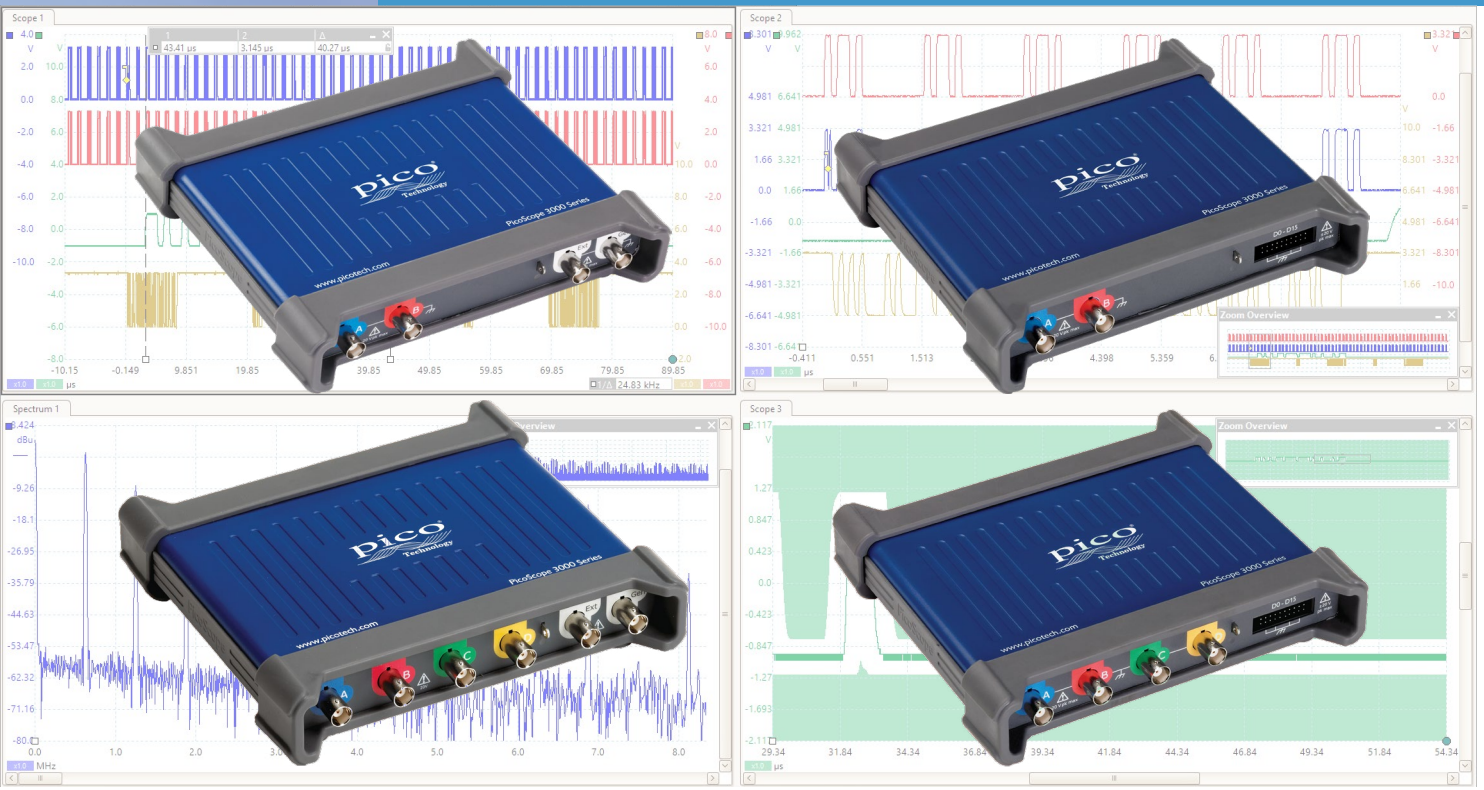
PicoScope® 3000 Series

PC oscilloscopes and MSOs



Power, portability and performance

2 or 4 analog channels
MSO models with 16 digital channels
Up to 200 MHz analog bandwidth
Up to 512 MS capture memory
1 GS/s real-time sampling
100 000 waveforms per second
Built-in arbitrary waveform generator
USB 3.0 connected and powered

Automatic measurements • Mask limit testing
Advanced triggers • Math channels
Spectrum analyzer • Serial decoding

Free technical support and updates
PicoScope, PicoLog and PicoSDK software included
5-year warranty

www.picotech.com

Introduction

The PicoScope 3000 Series PC oscilloscopes are small, light and portable, while offering the high-performance specifications required by engineers in the lab or on the move.

These oscilloscopes offer 2 or 4 analog channels, plus an additional 16 digital channels on the mixed-signal (MSO) models. The flexible, high-quality display options enable you to view and analyze each signal in fine detail. All models come with a built-in function generator and arbitrary waveform generator (AWG).

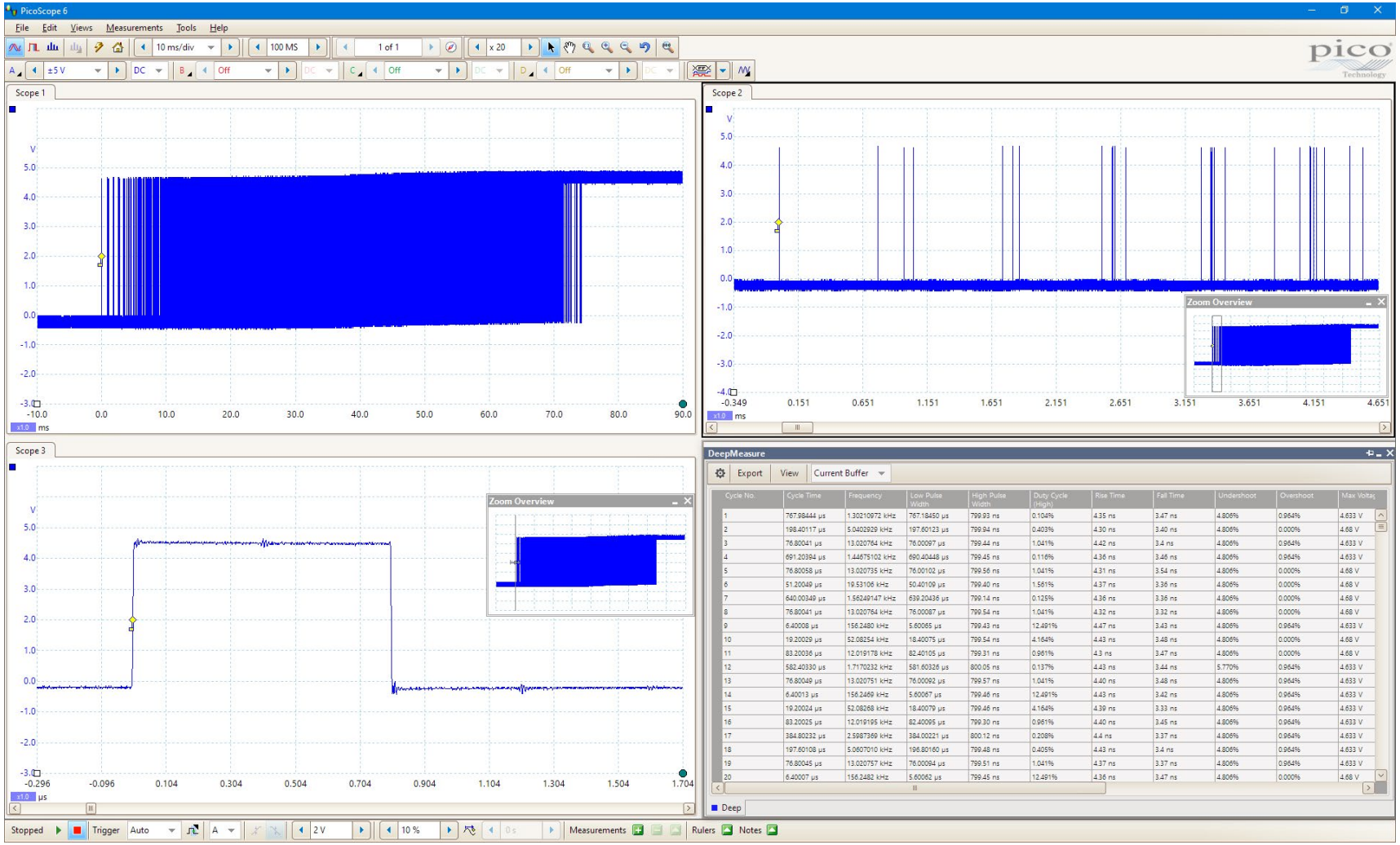
Operating together with the PicoScope 6 software, these devices offer an ideal, cost-effective package for many applications, including embedded systems design, research, test, education, service, and repair.

High bandwidth, high sampling rate, deep memory

Despite their compact size and low cost, there is no compromise on performance, with input bandwidths up to 200 MHz. This bandwidth is matched by a real-time sampling rate of up to 1 GS/s, enabling detailed display of high frequencies. For repetitive signals, the maximum effective sampling rate can be boosted to 10 GS/s using equivalent time sampling (ETS) mode. With a sampling rate of at least five times the input bandwidth, PicoScope 3000 Series oscilloscopes are well equipped to capture high-frequency signal detail.

Many other oscilloscopes have high maximum sampling rates, but without deep memory they cannot sustain these rates on long timebases. The PicoScope 3000 Series offers up to 512 million samples capture memory, enabling the PicoScope 3406D MSO to sample at 1 GS/s all the way down to 50 ms/div (500 ms total capture time).

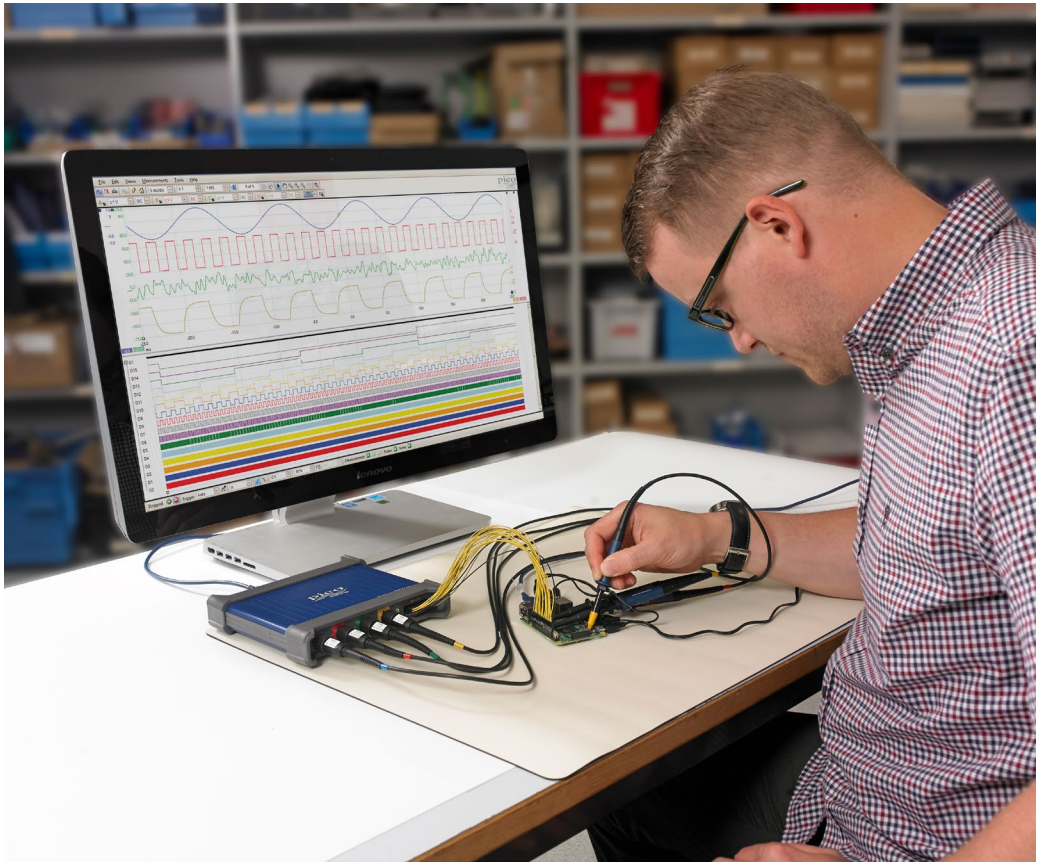
Managing all this data calls for some powerful tools. There's a set of zoom buttons, plus an overview window that lets you zoom and reposition the display by simply dragging with the mouse or touchscreen. Zoom factors of several million are possible. Other tools such as the waveform buffer navigator, mask limit testing, serial decoding, DeepMeasure and hardware acceleration work with the deep memory, making the PicoScope 3000 series some of the most capable oscilloscopes on the market.



Application examples

Testing on the move

The PicoScope 3000 Series oscilloscopes slip easily into a laptop bag, so you don't need to carry bulky benchtop instruments to perform on-site troubleshooting. Being powered via a USB connection, you can simply plug your PicoScope into your laptop and use it for measuring wherever you are. The PC connection also makes saving and sharing your data quick and easy: in a matter of seconds you can save your scope traces to review later, or attach the complete data file to an email for analysis by other engineers away from the test site. As PicoScope 6 is free to download by anyone, colleagues can use the full capabilities of the software, such as serial decoding and spectrum analysis, without needing an oscilloscope themselves.



Embedded debugging

You can test and debug a complete signal-processing chain using a PicoScope 3406D MSO.

