screen can quickly draw arbitrary waveform outputs

(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.

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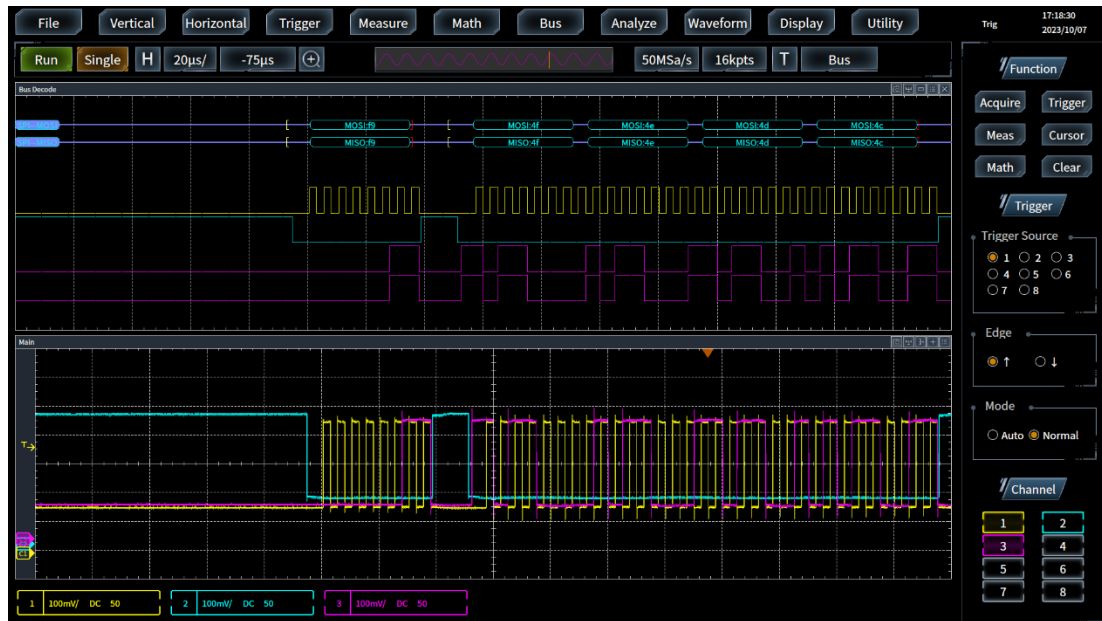
I²C, SPI embedded buses
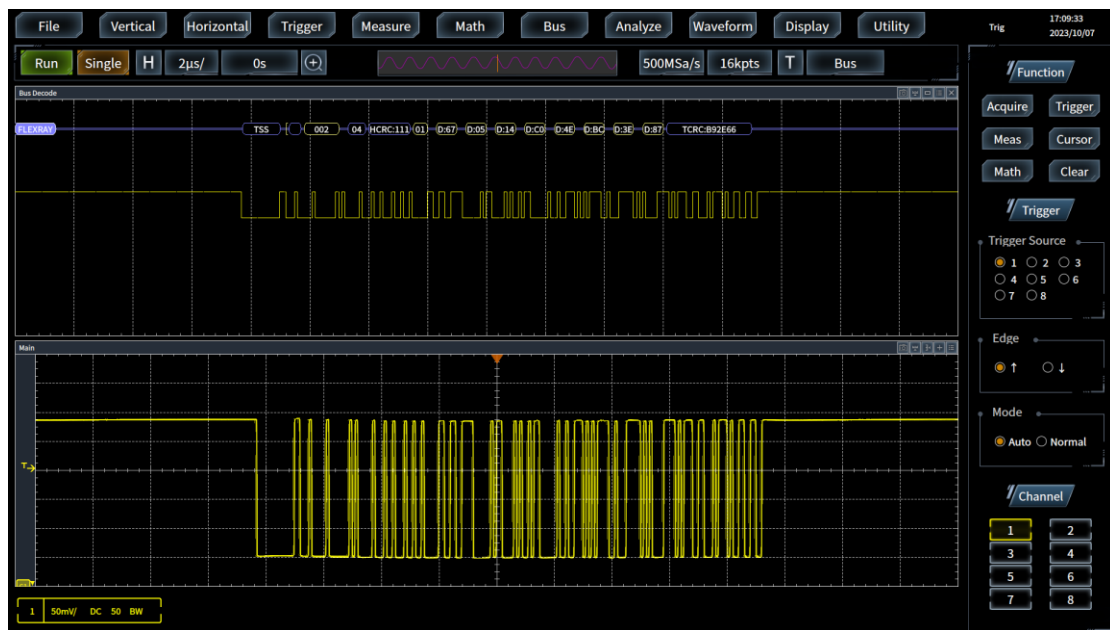
CAN, LIN, FlexRay automotive buses
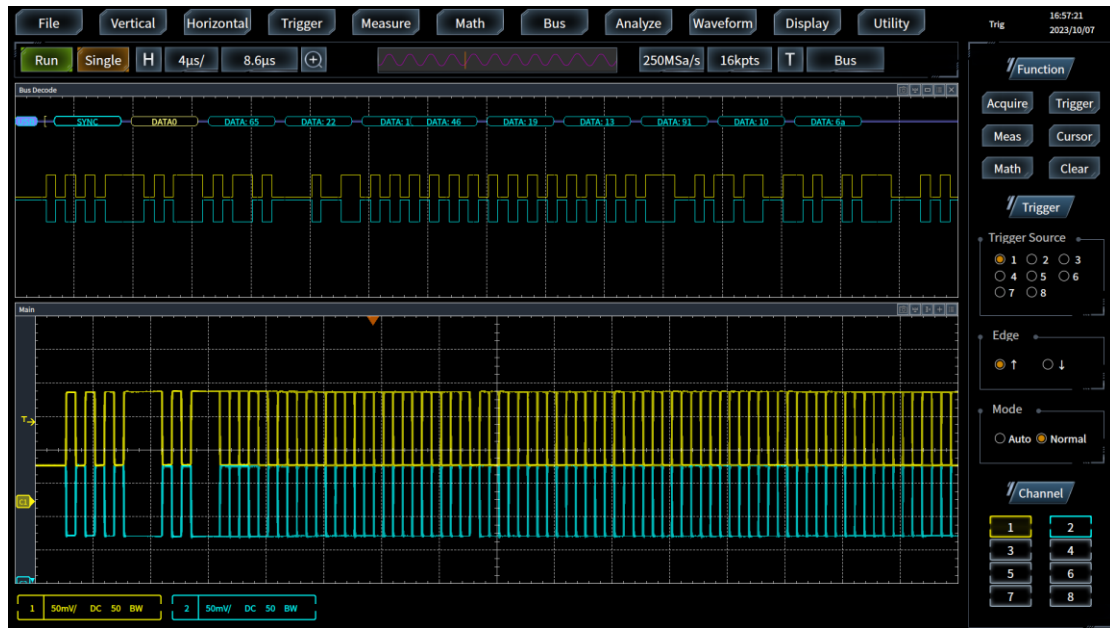
RS232, USB computer bus

