PicoScope® 5000E Series

World-first 4 channel 16-bit USB oscilloscopes and MSOs

Precision where you need it.
Speed when it matters.

Features

- **16-bit mode** with up to 200 MHz bandwidth, 2.5 GS/s sampling, 1 GS capture memory
- **8-bit mode** with up to 500 MHz bandwidth, 5 GS/s sampling, 2 GS capture memory
- **22 µV RMS noise floor at 20 MHz** to measure low-level signals other oscilloscopes lose in their own noise
- **> 73 dB SFDR and exceptional bandwidth flatness** to trust every measurement, from DC to full bandwidth

www.picotech.com

PicoScope 5000E Series - Our Precision Oscilloscopes

The PicoScope 5000E Series is the first four-channel oscilloscope to offer 16-bit resolution with a low noise floor and high dynamic range to measure low-level signals other oscilloscopes miss.

16-bit resolution

With 16-bit resolution on each of its 4 channels, the PicoScope 5000E Series offers a high-performance ADC to capture low-amplitude signals, power supply ripple, distortion and other subtle millivolt transitions. This allows engineers to achieve high measurement precision for analog systems.

Low noise

With a noise floor as low as 22 µV RMS, the PicoScope 5000E Series ensures even the smallest amplitude signals remain measurable and clear. When paired with 16-bit vertical resolution, the superior signal-to-noise ratio makes it an essential tool for high-precision signal analysis.

High dynamic range

Trust the data that you see with more than 73 dB of SFDR, exceptional crosstalk rejection and superior bandwidth flatness. This wide dynamic range means complex signals can be captured with precision. When paired with the powerful features of our PicoScope 7 software, it uncovers hidden signals with ease.

PicoScope 5000E Series primary specifications:

Specification	PicoScope 5000E	PicoScope 5000E+
Analog channels	4	4
Digital channels (MSO models)	16	16
Resolution	16 bits	8 bits and 16 bits
Bandwidth (16-bit mode)	60, 100 or 200 MHz	60, 100 or 200 MHz
Sample rate (16-bit mode)	2.5 GS/s	2.5 GS/s
Memory depth (16-bit mode)	1 GS	1 GS
Bandwidth (8-bit mode)	N/A	200, 350 or 500 MHz
Sample rate (8-bit mode)	N/A	5 GS/s
Memory depth (8-bit mode)	N/A	2 GS

PicoScope 5000E Plus - Our Flexible Oscilloscopes

Featuring switchable resolution, bandwidths up to 500 MHz, sampling rate up to 5 GS/s and deep memory of 2 GS, our PicoScope 5000E Plus offers two scopes in one.

FlexRes® technology

For applications that demand precision or speed, the PicoScope 5000E Plus features switchable 16-bit or 8-bit resolution. 16-bit mode increases vertical precision for detailed voltage readings. 8-bit mode boosts bandwidth and sampling rates to capture fast edges and digital signals without aliasing.

Higher sample rate

In 8-bit mode, the PicoScope 5000E Plus increases the sampling rate to 5 GS/s, enabling precise timing verification. Capture high-speed digital signals with time resolution down to 200 ps and analyze them with the powerful PicoScope 7 software.

Bandwidth up to 500 MHz

PicoScope 5000E Plus models feature up to 500 MHz bandwidth in 8-bit mode. This accurately captures fast digital edges and high-frequency switching transients, resolving fast waveform details like ringing and overshoot that slower scopes miss.

Deeper memory

The 8-bit mode on the PicoScope 5000E Plus doubles the memory to 2 GS, so you can capture long data packets with high time resolution. Memory segmentation provides multi-capture waveform analysis for in-depth mask limit testing, waveform averaging and persistence display.

Unmatched performance and price

Until now, engineers have been forced to choose between precision instruments too slow to capture transient events, or fast 8-bit scopes which lack the sensitivity to see microvolt-level changes. Now the PicoScope 5000E bridges this gap, combining lab-grade precision with high-speed digitizing and advanced triggering. For design engineers, it's the only way to get world-class specs and deep memory at a reasonable price.

Why Choose PicoScope USB Oscilloscopes?

For over 30 years, Pico Technology has challenged traditional benchtop scopes by pioneering a software-first approach to test and measurement. As the UK's only oscilloscope manufacturer, and the world's leader in USB scopes, we have redefined industry expectations by making high-performance, lab-grade tools that are powerful and portable.

Compact by design
Replace bulky benchtops with lab-grade performance that fits in your laptop bag.

Deep memory
Capture long timebases at maximum resolution with up to 2 GS of deep memory.

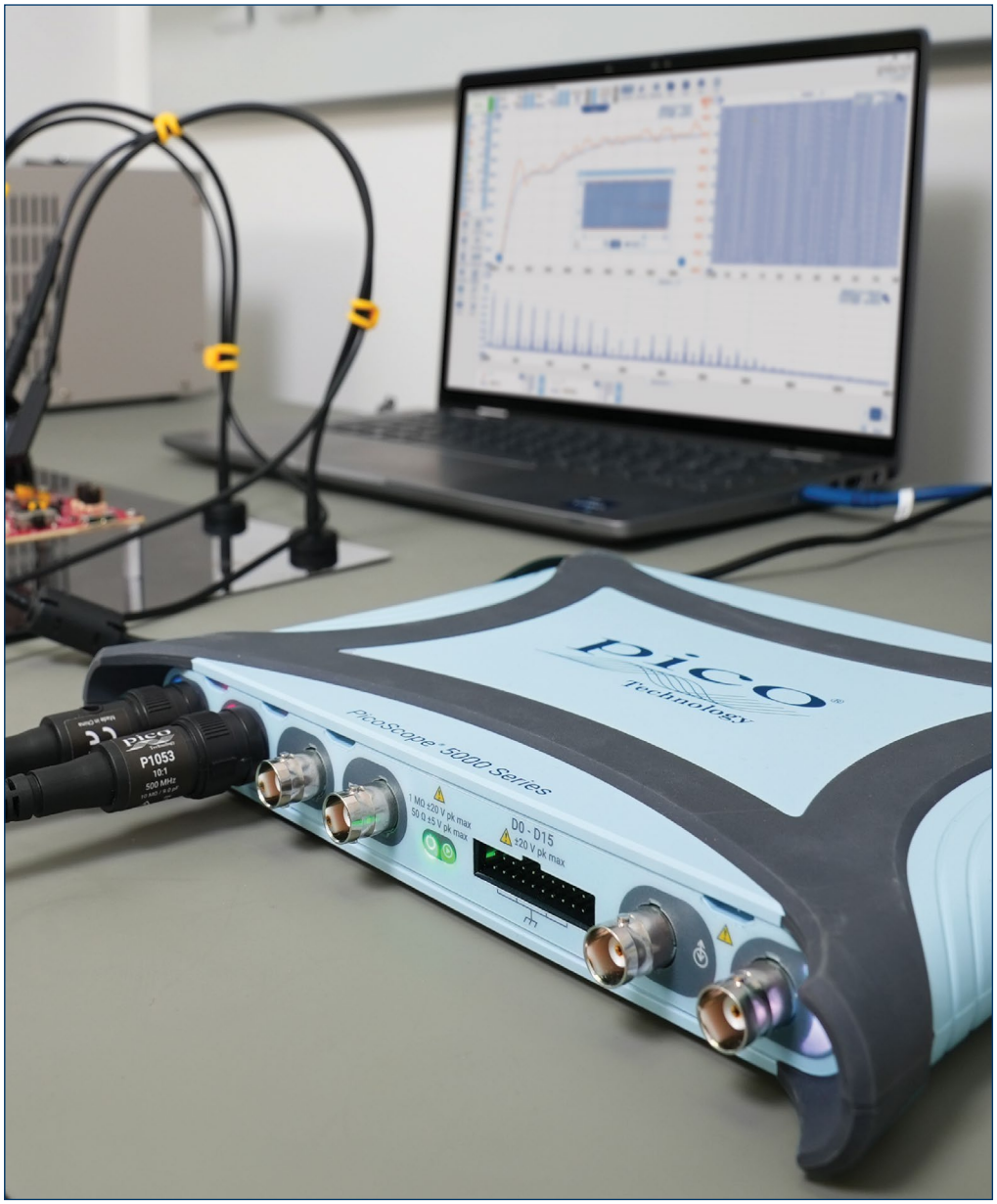
40+ serial decoders
Access more than 40 free serial protocol decoders as standard with our scopes.

Free software updates
Choose hardware that improves over time with free software upgrades for life.

Powerful software features
PicoScope 7 oscilloscope software included for Windows, Mac and Linux.

Software development kits
Develop custom test and measurement applications with PicoSDK.

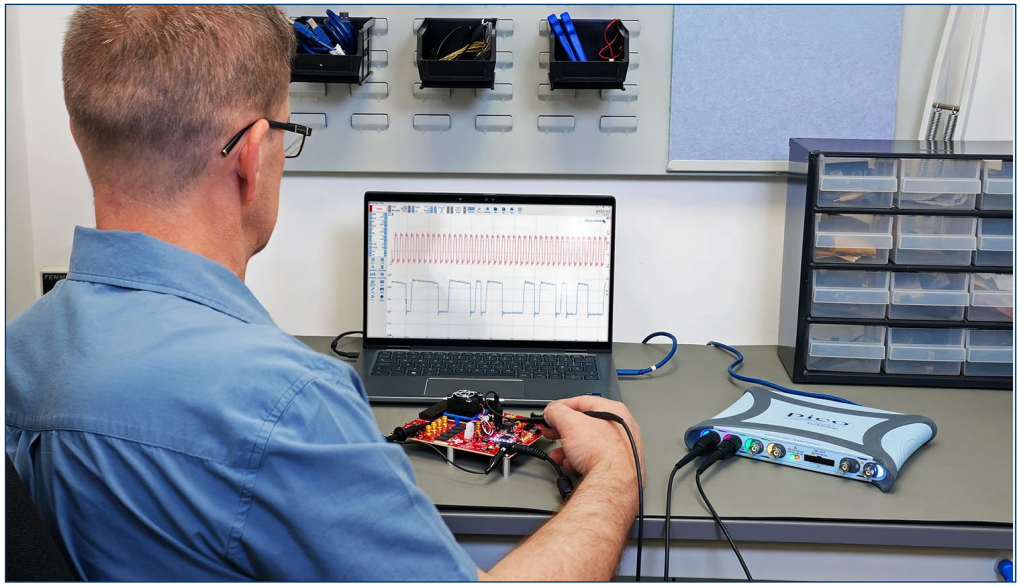
5-year warranty
All PicoScopes come with a 5-year warranty for total confidence they are built to last.

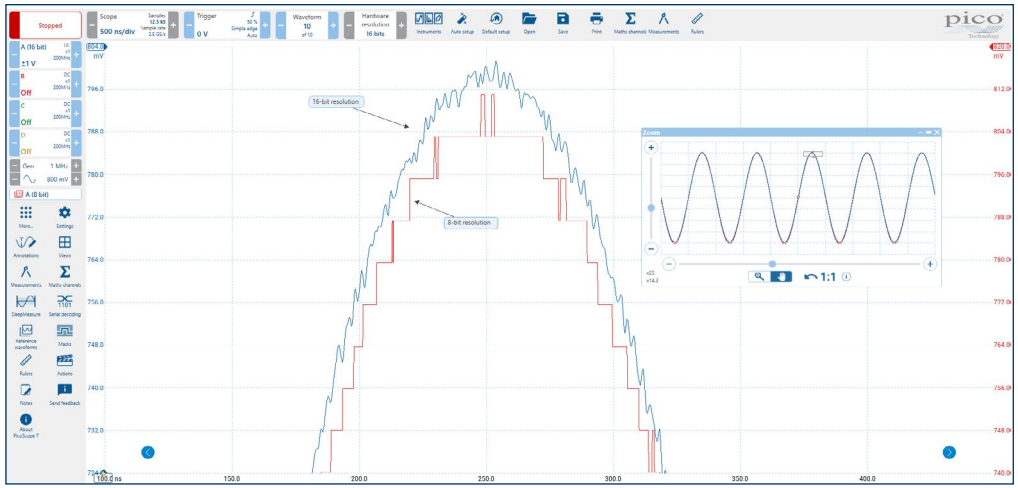


The high-resolution advantage - trust the waveform

Most oscilloscopes are built to a price point, but the PicoScope 5000E Series is built to a specification. Compared to a standard 8-bit scope, our native 16-bit hardware delivers 256 times more vertical detail. This allows you to visualize minute ripple, noise, and distortion—even when signals are superimposed on larger DC voltages. All data processing (including math channels and filtering) is maintained at a minimum of 16-bit resolution, ensuring that when you zoom in on low-level signals, you are seeing real data rather than quantization noise or digital artifacts.

Powerful software filters (lowpass, highpass, bandpass and bandstop) and resolution enhance can be used in addition to hardware bandwidth filters to reveal further signal details. The PicoScope 5000E Series not only has a much wider set of hardware bandwidth filters then other scopes, they're also more effective as they apply both analog and digital filtering in the device for optimal noise reduction.





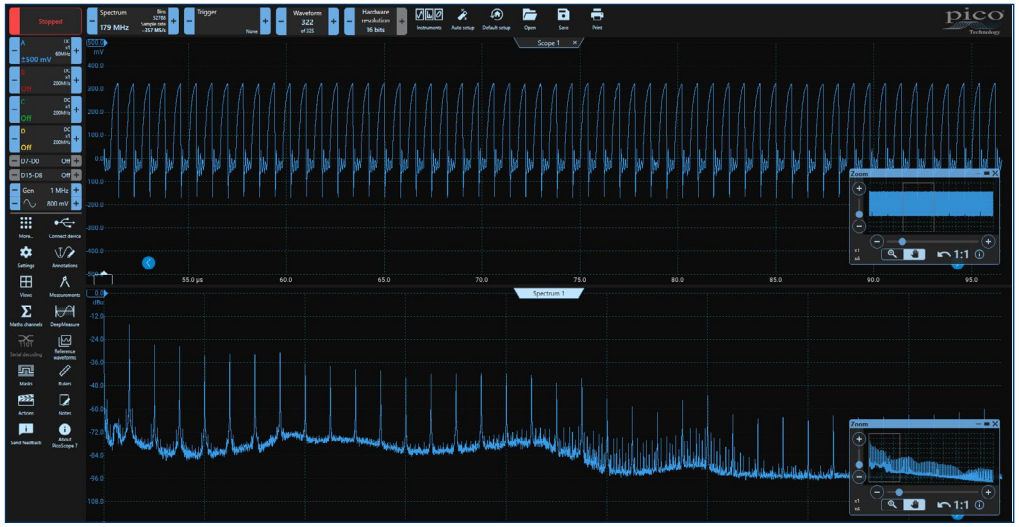
16 bits (blue trace) reveals ripple, noise and distortion that an 8-bit scope (red trace) will miss

Deep memory and sustained performance

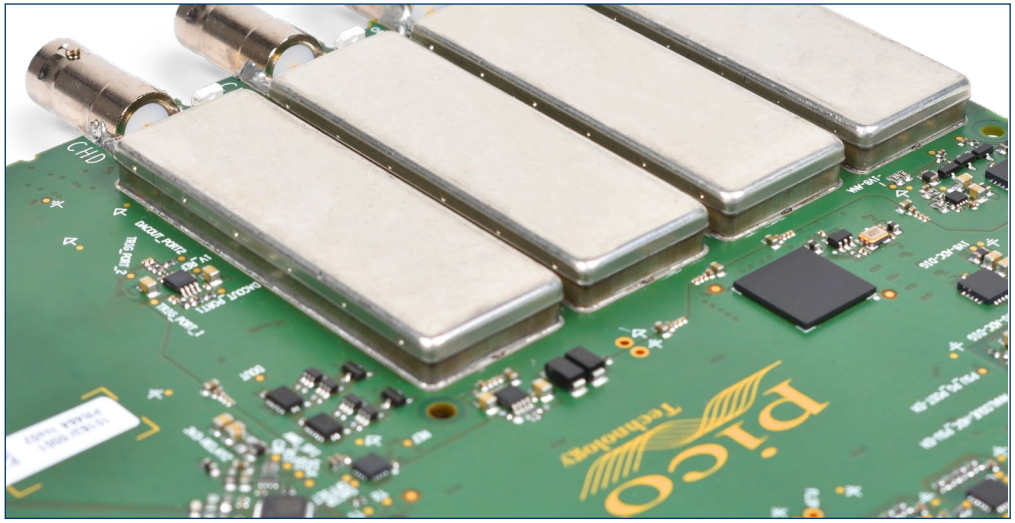
High sampling rates are meaningless if they can only be sustained for microseconds. The PicoScope 5000E Plus models solve this with a massive 2 GS capture memory. This allows the device to maintain its maximum 5 GS/s sampling rate for a full 200 ms duration. Whether you are capturing a second-long power-up sequence or searching for a single high-speed transient buried in a long data stream, the 5000E Series provides nanosecond time resolution without forcing you to compromise on your capture window or vertical accuracy.

Signal integrity and front-end engineering

Precision starts at the probe tip. The 5000E Series features a meticulous front-end design with shielded inputs to eliminate crosstalk and harmonic distortion. With a noise floor as low as 22 µV RMS and a typical channel-to-channel isolation ratio better than 500:1, you can detect microvolt-level signals that are typically lost in the noise floor of lesser instruments. This exceptional signal integrity is backed by improved bandwidth flatness and a 73 dB SFDR, making it the ideal tool for stabilizing precision power rails or analyzing sensitive sensor data.



Dual-domain capture: Scope view shows pulse ringing and impulses. Spectrum view identifies the fundamental frequency and harmonic decay via high dynamic range.