Use the built-in arbitrary waveform generator (AWG) to inject single-shot or continuous analog signals. The response of your system can then be observed in both the analog domain, using the four 200 MHz input channels, and in the digital domain with 16 digital inputs at up to 100 MHz. Follow the analog signal through the system while simultaneously using the built-in serial decoding function to view the output of an I^2C or SPI ADC.

If your system drives a DAC in response to the analog input changing, you can decode the I^2C or SPI communication to that as well as its analog output. This can all be performed simultaneously using the 16 digital and 4 analog channels.

Using the deep 512 MS capture memory, you can capture the complete response of your system without sacrificing the sampling rate, and zoom in on the captured data to find glitches and other points of interest.

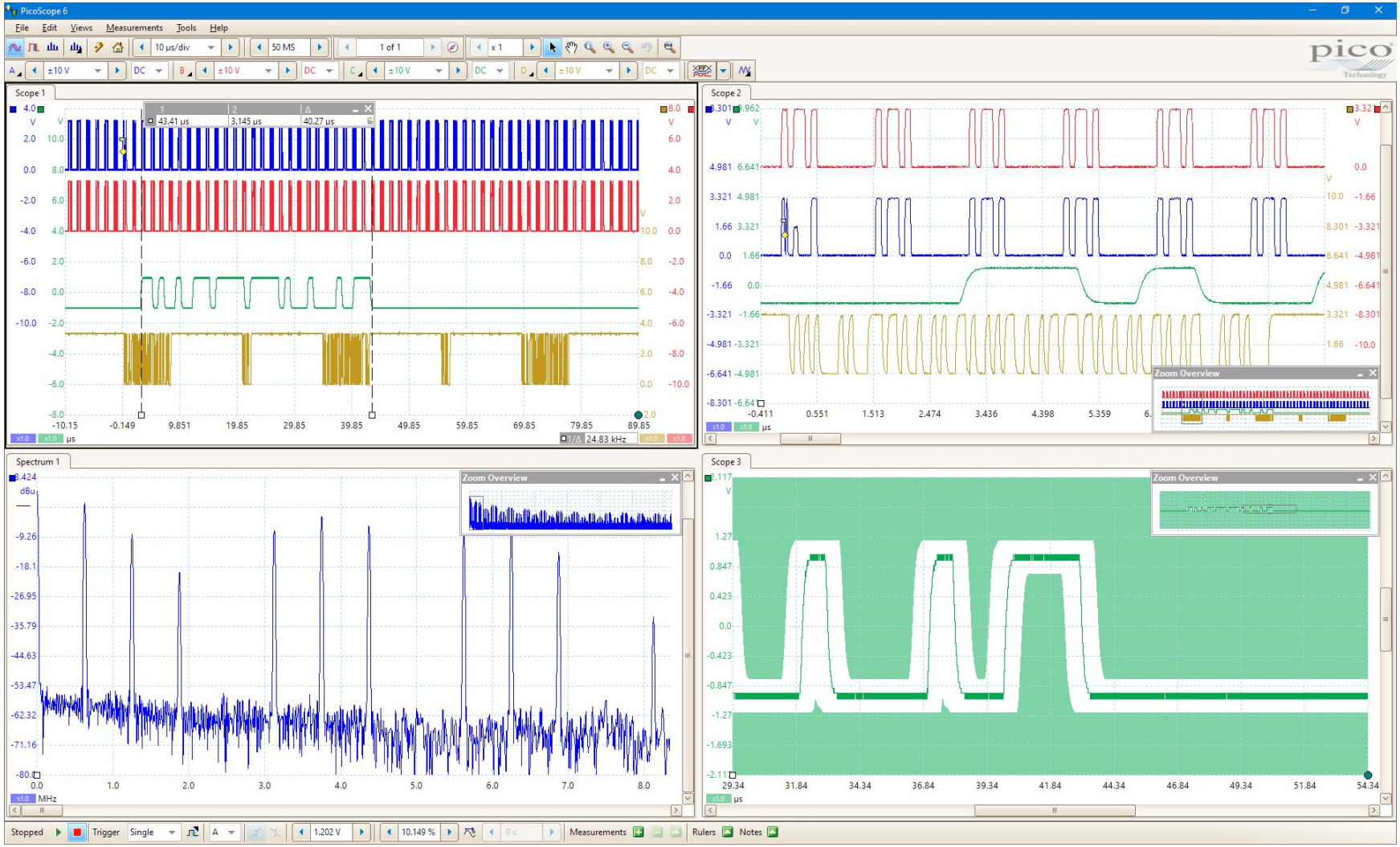
PicoScope features

Advanced display

PicoScope 6 software dedicates the majority of the display area to the waveform, ensuring that the maximum amount of data is visible at all times. The size of the display is only limited by the size of your computer's monitor, so even with a laptop, the viewing area is much bigger, with much higher resolution, than that of a benchtop scope.

With such a large display area available, you can create a customizable split-screen display and view multiple channels or different views of the same signal at the same time – the software can even show multiple oscilloscope and spectrum analyzer views at once. Each view has separate zoom, pan and filter settings for ultimate flexibility.

You can control the PicoScope 6 software using a mouse, touchscreen or customizable keyboard shortcuts.

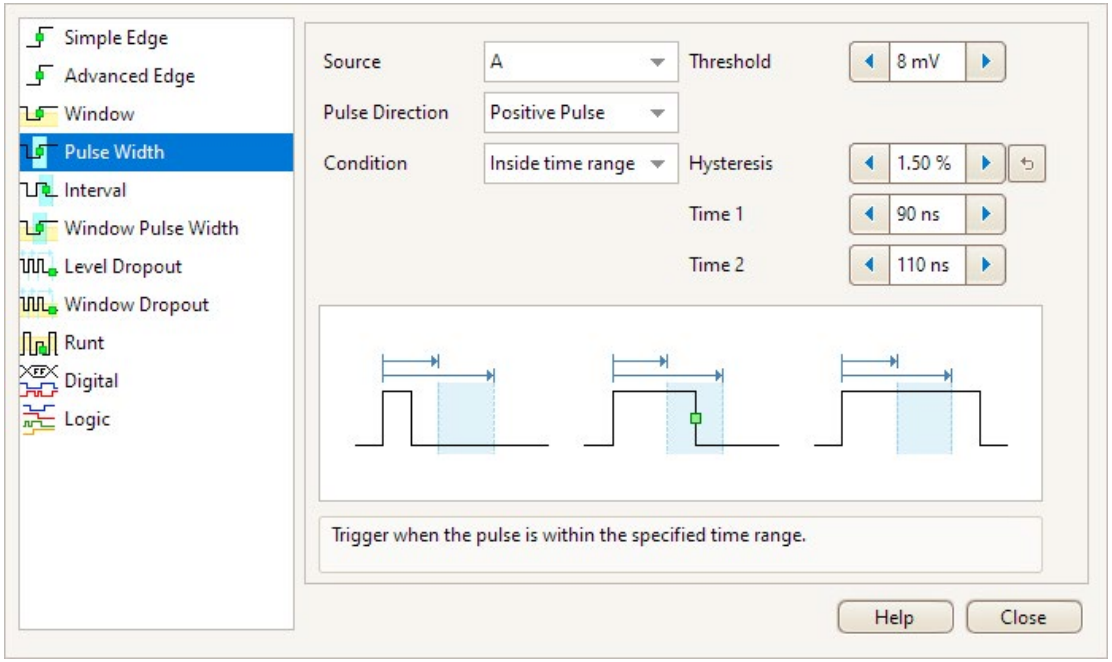


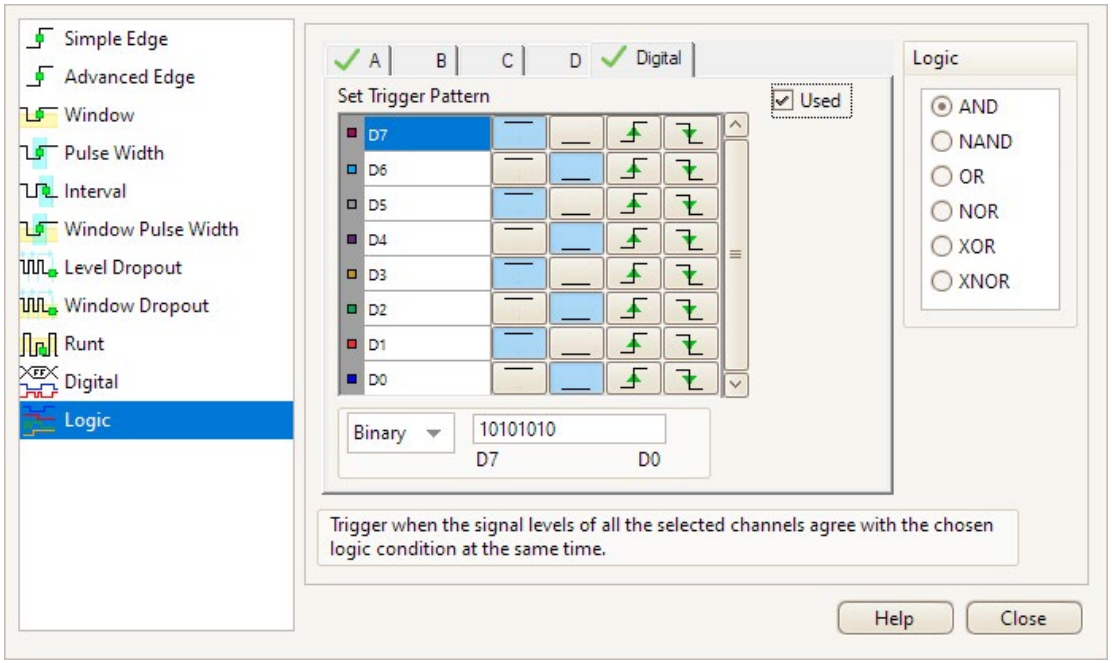
Digital triggering architecture

In 1991, Pico Technology pioneered the use of digital triggering using the actual digitized data. Traditionally, digital oscilloscopes have used an analog trigger architecture based on comparators, which can cause time and amplitude errors that cannot always be calibrated out. Additionally, the use of comparators can often limit the trigger sensitivity at high bandwidths and can create a long trigger rearm delay.

Pico's technique of fully digital triggering reduces trigger errors and allows our oscilloscopes to trigger on the smallest signals, even at the full bandwidth, so you can set trigger levels and hysteresis with high precision and resolution.

The digital triggering architecture also reduces the rearm delay. Combined with the segmented memory, this enables you to use rapid triggering to capture 10 000 waveforms in 6 ms.





Advanced triggers

The PicoScope 3000 Series offers an industry-leading set of advanced triggers including pulse width, windowed and dropout.

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.

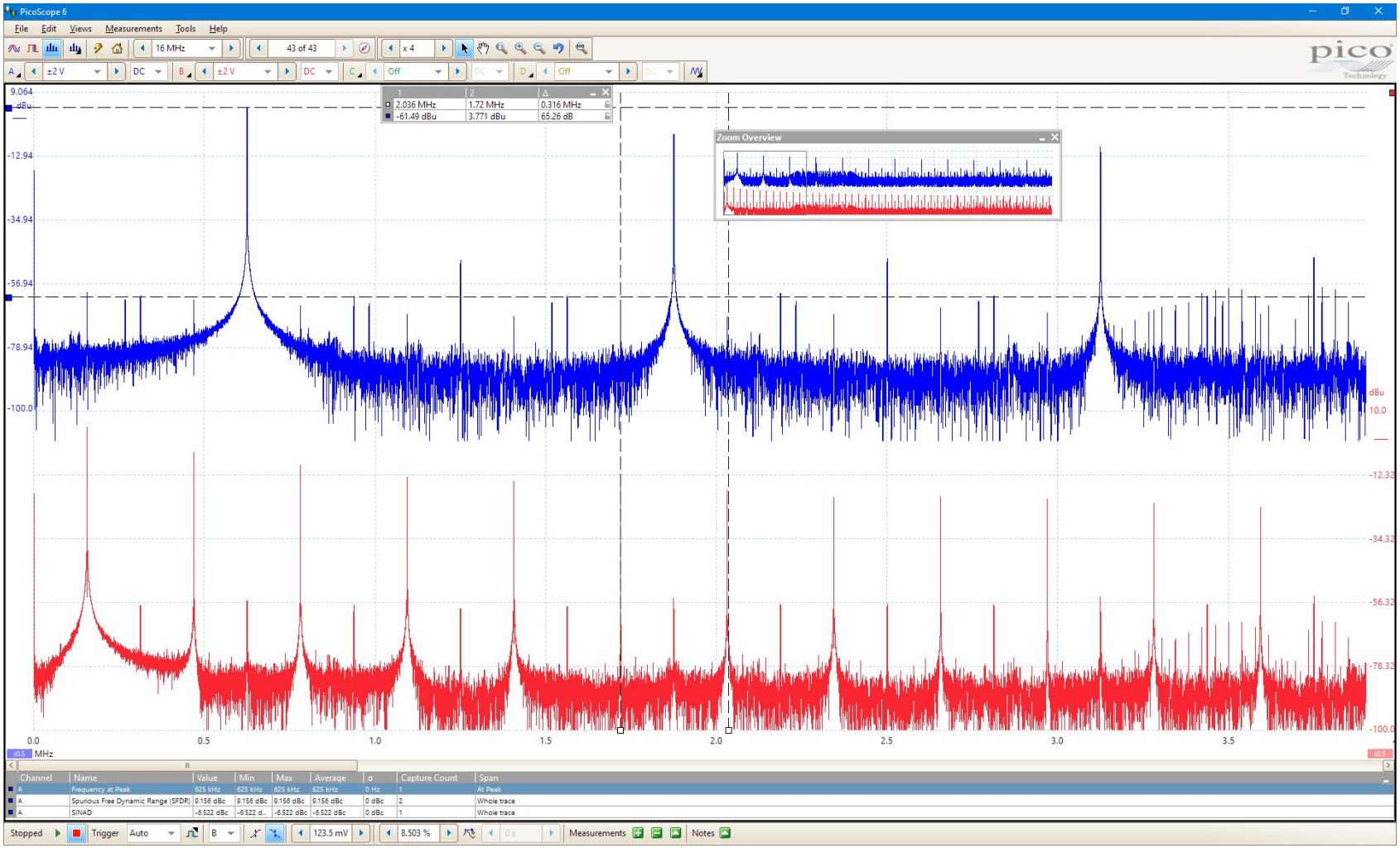
You can also use the logic trigger to combine the digital trigger with an edge or window trigger on any of the analog inputs, for example to trigger on data values in a clocked parallel bus.

