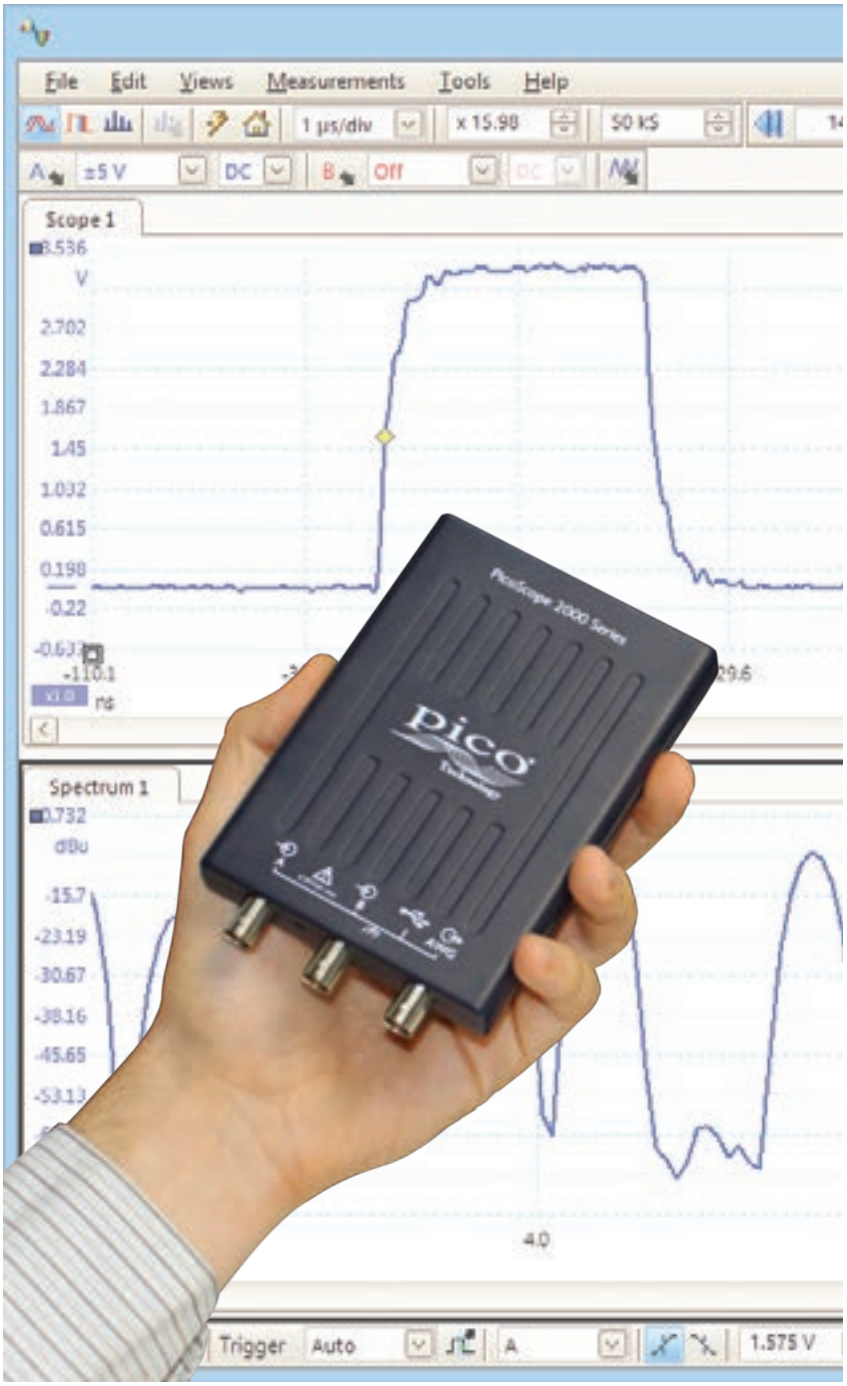
impac

PicoScope® 2200A Series

Benchtop performance in a pocket-sized scope



2 channels
Low cost
200 mhz bandwidth
Up to 1 GS/s sampling rate
Arbitrary waveform generator
Advanced digital triggers
Persistence display modes
USB connected and powered
mask limit testing
Serial bus decoding