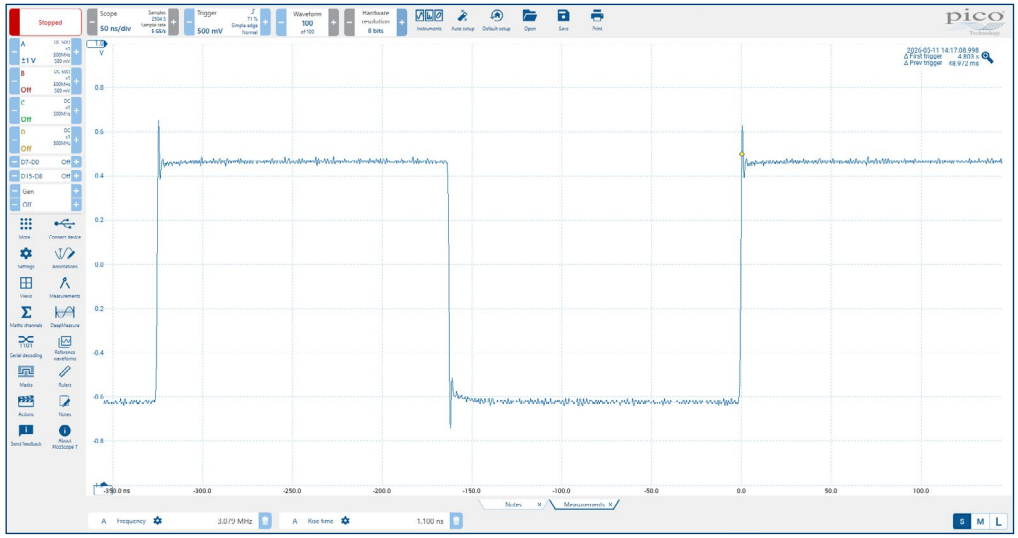
High-performance PCB of a PicoScope 5000E featuring a precision ADC for native 16-bit resolution and shielded front-ends for an ultra-low 22 µV RMS noise floor.

Advanced analysis and dual domain workflow

Analyze large data sets quickly with a fast USB-C connection that keeps the display responsive, even with millions of data points on screen. Automatically measure each cycle in a waveform, or view signal pulses and frequency spectra side by side.

To isolate rare events, memory segmentation combines with rapid trigger mode to capture thousands of waveforms in quick succession. These can be viewed in the waveform buffer navigator where you can scroll and zoom through them to find glitches. You can also filter using mask limit testing or measurement limits to display the waveforms you need to see.

More advanced tools, such as serial decoding and DeepMeasure™, work to analyze data packets or events across all waveform buffers in the deep memory, making the PicoScope 5000E Series some of the most capable oscilloscopes on the market.



By switching to 8-bit mode, the scope achieves 5 GS/s and 500 MHz bandwidth. This enables the capture of fast edges, like this pulse's 1.1 ns rise time.

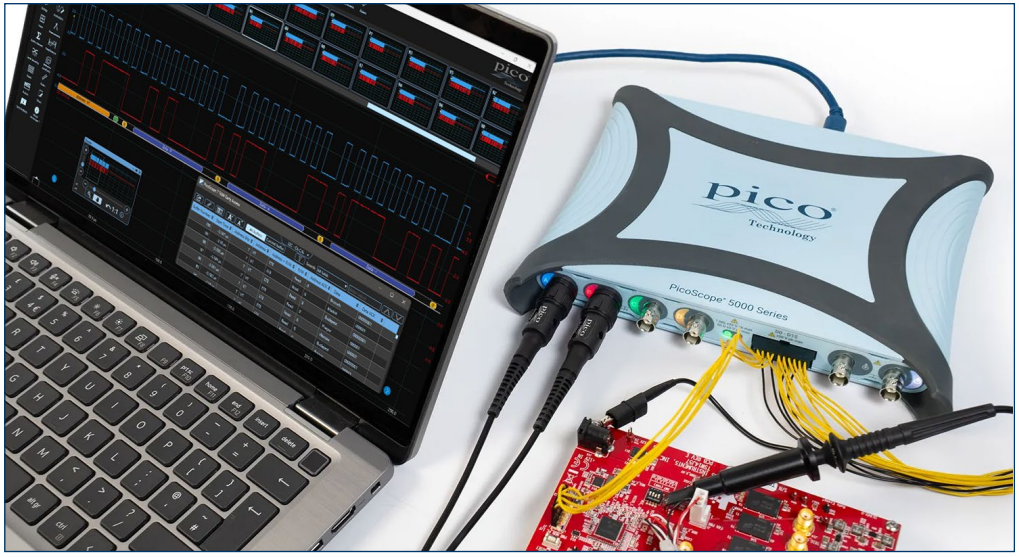
Bandwidth and memory scalability

The PicoScope 5000E Plus models feature a flexible hardware architecture that allows you to prioritize precision where you need it or speed when it matters. While the series supports up to 16-bit resolution for low-noise analog analysis, you can switch to 8-bit mode to unlock the scope's full speed.

In 8-bit mode, the sampling rate doubles to 5 GS/s, and the capture memory expands to a massive 2 GS. This configuration is ideal for capturing high-speed serial buses and signals with edges up to 500 MHz. Furthermore, the deep 2 GS buffer ensures that even at maximum speed, you can record a 200 ms time window—essential for debugging long power-up sequences or hunting down elusive intermittent timing errors.

Mixed-signal integration

To support modern embedded system development, both the 5000E and 5000E Plus ranges include Mixed Signal Oscilloscopes (MSO). These models augment the four analog channels with 16 digital inputs, allowing for simultaneous observation of logic states and analog waveforms. This integrated approach enables engineers to correlate bus protocol data (such as I2C, SPI or CAN) directly with physical layer phenomena like ringing, crosstalk or power supply droop, all within a single time-aligned display.



Mixed-signal models are available with both the 5000E and 5000E Plus.

The PicoScope 5000E Series fits easily into a laptop bag for high-performance measurements on the move.

Carry your hardware with you

Traditional benchtop oscilloscopes occupy significant workspace and lack portability, whereas the PicoScope 5000E Series packs a full-scale lab instrument into a compact design. This flexibility bridges the gap between speed and accuracy, allowing engineers to maintain high-level diagnostic capability and signal integrity in the lab or in the field.

The price of a scope also includes the full PicoScope software with no recurring licensing fees or restrictive hardware keys. You can install the software on multiple PCs for offline data analysis and receive free updates for the life of an instrument. This ensures the lowest cost of ownership while providing a scalable environment for data sharing and remote collaboration.

Powerful tools provide endless options

Your PicoScope provides powerful tools to help you acquire and analyze waveforms. While these tools can be used on their own, the real power of PicoScope lies in the way they have been designed to work together.

For example, the rapid trigger mode allows you to collect 40 000 waveforms in a few milliseconds with minimal dead time. Manually searching through these waveforms would be time-consuming, so just pick a waveform you are happy with and let the mask tools scan for you. Measurements will tell you how many have failed and the waveform navigator allows you to hide good waveforms to display anomalies. To find out more about the capabilities of PicoScope software, visit our Knowledge Base.

High-end features as standard

Buying a PicoScope is not like making a purchase from other oscilloscope companies, where extras increase the price. With our scopes, high-end features such as serial decoding, mask limit testing, advanced math channels, segmented memory, hardware-based time-stamping and a signal generator are all included in the price. To protect your investment, both the PC software and firmware inside the scope can be updated.

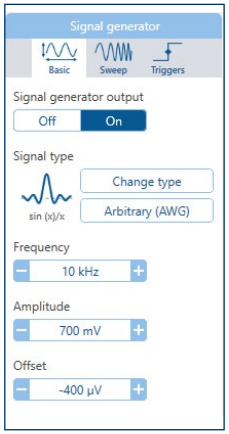
PicoScope 7 allows for multiple synchronized scope views, enabling the simultaneous analysis of complex signals across different timebases or domains to streamline multi-channel debugging.

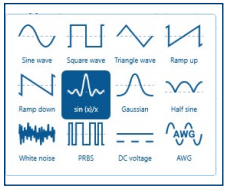
Ultra-deep memory

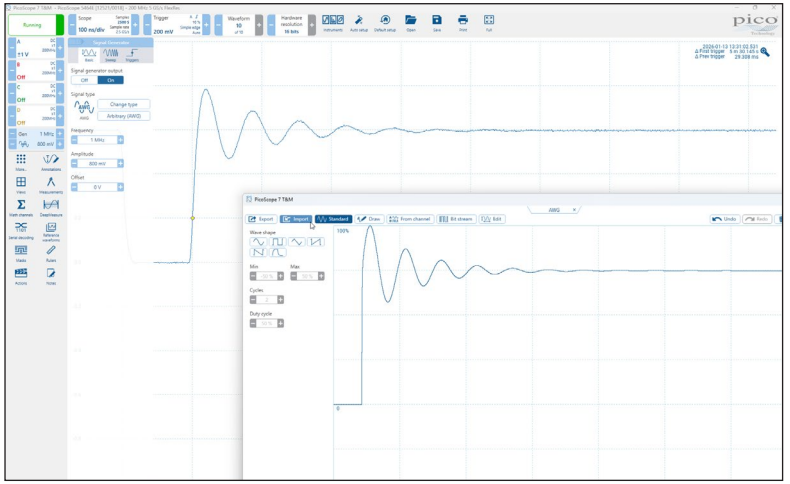
Deep memory enables the capture of long waveforms at maximum sampling rate. PicoScope 5000E Series oscilloscopes have waveform memories of up to 2 gigasamples, capturing waveforms up to 200 ms long with 200 ps resolution. Deep memory is invaluable when you need to capture fast serial data with long gaps between packets, or nanosecond laser pulses spaced milliseconds apart.

PicoScope also allows you to divide the capture memory into segments and set up a trigger condition to store a separate capture in each one. You can capture up to 40 000 waveforms in as little as 20 ms - an effective rate of 2 million waveforms per second. Afterwards, you can step through the memory one segment at a time until you find the event you are looking for, or use powerful waveform buffer tools, like Playback and Overlay, to refine your search.

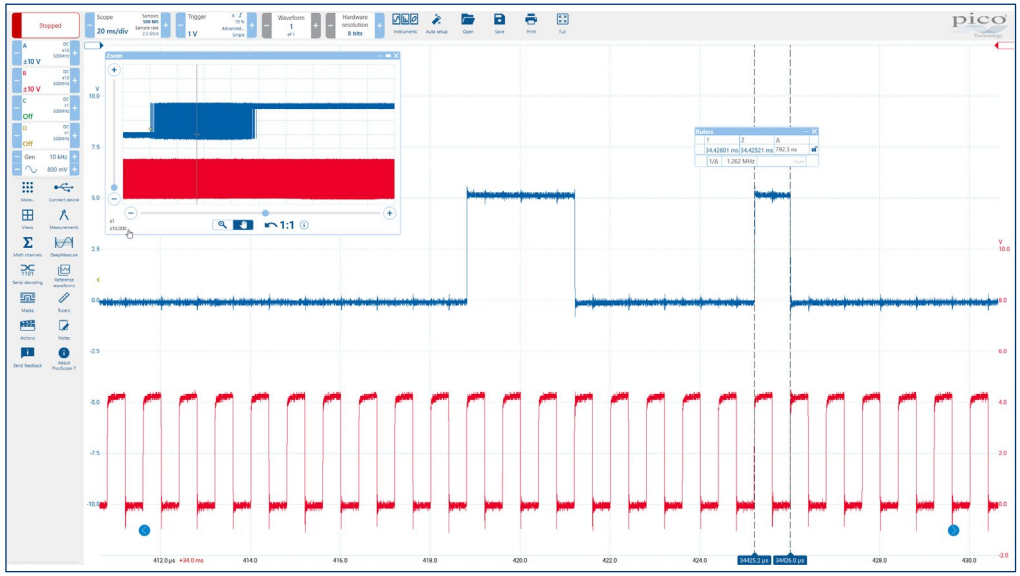
Other tools, like mask limit testing, DeepMeasure and serial decoding work with deep memory to analyze and examine all of this data. PicoScope software enables you to zoom into your waveform up to 100 million times, while hardware acceleration makes viewing the ultra-deep memory fast and responsive.







A waveform created in the PicoScope AWG and its output displayed on the main scope display (blue trace), along with the user interface menus for the signal generator.



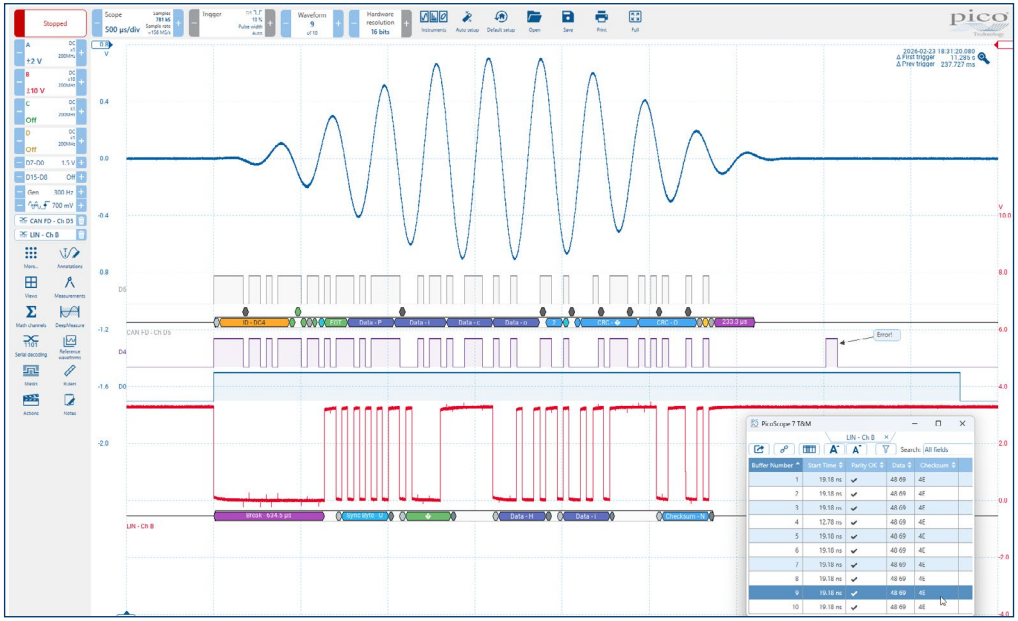
Ultra-deep memory: 10 000x zoom on a 500 MS capture at 2.5 GS/s

Arbitrary waveform and function generator

All PicoScope 5000E models have a built-in function generator covering the frequency range from 100 µHz to 20 MHz. As well as basic controls to set level, offset and frequency, more advanced controls allow you to sweep over a range of frequencies, while spectrum peak-hold options enable amplifier and filter response testing.

Trigger features allow one or more cycles of a waveform to be output when various conditions are met, such as the scope triggering, a trigger event on the aux input or a mask limit test failing.

All models also include a 14-bit 200 MS/s arbitrary waveform generator (AWG). AWG waveforms can be created with the built-in editor, loaded from a spreadsheet or exported as a CSV file.



A comprehensive view showing simultaneous analog waveform capture alongside multi-bus decoding of CAN FD and LIN serial protocols, featuring real-time error detection and 16-bit hardware resolution.

Mixed-signal models

The PicoScope 5000E MSO models add 16 digital channels, enabling you to accurately time-correlate analog and digital signals.

Digital channels may be grouped and displayed as a bus, with each bus value displayed in hex, binary, decimal or as a level for DAC testing. You can set advanced triggers across both the analog and digital channels.

The digital inputs also bring extra power to the serial decoding options. You can decode serial data on all analog and digital channels simultaneously, giving you up to 20 channels of data – for example decoding multiple SPI, I2C, CAN bus, LIN bus and FlexRay signals at the same time.

All MSO models are supplied with the following additional accessories:

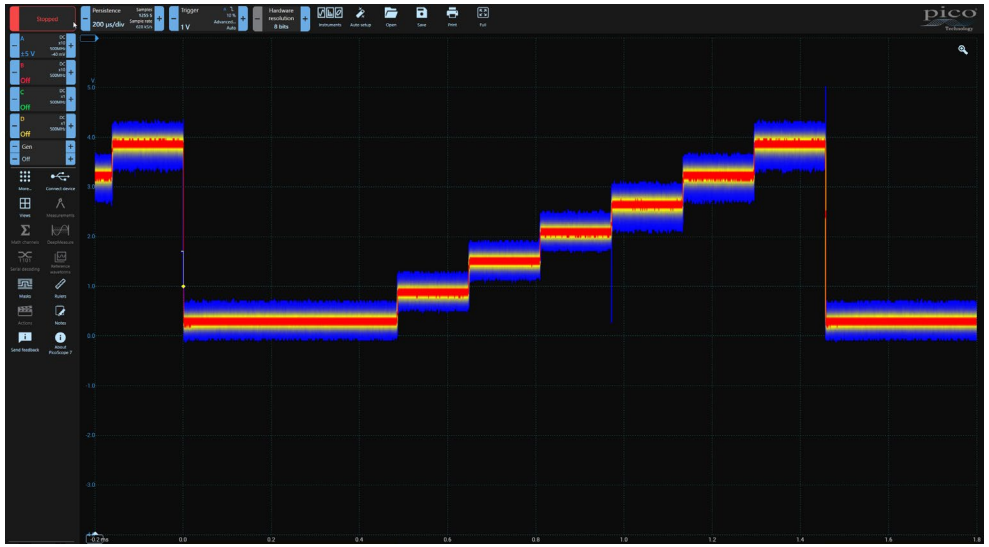
- 20-way 25 cm digital MSO cable
- MSO test clips

Hardware acceleration engine (HAL4)

Some oscilloscopes struggle when you enable deep memory. The screen update rate slows and the controls become unresponsive. The PicoScope 5000E Series avoids this limitation with the use of a dedicated fourth-generation hardware acceleration (HAL4) engine inside the oscilloscope.

Its massively parallel design effectively creates the waveform image to be displayed on the PC screen and allows the continuous capture and display of up to 2 billion samples every second.

The hardware acceleration engine eliminates any concerns about the USB connection or PC processor performance being a bottleneck.