I^{2}S, 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.
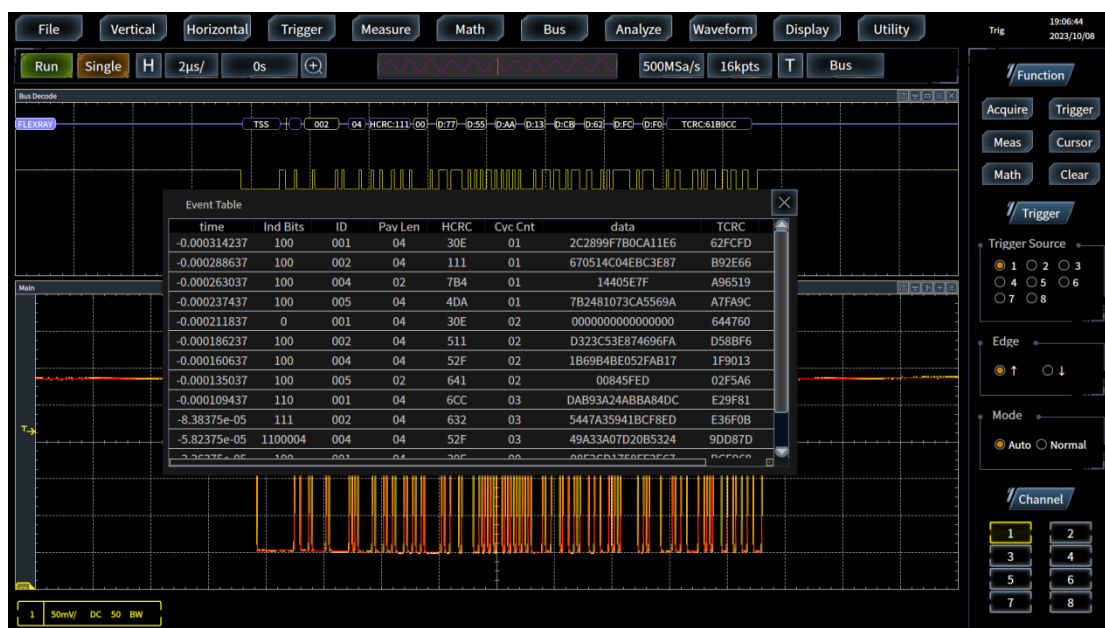
Multiple views: digital view, bus view, and event table