Spectrum analyzer

The spectrum view plots amplitude against frequency and is ideal for finding noise, crosstalk or distortion in signals. PicoScope uses a fast Fourier transform (FFT) spectrum analyzer, 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.

With a click of a button, you can display a spectrum plot of the active channels, with a maximum frequency of up to 200 MHz. A comprehensive range of settings gives you control over the number of spectrum bins, window functions, scaling (including log/log) and display mode (instantaneous, average or peak-hold).

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. You can apply mask limit testing to a spectrum and can even use the AWG and spectrum mode together to perform swept scalar network analysis.



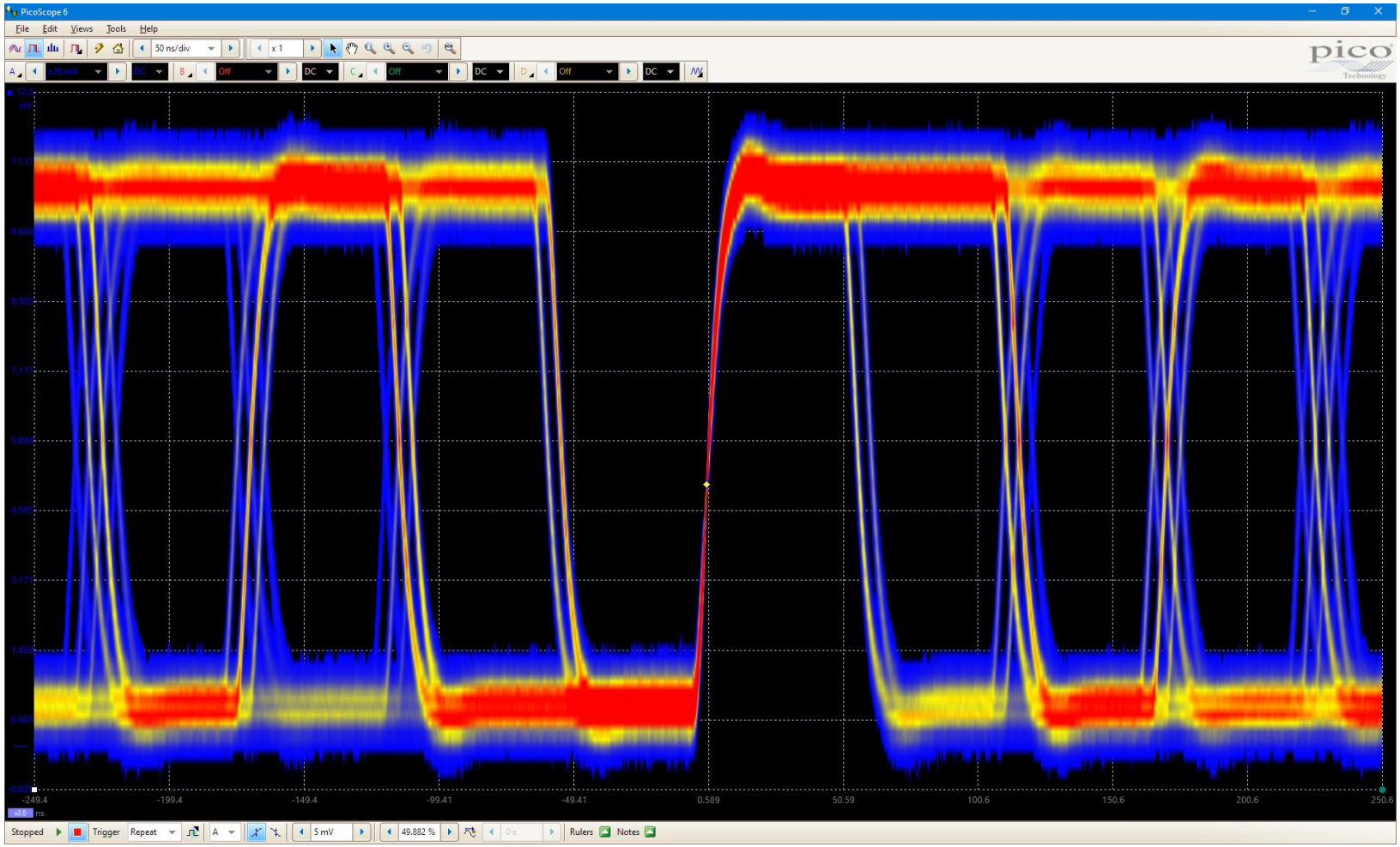
Persistence mode

PicoScope's persistence mode options allow you to see old and new data superimposed, making it easy to spot glitches and dropouts and 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 show which areas are stable and which are intermittent. Choose between **Analog Intensity**, **Digital Color** and **Fast** display modes or create your own custom setup.

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 capture rate refers to how quickly an oscilloscope acquires waveforms.

Oscilloscopes with high waveform capture 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 – that you may not even know exist.

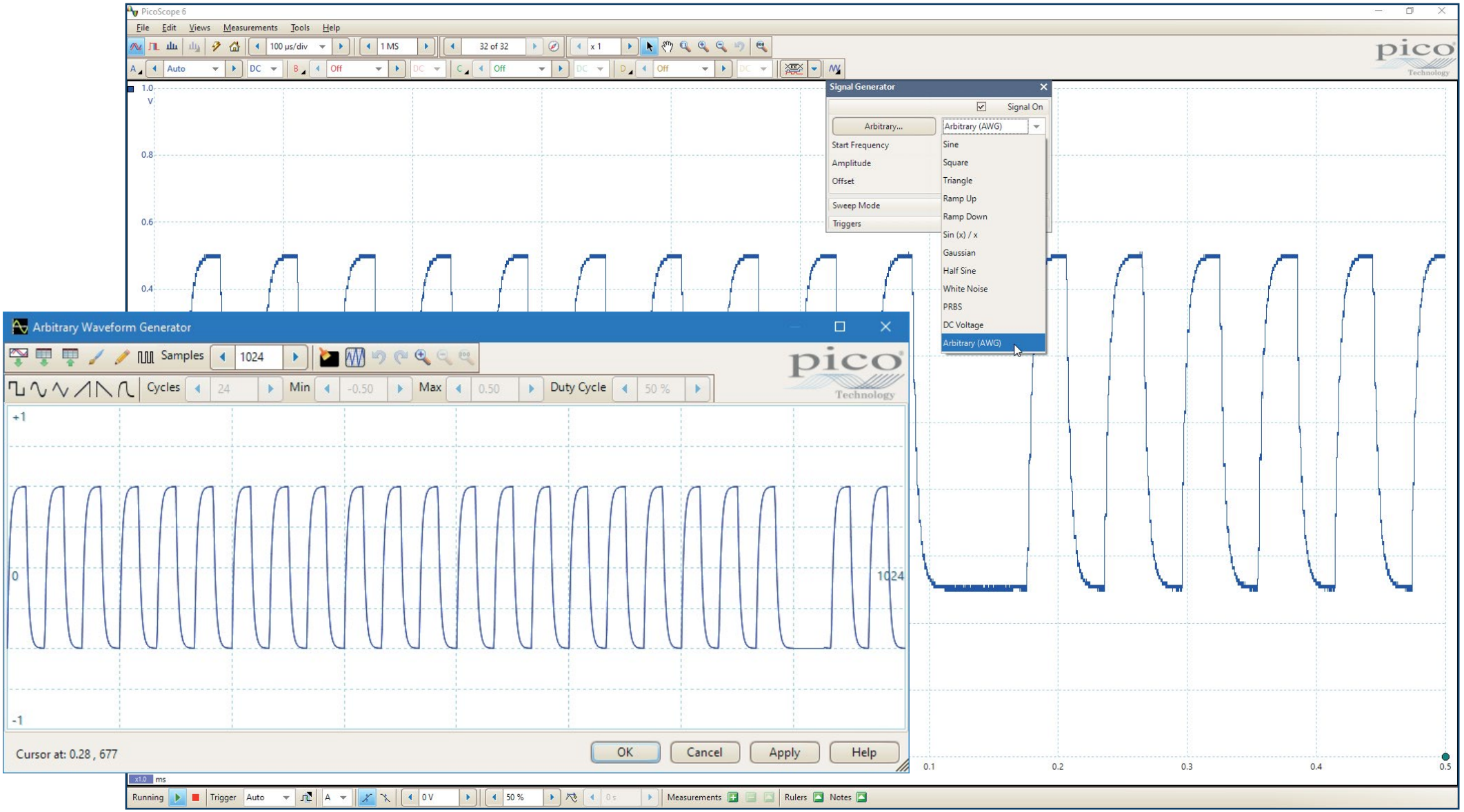
The PicoScope 3000 Series' HAL3 hardware acceleration means that, in fast persistence mode, update rates of up to 100 000 waveforms per second are achievable.



Arbitrary waveform and function generator

All PicoScope 3000 Series oscilloscopes have a built-in function generator and arbitrary waveform generator (AWG). The function generator can produce sine, square, triangle and DC level waveforms, and many more besides, while the AWG allows you to import waveforms from data files or create and modify them using the built-in graphical AWG editor.

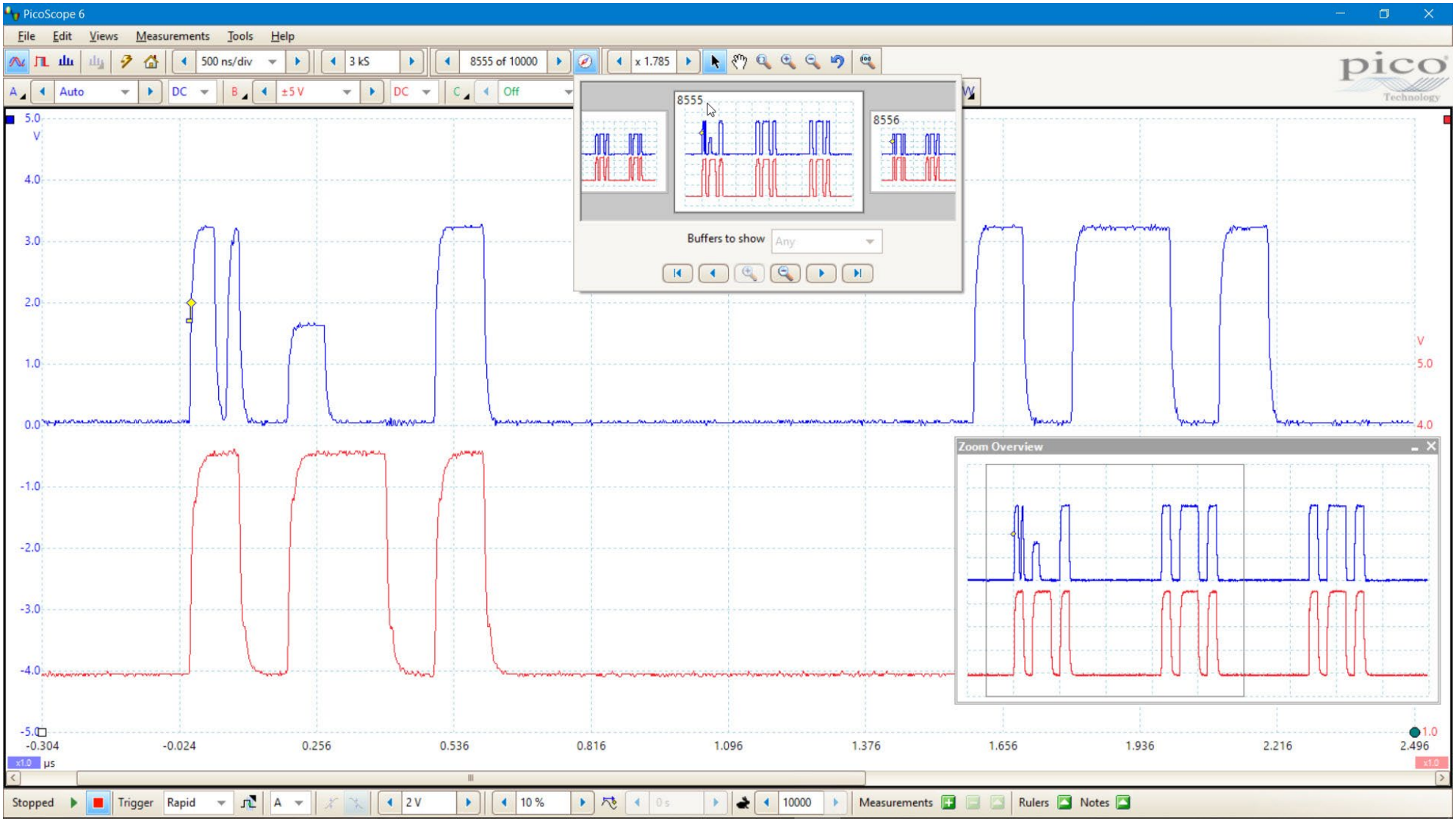
As well as level, offset and frequency controls, advanced options allow you to sweep over a range of frequencies. Combined with the advanced spectrum mode, with options including peak hold, averaging and linear/log axes, this creates a powerful tool for testing amplifier and filter responses.