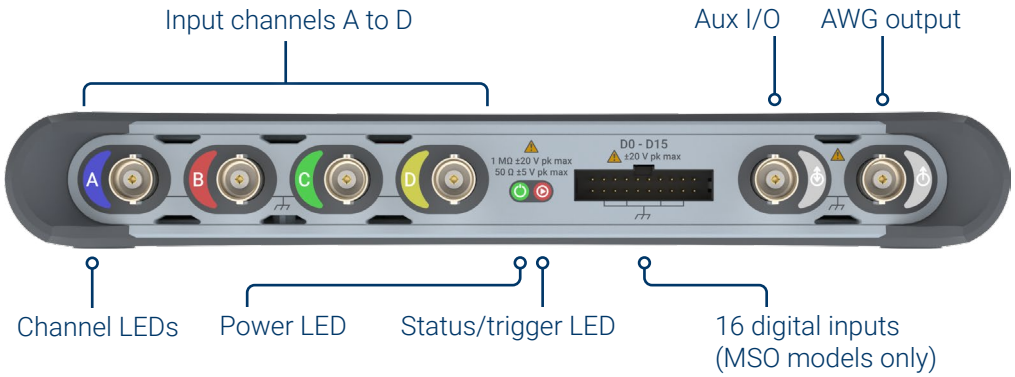


Persistence mode visualizes a noisy staircase. Color temperature mapping reveals signal jitter and stability at a fluid, high update rate.

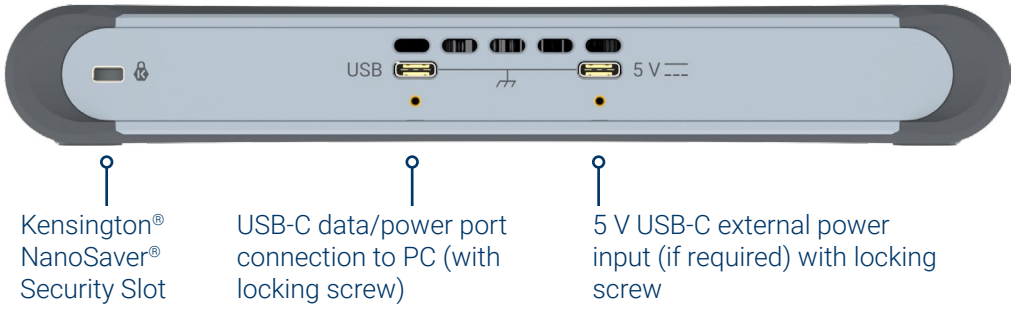
PicoScope 5000E Series inputs, outputs and indicators

The colored indicators next to each BNC input channel automatically adapt when you customize trace colors displayed on the screen — aiding channel identification for error-free waveform interpretation.

Front panel



Rear panel



SuperSpeed® USB-C® connection

The PicoScope 5000E Series features a USB-C SuperSpeed connection to the host computer, providing power for the scope with a single USB-C cable. To retain compatibility, a USB-A to USB-C cable is also supplied, along with an external power adaptor for use with USB ports which can't supply the full power requirements of the scope. The USB connection allows high-speed data acquisition and transfer, while making printing, copying, saving and sharing your data quick and easy. PicoSDK® supports continuous USB streaming to the host computer at rates of over 300 MS/s.

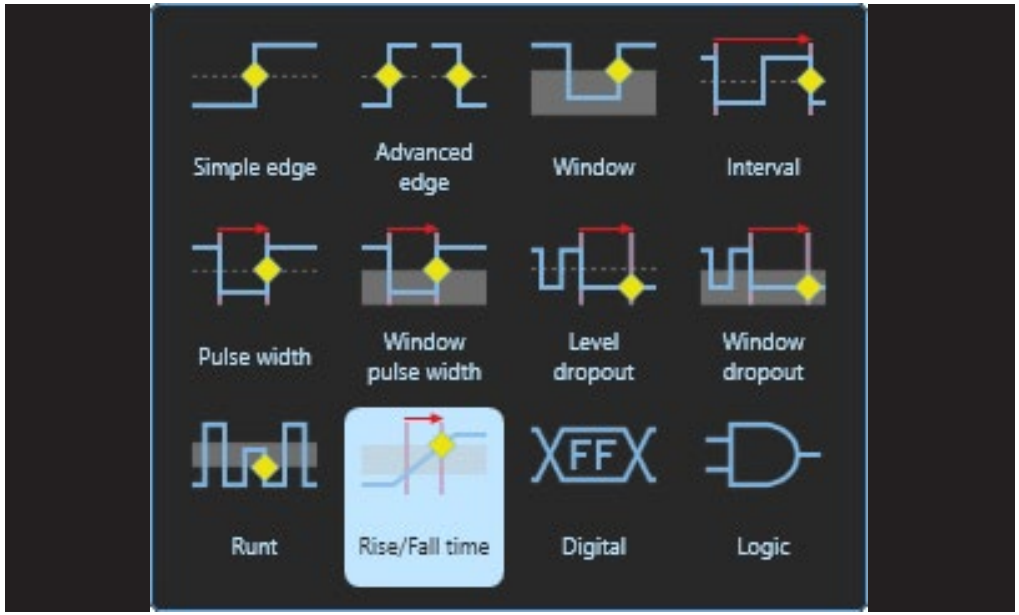
Digital triggering architecture

Many digital oscilloscopes still use a trigger architecture based on analog comparators. This causes time and amplitude errors that cannot always be calibrated out and often limits trigger sensitivity at high bandwidths.

In 1991 Pico pioneered the use of fully digital triggering using the actual digitized data. This technique reduces trigger errors and allows our oscilloscopes to trigger on the smallest signals, even at the full bandwidth. Trigger levels and hysteresis can be set with high precision and resolution.

The reduced rearm delay provided by digital triggering, together with segmented memory, allows the capture of events that happen in rapid sequence. Rapid triggering can capture waveforms at a rate of 2 million waveforms per second, until the buffer is full.

Rise-time triggering isolates anomalies in a high-speed stream. The Waveform Navigator displays time-stamped buffers, enabling storage of hundreds of events for post-capture inspection.



Advanced trigger selection

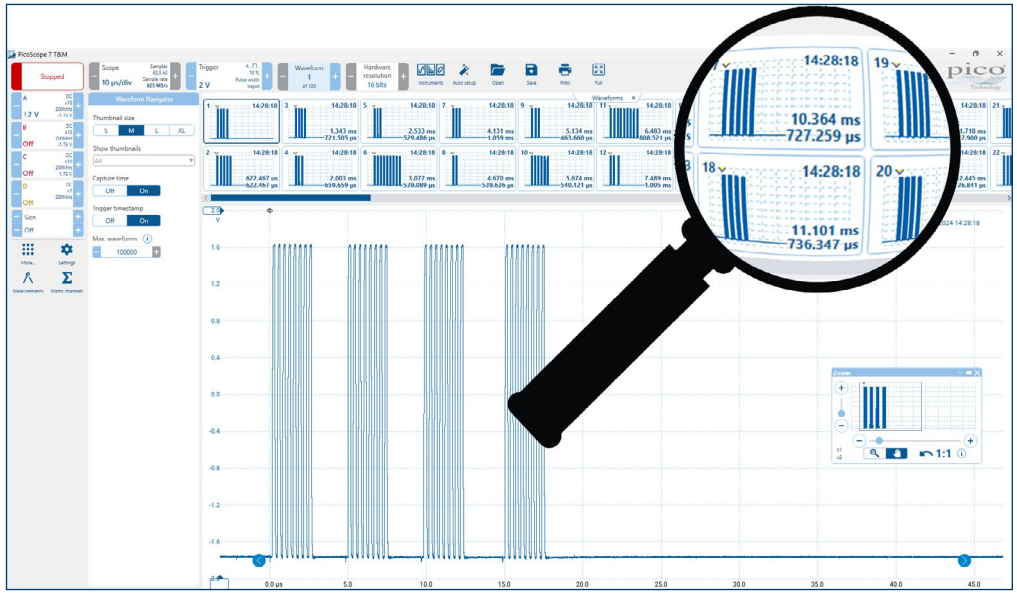
Advanced triggers

The PicoScope 5000E Series offers a set of advanced trigger types including pulse width, runt pulse, windowed, rise/fall time, logic and dropout that function across the full scope bandwidth.

The pulse width direction control specifies whether you want to trigger on positive, negative or either-polarity pulses, and the dropout trigger control specifies whether to trigger when the signal remains high, low or in either state relative to the threshold.

The digital trigger available on MSO models allows you to trigger the scope when any or all of the 16 digital inputs match a user-defined pattern. You can specify a condition for each channel individually, or set up a pattern for all channels at once using a hexadecimal or binary value.

The logic trigger function also allows you to trigger on combinations of edge or window triggers on any of the analog inputs, for example to trigger on edges on channel A only when channel B is also high, or to trigger when any of the four channels go outside a specified voltage range.



PicoScope features the Waveform Navigator for managing thousands of captures. Each buffer includes precise time-of-day and delta timestamps for intermittent fault finding.

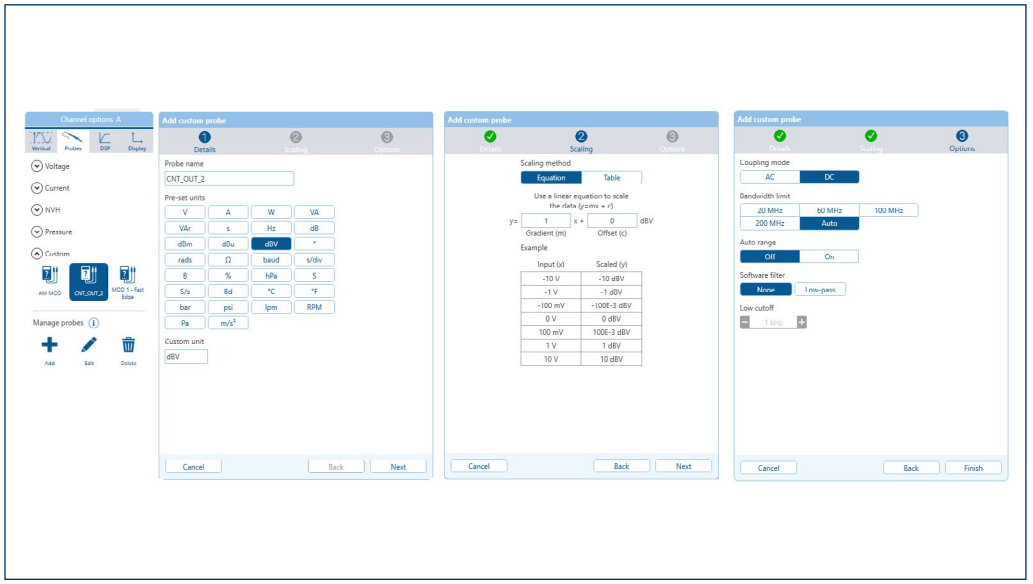
Time-stamping and frequency counting

The PicoScope 5000E Series features hardware-based trigger time-stamping and frequency counting. Each waveform can be time-stamped with the time from the previous waveform, with the resolution of a single sample interval, and the trigger signal frequency can be displayed with up to 7 digits of precision. Rapid trigger rearm times are possible, down to < 700 ns on the fastest timebase.

Custom probes in PicoScope oscilloscope software

Custom probes allow you to scale readings from sensors and transducers to their real-world values. You can adjust the software to account for gain, attenuation, offsets, and non-linearities. By configuring the correct scaling and units, the system displays real-world data directly. This eliminates the need for manual calculations. For complex inputs, such as non-linear temperature sensors, you can use advanced lookup tables to convert measured voltages into temperatures in degrees.

The setup process is efficient and flexible. The software guides you through configuring channel settings, including coupling, voltage range and filtering to match your hardware. The software includes definitions for standard Pico-supplied probes. Additionally, you can save user-created probes for future use. These settings are stored within .psdata files, which allows you to share your configurations with other users.



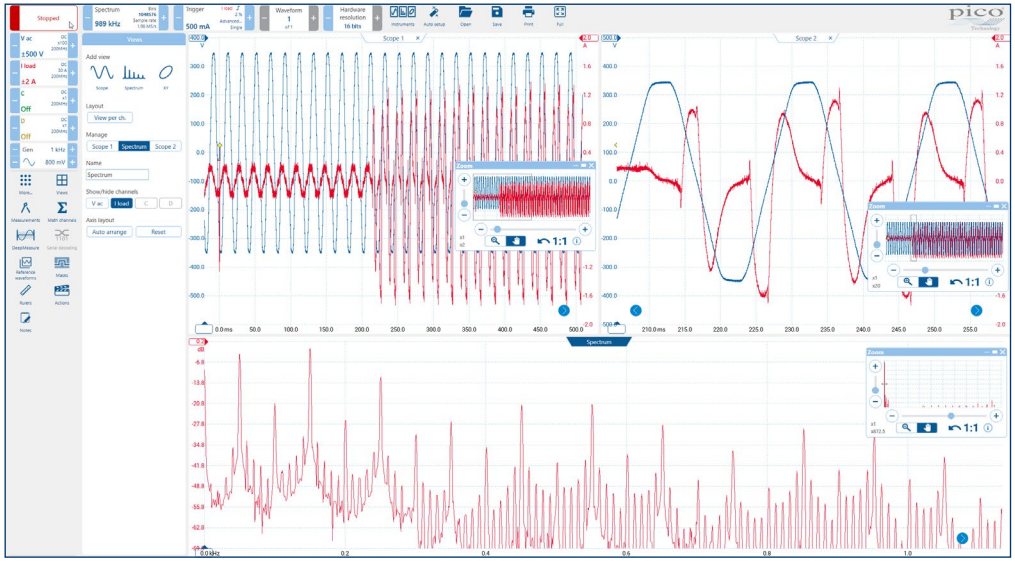
Creating a custom probe in the PicoScope software.

Ultra-high-definition display

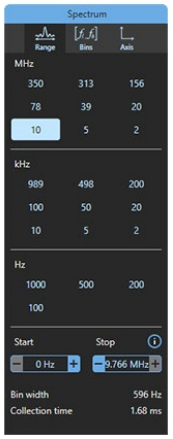
PicoScope PC-based oscilloscopes use the host computer's display, which is typically larger and of higher resolution than the dedicated displays installed in traditional benchtop scopes. This allows for simultaneous display of time- and frequency-domain waveforms, decoded serial bus tables, measurement results with statistics and more.

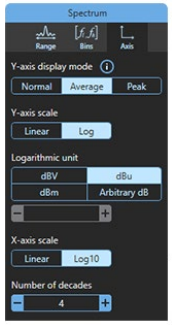
PicoScope software scales automatically to take full advantage of the improved resolution of larger screens, including 4K models. It allows engineers to get more done in less time through split-screen views of multiple channels or different views of the same channel. And, it can show multiple oscilloscope and spectrum analyzer traces at once.

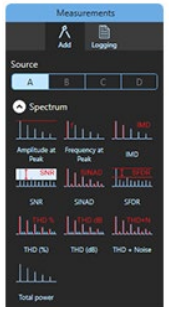
Large, high-resolution displays make it easy to view the high-resolution signals achieved with the PicoScope 5000E Series. With a 4K monitor, PicoScope can display more than ten times the information of traditional scopes. Elements such as measurements, serial decoding or scope traces can be un-docked from the main window and moved to another screen to take full advantage of multi-monitor setups.

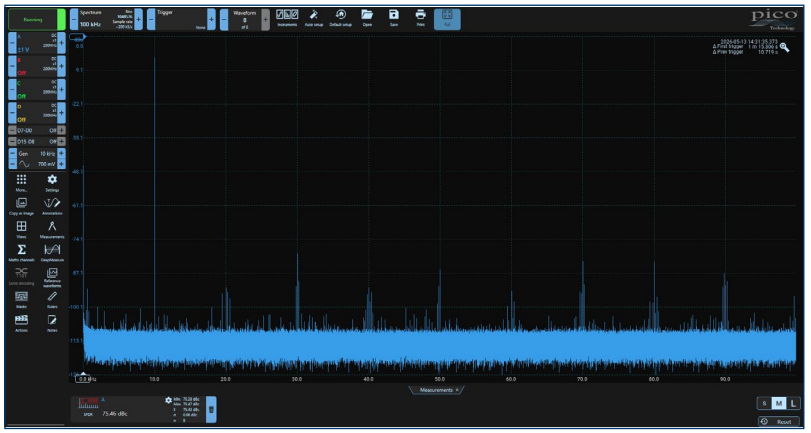


High-Resolution Multi-Domain Analysis: Optimized for ultra-HD displays, ideal for providing a clear multi-view of power startup analysis captured using PicoScope software, as shown above.







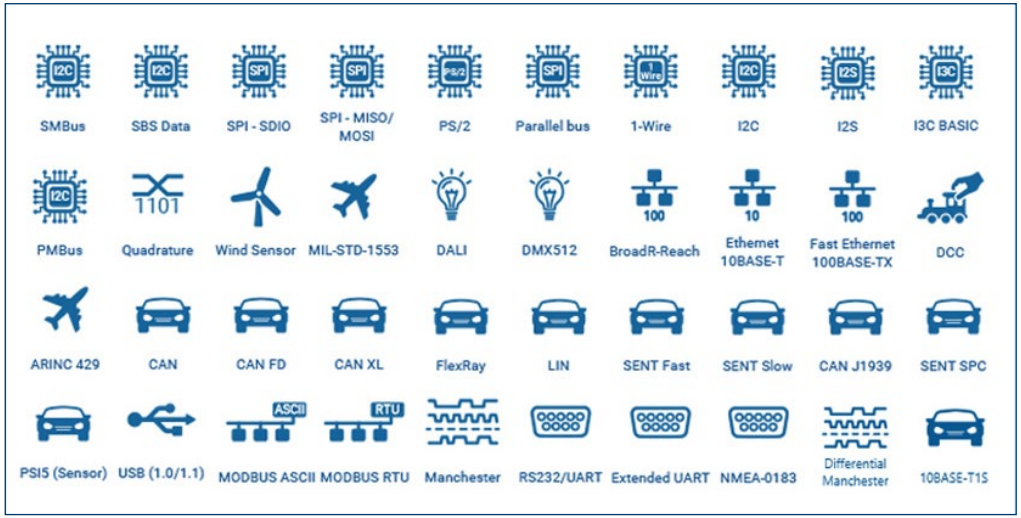


FFT settings give you greater control over the number of spectrum bands, scaling and display modes, while different window functions allow you to optimize for selectivity, accuracy or dynamic range.