(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.
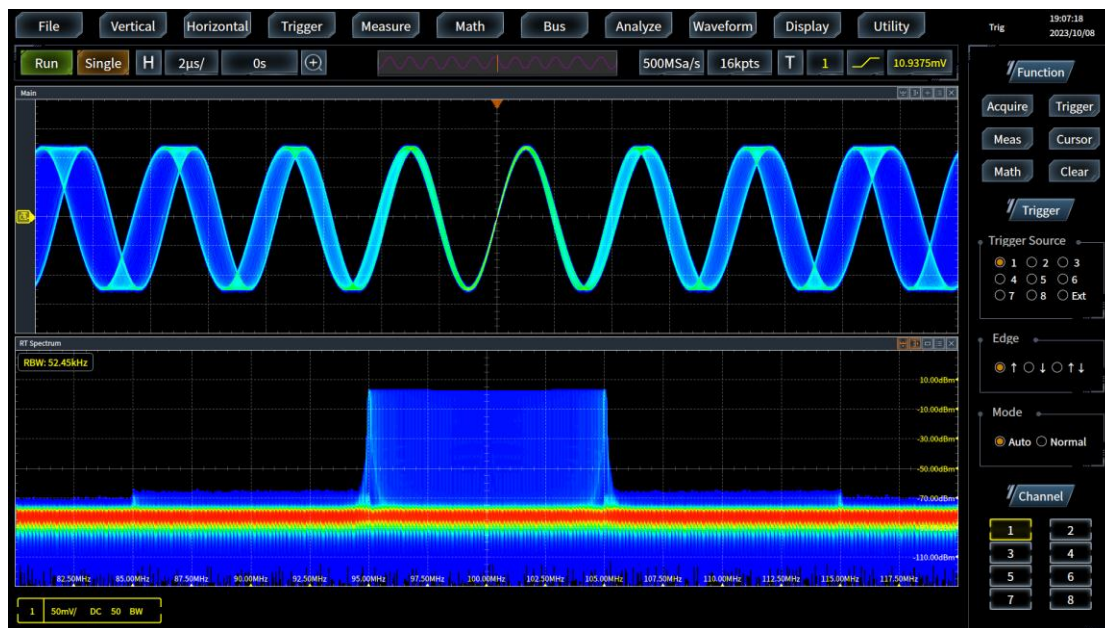
Real-time spectrum analysis function