HAL3 hardware acceleration

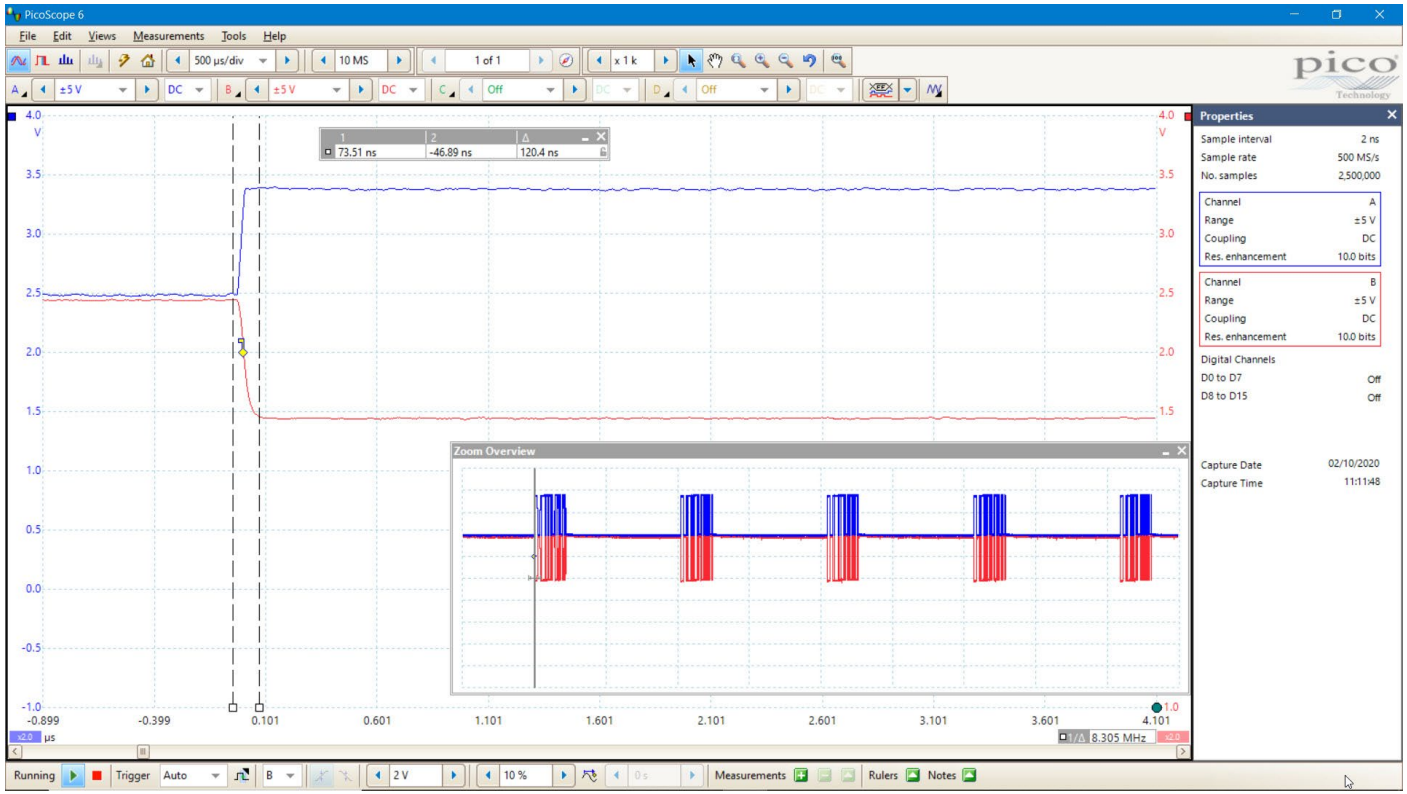
Many oscilloscopes struggle when deep memory is enabled: the screen update rate slows and the controls can become unresponsive. The PicoScope 3000 Series oscilloscopes avoid this limitation with the use of a dedicated hardware acceleration engine. This parallel design effectively creates the waveform image to be displayed on the PC screen and allows the continuous capture and display of over 440 000 000 samples every second.

For example, the PicoScope 3206D can sample at 1 GS/s on timebases as long as 20 ms/div, capturing 200 million samples per waveform, and still update the screen several times per second. That's around 500 million sample points each second! The hardware acceleration engine eliminates any concerns about the USB connection or PC processor being a bottleneck.



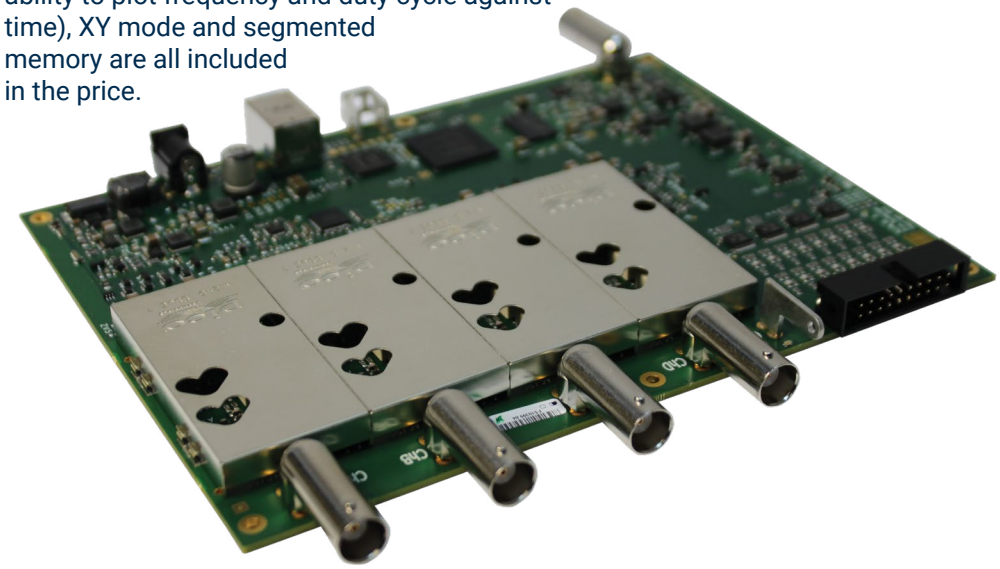
High signal integrity

Careful front-end design and shielding reduce noise, crosstalk and harmonic distortion, meaning we are proud to publish the specifications of our scopes in detail. Decades of oscilloscope design experience can be seen in improved pulse response and bandwidth flatness, and low distortion. PicoScope 3000 Series oscilloscopes feature 10 input ranges from ±20 mV to ±20 V full scale and a typical dynamic performance of up to 52 dB SFDR. The result is simple: when you probe a circuit, you can trust in the waveform you see on the screen.



High-end features as standard

Buying a PicoScope is not like making a purchase from other oscilloscope companies, where increased functionality can considerably raise the price. PicoScopes are all-inclusive instruments, with no need for expensive upgrades to unlock the hardware. Other advanced features such as resolution enhancement, mask limit testing, serial decoding, advanced triggering, automatic measurements, math channels (including the ability to plot frequency and duty cycle against time), XY mode and segmented memory are all included in the price.



SuperSpeed USB 3.0 connection

PicoScope 3000 Series oscilloscopes feature a USB 3.0 connection, providing lightning-fast saving of waveforms while retaining compatibility with older USB standards.

PicoSDK® supports continuous streaming to the host computer at up to 125 MS/s.

The USB connection not only allows high-speed data acquisition and transfer, but also makes printing, copying, saving and emailing your data from the field quick and easy.

PicoScope software

The PicoScope software display can be as basic or as detailed as you need. Begin with a single view of one channel, and then expand the display to include up to four live analog and 16 digital channels (model-dependent), plus math channels and reference waveforms. Display multiple scope and spectrum views with automatic or custom layouts and quickly access all the most frequently-used controls from the toolbars, leaving the display clear for your waveforms.

Tools menu
Home to our award-winning DeepMeasure feature, along with custom probes, serial decoding, reference waveforms, mask limit testing, alarms and macros.

Touchscreen controls:
Handy buttons make fine adjustments easy on touchscreen devices.

Trigger marker:
Drag the marker to adjust the trigger threshold and pre-trigger time.

Buffer Navigation toolbar:
PicoScope can record up to 10 000 of your most recent waveforms. Click through the buffer to look for intermittent events, or use the Buffer Overview thumbnails.

Zooming and Scrolling toolbar:
PicoScope makes it easy to zoom in on waveforms, with straightforward zoom-in, zoom-out and pan tools.

Auto Setup button:
Let PicoScope configure the collection time and input range for a correctly scaled display.

Signal generator:
Generates standard signals or arbitrary waveforms. Includes frequency sweep mode.

Channel options:
Adjust settings specific to each channel here.

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

Adjustable axes:
Move the vertical axes up and down the display and vary their scale and offset. PicoScope can also rearrange the axes automatically.

Rulers:
Each axis has two rulers that you can drag across the screen to make quick measurements.

Views:
Add new scope and spectrum views with automatic or custom layouts.

Trigger toolbar:
Quick access to the main controls, with advanced triggers in a pop-up window.

Automatic measurements:
Add as many calculated time- and frequency-domain measurements as you need, along with statistical parameters showing their variability.

Spectrum view:
View frequency-domain data alongside time-domain waveforms or in the dedicated spectrum mode.

Zoom Overview window:
Click and drag for quick navigation and adjustment of zoomed views.

Mixed signal models

The PicoScope 3000 MSO models add 16 digital channels to the two or four analog channels, enabling you to accurately time-correlate analog and digital channels. Digital channels may be grouped and displayed as a bus, with each bus value displayed in hex, binary or 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 all at the same time.

Oscilloscope controls:
PicoScope's full analog-domain controls, including zoom, filtering, and function generator, are all available in MSO digital signal mode.

Analog waveforms:
View analog waveforms time-correlated with digital inputs.

Split-screen display:
PicoScope can display both analog and digital signals at the same time. The split-screen display can be adjusted to give more or less space to the analog waveforms.

Digital channels button:
Set up and display digital inputs. View analog and digital signals on the same timebase.

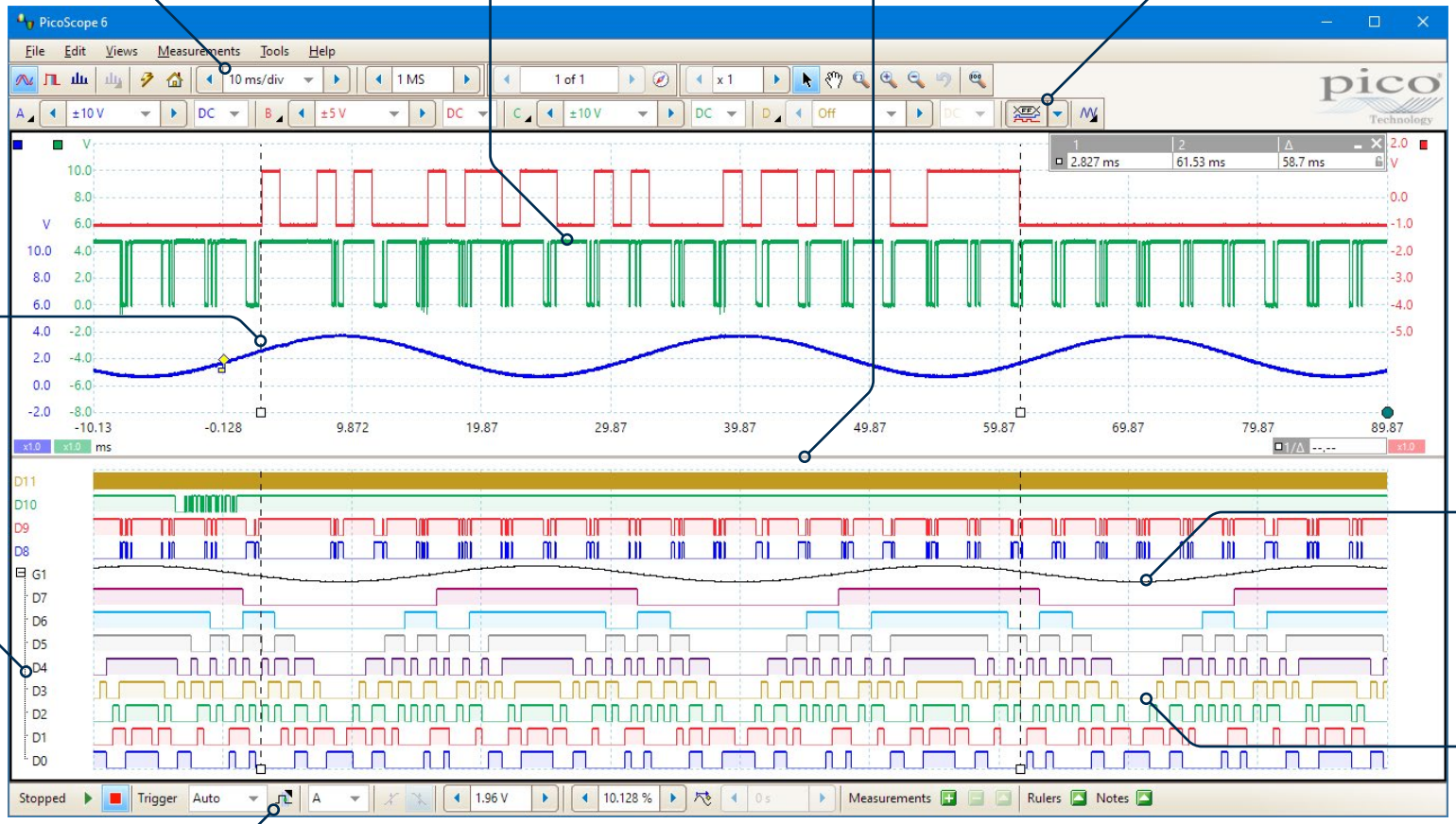
Rulers:
Drawn across both analog and digital panes so signal timings can be compared.