FFT spectrum analyzer

The spectrum view plots amplitude against frequency and is ideal for finding noise, crosstalk or distortion in signals. The spectrum analyzer in PicoScope is of the Fast Fourier Transform (FFT) type which, unlike a traditional swept spectrum analyzer, can display the spectrum of a single, non-repeating waveform. With up to a million points, PicoScope's FFT has excellent frequency resolution and a low noise floor.

PicoScope can display a spectrum plot of all active channels simultaneously, with a maximum frequency up to the bandwidth of your scope. You can display multiple spectrum views alongside oscilloscope views of the same data. A comprehensive set of automatic frequency-domain measurements can be added to the display, including THD, THD+N, SNR, SINAD and IMD. A mask limit test can be applied to a spectrum and you can also use the AWG and spectrum mode together to perform swept scalar network analysis.



More than 40 serial protocol decoders as standard in PicoScope oscilloscopes.

Serial bus decoding and protocol analysis

PicoScope oscilloscopes can decode more than 40 data protocols, with more in development, including CAN, UART, I2C, LIN, MODBUS and more. All protocols are built-in as standard and available free of charge as part of software upgrades. See the full list of protocols in the technical specifications.

On MSO models, you can decode up to 20 analog and digital channels of serial data, giving you the flexibility to decode multiple buses simultaneously.

Graph format shows the decoded data (in hex, binary, decimal or ASCII) in a data-bus timing format beneath the waveform on a common time axis, with error frames marked in red. These frames can be zoomed to investigate noise or signal integrity issues.

Table format shows a list of the decoded frames, including the data and all flags and identifiers. You can set up filtering conditions to display only the frames you are interested in or search for frames with specified properties.

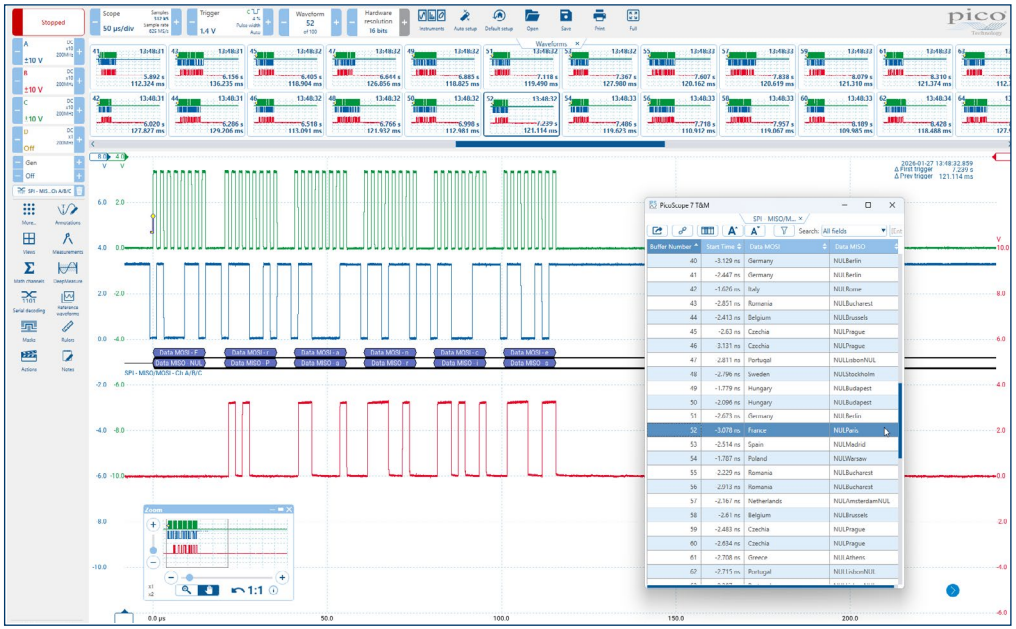
The statistics option reveals more detail about the physical layer such as frame times and voltage levels if appropriate.

PicoScope can also import a "Link File" spreadsheet to decode the data into user-defined text strings. This helps to speed analysis by cross-referencing hexadecimal field values into human readable form. So, for example, instead of displaying “Address: 7E” in the Table View, the corresponding text "Set Motor Speed" will be shown instead.

Advanced serial filtering

Advanced serial filtering is built into the serial protocol decoder. You can isolate specific packets of interest within the serial protocol decoder, for the analysis of large datasets captured via deep memory. You can apply cumulative filters to the decoding table using logical operators (such as equal to or contains) on specific fields; for example, isolating I2C traffic to display only Write operations.

Additionally, the tool supports data indexing, enabling you to filter for specific byte ranges within a data payload (e.g. columns 0–1). Applying these filters updates the tabular data list and simultaneously generates a secondary trace on the graph display, visualizing only the filtered values directly beneath the complete packet data.

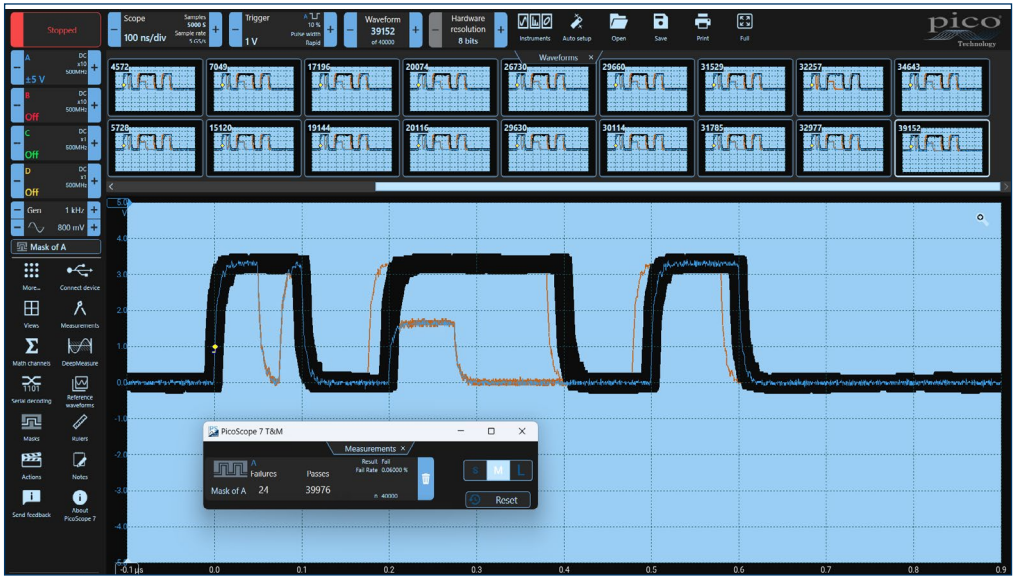


SPI interface showing serial bus decoding in both graph and table formats.

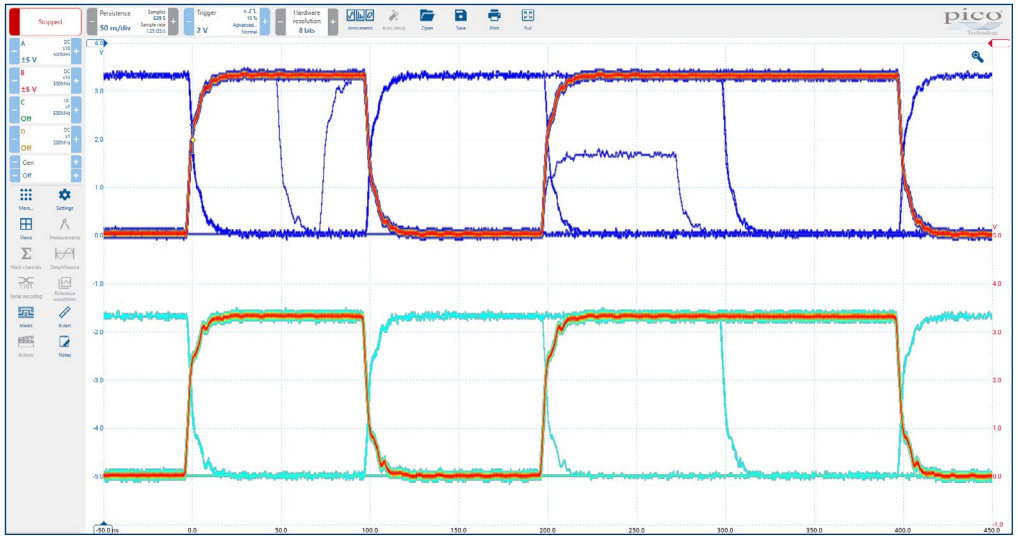
Mask limit testing

Mask limit testing allows you to compare live signals against known good signals. It is designed for production and debugging environments. Simply capture a good signal and use it to auto-generate a mask then measure the system under test. PicoScope will check for mask violations and perform pass/fail testing, capture intermittent glitches, and can show a failure count and other statistics in the Measurements window.

Leveraging the power of the PicoScope 5000E Series, you can further enhance this process by using deep segmented memory to capture thousands of waveforms and filter for only those that breach the mask. You can also automate your workflow by setting "Actions" to trigger on a failure, such as sounding an alarm or saving the file. Masks can be exported and imported to share them with other engineers or save them for future use, ensuring consistency across your entire design or production team.



Mask limit testing, up to 40 000 waveforms



HAL4 hardware acceleration persistence

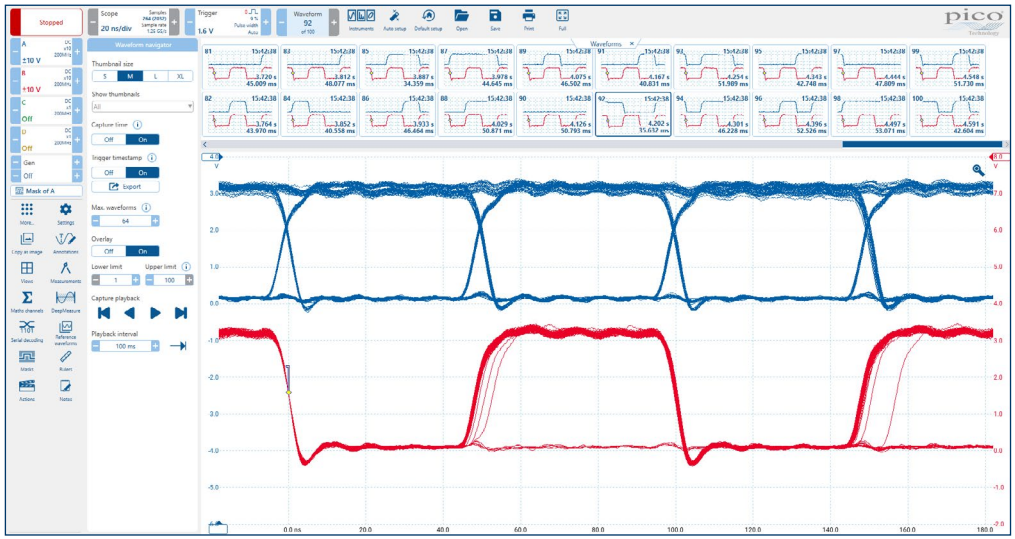
Persistence mode

PicoScope's persistence mode allows you to see new and old data superimposed, making it easy to spot glitches and dropouts to estimate their relative frequency – useful for displaying and interpreting complex analog signals, such as video waveforms and amplitude modulated signals. Color-coding and intensity-grading demonstrate which areas are stable and intermittent. Choose between fast, time or frequency persistence types and customizations within each.

An important specification to understand when evaluating oscilloscope performance, especially in persistence mode, is the waveform update rate, which is expressed as waveforms per second. While the sampling rate indicates how frequently the oscilloscope samples the input signal within one waveform or cycle, the waveform update rate refers to how many complete waveforms it can acquire and display per second.

Oscilloscopes with high waveform update rates provide better visual insight into signal behavior and dramatically increase the probability that the oscilloscope will quickly capture transient anomalies, such as jitter, runt pulses and glitches.

The PicoScope 5000E Series' HAL4 hardware acceleration can achieve continuous update rates of 300 000 waveforms per second in fast persistence mode.



Analyze up to 40 000 captures with PicoScope's buffer. Use overlays and mask testing to isolate glitches and compare individual layers.

Waveform buffer, navigation and overlays

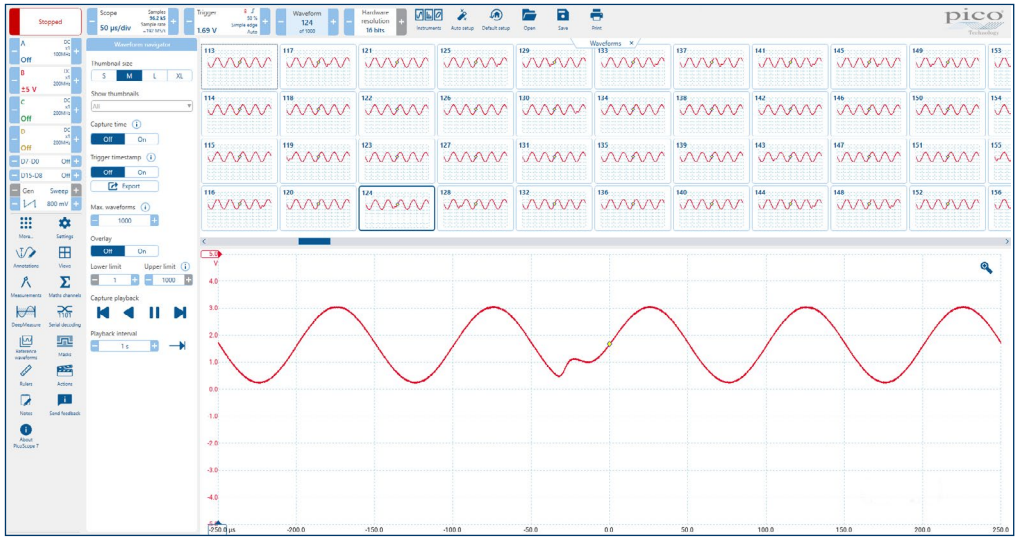
With PicoScope you don't need to worry about missing glitches or other transient events, as it can store the last 40 000 oscilloscope or spectrum waveforms in its circular waveform buffer. The buffer navigator provides an efficient way of navigating and searching through waveforms, while tools like mask limit testing can scan through each waveform in the buffer looking for mask violations. The waveform buffer is also used for rapid trigger mode, where the scope can fill the 40 000-waveform buffer in as little as 20 ms (a rate of 2 million waveforms per second).

Waveform overlays take advantage of the memory segmentation of the PicoScope 5000E to show the traces from selected buffers overlaid on screen. This rapidly visualizes any variation or anomalies between the waveforms. Unlike persistence view, waveform overlays keep each buffer as a full waveform layer, so you can isolate the individual buffer where an event took place for later analysis.

Waveform capture playback

PicoScope software includes a capture playback facility for the waveform navigator, designed to review captured waveforms to help identify signal anomalies that are easily missed on a live display. After buffering up to 40 000 waveforms, you can use the playback controls to cycle through every captured frame, adjusting the playback interval to pinpoint specific events. This capability is essential for identifying rare glitches.

This feature transforms the oscilloscope into a sophisticated troubleshooting tool for characterizing complex, non-periodic faults like crosstalk, power rail drops, or signal integrity issues. In conjunction with mask limit testing, the playback facility allows you to automatically stop a capture upon a violation and then examine the preceding signal behavior. This provides the visual evidence and historical context required to diagnose and resolve the most elusive hardware bugs.



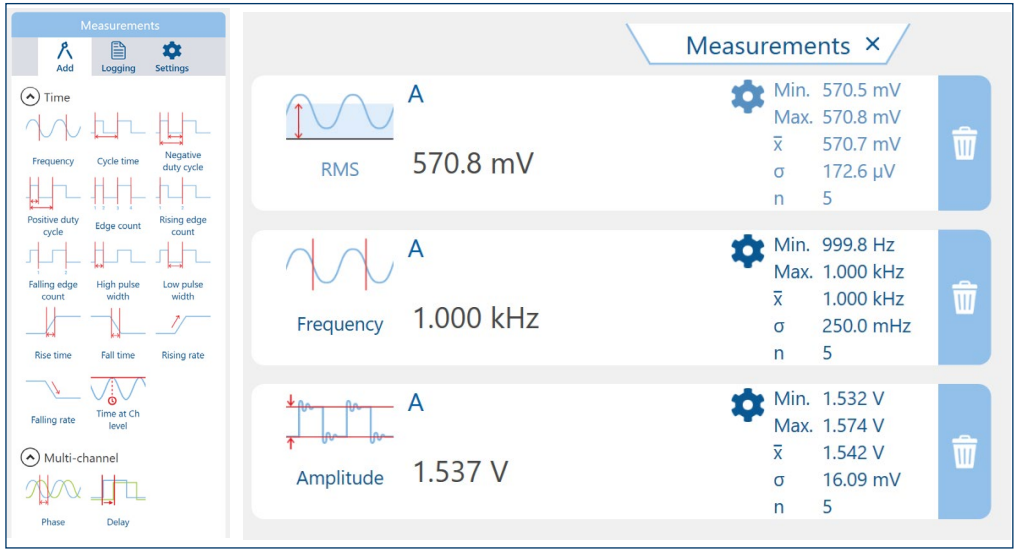
PicoScope's playback interface provides media controls to stream through 40 000 buffered frames, making it easy to spot and pause on rare signal anomalies.