Supplied with SDK
including example programs
Free technical support
Free software upgrades
Software compatible with
windows XP, windows Vista,
windows 7 and windows 8

Powerful, portable, and versatile

The PicoScope 2200A Series oscilloscopes offer a small, light, modern alternative to bulky benchtop devices. You can now fit a 200 MHz, 1 GS/s instrument easily in your laptop bag! They are perfect for engineers on the move, and ideal for a wide range of applications including design, test, education, service, monitoring, fault finding, and repair.

A small form factor is not the only benefit of these PC-based scopes. With our PicoScope 6 software, high-end features such as serial decoding and mask limit testing are included as standard. New functionality is regularly delivered through free upgrades, optimized with the help of feedback from our customers.

USB connectivity

The USB connection makes printing, copying, saving, and emailing your data from the field quick and easy. The high-speed USB interface allows fast data transfer, while USB powering removes the need to carry around a bulky external power supply.

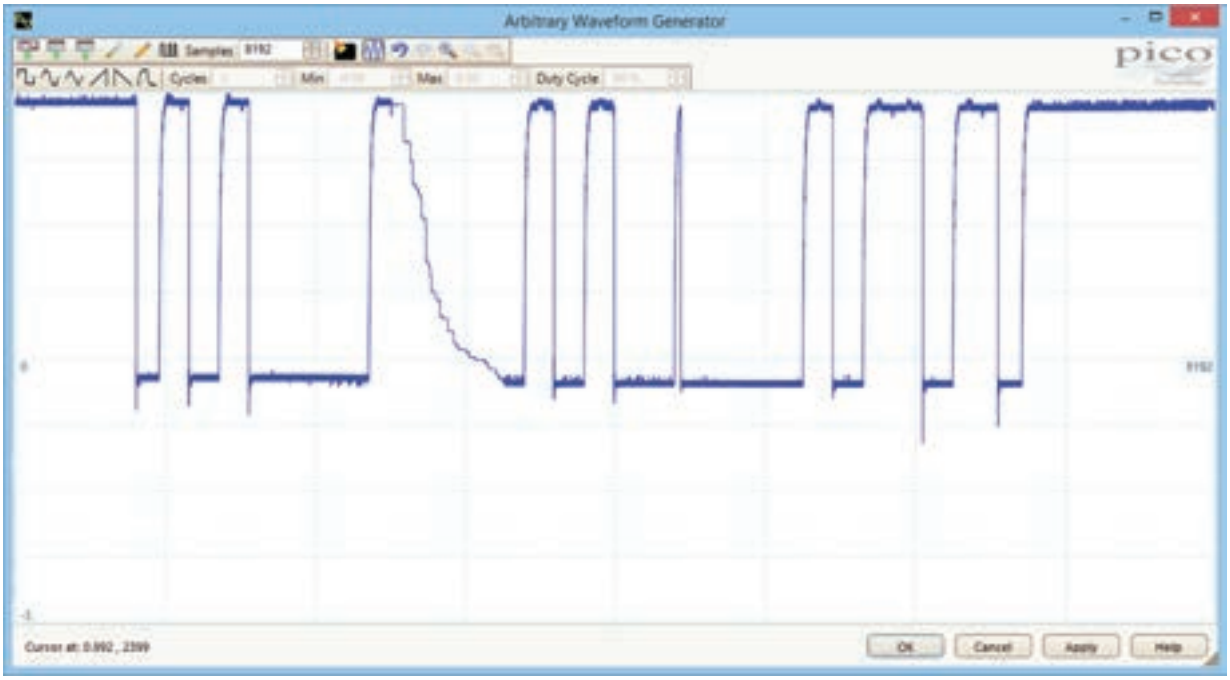
Fast sampling

The PicoScope 2200A Series oscilloscopes provide fast real-time sampling rates up to 1 GS/s, equivalent to a timing resolution of only 1 ns. For repetitive signals, equivalent-time sampling (ETS) mode can boost the maximum effective sampling rate up to 10 GS/s, allowing even finer resolution down to 100 ps. All scopes support pre-trigger and post-trigger capture.