(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.
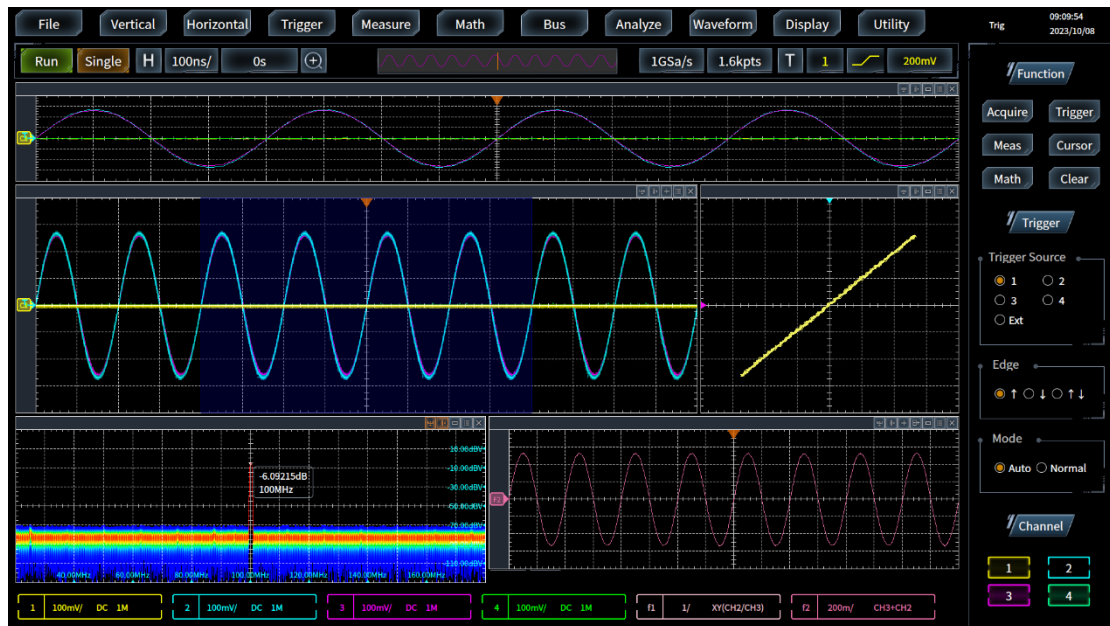
Multi-window display

- **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.
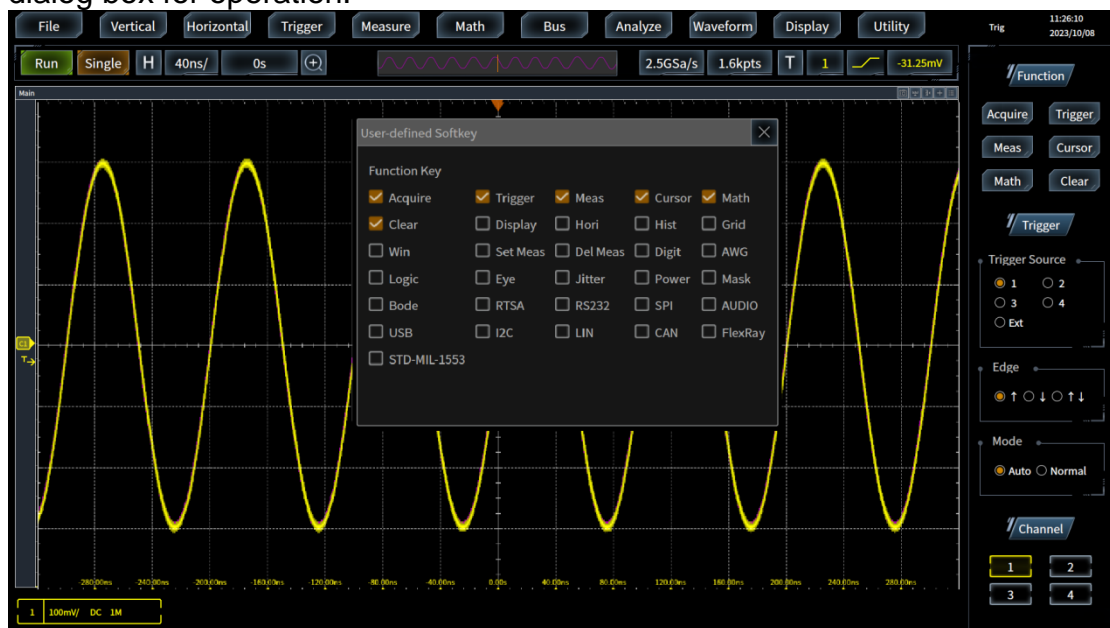
Free definition of the right shortcut bar