Automated measurements

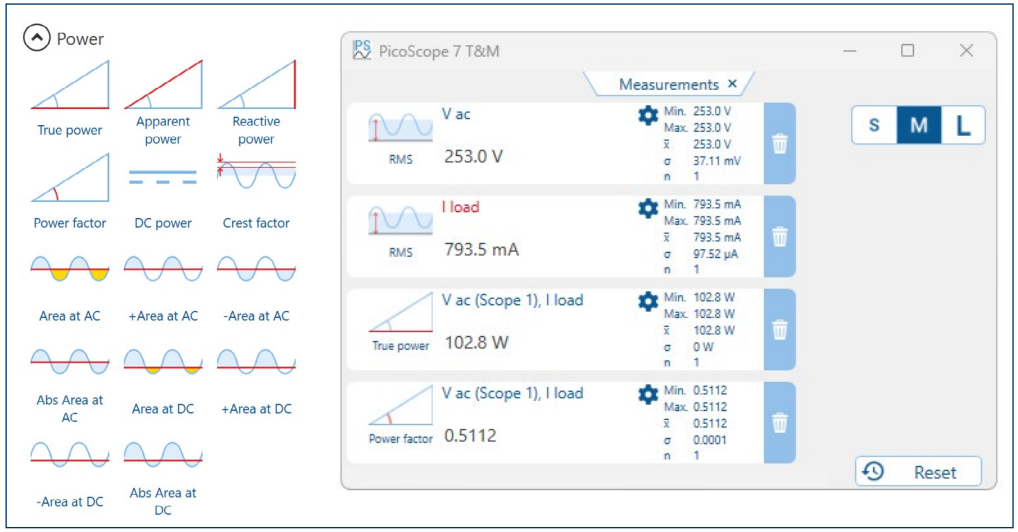
PicoScope 7 provides dozens of automated measurements both for the oscilloscope and spectrum. This includes standard measurements like DC level and frequency, in addition to complex measurements, such as overshoot, edge count, phase, power factor, THD and SINAD.

Statistics can be displayed to show average (mean), maximum, minimum and standard deviation values for the duration of a test, in addition to a count for the number of waveforms.

Measurements are also highly configurable, allowing you to measure across the whole waveform, between rulers or just a single cycle.



An example of the measurements menu and selected measurements on a waveform in PicoScope 7 software.



An example of the power measurements menu and selected power measurements on a waveform in PicoScope 7 software.

Power measurements

PicoScope offers a suite of power measurements and associated power math channels including:

- True power
- Apparent power
- Reactive power
- Power factor
- DC power
- Crest factor
- Area at AC
- +Area at AC
- −Area at AC
- Abs area at AC
- Area at DC
- +Area at DC
- −Area at DC
- Abs area at DC

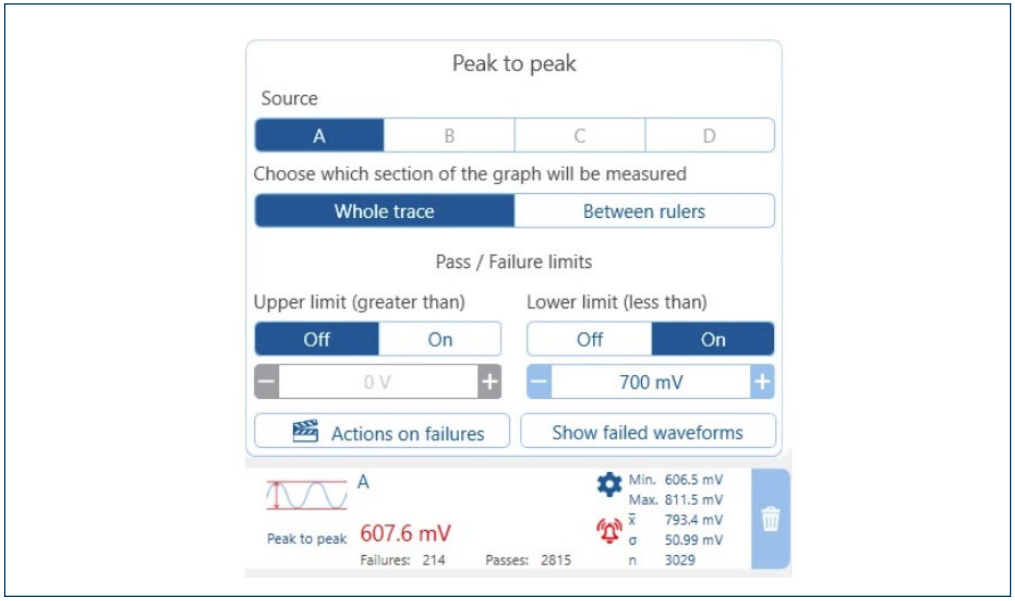
Unlike many other oscilloscopes, all these measurements are included as standard without costly add-ons.

Pass/fail limits

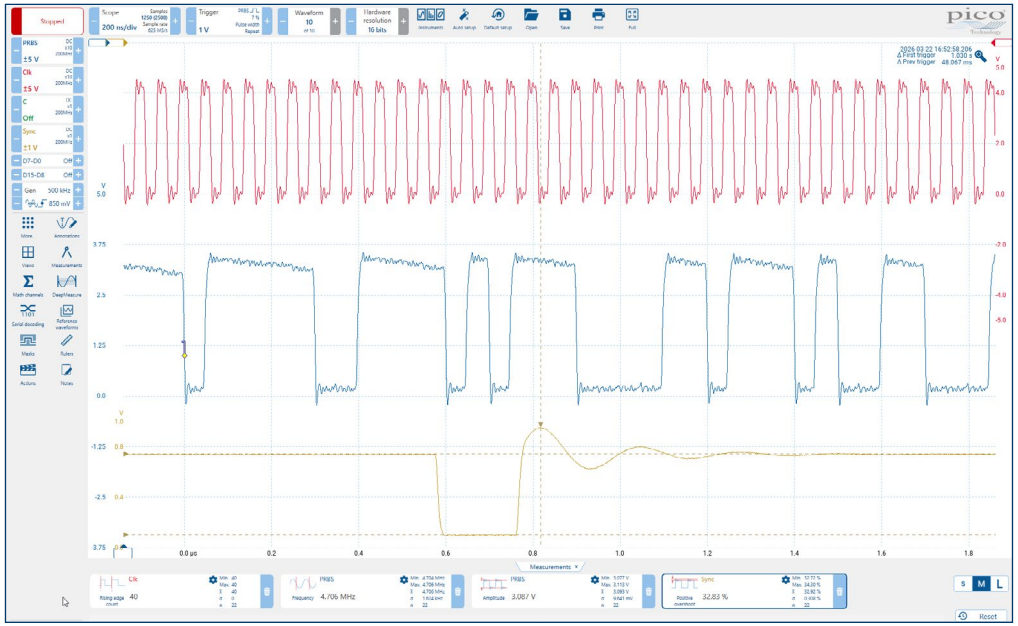
PicoScope software offers pass/fail limits for any measurement. This gives a visual indication within the measurement window whenever the measurement result goes above or below specified values.

Pass/fail limits can be combined with actions to immediately alert the user or execute other actions when a measurement threshold has been exceeded, either above or below set limits.

By filtering the waveform buffer to show only those waveforms failing a measurement limit, you can quickly identify points of interest out of the thousands of waveforms captured in the deep memory of your PicoScope.



PicoScope's pass/fail limits provide visual alerts and automated actions when measurements exceed set thresholds.

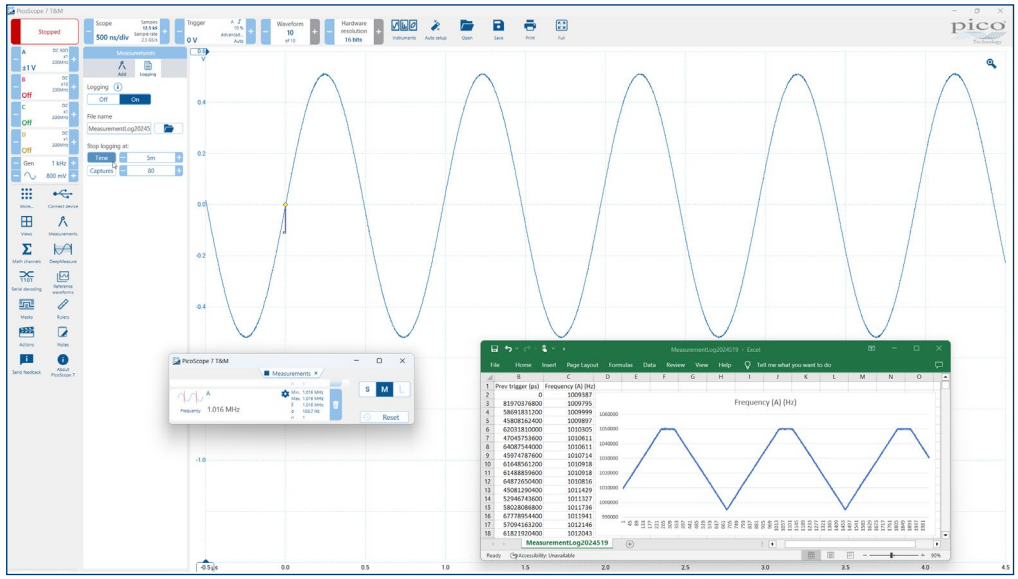


Waveform capture of PRBS, timing and sync signals. Measurement indicators show the reference points for the overshoot measurement on Channel D.

Measurement graph indicators for automatic measurements

Measurement graph indicators are on-screen visual markers that pinpoint exactly where PicoScope 7 software performs automatic measurements on a waveform. These indicators allow you to quickly verify measurements—such as pulse width, edge counts, phase or duty cycles—directly on the graph.

When a measurement result is unexpected, these markers reveal how your specific parameters and constraints are affecting the calculation. This transparency provides greater confidence in your measurement results and simplifies the debugging of complex signals.



PicoScope logs measurement results to disk for long-duration testing. This allows for detailed analysis of circuit drift, thermal effects or functionality against variables like supply voltage.

Logging (trending)

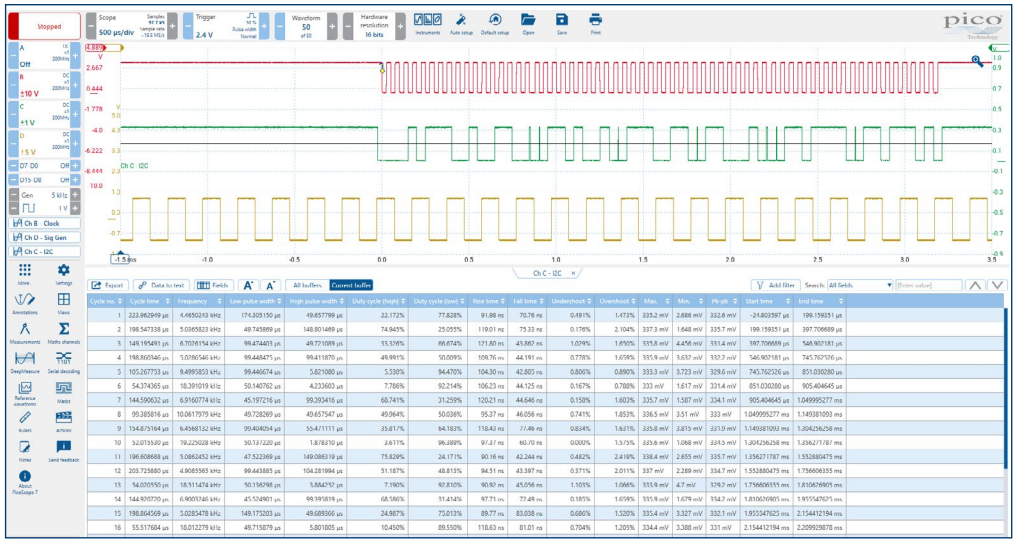
PicoScope allows results of measurements to be recorded to a file for later analysis. The resulting log can be used to characterize the performance of a circuit over medium or long-duration tests. For example, when evaluating drift due to thermal and other effects, or for checking functionality against an externally controlled variable, like supply voltage.

The maximum number of rows recorded is limited by the user-set constraints or disk capacity. Read more about Measurements.

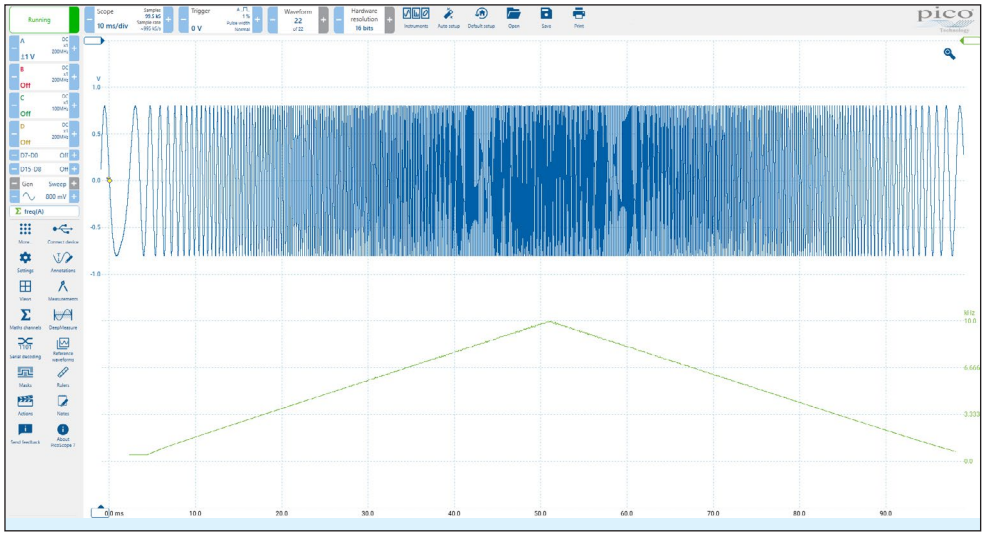
DeepMeasure

Measurement of waveform pulses and cycles is key to verification of the performance of electrical and electronic devices. DeepMeasure delivers automatic measurements of important waveform parameters, such as pulse width, rise time and voltage, for every individual cycle in the captured waveforms. Up to a million cycles can be displayed with each triggered acquisition or combined across multiple acquisitions. Results can be easily sorted, analyzed and correlated with the waveform display, or exported as a .CSV file or spreadsheet for further analysis.

For example, use DeepMeasure to capture 40 000 pulses and quickly find those with the largest or smallest amplitude, or use your scope's deep memory to record a million cycles of one waveform and export the rise time of every single edge for statistical analysis.



DeepMeasure analyzes every cycle in a waveform, providing a comprehensive table of results like pulse width and rise time for millions of cycles, ideal for identifying anomalies in complex data.



This PicoScope 7 capture shows a 10 kHz linear frequency sweep (channel A) tracked by a freq(A) math trace (green), visualizing the instantaneous frequency ramp.

Graphing measurements and math channels

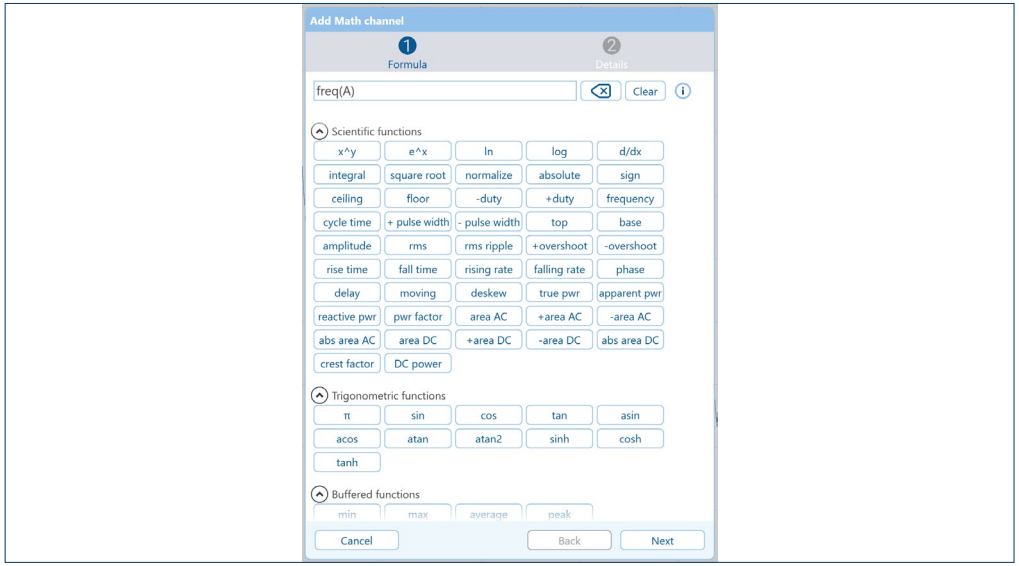
Math channels provide a powerful way to process and visualize waveform data beyond basic arithmetic. While many functions are available as both measurements and math channels, they serve different analytical purposes. As a math channel, a function operates on every individual cycle of a waveform. This allows you to graph variations over time across a multi-cycle capture, which is ideal for troubleshooting dynamic signals like changing duty cycles or frequency-output sensors.

In contrast, automated measurements provide an aggregate value for an entire trace or a specific section defined by rulers. These measurements calculate statistics based on the total data set, offering a high-level summary of the waveform's behavior. PicoScope supports a wide range of math functions, including advanced filters, trigonometry, integrals, and derivatives. These calculated channels can be displayed alongside live signals, saved as reference waveforms for comparison, or even exported to an arbitrary waveform generator to recreate complex signals for testing.

Math channels and filters

PicoScope math channels outperform other oscilloscopes on the market. You can select simple functions, such as addition and inversion, or open the equation editor to create complex functions involving filters (lowpass, highpass, bandpass and bandstop filters), trigonometry, exponentials, logarithms, statistics, integrals and derivatives.

Display up to eight real or calculated channels in each scope view. If you run out of space, just open another scope view and add more. You can also use math channels to reveal new details in complex signals, for example graphing the changing duty cycle or frequency of your signal over time.



Select from a vast library of scientific, trigonometric and buffered functions to build advanced custom math channels in the PicoScope 7 software.

PicoScope 7 Software - Time Domain View

Running/Stopped control: Click to start displaying waveforms. Click again to stop. The keyboard space bar has the same function.

Timebase sampling controls: Set the timing of an acquisition using the seconds/division control. **Sampling** controls provide a choice of timebase operating modes: **Buffer memory** priority adjusts the sampling rate to maintain a fixed capture memory depth. **Sample rate** priority adjusts memory depth to maintain a fixed sampling rate.