Rename:
The digital channels and groups can be renamed. You can expand or collapse groups in the digital view.

Advanced triggers:
Additional Digital and Logic trigger options are available for digital channels.

Show by level:
Group bits into fields and then display as an analog level.

Display format:
Display selected bits individually or as groups in binary, hex or decimal format.



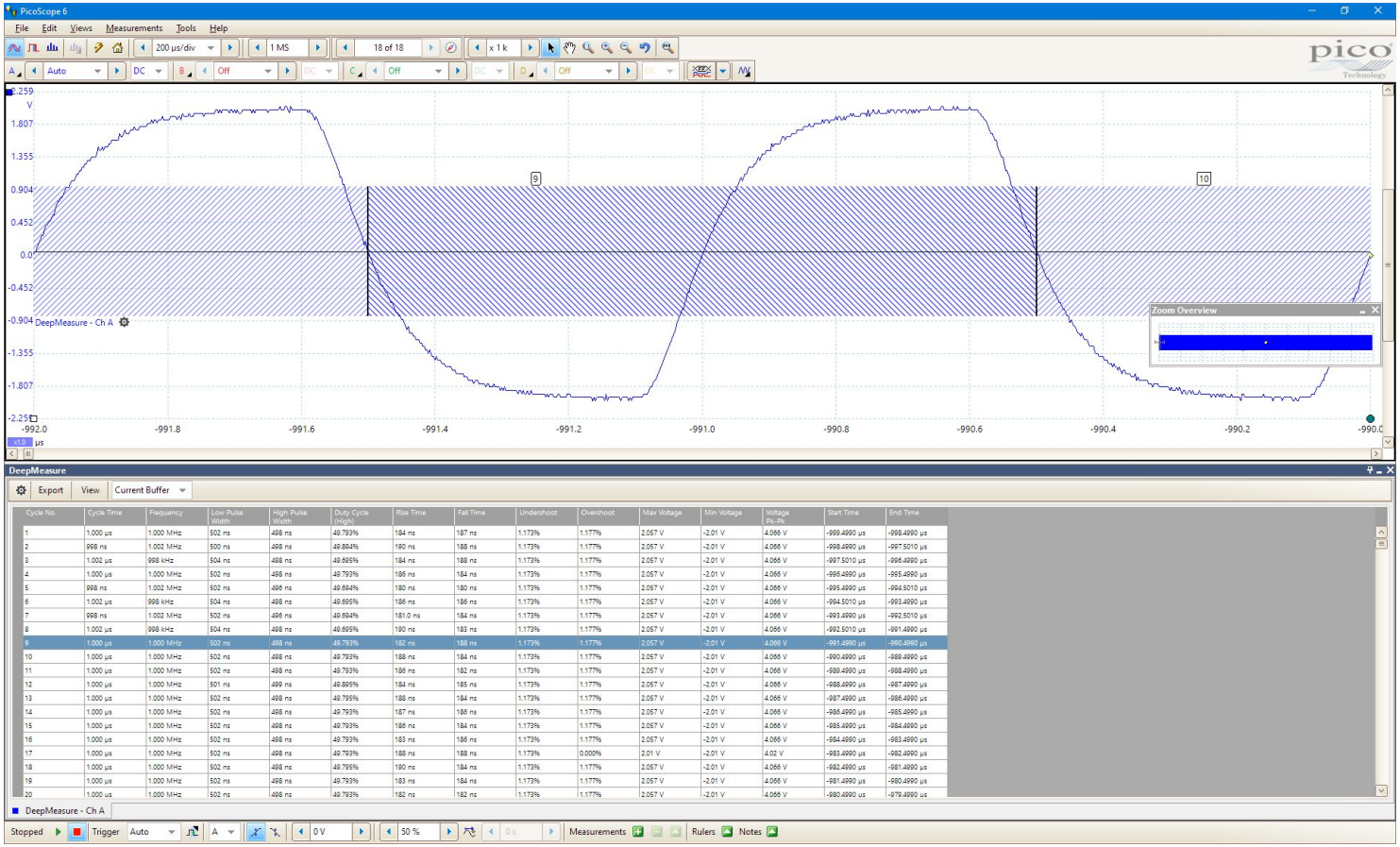
DeepMeasure™

One waveform, millions of measurements

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 waveform cycles can be displayed with each triggered acquisition. Results can be easily sorted, analyzed and correlated with the waveform display, or exported as a CSV file or spreadsheet for further analysis.

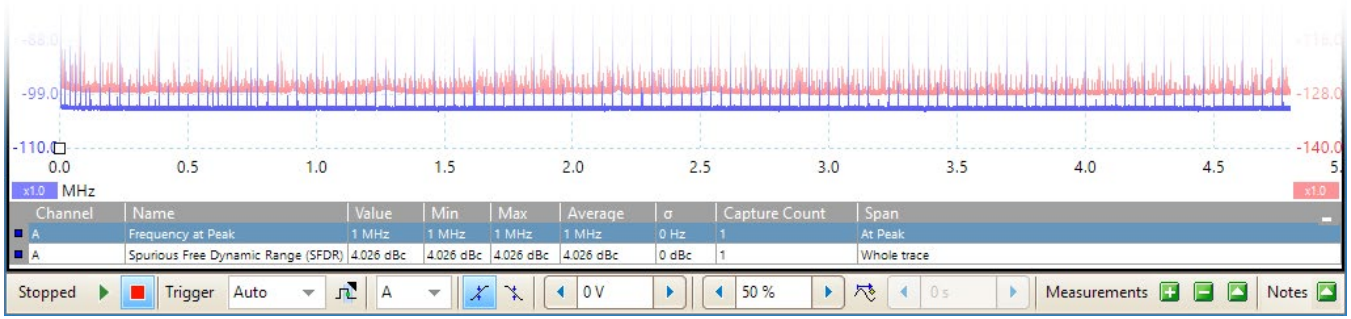
For example, use DeepMeasure with PicoScope's rapid trigger mode to capture 10 000 pulses and quickly find those with the largest or smallest amplitude, or use your scope's deep memory to record a million cycles of one waveform and export the rise time of every single edge for statistical analysis.



Automatic measurements

PicoScope allows you to display a table of calculated measurements for troubleshooting and analysis. Using the built-in measurement statistics you can see the average, standard deviation, maximum and minimum of each measurement as well as the live value.

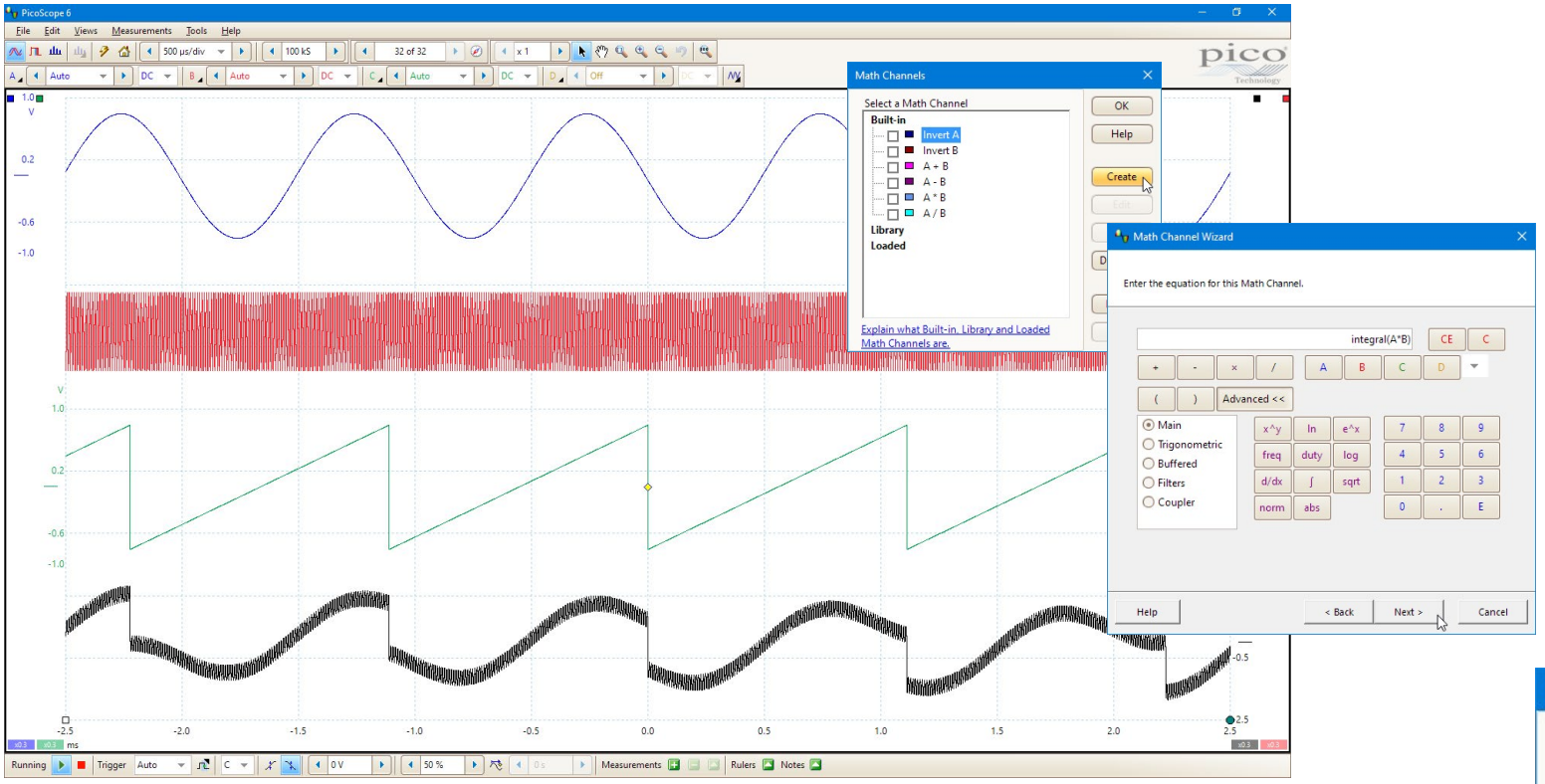
You can add as many measurements as you need on each view – 19 different measurements are available in scope mode and 11 in spectrum mode. For information on these measurements, see Automatic measurements in the Specifications table.



Math channels and filters

With PicoScope 6 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.

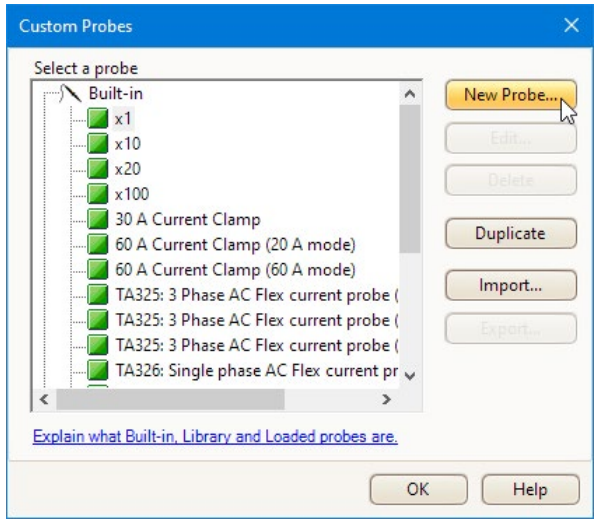
Display up to eight real or calculated channels in each scope view. If you run out of space, just open another scope view and add more. You can also use math channels to reveal new details in complex signals, for example graphing the changing duty cycle or frequency of your signal over time.



Custom probes

The custom probes feature allows you to correct for gain, attenuation, offsets and nonlinearities in probes, sensors or transducers that you connect to the oscilloscope. This could be used to scale the output of a current probe so that it correctly displays amperes. A more advanced use would be to scale the output of a nonlinear temperature sensor using the table lookup function.

Definitions for standard Pico-supplied oscilloscope probes and current clamps are included, but you can also create your own and save them for later use.