Arbitrary waveform and function generators

All PicoScope 2200A Series oscilloscopes have a built-in arbitrary waveform generator (AWG). Waveforms can be imported from data files or created and modified using the built-in graphical AWG editor.

A function generator is also included, with sine, square, triangle, DC level and many more standard waveforms. As well as level, offset and frequency controls, advanced options allow you to sweep over a range of frequencies. Combined with the spectrum peak hold option, this creates a powerful tool for testing amplifier and filter responses.

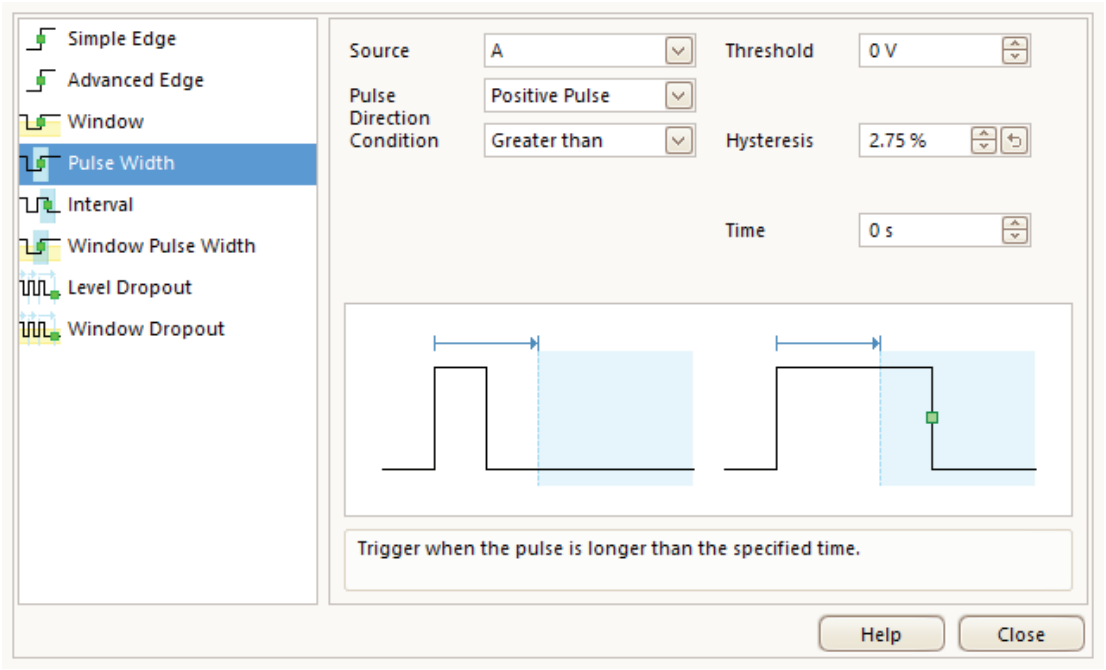


Digital triggering

Most digital oscilloscopes still use an analog trigger architecture based on comparators. This can cause time and amplitude errors that cannot always be calibrated out. The use of comparators often limits the trigger sensitivity at high bandwidths and can also create a long trigger rearm delay.