- **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.
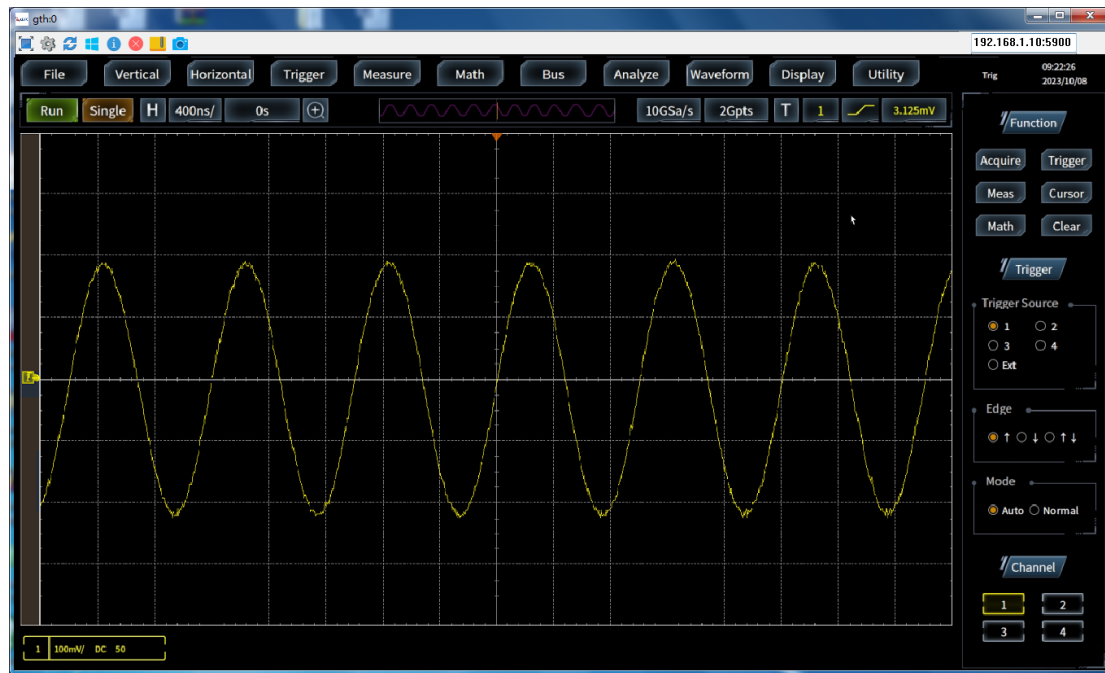
WEB terminal software interface

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

Model Indicator		4457E	4457F	4457G	4457K
Vertical system . .	Number of channels	4, 8 (optional)			4
	Bandwidth (≥10mV/div, 50Ω)	1GHz	2GHz	3GHz	4GHz
	Bandwidth (≥10mV/div, 1MΩ)	500MHz	500MHz	500MHz	500MHz
	Rising time (50Ω)	≤450ps	≤225ps	≤150ps	≤113ps
	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:50Ω±2%, 1MΩ±1%//24pF±3pF			
		K:50Ω±2%, 1MΩ±1%			
	Input coupling	50Ω:DC			
		1MΩ: DC, AC			
	Vertical sensitivity	50Ω: 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	± (1ppm+1ppm/year aging rate)
	Time base delay range	1 screen before trigger, maximum 5000s after trigger
	Inter-channel delay adjustment range	±150ns, 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: ±0.4V, external/10: ±4V

		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

		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 Nth 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

			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

	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	Real-time spectrum analyzer (Option S22)	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

		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.

	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

	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)

		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)

	DC offset	Bias range: ±1.25V (50 Ω), ±2.5V (high resistance)
		Bias resolution: 1mV (50 Ω), 2mV (high resistance)
		Bias accuracy: ± (1.5% + 3mV 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.

.	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 1MΩ±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 (50Ω)
	Reference output	Rear panel BNC, output of time base system for reference clock, frequency 10MHz, amplitude 1.3Vpp (50Ω)
	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℃~+40℃

	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

V. Order Information

● **Mainframe:**

    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	

		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%	

		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	

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%	

4457-H45	87121FB active differential probe	Bandwidth: 2GHz Attenuation ratio: 10:1 DC gain accuracy: ±3%	
4457-H46	87121GB active differential probe	Bandwidth: 3GHz Attenuation ratio: 10:1 DC gain accuracy: ±3%	
4457-H47	87121KB active differential probe	Bandwidth: 4GHz Attenuation ratio: 10:1 DC gain accuracy: ±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^2S, 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	

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