Trigger controls: Quick access to main controls and advanced triggers.

Waveform buffer navigator: PicoScope can store the last 40 000 oscilloscope or spectrum waveforms in a circular waveform buffer. The buffer navigator provides an efficient way of navigating and searching through waveforms.

Channel controls: Each channel corresponds to one of the PicoScope input connectors. Use controls to manage probe types, assign channel names, set vertical scaling, offset, input coupling and other signal conditioning parameters before making measurements on the DUT.

Bandwidth (BW) limit: Available BW-limit options depend on the selected voltage range and resolution. Auto mode selects the highest available BW based on your setup. The BW limit in use is shown in each channel control.

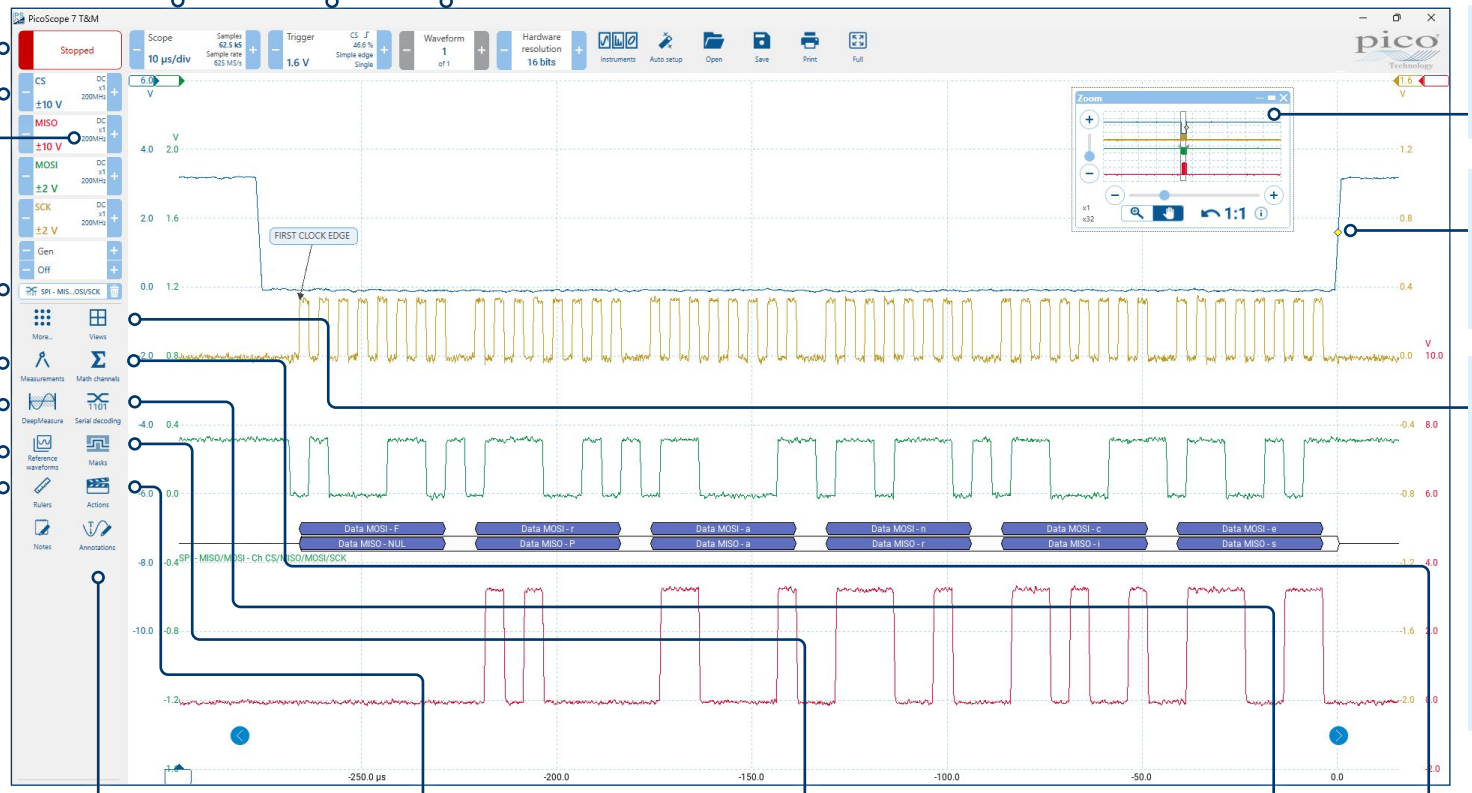
Serial protocol decoding: Serial decoders in use are listed here.

Automatic measurements: Display calculated measurements for troubleshooting and analysis. You can add as many measurements as you need on each view. Each measurement includes statistical parameters showing its variability.

DeepMeasure: Delivers automatic measurement of important waveform parameters on up to a million waveform cycles on each triggered acquisition.

Reference waveforms: Waveforms can be saved and displayed for comparison with live data.

Rulers: Help to make on-screen waveform measurements without having to count graticule marks.



Zoom: Zoom-in to magnify and click or drag to pan around.

Trigger marker: Shows the channel, signal level and time of the trigger event. Drag to adjust.

Views: Display separate scope, spectrum and XY views, which can be moved to different screens. Customize the layout—grid, rows or columns—by dragging the scope tabs into your preferred positions.

Waveform annotations: Add freeform text and arrows to specific events. These notes are included in all files, printouts and image exports, making complex multi-channel scenarios easier to document and share.

Actions: These are things that the PicoScope can be programmed to do when certain events occur. Actions include: **Stop capture**, **Save waveform**, **Play sound**, **Trigger signal generator** and **Run application.**

Masks: Mask limit testing allows the comparison of live signals against known good signals and is designed for production and debugging environments. Simply capture a known good signal, generate a mask around it and then monitor the device under test.

Serial decoding: PicoScope has 40 built-in serial protocol decoders which are included as standard at no extra cost.

Math channels: Advanced scientific, trigonometric, buffer, filter and coupler functions as well as basic arithmetic.

PicoScope 7 Software - Frequency Domain View

Spectrum controls: Set the frequency range, window functions (**Blackman**, **Gaussian**, **Triangular**, **Hamming**, **Hann**, **Blackman-Harris**, **Flat-top** or **Rectangular**), number of bins (bin width and collection time are calculated and displayed) and XY axis settings.

Trigger controls: The full advanced trigger capabilities of the scope are available in spectrum mode, to capture the frequency spectrum of a single event.

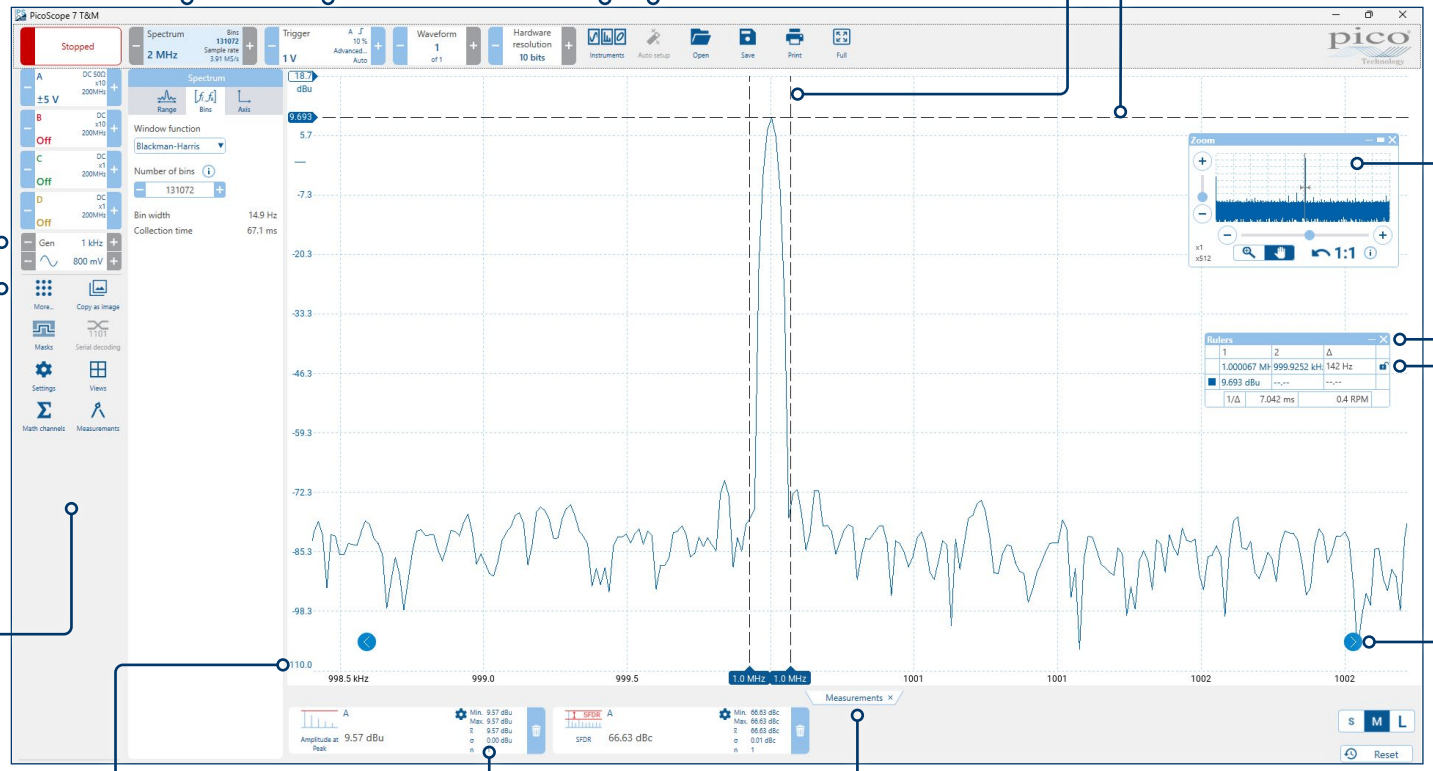
Instruments: Switches between the following modes: scope, spectrum, XY and persistence.

Auto setup: Click this first to find your signal, then adjust using the other controls.

Frequency rulers: Drag ruler from left to right to mark a point on the x-axis. The ruler legend displays the frequency at each ruler and the difference between them. **Track** option (in **Rulers** settings) allows automatic reading of dB/voltage values in the **Ruler legend** without the need for a horizontal ruler.

dB/voltage rulers: Drag up or down to mark a point on the axis. The ruler legend will display the decibel/voltage value at each ruler and the difference between them.

Signal generator: For oscilloscopes with a built-in arbitrary waveform generator (AWG). Generates standard signals or arbitrary waveforms. Includes frequency sweep mode.



Zoom window: Shows the full waveforms on all active channels. The grey rectangle indicates the area that is visible in the current view.

Ruler legend: Displays the positions of all the rulers you have placed on the view. It appears automatically whenever you position a ruler on the view. **Track** option (in **Rulers** settings) allows automatic reading of Y-axis values.

More: Click to display all available tools to select and favorite for quick access.

Favorite tools or functions such as **Measurements**, **Math channels**, **Serial protocol decoding**, **Rulers**, **Reference waveforms**, **Masks**, **Annotations** and **Actions** are one touch away in a custom UI panel.

Lock rulers: When two rulers have been positioned on one channel, the unlocked padlock button appears next to that ruler in the legend. Clicking this button locks the two rulers together so they track each other: dragging one causes the other to follow it, maintaining a fixed separation. The button changes to a "locked padlock" when the rulers are locked.

Channel axis: Each channel has a color-coded axis. Drag it up or down to position the channel. Selecting or dragging also brings the associated waveform to the front if it overlaps others. You can also roll your mouse scroll wheel to adjust the scaling.

Measurement statistics: The minimum, maximum, average and standard deviation of each measurement are calculated and displayed.

Measurements window: Dynamically updated automatic measurements. Choose from a rich set of time-domain and frequency-domain measurement types. The measurements window can be un-docked from the main display, and even moved to another monitor.

Navigate waveform: When zoomed-in, click to pan up or down the frequency range.

Advanced digital trigger: Triggers on a combination of the state of the digital inputs and a transition (edge) on one digital input.

Packet summary: Hover your mouse or touch-and-hold packet data to view summary.

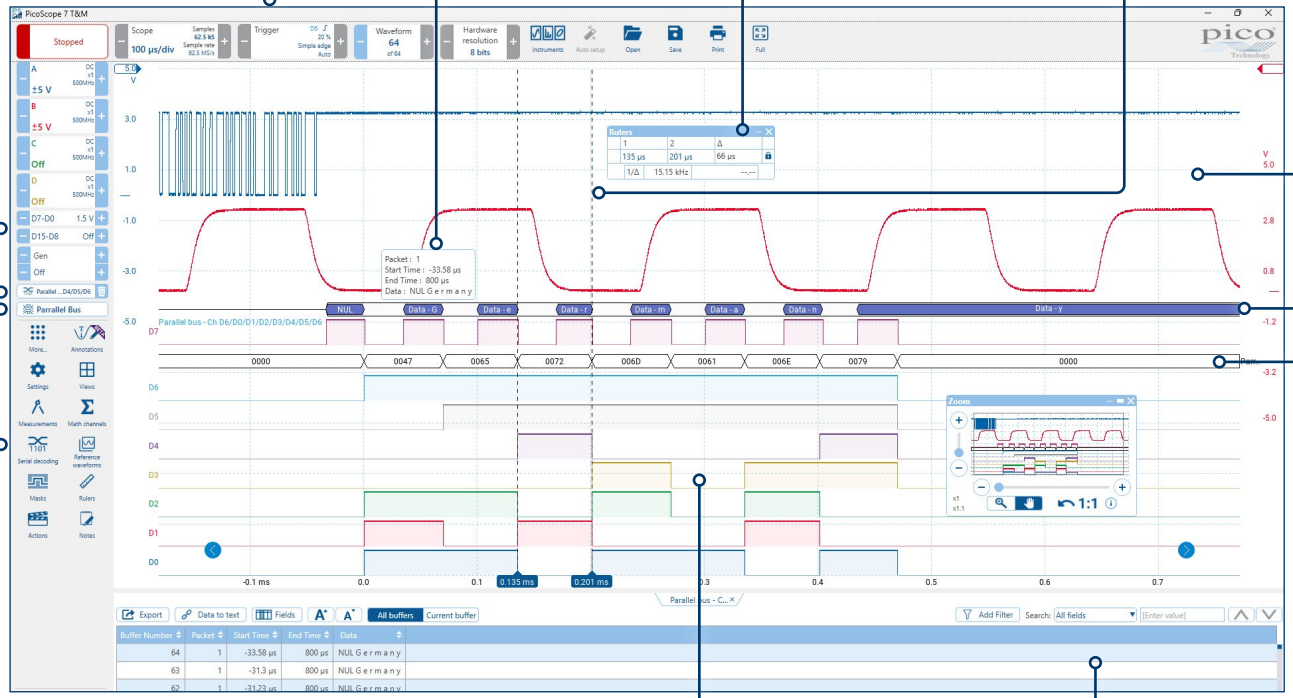
Ruler legend: Absolute and differential ruler measurements are listed here.

Rulers: Drawn across both analog and digital waveforms so signal timings can be compared.

Digital channel controls: Display a digital signal as either a logic high or logic low, depending on whether the voltage on that channel is above or below a set threshold. You can switch digital channels on and off, add and edit labels, channel names, invert the channel, change colors, set the threshold voltage, choose a waveform display size and create digital groups.

Serial protocol decoding: Serial decoders currently in use are listed here. You can edit the configuration and display options for each decoder. For example, you can choose a format for the decoded data: **Hex**, **Binary**, **Decimal** or **ASCII**.

Digital channel group control: Channels added to a group are placed with the most significant bit at the top of the list.



Analog waveforms: Drawn on the same time axis as digital waveforms. Waveforms can be dragged up and down to show related signals near each other, whether analog or digital.

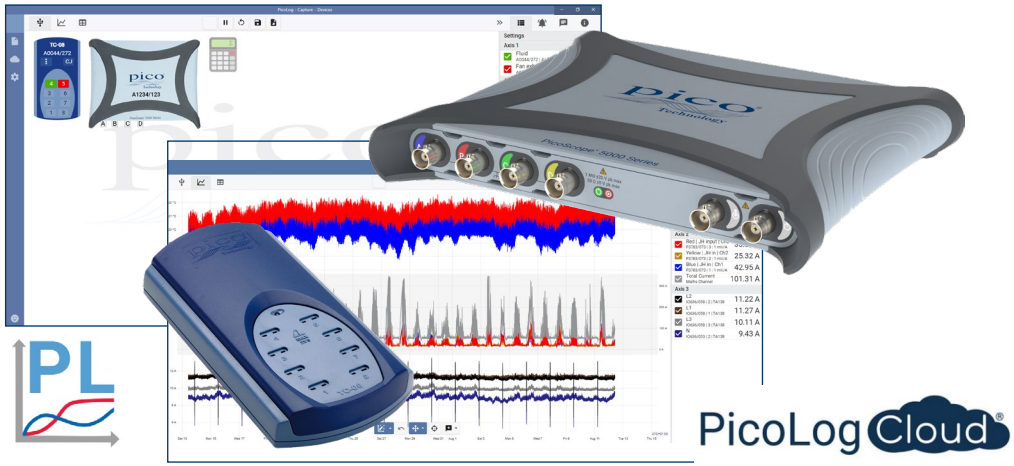
Graph: Data packets displayed in logic-analyzer style, on the same time axis as the analog waveform. Click and drag the decoded data up or down the scope view.
If the table display is visible, double click on any packet to highlight it in the table.

Digital group: Group bits into fields and optionally display as an analog level. Choose either hex, binary, decimal or signed display formats.

Serial decoding: To start decoding, select **Serial decoding** from the tools menu. PicoScope has 40 built-in serial protocol decoders (with more in development) which are included as standard at no extra cost. You can use PicoScope to decode data from a serial bus such as I2C or CAN Bus. Unlike a conventional bus analyzer, PicoScope lets you see the high-resolution electrical waveform, on analog channels, at the same time as the data. The data is integrated into the scope view, with color coded packets.