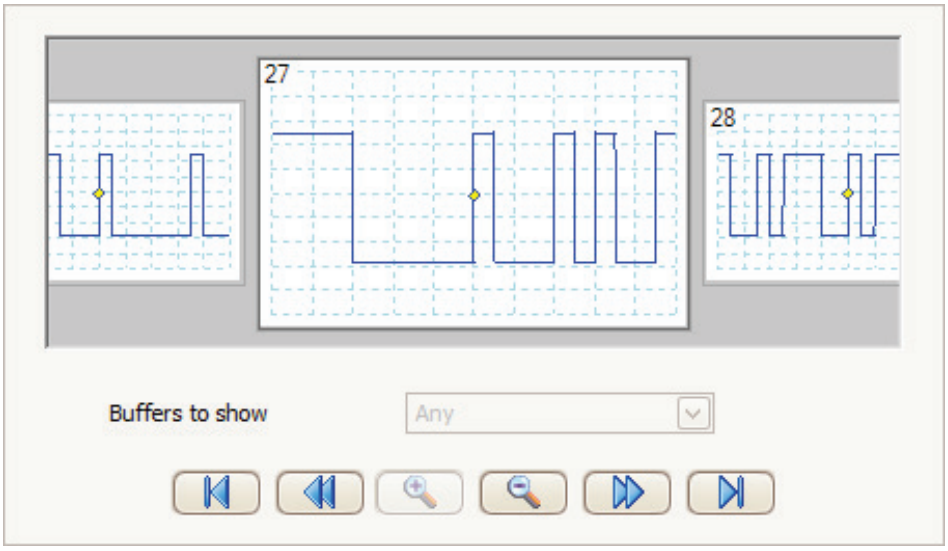
For over 20 years Pico have been pioneering the use of full digital triggering using the actual digitized data. This reduces trigger errors and allows our oscilloscopes to trigger on the smallest signals, even at the full bandwidth. All triggering is digital, resulting in high threshold resolution within programmable hysteresis and optimal waveform stability.

On selected models, the reduced rearm delay provided by digital triggering, together with segmented memory, allows the capture of events that happen in rapid sequence. At the fastest timebase, rapid triggering can capture a new waveform every 2 microseconds until the buffer is full. The mask limit testing function helps to detect waveforms that fail to meet your specifications.



Advanced triggers

As well as the standard range of triggers found on most oscilloscopes, the PicoScope 2200A Series offers one of the best selections of advanced triggers available. These include pulse width, windowed and dropout triggers to help you find and capture your signal quickly.