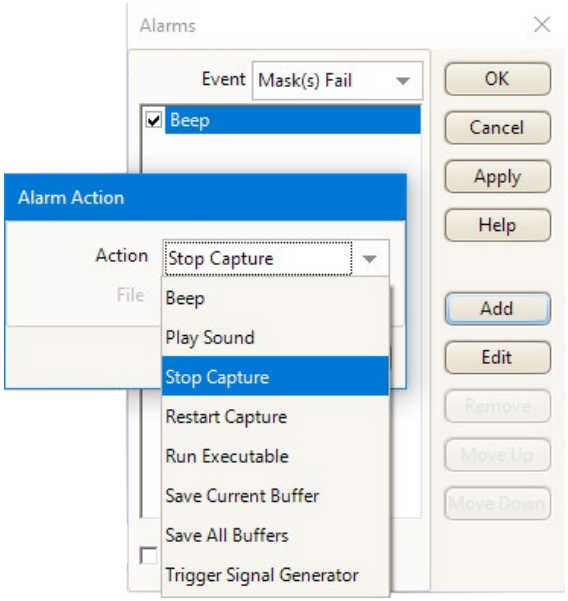
Mask limit testing

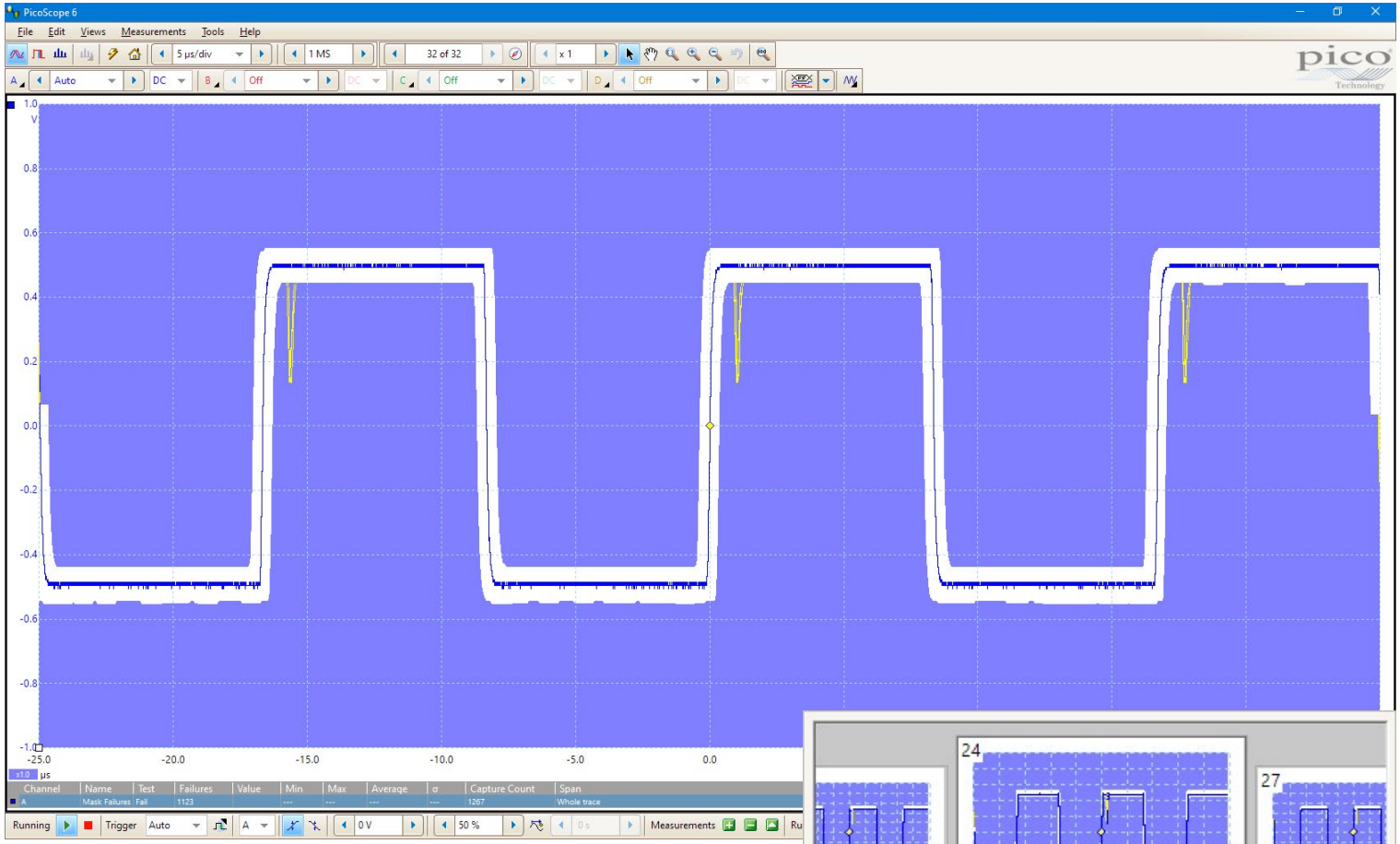
Mask limit testing allows you to compare live signals against known good signals, and is designed for production and debugging environments. Simply capture a known good signal, generate a mask around it and then measure the system under test. PicoScope will check for mask violations and perform pass/fail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

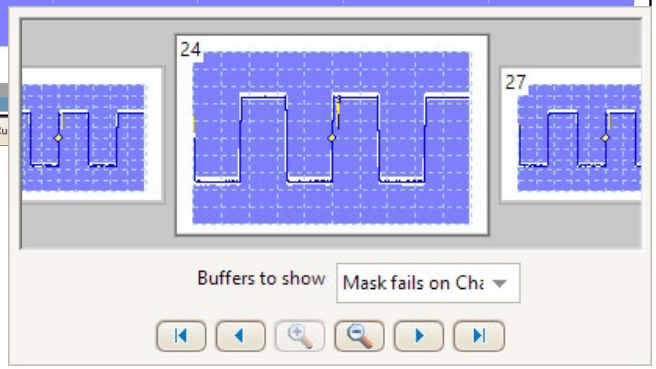
Alarms

You can program the PicoScope software to execute actions when certain events occur.

The events that can trigger an alarm include mask limit fails, trigger events and buffers full, and possible actions include saving a file, playing a sound, executing a program and triggering the arbitrary waveform generator.







Waveform buffer and navigator

Ever spotted a glitch on a waveform, but by the time you've stopped the scope it's gone? With PicoScope you don't need to worry about missing glitches or other transient events, as it can store the last 10 000 oscilloscope or spectrum waveforms in its circular waveform buffer.

The buffer navigator provides an efficient way of navigating and searching through waveforms, effectively letting you turn back time. When running a mask limit test, you can also set the navigator to show only mask fails, enabling you to find any glitches quickly.

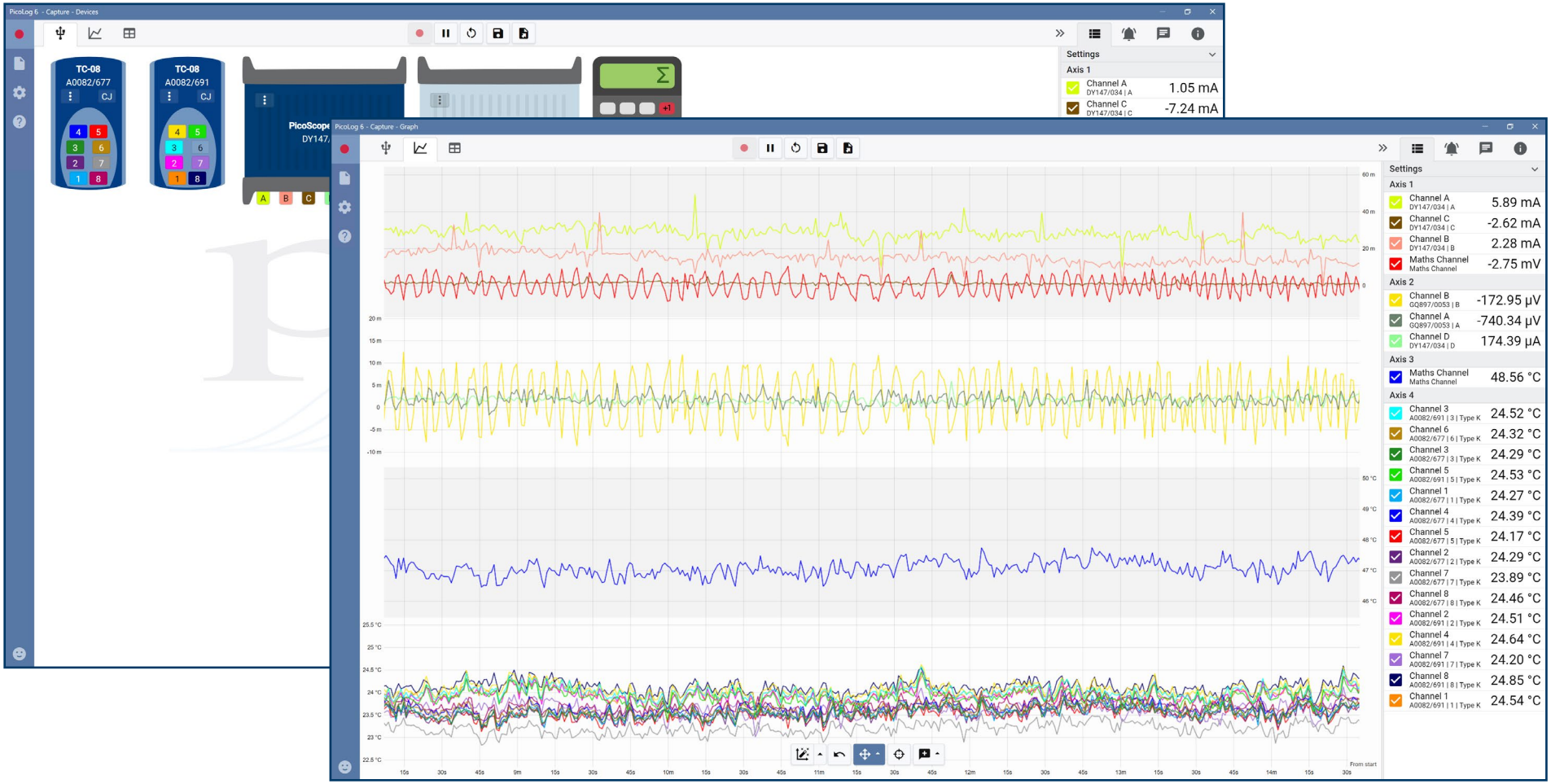
PicoLog® 6 software

PicoScope 3000 Series oscilloscopes are also 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 6 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, or humidity with a DrDAQ multipurpose data logger.

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

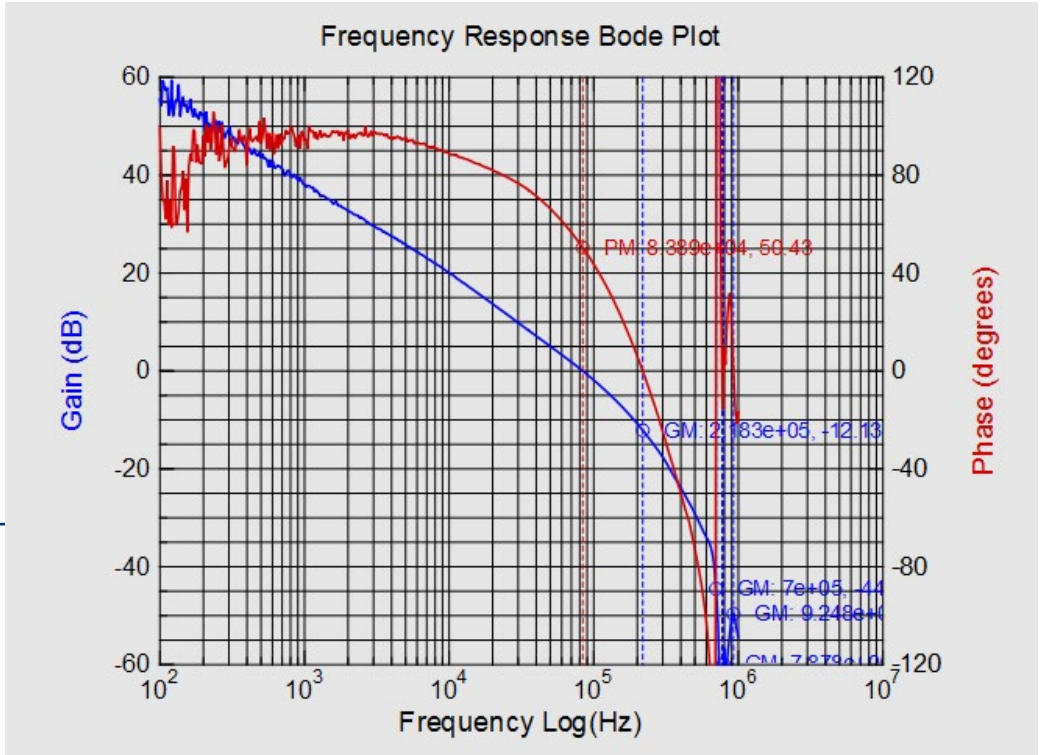


PicoSDK® – write your own apps

Our software development kit, PicoSDK, allows you to write your own software and includes drivers for Windows, macOS and Linux. Example code supplied on our GitHub organization page shows how to interface to third-party software packages such as NI LabVIEW and MathWorks MATLAB.

Amongst other features, the drivers support data streaming, a mode that captures continuous gap-free data directly to your PC at rates of up to 125 MS/s (when taking advantage of the PicoScope 3000 Series' USB 3.0 connection), so you are not limited by the size of your scope's capture memory. Sampling rates in streaming mode are subject to PC specifications and application loading.

There is also an active community of PicoScope 6 users who share both code and whole applications on our Test and Measurement Forum and the PicoApps section of the website. The Frequency Response Analyzer shown here is one of the most popular of these applications.




```
ScopeSettingsPropTree.clear();
    wstring appVersionStringW = wstring_convert<codecvt_utf8<wchar_t>>().from_bytes(appVersionString);
    ScopeSettingsPropTree.put( L"appVersion", appVersionStringW );
    ScopeSettingsPropTree.put( L"picoScope.inputChannel.name", L"A" );
    ScopeSettingsPropTree.put( L"picoScope.inputChannel.attenuation", ATTEN_1X );
    ScopeSettingsPropTree.put( L"picoScope.inputChannel.coupling",PS_AC );
    ScopeSettingsPropTree.put( L"picoScope.inputChannel.dcOffset", L"0.0" );
    ScopeSettingsPropTree.put( L"picoScope.inputChannel.startingRange", -1 ); // Base on stimulus
    ScopeSettingsPropTree.put( L"picoScope.outputChannel.name", L"B" );
    ScopeSettingsPropTree.put( L"picoScope.outputChannel.attenuation", ATTEN_1X );
    ScopeSettingsPropTree.put( L"picoScope.outputChannel.coupling", PS_AC );
    ScopeSettingsPropTree.put( L"picoScope.outputChannel.dcOffset", L"0.0" );
    ScopeSettingsPropTree.put( L"picoScope.outputChannel.startingRange", pScope->GetMinRange(PS_AC) );

    midSigGenVpp = floor((pScope->GetMinFuncGenVpp() + pScope->GetMaxFuncGenVpp()) / 2.0);

    stimulusVppSS << fixed << setprecision(1) << midSigGenVpp;
    maxStimulusVppSS << fixed << setprecision(1) << pScope->GetMaxFuncGenVpp();
    startFreqSS << fixed << setprecision(1) << (max(1.0, pScope->GetMinFuncGenFreq())); // Make frequency at least 1.0 since 0.0 (DC) makes no sense for FRA
    stopFreqSS << fixed << setprecision(1) << (pScope->GetMaxFuncGenFreq());
```


OEM and custom applications

Pico Technology has supplied products for use in custom test and monitoring solutions since 1991. Pico products have been used as core components in a broad range of demanding applications for clients including Kistler, Techimp and the GSI/FAIR particle accelerator facility in Darmstadt, Germany.