Digital channel traces: These can be arranged on-screen individually or in groups to best show the relationship between signals being measured.

Table: Displays the decoded data in an alphanumeric format in a table with advanced search and filtering functions. You can sort the data by any of the fields and double-click a row in the table to zoom to the corresponding frame in the scope view.



PicoLog™ 6 software

PicoScope 5000E Series oscilloscopes are supported by the PicoLog 6 data logging software, allowing you to view and record signals on multiple units in one capture.

PicoLog 6 allows sample rates of up to 1 kS/s per channel, and is ideal for long-term observation of general parameters, such as voltage or current levels, on several channels at the same time, whereas the PicoScope software is more suitable for waveshape or harmonic analysis.

You can also use PicoLog 6 to view data from your oscilloscope alongside a data logger or other device. For example, you could measure voltage and current with your PicoScope and plot both against temperature using a TC-08 thermocouple data logger.

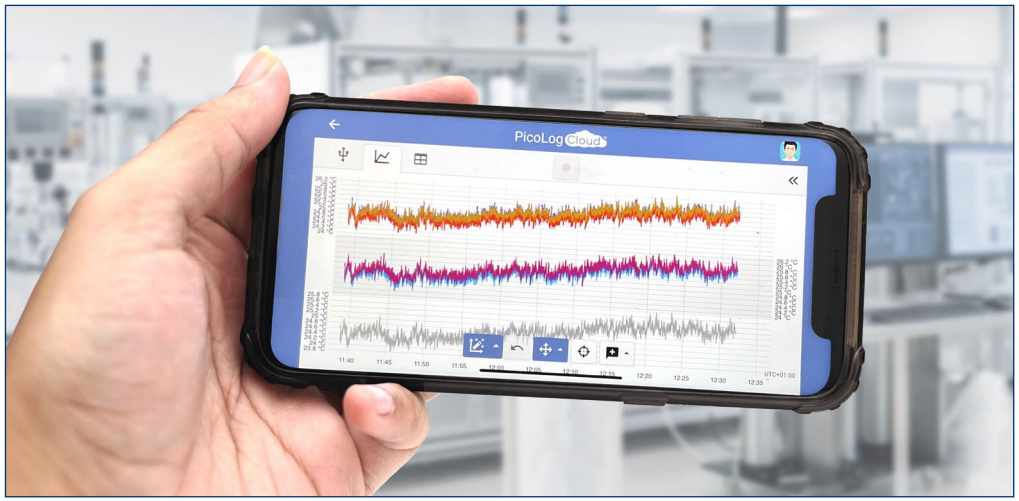
PicoLog Cloud

Your PicoScope or data logger can capture to a local disk and stream the capture directly to a secure online cloud store, which is completely free.

This feature stays true to our vision of creating a data logging application with a simple user interface, and is equally straightforward for use by technical or non-technical users.

PicoLog Cloud (built-in to PicoLog 6) provides enhancements to send the live capture data directly to your remote PicoLog Cloud space, and in addition view saved captures stored in the Cloud.

PicoLog 6 is available for Windows, macOS, Linux and Raspberry Pi OS.



PicoLog Cloud enables real-time remote monitoring of live captures on any device. Stream data from your PicoScope to a secure online store for instant viewing and long-term analysis from anywhere.

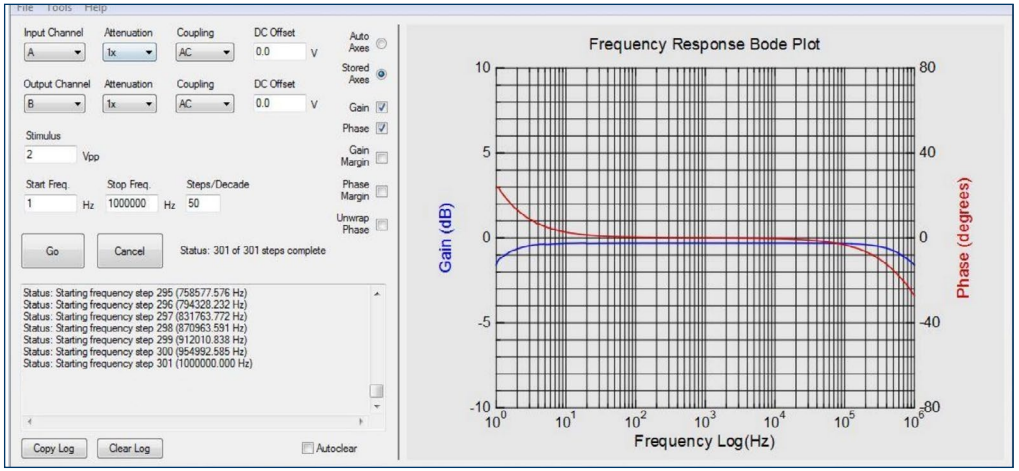
PicoSDK - write your own apps

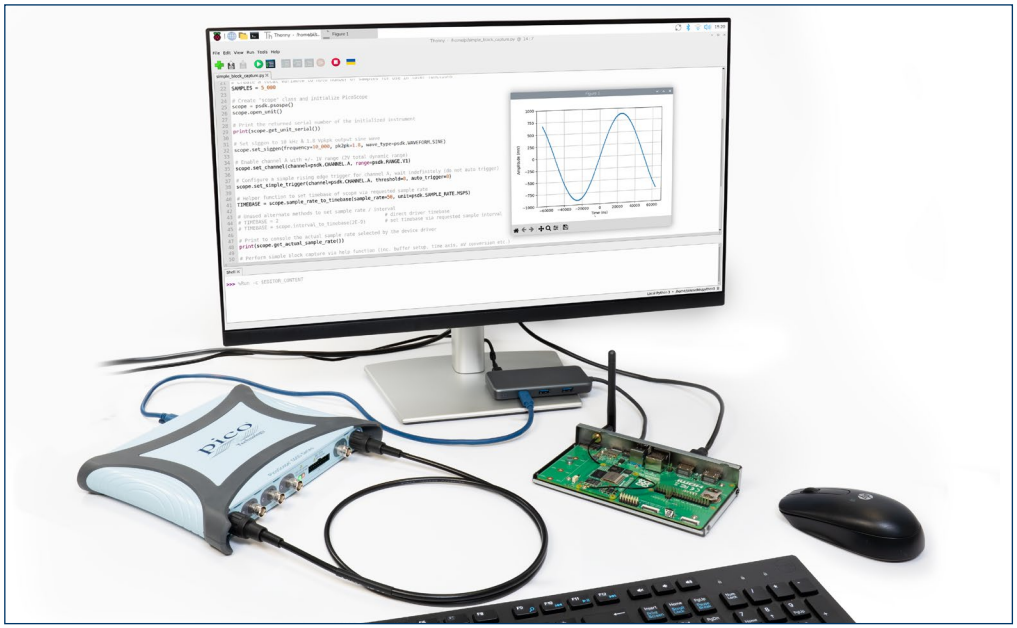
Our free software development kit, PicoSDK, enables you to write custom software with drivers for Windows, macOS, and Linux. GitHub examples demonstrate interfacing with LabVIEW, MATLAB, and languages like C/C++, C#, and Python.

Engineers use PicoSDK to unlock hardware potential for specialized tasks. It allows for integrating PicoScopes into automated production test systems, enabling remote monitoring, and building custom GUIs tailored to specific workflows. With Python automation, you can script complex sequences and integrate with data science tools.

The drivers support data streaming, capturing gap-free data directly to your PC at over 300 MS/s. This bypasses internal memory limits, perfect for long-duration events. Additionally, pyPicoSDK provides a Pythonic wrapper for our C drivers, bundling helper functions and NumPy support to quickly automate measurements and data logging.

Our active community shares code and applications on the Test and Measurement Forum and PicoApps website. Popular tools, like the Frequency Response Analyzer, show how PicoSDK transforms a standard oscilloscope into a specialized precision instrument. Whether you are streamlining factory verification or developing bespoke research tools, PicoSDK provides the flexibility needed for advanced engineering.





The PicoScope 5000E Series running a custom Python application via the PicoSDK on a Raspberry Pi Compute Module 5. This compact Arm64 setup is ideal for embedded systems and remote monitoring.

Arm®64 compatibility

Both the PicoScope 7 software and PicoSDK are compatible with the ARM64 architecture supporting operating systems such as macOS and Linux distributions. This enables PicoScope 7 to run on single-board computers (SBCs) such as the Raspberry Pi and similar devices.

This allows users to perform tests and share captured data between x64 and ARM64 systems. By maintaining a uniform interface across platforms, PicoScope 7 ensures a consistent user experience and simplifies cross-platform collaboration.

ARM64 support for the PicoSDK also allows users to build custom applications on single-board computers to leverage the compact size and power efficiency of ARM64 architecture. This makes a PicoScope device the ideal choice for embedded systems, remote monitoring and automated testing where space constraints and power efficiency are critical.

PicoScope 5000E Series		5462E 5462E MSO	5463E 5463E MSO	5464E 5464E MSO	5462E+ 5462E+ MSO	5463E+ 5463E+ MSO	5464E+ 5464E+ MSO
Input channels		4	4	4	4	4	4
Bandwidth (–3 dB)	**16-bit mode**	60 MHz	100 MHz	200 MHz	60 MHz	100 MHz	200 MHz
	8-bit mode	N/A	N/A	N/A	200 MHz	350 MHz	500 MHz
Rise time (10% to 90%, –2 dBFS)	**16-bit mode**	5.8 ns	3.5 ns	1.75 ns	5.8 ns	3.5 ns	1.75 ns
	8-bit mode	N/A	N/A	N/A	1.75 ns	1.2 ns	925 ps
Selectable bandwidth limits	**16-bit mode**	20, 60 MHz	20, 60, 100 MHz	20, 60, 100, 200 MHz	20, 60 MHz	20, 60, 100 MHz	20, 60, 100, 200 MHz
	8-bit mode	N/A	N/A	N/A	20, 60, 100, 200 MHz	20, 60, 100, 200, 350 MHz	20, 60, 100, 200, 350, 500 MHz
Vertical resolution		16 bits	16 bits	16 bits	8/16 bits	8/16 bits	8/16 bits
Enhanced vertical resolution (software)		Hardware resolution + 4 bits					
Input connector		BNC(f)					
Input characteristics	**50 Ω**	±2%					
	1 MΩ	±1% ‖ 13 pF ±2 pF					
Input coupling	**50 Ω**	DC					
	1 MΩ	AC/DC					
Input sensitivity	**50 Ω**	1 mV/div to 1 V/div (10 vertical divisions)					
	1 MΩ	1 mV/div to 4 V/div (10 vertical divisions)					
Input ranges (full scale)	**50 Ω**	±5 mV[1], ±10 mV[2], ±20 mV[3], ±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V					
	1 MΩ	±5 mV[1], ±10 mV[2], ±20 mV[3], ±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V, ±20 V					
[1] ±5 mV only available up to 100 MHz [2] ±10 mV only available up to 200 MHz [3] ±20 mV only available up to 350 MHz							
DC gain accuracy		±(0.5% of signal + 1 LSB)					
DC offset accuracy		±(1% of full scale + 300 µV) Offset accuracy can be improved by using the **Offset correction** function (**Settings** > **Device**) in PicoScope.					
LSB size (quantization step size)	**16-bit mode**	< 0.002% of input range			< 0.002% of input range		
	8-bit mode	N/A			< 0.4% of input range		
Analog offset range (vertical position adjustment)		±25 mV (5, 10, 20 mV ranges), ±250 mV (50, 100, 200 mV ranges), ±2.5 V (500 mV, 1 V, 2 V ranges), ±5 V (5 V range), 50 Ω input coupling ±20 V (5, 10, 20 V ranges), 1 MΩ input coupling					
Analog offset control accuracy		±0.5% of offset setting, additional to DC accuracy above					
Overvoltage protection	**50 Ω**	5.5 V RMS max, ±20 V pk max					
	1 MΩ	±100 V (DC + AC peak) up to 10 kHz					

Vertical (digital channels) - MSO only		
Input channels		16 (2 logical ports of 8 channels each)
Input connector		2.54 mm pitch, 10 x 2 way connector
Maximum input frequency		100 MHz (200 Mbit/s)
Maximum detectable pulse width		5 ns
Threshold	**Grouping**	Two independent threshold controls. Port 0: D0 to D7, Port 1: D8 to D15
	Range	±5 V
	Accuracy	< ±350 mV (inclusive of hysteresis)
	Hysteresis	< ±250 mV
Input dynamic range		±20 V
Minimum input voltage swing		500 mV peak to peak
Input impedance		200 kΩ ± 2% || 8 pF ± 2 pF
Channel-to-channel skew		2 ns, typical
Minimum input slew rate		10 V/µs
Overvoltage protection		±50 V (DC + AC peak) up to 100 kHz

Horizontal		PicoScope 5000E Series		PicoScope 5000E+ Series	
		Analog channels	Digital channels (MSO models)	Analog channels	Digital channels (MSO models)
Maximum sampling rate, 16-bit mode	1 channel[4]	2.5 GS/s	1.25 GS/s	2.5 GS/s	1.25 GS/s
	2 channels	1.25 GS/s	1.25 GS/s	1.25 GS/s	1.25 GS/s
	3 or 4 channels	625 MS/s	625 MS/s	625 MS/s	625 MS/s
	> 4 channels	312.5 MS/s	312.5 MS/s	312.5 MS/s	312.5 MS/s
Maximum sampling rate, 8-bit mode	1 channel	N/A	N/A	5 GS/s	1.25 GS/s
	2 channels	N/A	N/A	2.5 GS/s	1.25 GS/s
	3 or 4 channels	N/A	N/A	1.25 GS/s	1.25 GS/s
	> 4 channels	N/A	N/A	625 MS/s	625 MS/s
[4] Channel means the total number of enabled analog channels and/or 8-bit digital ports.					
Max. sampling rate, continuous USB streaming into PC memory[5] (PicoScope 7)	1 channel	~50 MS/s		~50 MS/s	
	2 channels	~25 MS/s		~25 MS/s	
	3 or 4 channels	~12 MS/s		~12 MS/s	
	> 4 channels	~6 MS/s		~6 MS/s	
Max. sampling rate, continuous USB streaming into PC memory[5] (PicoSDK), 16-bit mode	1 channel	~150 MS/s		~150 MS/s	
	2 channels	~75 MS/s		~75 MS/s	
	3 or 4 channels	~38 MS/s		~38 MS/s	
	> 4 channels	~18 MS/s		~18 MS/s	
Max. sampling rate, continuous USB streaming into PC memory[5] (PicoSDK), 8-bit mode	1 channel	N/A		~300 MS/s	
	2 channels	N/A		~150 MS/s	
	3 or 4 channels	N/A		~75 MS/s	
	> 4 channels	N/A		~38 MS/s	
[5] On USB 5Gbps port. Max. sampling rates in streaming mode are dependent on the host computer performance and workload.					

Horizontal (continued)			PicoScope 5000E Series	PicoScope 5000E+ Series
Max. sampling rate, USB streaming of downsampled data[6] (PicoSDK), 16-bit mode	1 channel		500 MS/s	500 MS/s
	2 channels		250 MS/s	250 MS/s
	3 or 4 channels		125 MS/s	125 MS/s
	> 4 channels		62.5 MS/s	62.5 MS/s
Max. sampling rate, USB streaming of downsampled data[6] (PicoSDK), 8-bit mode	1 channel		N/A	1 GS/s
	2 channels		N/A	500 MS/s
	3 or 4 channels		N/A	250 MS/s
	> 4 channels		N/A	125 MS/s
Capture memory (per channel) 16-bit mode	1 channel		1 GS	1 GS
	2 channels		512 MS	512 MS
	3 or 4 channels		256 MS	256 MS
	> 4 channels		128 MS	128 MS
Capture memory (per channel) 8-bit mode	1 channel		N/A	2 GS
	2 channels		N/A	1 GS
	3 or 4 channels		N/A	512 MS
	> 4 channels		N/A	256 MS
[6] Downsampled (min/max/average/decimated) data returned to PC during streaming up to USB data bandwidth. Raw data available to read from device buffer after streaming complete.				
Maximum single capture duration at maximum sampling rate	PicoScope 7		200 ms	
	PicoSDK		400 ms	
Capture memory (continuous streaming)	PicoScope 7		250 MS	
	PicoSDK		Buffering using full device memory, no limit on total duration of capture	
Waveform buffer (number of segments)	PicoScope 7		40 000	
	PicoSDK	16-bit mode	1 000 000	1 000 000
		8-bit mode	N/A	2 000 000
Timebase ranges			1 ns/div to 5000 s/div	
Initial timebase accuracy			±2 ppm	
Timebase drift			±1 ppm/year	
ADC sampling			Simultaneous sampling on all active channels	

Dynamic performance (typical)		PicoScope 5000E Series	PicoScope 5000E+ Series
Crosstalk		> 500:1 (from DC to bandwidth of victim channel, equal voltage ranges)	
Harmonic distortion (1 MHz, −2 dBFS input)	16-bit mode	< −73 dB on ±50 mV to ±20 V ranges	< −73 dB on ±50 mV to ±20 V ranges
	8-bit mode	N/A	< −50 dB on ±50 mV to ±20 V ranges
SFDR (1 MHz, −2 dBFS input)	16-bit mode	> 73 dB on ±50 mV to ±20 V ranges	> 73 dB on ±50 mV to ±20 V ranges
	8-bit mode	N/A	> 50 dB on ±50 mV to ±20 V ranges
Bandwidth flatness	16-bit mode	(+0.3 dB, −3 dB) from DC to full bandwidth	(+0.3 dB, −3 dB) from DC to full bandwidth
	8-bit mode	N/A	(+0.5 dB, −3 dB) from DC to full bandwidth
Low-frequency flatness		< ±3% (or ±0.3 dB) from DC to 1 MHz	