Our technical support team provides support and guidance for you to develop your custom test requirements, including software development using PicoSDK, and system integration.

Read more about custom and OEM applications, including examples and case studies, at picotech.com/library/oem-custom-applications.

Kit contents and accessories

Your PicoScope 3000 Series oscilloscope kit contains the following items:

- PicoScope 3000 Series oscilloscope
- Quick start guide
- USB 3.0 cable, 1.8 m
- AC power adaptor (4-channel models only)

Probes

Each oscilloscope comes with probes specifically trimmed to match its performance.

50, 70 and 100 MHz models: 2/4 x TA375 100 MHz probes

200 MHz models: 2/4 x TA386 200 MHz probes.

MSO kit contents

Mixed-signal models come with extra accessories:

- TA136 20-way digital input cable for MSOs
- 2 x TA139 pack of 12 logic test clips

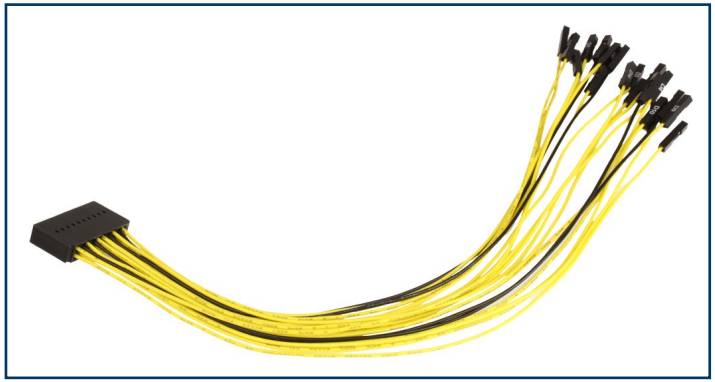
USB connectivity and power

All PicoScope 3000 Series oscilloscopes are supplied with a USB 3.0 cable for SuperSpeed connectivity.

For models with four analog channels, the supplied AC power adaptor may be required if the USB port provides less than 1200 mA to the instrument.

Oscilloscope probe

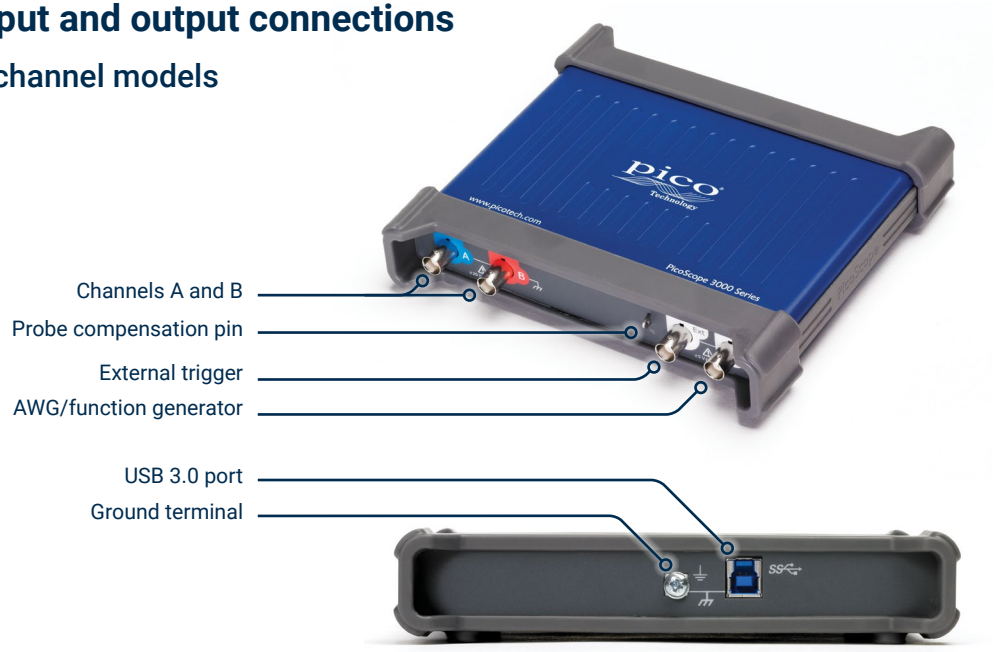
TA139 logic test clips, pack of 12



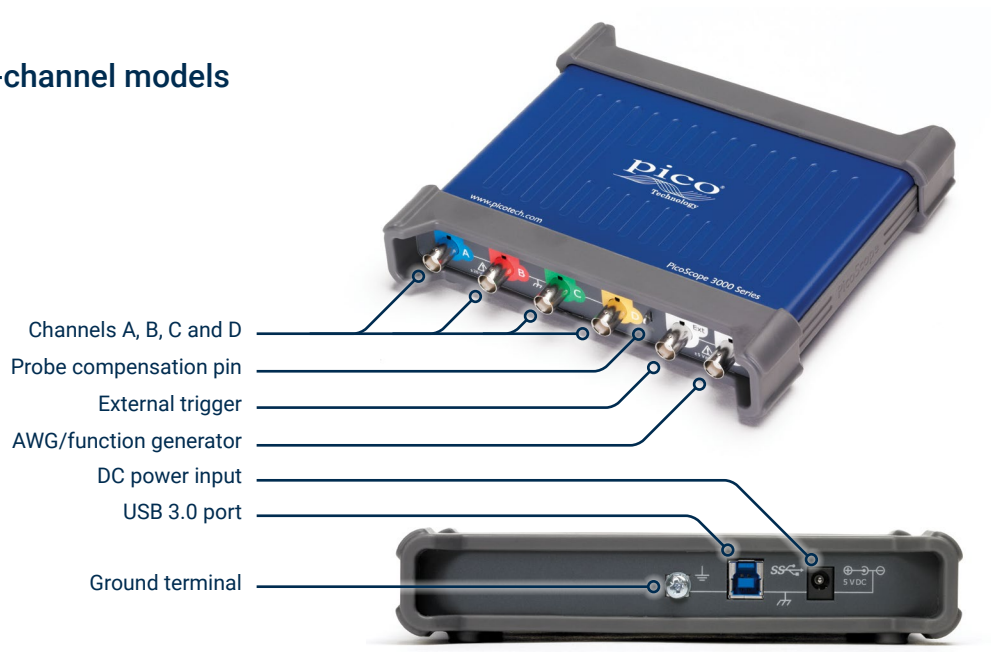
TA136 20-way digital input cable for MSOs

Input and output connections

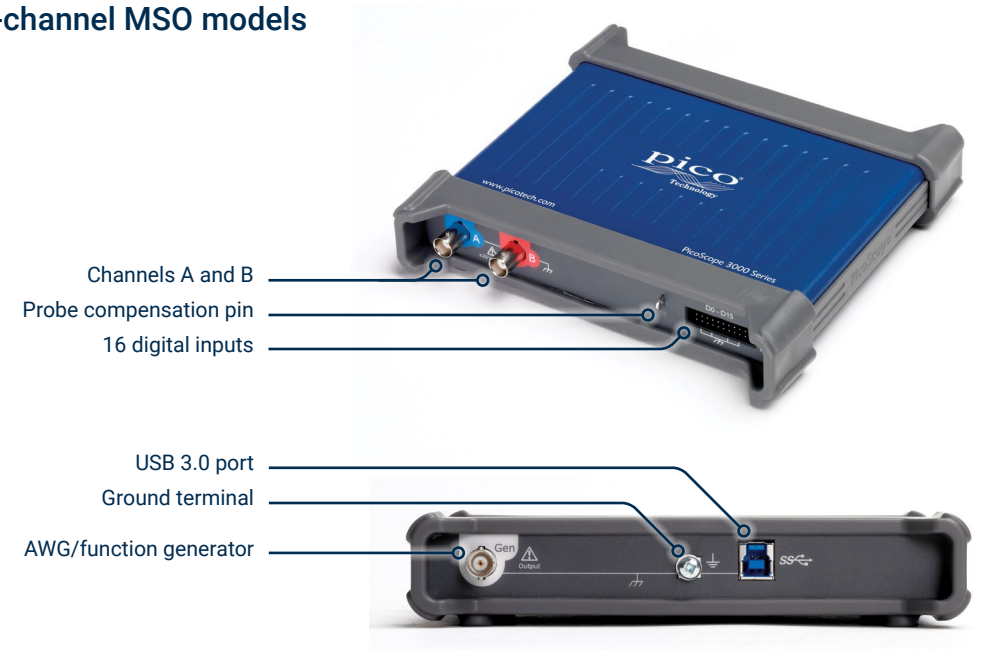
2-channel models



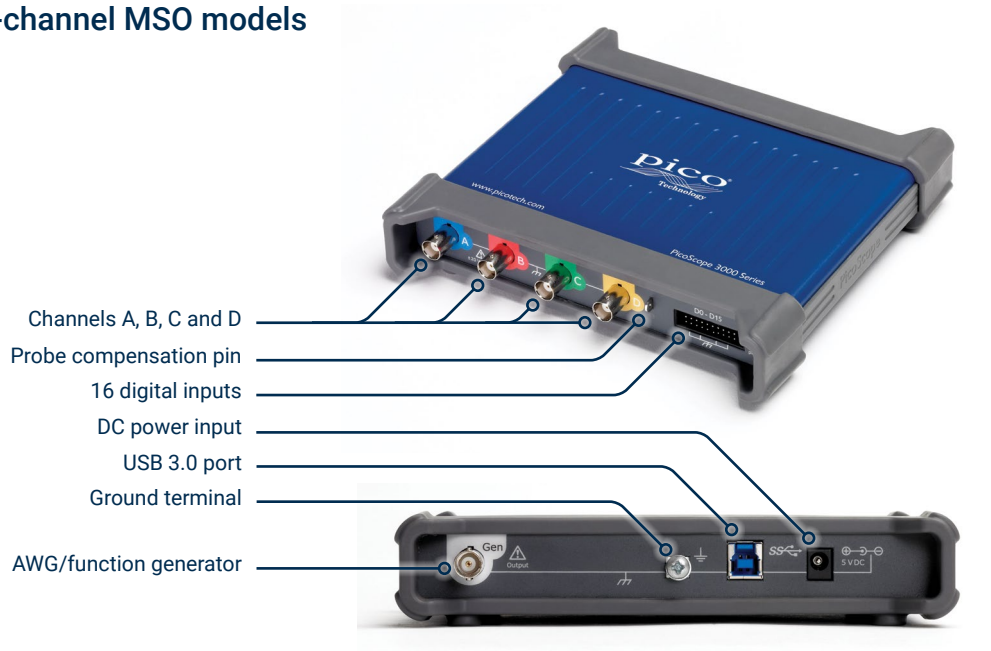
4-channel models



2-channel MSO models



4-channel MSO models



PicoScope 3000 Series specifications

PicoScope software and drivers are subject to updates and changes in functionality. We recommend you check the most recent specifications at picotech.com.