RMS Noise							
Range	Per division	Bandwidth filter					
		20 MHz	60 MHz	100 MHz	200 MHz	350 MHz	500 MHz
±5 mV	1 mV	0.022 mV	0.038 mV	0.051 mV	N/A	N/A	N/A
±10 mV	2 mV	0.022 mV	0.038 mV	0.051 mV	0.071 mV	N/A	N/A
±20 mV	4 mV	0.023 mV	0.038 mV	0.052 mV	0.073 mV	0.15 mV	N/A
±50 mV	10 mV	0.030 mV	0.049 mV	0.067 mV	0.10 mV	0.27 mV	0.32 mV
±100 mV	20 mV	0.037 mV	0.056 mV	0.077 mV	0.14 mV	0.46 mV	0.60 mV
±200 mV	40 mV	0.056 mV	0.076 mV	0.11 mV	0.23 mV	0.91 mV	1.2 mV
±500 mV	100 mV	0.32 mV	0.50 mV	0.68 mV	1.0 mV	2.3 mV	3.2 mV
±1 V	200 mV	0.38 mV	0.57 mV	0.78 mV	1.4 mV	4.1 mV	6.0 mV
±2 V	400 mV	0.57 mV	0.77 mV	1.1 mV	2.3 mV	8.1 mV	12 mV
±5 V	1 V	3.2 mV	5.0 mV	6.8 mV	10 mV	23 mV	32 mV
±10 V	2 V	3.9 mV	5.7 mV	7.8 mV	14 mV	41 mV	60 mV
±20 V	4 V	5.7 mV	7.7 mV	11 mV	23 mV	81 mV	117 mV

Triggering		
Source		Any analog channel, AUX I/O trigger MSO models: digital D0-D15
Trigger modes		None, auto, repeat, single, rapid (segmented memory)
Advanced trigger types (analog channels)		Edge (rising, falling, rising-or-falling), window (entering, exiting, entering-or-exiting), pulse width (positive or negative or either pulse), window pulse width (time inside, outside window or either), level dropout (including high/low or either), window dropout (including inside, outside or either), interval, runt (positive or negative), transition time (rise/fall), logic Logic trigger capabilities: AND or OR function of any trigger sources (analog channels plus digital pattern or aux input) NAND/NOR/XOR/XNOR of up to four analog channels or digital ports plus aux input User-defined Boolean function of up to four analog channels or digital ports plus aux input (PicoSDK only)
Trigger sensitivity (analog channels)		Digital triggering provides 1 LSB accuracy up to full bandwidth of scope with adjustable hysteresis
Advanced trigger types (digital channels)		Edge (rising, falling, rising-or-falling), pulse width (positive or negative or either pulse), level dropout (including high/low or either), interval, digital pattern (combination of any digital input states qualified by one edge), logic (mixed signal)
Pre-trigger capture		Up to 100% of capture size
Post-trigger delay	**PicoScope 7**	Zero to > $4x10^9$ samples, settable in 1 sample steps (delay range at 5 GS/s of 0.8 s in 200 ps steps)
	PicoSDK	Zero to > $1x10^{12}$ samples, settable in 1 sample steps (delay range at 5 GS/s of > 200 s in 200 ps steps)
Trigger holdoff by time		Delay re-arming the trigger after each trigger event by a user-set time up to 4×10^9 sample intervals.
Rapid trigger mode rearm time		< 700 ns on fastest timebase
Maximum trigger rate (rapid mode)	**PicoScope 7**	40 000 waveforms in 20 ms
	PicoSDK	Number of waveforms up to memory segment count, at a rate of 2 million waveforms per second.
Continuous waveform update rate		Up to 300 000 waveforms per second in PicoScope 7 fast persistence mode
Trigger time-stamping		Each waveform is timestamped with time from previous waveform, with sample-interval resolution.
Trigger frequency counter		Hardware-based measurement of trigger signal frequency with up to 7 digits of resolution.

Auxiliary trigger		
Trigger type	**Triggering scope**	Edge (rising, falling, rising-or-falling), pulse width (positive or negative or either pulse), level dropout (including high/low or either), interval, logic
	Triggering AWG	Rising edge, falling edge, gate high, gate low
Input bandwidth		> 10 MHz
Input characteristics		3.3 V CMOS Hi-Z input, DC coupled
Input threshold		Fixed threshold, low < 1 V, high > 2.3 V suitable for 3.3 V CMOS
Input hysteresis		1.3 V max (V_{IH} < 2.3 V, V_{IL} > 1 V)
Auxiliary output function		Trigger output
Output	**Voltage**	3.3 V CMOS (V_{OH} > 3.2 V, V_{OL} < 0.1 V into Hi-Z)
	Impedance	Approx. 270 Ω
	Rise time	Measured directly at BNC: < 15 ns
Coupling		DC
Overvoltage protection		±20 V peak max
Connector type		BNC(f)

Function generator		
Standard output signals		Sine, square, triangle, DC voltage, ramp up, ramp down, sinc, Gaussian, half-sine
Output frequency	**Range**	100 µHz to 20 MHz
	Accuracy	Oscilloscope timebase accuracy ± output frequency resolution
	Resolution	< 1 µHz
Sweep modes		Up, Down, Up/Down with selectable start/stop frequencies and increments
Triggering		Free-run, or from 1 to 1 billion counted waveform cycles or frequency sweeps. Triggered from scope trigger, aux trigger or manually.
Gating		Waveform output can be gated (paused) via aux trigger input or software
Pseudorandom output signals		White noise, selectable amplitude and offset within output voltage range Pseudorandom binary sequence (PRBS), selectable high and low levels within output voltage range, selectable bit rate up to 20 Mb/s
Output voltage	**Range**	±2.0 V into Hi-Z (±1.0 V into 50 Ω)
	Adjustment	Signal amplitude and offset adjustable in approx. 0.3 mV steps within overall ± 2 V range
DC accuracy		±1% of full scale, into Hi-Z load
Amplitude flatness		< 1.5 dB to 20 MHz, typical, sine wave into 50 Ω
SFDR		> 70 dB, 10 kHz full scale sine wave
Output resistance		50 Ω ±1%
Overvoltage protection		±20 V peak max
Connector type		BNC(f)

Arbitrary waveform generator	
Update rate	200 MS/s
Buffer size	32 kS
Vertical resolution	14 bits (output step size 0.3 mV approx.)
Bandwidth (−3 dB)	> 20 MHz
Rise time (10% to 90%)	< 10 ns (50 Ω load)
Sweep modes, triggering, frequency accuracy and resolution, voltage range and accuracy and output characteristics as for function generator.	

Spectrum analyzer	
Frequency range	DC to maximum bandwidth
Display modes	Magnitude, average, peak hold
Y axis	Logarithmic (dBV, dBu, dBm, arbitrary dB) or linear (volts)
X axis	Linear or logarithmic
Windowing functions	Rectangular, Gaussian, triangular, Blackman, Blackman−Harris, Hamming, Hann, flat-top
Number of FFT points	Selectable from 128 to 1 million in powers of 2

Math channels	
Functions	−x, x+y, x−y, x*y, x/y, x^y, sqrt, exp, ln, log, abs, norm, sign, sin, cos, tan, arcsin, arccos, arctan, atan2, sinh, cosh, tanh, delay, average, frequency, derivative, integral, min, max, peak, duty, high pass, low pass, band pass, band stop, coupler (RG58, Cat5), top, base, amplitude, positive overshoot, negative overshoot, phase, delay, moving, deskew, true power, apparent power, reactive power, power factor, area AC, positive area AC, negative area AC, abs area AC, area DC, positive area DC, negative area DC, abs area DC
Operands	A to D (input channels), D0-D15 (digital channels), T (time), reference waveforms, pi, constants

Automatic measurements	
Scope mode	Absolute area at AC/DC, AC RMS, amplitude, apparent power, area at AC/DC, base, crest factor, channel at channel level, cycle time, DC average, DC power, duty cycle, edge count, fall time, falling edge count, falling rate, frequency, high pulse width, low pulse width, maximum, minimum, negative area at AC, negative area at DC, negative duty cycle, negative overshoot, peak to peak, phase, positive area at AC, positive area at DC, positive overshoot, power factor, reactive power, rise time, rising edge count, rising rate, time at levels, top, true power, true RMS
Spectrum mode	Frequency at peak, amplitude at peak, average amplitude at peak, total power, THD%, THD dB, THD+N, SINAD, SNR, IMD
Statistics	Minimum, maximum, average, standard deviation

Mask limit testing	
Statistics	Pass/fail, failure count, total count
Mask creation	Auto-generated from waveform or imported from file

DeepMeasure	
Parameters	Cycle number, cycle time, frequency, low pulse width, high pulse width, duty cycle (high), duty cycle (low), rise time, fall time, undershoot, overshoot, max. voltage, min. voltage, voltage peak to peak, start time, end time

Serial decoding	
Protocols	10BASE-T1S, 1-Wire, ARINC 429, BroadR-Reach, CAN, CAN FD, CAN J1939, CAN XL, DALI, DCC, Differential Manchester, DMX512, Ethernet 10BASE-T, Extended UART, Fast Ethernet 100BASE-TX, FlexRay, I2C, I2S, I3C BASIC v1.0, IsoSPI, JTAG, LIN, Manchester, MIL-STD-1553, MODBUS ASCII, MODBUS RTU, NMEA-2000, NMEA-0183, Parallel Bus, PMBus, PS/2, PSI5 (Sensor), Quadrature, RS232 / UART, SBS Data, SENT Fast, SENT SLOW, SENT SPC, SMBus, SPI-MISO/MOSI, SPI-SDIO, USB (1.0/1.1), Wind Sensor.

Display	
Display modes	Scope, XY scope, persistence, spectrum
Interpolation	Linear or sin(x)/x
Persistence modes	Time, frequency, fast
Output file formats	csv, mat, pdf, png, psdata, pssettings, txt
Output functions	Copy to clipboard, print

Data transfer		PicoScope 5000E Series	PicoScope 5000E+ Series
Captured waveform data transfer rate to PC (USB 5Gbps, PC dependent)	**16-bit mode**	Up to 180 MS/s	Up to 180 MS/s
	8-bit mode	N/A	Up to 360 MS/s
Hardware accelerated waveform display rate	**16-bit mode**	Hardware acceleration enables over 1 GS of data to be displayed on screen per second, 4 channels, 125 MS per channel at max sample rate.	Hardware acceleration enables over 1 GS of data to be displayed on screen per second, 4 channels, 125 MS per channel at max sample rate.
	8-bit mode	N/A	Hardware acceleration enables over 2 GS of data to be displayed on screen per second, 4 channels, 250 MS per channel at max sample rate.

General specifications		
PC connectivity		USB 5 Gbps
PC connector type		USB Type-C, USB 5 Gbps (recommended) or Hi-Speed (compatible)
Power requirement		Powered from single USB Type-C 3 A port or from USB port plus external Type-C PSU (5 V, 3 A)
Status indicators		RGB LED per BNC connector plus power and status
Thermal management		Automatic fan speed control for low noise
Dimensions		221 x 173 x 30 mm
Weight		< 0.7 kg
Ambient temperature range	**Operating**	0 to 40 °C
	For quoted accuracy	15 to 30 °C after 20-minute warm-up
	Storage	–20 to +60 °C
Humidity range	**Operating**	5 to 80 %RH non-condensing
	Storage	5 to 95 %RH non-condensing
Altitude		Up to 2000 m
Pollution degree		EN 61010 pollution degree 2: "only nonconductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected"
Safety compliance		Designed to EN 61010-1
EMC compliance		Tested to EN 61326-1 and FCC Part 15 Subpart B
Environmental compliance		RoHS, REACH & WEEE
Warranty		5 years

Software		
Windows software: Intel/AMD (x64), Arm64[7]		PicoScope 7, PicoLog 6, PicoSDK
macOS software: Intel (x64), Apple Silicon (Arm64)[7]		PicoScope 7, PicoLog 6, PicoSDK
Linux software (including Raspberry Pi and SBCs): Intel/AMD (x64), Arm64[7] [8]		PicoScope 7 software and drivers, PicoLog 6 (including drivers) See Linux Software and Drivers to install drivers only
[7] See picotech.com/downloads for more information. Users writing their own apps can find example programs for all platforms on the Pico Technology organization page on GitHub. [8] For Raspberry Pi, 64-bit (Arm64) OS is required for the latest PicoScope and PicoLog software and PicoSDK features.		
Languages supported	**PicoScope 7**	English-US, English-UK, Bulgarian, Czech, Danish, German, Greek, Spanish, French, Korean, Croatian, Italian, Hungarian, Netherlands Dutch, Japanese, Norwegian, Polish, Portuguese-Brazil, Portuguese, Romanian, Russian, Slovene, Serbian, Finnish, Swedish, Turkish, Simplified Chinese, Traditional Chinese
	PicoLog 6	Simplified Chinese, Dutch, English (UK), English (US), French, German, Italian, Japanese, Korean, Russian, Spanish
PC requirements		Processor, memory and disk space: as required by the operating system Ports: USB 5Gbps (recommended) or 2.0 (compatible)

PicoScope 5000E Series oscilloscope kit contents:

- PicoScope 5000E Series oscilloscope
- TA532 USB-C to USB-C cable, 1.8 m
- TA534 USB-A to USB-C cable, 0.9 m
- TA136 MSO cable and 2 x TA139 set of MSO clips (MSO models only)
- PS017 USB-C power supply, with UK, EU, US and AUS plugtops
- Probe-to-BNC adaptor (TA537 5 mm adaptor included with 60, 100, 200 and 350 MHz oscilloscopes, or a TA563 3.5 mm adaptor included with the 500 MHz oscilloscope)
- User's Guide

OEM and non-standard product configurations may be available without probes or other items. Please see www.picotech.com/tech-support. Probe accessories may also vary by bandwidth.

PicoScope 5464E+ kit, with probes selected

PicoScope 5464E+ MSO kit, with probes selected

Probes (if selected when ordering)

You will receive four probes for the scope model you choose:

5 mm probes:

- TA375, 100 MHz, 1:1/10:1 probe (for 5462E, 5462E MSO, 5463E, 5463E MSO)
- TA386, 200 MHz, 1:1/10:1 probe (for 5462E+, 5462E+ MSO, 5464E, 5464E MSO)
- TA536, 350 MHz, 1:1/10:1 probe (for 5463E+ and 5463E+ MSO)

3.5 mm probe:

- P1053, 500 MHz, 10:1 passive probe (for 5464E+ and 5464E+ MSO)

PicoScope 5462E, 5463E, 5464E, 5462E+ and 5463E+ kits, with probes selected (Ground spring included with the 5463E+ only)

PicoScope 5462E, 5463E, 5464E, 5462E+ and 5463E+ MSO kits, with probes selected (Ground spring included with the 5463E+ MSO only)

PicoScope 5000E Series kit ordering information:

Order code	Description	Bandwidth		Channels		Resolution	Memory	
		16-bit mode	8-bit mode	Analog	Digital		16-bit mode	8-bit mode
PQ392	PicoScope 5462E kit	60 MHz	N/A	4	N/A	16-bit	1 GS	N/A
PQ394	PicoScope 5462E MSO kit				16			
PQ396	PicoScope 5463E kit	100 MHz			N/A			
PQ398	PicoScope 5463E MSO kit				16			
PQ400	PicoScope 5464E kit	200 MHz			N/A			
PQ402	PicoScope 5464E MSO kit				16			
PQ413	PicoScope 5462E+ kit	60 MHz	200 MHz	4	N/A	8 and 16-bit	1 GS	2 GS
PQ415	PicoScope 5462E+ MSO kit				16			
PQ417	PicoScope 5463E+ kit	100 MHz	350 MHz		N/A			
PQ419	PicoScope 5463E+ MSO kit				16			
PQ421	PicoScope 5464E+ kit	200 MHz	500 MHz		N/A			
PQ423	PicoScope 5464E+ MSO kit				16			

Optional compatible accessories and replacement items:

Oscilloscope probes	
TA375	5 mm passive oscilloscope probe: 100 MHz bandwidth 1:1/10:1 switchable, BNC
TA386	5 mm passive oscilloscope probe: 200 MHz bandwidth 1:1/10:1 switchable, BNC
TA536	5 mm passive oscilloscope probe: 350 MHz bandwidth 1:1/10:1 switchable, BNC
TA561	3.5 mm passive oscilloscope probe: 500 MHz 10:1, BNC, single pack
TA562	3.5 mm passive oscilloscope probe: 500 MHz 10:1, BNC, dual pack
Cables	
TA532	USB Type-C to USB Type-C cable, 1.8 m
TA534	USB Type-A to USB Type-C cable, 0.9 m
MSO accessories	
TA136	20-way digital input cable for MSOs
TA139	Logic test clips, pack of 12
Adaptor	
TA537	5 mm oscilloscope probe BNC adaptor
TA563	3.5 mm oscilloscope probe BNC adaptor
Power supply	
PS017	5 V, 3 A, UK/EU/US/AUS, USB-C power supply
Calibration service	
CC017	Calibration certificate for PicoScope 5000E Series oscilloscopes and MSOs

Total cost of ownership (TCO), environmental benefits and portability

Total cost of ownership of a PicoScope 5000E Series oscilloscope is lower than traditional benchtop instruments for several reasons:

- Everything is included in the purchase price from serial protocol decoders to math channels and mask limit testing. No expensive optional upgrades or annual license fees.
- Free updates: new features and capabilities are provided throughout the lifetime of the product as we develop and release them.
- The PicoScope 5000E oscilloscopes are highly portable and are very suited to home-working where desk space might be limited.
- Low power consumption — less than 15 W — saves money and is kinder to the environment.
- 5-year warranty.

Explore more from Pico Technology

PicoScope 9400A SXRTO
Sampler-extended real-time oscilloscopes 6 to 33 GHz

PicoLog TC-08 temperature data logger
8-channel, 20-bit resolution, measures from −270 °C to +1820 °C

PicoVNA
Low-cost, professional-grade 6 GHz and 8.5 GHz vector network analyzers for both lab and field use

PicoScope 6000 Series
Up to 8 channels, ultra-deep 4 GS memory buffer, gigabit MSO channels

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