	PicoScope 3203D and 3203D MSO	PicoScope 3403D and 3403D MSO	PicoScope 3204D and 3204D MSO	PicoScope 3404D and 3404D MSO	PicoScope 3205D and 3205D MSO	PicoScope 3405D and 3405D MSO	PicoScope 3206D and 3206D MSO	PicoScope 3406D and 3406D MSO
Vertical (analog channels)								
Input channels	2	4	2	4	2	4	2	4
Bandwidth (–3dB)	50 MHz		70 MHz		100 MHz		200 MHz	
Rise time (calculated)	7.0 ns		5.3 ns		3.5 ns		1.75 ns	
Bandwidth limit	20 MHz, selectable							
Vertical resolution	8 bits							
Enhanced vertical resolution	12 bits in PicoScope software							
Input type	Single-ended, BNC(f) connector							
Input characteristics	1 MΩ ±1% || 14 pF ±1 pF							
Input coupling	AC/DC							
Input sensitivity	4 mV/div to 4 V/div (10 vertical divisions)							
Input ranges (full scale)	±20 mV, ±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V, ±20 V							
DC accuracy	±(3% of full scale + 200 µV)							
Analog offset range (vertical position adjustment)	±250 mV (±20 mV, ±50 mV, ±100 mV, ±200 mV ranges) ±2.5 V (±500 mV, ±1 V, ±2 V ranges) ±20 V (±5 V, ±10 V, ±20 V ranges)							
Offset adjustment accuracy	±1% of offset setting, additional to DC accuracy							
Overvoltage protection	±100 V (DC + AC peak)							
Vertical (digital channels: MSO models only)								
Input channels	16 channels (2 ports of 8 channels)							
Input connectors	2.54 mm pitch, 10 x 2-way connector							
Maximum input frequency	100 MHz (200 Mb/s)							
Minimum detectable pulse width	5 ns							
Input characteristics	200 kΩ ±2% || 8 pF ±2 pF							
Input dynamic range	±20 V							
Threshold range	±5 V							
Threshold grouping	Two independent threshold controls. Port 0: D0 to D7, Port 1: D8 to D15.							
Threshold selection	TTL, CMOS, ECL, PECL, user-defined							
Threshold accuracy	< ±350 mV including hysteresis							
Hysteresis	< ±250 mV							
Minimum input voltage swing	500 mV peak to peak							

	PicoScope 3203D and 3203D MSO	PicoScope 3403D and 3403D MSO	PicoScope 3204D and 3204D MSO	PicoScope 3404D and 3404D MSO	PicoScope 3205D and 3205D MSO	PicoScope 3405D and 3405D MSO	PicoScope 3206D and 3206D MSO	PicoScope 3406D and 3406D MSO
Channel-to-channel skew	2 ns, typical							
Minimum input slew rate	10 V/µs							
Overvoltage protection	±50 V (DC + AC peak)							
Horizontal								
Maximum sampling rate (real-time)	1 GS/s: 1 analog channel in use 500 MS/s: up to 2 analog channels or digital ports[1] in use 250 MS/s: up to 4 analog channels or digital ports[1] in use 125 MS/s: all other combinations [1] *A digital port contains 8 digital channels*							
Maximum equivalent-time sampling (ETS) rate (repetitive signals)	2.5 GS/s				5 GS/s		10 GS/s	
Maximum sampling rate (USB streaming)	~17 MS/s in PicoScope software, divided between active channels (PC-dependent) 125 MS/s using PicoSDK, divided between active channels (PC-dependent)							
Maximum capture rate	100 000 waveforms per second (PC-dependent)							
Capture memory	64 MS		128 MS		256 MS		512 MS	
Capture memory (streaming)	100 MS in PicoScope software. Up to available PC memory when using PicoSDK.							
Maximum waveform buffer segments	10 000 in PicoScope software							
	130 000 using PicoSDK		250 000 using PicoSDK		500 000 using PicoSDK		1 000 000 using PicoSDK	
Timebase ranges	1 ns/div to 5000 s/div						500 ps/div to 5000 s/div	
Timebase accuracy	±50 ppm				±2 ppm			
Timebase drift per year	±5 ppm				±1 ppm			
Sample jitter	3 ps RMS typical							
ADC sampling	Simultaneous sampling on all enabled channels							
Dynamic performance (typical)								
Crosstalk	Better than 400:1 up to full bandwidth (equal voltage ranges)							
Harmonic distortion	–50 dB at 100 kHz full scale input							
SFDR	52 dB (44 dB on ±20 mV range) at 100 kHz full scale input							
Noise	110 µV RMS on 20 mV range				160 µV RMS on 20 mV range			
Bandwidth flatness	(+0.3 dB, –3 dB) from DC to full bandwidth							
Triggering								
Source	Analog channels (all models) EXT trigger (not MSO models) Digital channels (MSO models only)							
Trigger modes	None, auto, repeat, single, rapid (segmented memory)							

	PicoScope 3203D and 3203D MSO	PicoScope 3403D and 3403D MSO	PicoScope 3204D and 3204D MSO	PicoScope 3404D and 3404D MSO	PicoScope 3205D and 3205D MSO	PicoScope 3405D and 3405D MSO	PicoScope 3206D and 3206D MSO	PicoScope 3406D and 3406D MSO
Pre-trigger capture	Up to 100% of capture size							
Post-trigger delay	Up to 4 billion samples, selectable in 1 sample steps							
Trigger rearm time	< 0.7 µs at 1 GS/s sampling rate							
Maximum trigger rate	Up to 10 000 waveforms in a 6 ms burst at 1 GS/s sampling rate, typical							
Triggering for analog channels								
Advanced trigger types	Edge, window, pulse width, interval, window pulse width, level dropout, window dropout, runt, logic							
Trigger types (ETS mode)	Rising edge, falling edge (available on channel A only)							
Trigger sensitivity	Digital triggering provides 1 LSB accuracy up to full bandwidth of scope							
Trigger sensitivity (ETS mode)	10 mV peak to peak at full bandwidth, typical							
Triggering for digital inputs – MSO models only								
Trigger types	Pattern, edge, combined pattern and edge, pulse width, dropout, interval, logic							
External trigger input – not MSO models								
Connector type	Front panel BNC							
Trigger types	Edge, pulse width, dropout, interval, logic							
Input characteristics	1 MΩ ‖ 14 pF							
Bandwidth	50 MHz		70 MHz		100 MHz		200 MHz	
Threshold range	±5 V							
Coupling	DC							
Overvoltage protection	±100 V (DC + AC peak)							

Common specifications

	All PicoScope 3000 Series oscilloscopes
Function generator	
Standard output signals	Sine, square, triangle, DC voltage, ramp up, ramp down, sinc, Gaussian, half-sine.
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 1 Mb/s
Standard signal frequency	0.03 Hz to 1 MHz
Sweep modes	Up, down, dual 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, external trigger (where present) or manually.
Output frequency accuracy	As oscilloscope
Output frequency resolution	< 0.01 Hz
Output voltage range	±2 V
Output voltage adjustments	Signal amplitude and offset adjustable in approximately 1 mV steps within overall ±2 V range
Amplitude flatness	< 0.5 dB to 1 MHz, typical
DC accuracy	±1% of full scale
SFDR	> 60 dB, 10 kHz full scale sine wave, typical
Output impedance	600 Ω
Connector type	Front panel BNC (non-MSO models) Rear panel BNC (MSO models)
Overvoltage protection	±20 V
Arbitrary waveform generator[2]	
Update rate	20 MS/s
Buffer size	32 kS
Resolution	12 bits (output step size approximately 1 mV)
Bandwidth (–3 dB)	> 1 MHz
Rise time (10% to 90%)	< 120 ns
[2] *For additional AWG specifications, see Function generator specifications above.*	
Probe compensation pin	
Output impedance	600 Ω
Output frequency	1 kHz
Output level	2 V peak to peak, typical
Spectrum analyzer	
Frequency range	DC to maximum bandwidth of scope
Display modes	Magnitude, average, peak hold
Y axis	Logarithmic (dbV, dBu, dBm, arbitrary dB) or linear (volts)
X axis	Linear or logarithmic

	All PicoScope 3000 Series oscilloscopes
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, sinh, cosh, tanh, freq, derivative, integral, min, max, average, peak, delay, duty, highpass, lowpass, bandpass, bandstop, coupler
Operands	All analog and digital input channels, reference waveforms, time, constants, π
Automatic measurements	
Oscilloscope mode	AC RMS, true RMS, cycle time, DC average, duty cycle, negative duty cycle, edge count, rising edge count, falling edge count, falling rate, fall time, frequency, high pulse width, low pulse width, maximum, minimum, peak to peak, rise time, rising rate.
Spectrum mode	Frequency at peak, amplitude at peak, average amplitude at peak, total power, THD %, THD dB, THD+N, SFDR, SINAD, SNR, IMD
Statistics	Minimum, maximum, average, standard deviation
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, maximum voltage, minimum voltage, voltage peak to peak, start time, end time
Serial decoding	
Protocols	1-Wire, ARINC 429, CAN, CAN FD, DALI, DCC, DMX512, Ethernet 10BASE-T & 100BASE-TX, FlexRay, I²C, I²S, LIN, Manchester, Modbus ASCII, Modbus RTU, PS/2, SENT Fast & Slow, SPI, UART (RS-232 / RS-422 / RS-485), USB 1.0/1.1
Mask limit testing	
Statistics	Pass/fail, failure count, total count
Display	
Interpolation	Linear or sin(x)/x
Persistence modes	Digital color, analog intensity, fast, advanced
Output file formats	bmp, csv, gif, animated gif, jpg, mat, pdf, png, psdata, pssettings, txt
Output functions	Copy to clipboard, print
General specifications	
Connectivity	USB 3.0 SuperSpeed (USB 2.0 compatible) type B
Power requirements	Powered from a single USB 3.0 port 4-channel models: AC adaptor included for use with USB ports that supply less than 1200 mA
Ground terminal	M4 screw terminal, rear panel
Dimensions	190 mm x 170 mm x 40 mm including connectors
Weight	< 0.5 kg
Temperature range	Operating: 0 °C to 40 °C (15 °C to 30 °C for stated accuracy). Storage: −20 °C to 60 °C
Humidity range	Operating: 5% RH to 80% RH non-condensing Storage: 5% RH to 95% RH non-condensing
Altitude range	Up to 2000 m
Pollution degree	Pollution degree 2

	All PicoScope 3000 Series oscilloscopes
Safety approvals	Designed to EN 61010-1:2010
EMC approvals	Tested to EN 61326-1:2013 and FCC Part 15 Subpart B
Environmental compliance	RoHS, REACH and WEEE compliant
Software availability and requirements (hardware requirements as operating system)	
Windows software (32-bit or 64-bit)[3]	PicoScope 6, PicoLog 6, PicoSDK
macOS software (64-bit)[3]	PicoScope 6 Beta (including drivers), PicoLog 6 (including drivers)
Linux software (64-bit)[3]	PicoScope 6 Beta software and drivers, PicoLog 6 (including drivers) *See* Linux Software and Drivers *to install drivers only*
Raspberry Pi 3B and 4B (Raspberry Pi OS)[3]	PicoLog 6 (including drivers) *See* Linux Software and Drivers *to install drivers only*
[3] *See* picotech.com/downloads *for more information, including supported OS versions.*	
Languages supported, PicoScope 6	Simplified Chinese, Czech, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Spanish, Swedish, Turkish
Languages supported, PicoLog 6	Simplified Chinese, Dutch, English (UK), English (US), French, German, Italian, Japanese, Korean, Russian, Spanish

Ordering information

Order code	Description	Bandwidth (MHz)	Channels	Capture memory (MS)
PP958	PicoScope 3203D	50	2	64
PP956	PicoScope 3203D MSO	50	2+16	64
PP962	PicoScope 3403D	50	4	64
PP957	PicoScope 3403D MSO	50	4+16	64
PP959	PicoScope 3204D	70	2	128
PP931	PicoScope 3204D MSO	70	2+16	128
PP963	PicoScope 3404D	70	4	128
PP934	PicoScope 3404D MSO	70	4+16	128
PP960	PicoScope 3205D	100	2	256
PP932	PicoScope 3205D MSO	100	2+16	256
PP964	PicoScope 3405D	100	4	256
PP935	PicoScope 3405D MSO	100	4+16	256
PP961	PicoScope 3206D	200	2	512
PP933	PicoScope 3206D MSO	200	2+16	512
PP965	PicoScope 3406D	200	4	512
PP936	PicoScope 3406D MSO	200	4+16	512

Accessories

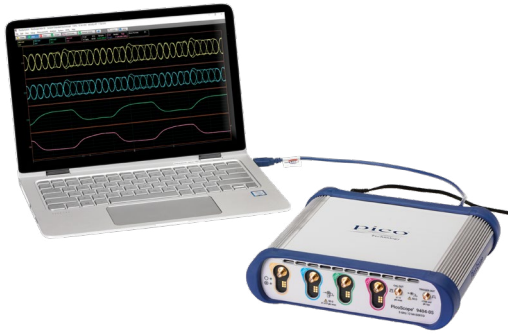
Order code	Description
TA375	TA375 Passive oscilloscope probe: 100 MHz bandwidth 1:1/10:1 switchable
TA386	TA386 Passive oscilloscope probe: 200 MHz bandwidth 1:1/10:1 switchable
TA136	TA136 20-way digital input cable for MSOs
TA139	TA139 Logic test clips, pack of 12
PS011	PS011 5 V AC power adaptor
TA155	TA155 USB 3.0 cable, 1.8 m
PP969	PP969 Hard carry case – medium

Calibration service

Order code	Description
CC017	Calibration certificate for PicoScope 3000 Series oscilloscope

More products in the Pico Technology range...

PicoScope 9400 Series SXRTOs



4-channel, 12-bit, 5 and 16 GHz sampler-extended real-time oscilloscopes. Capture pulse and step transitions down to 22 ps and clocks and data eyes to 8 Gb/s.

Comprehensive RF, microwave and gigabit visualization and measurement in a compact, portable and affordable instrument.

PicoScope 5000 Series

Why compromise between fast sampling and high resolution? PicoScope 5000 Series FlexRes® scopes let you choose the resolution, from 8 to 16 bits.

Up to 200 MHz bandwidth and 512 MS capture memory, with mixed-signal models available.

PicoLog CM3 Current Data Logger

3-channel data logger using industry-standard AC current clamps.

Ideal for measuring the current consumption of buildings and machinery.

USB and Ethernet interfaces for local or remote data logging.

TC-08 Thermocouple Data Logger

8-channel temperature data logger. Accepts all popular thermocouples to record temperatures from −270 °C to +1820 °C

Up to 10 measurements per second at 20-bit resolution. Optional terminal board for voltage and current measurement.

United Kingdom global headquarters:

Pico Technology
James House
Colmworth Business Park
St. Neots
Cambridgeshire
PE19 8YP
United Kingdom

☎ +44 (0) 1480 396 395
✉ sales@picotech.com

North America regional office:

Pico Technology
320 N Glenwood Blvd
Tyler
TX 75702
United States

☎ +1 800 591 2796
✉ sales@picotech.com

Asia-Pacific regional office:

Pico Technology
Room 2252, 22/F, Centro
568 Hengfeng Road
Zhabei District
Shanghai 200070
PR China

☎ +86 21 2226-5152
✉ pico.asia-pacific@picotech.com

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