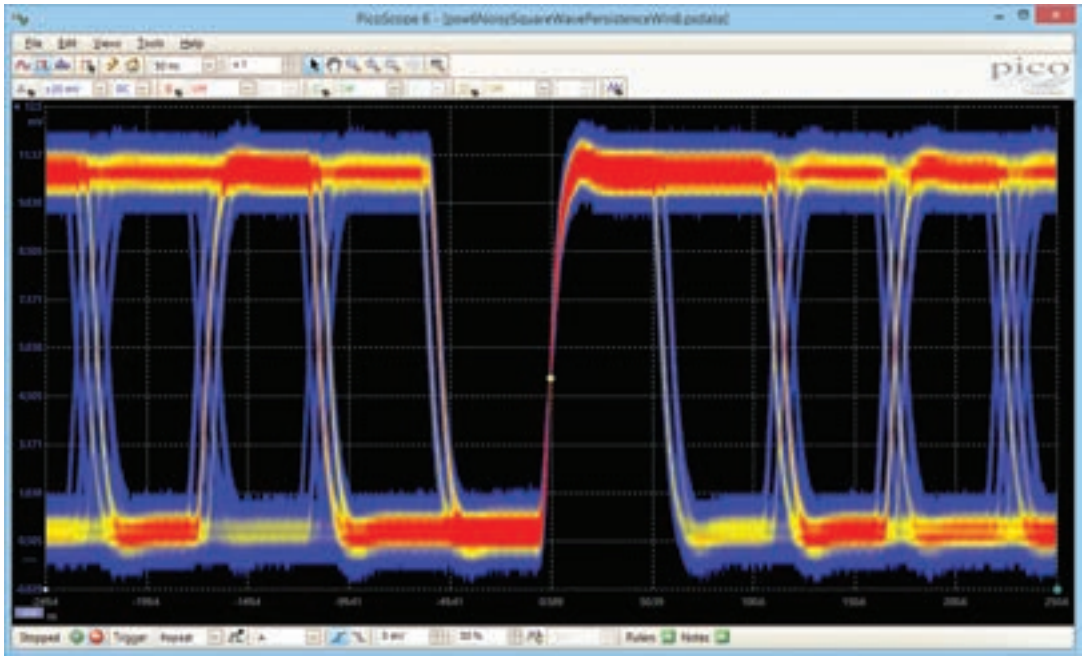
High signal integrity

Most oscilloscopes are built down to a price. PicoScopes are built up to a specification.

Careful front-end design and shielding reduces noise, crosstalk and harmonic distortion. Decades of oscilloscope design experience can be seen in improved pulse response and bandwidth flatness. We are proud of the dynamic performance of our products and publish these specifications in detail. The result is simple: when you probe a circuit, you can trust in the waveform you see on the screen.

Color persistence modes

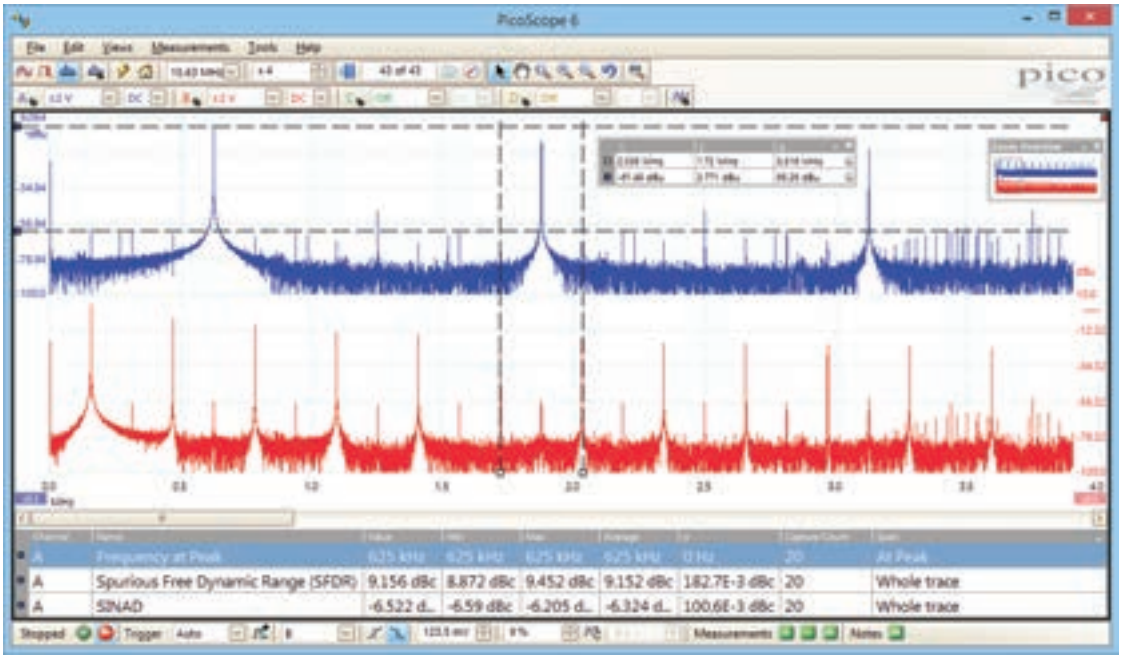
Advanced display modes allow you to see old and new data superimposed, with new data in a brighter color or shade. This makes it easy to see glitches and dropouts and to estimate their relative frequency. Choose between analog persistence, digital color, or custom display modes.



Spectrum analyzer

With the click of a button, you can open a new window to display a spectrum plot of selected channels up to the full bandwidth of the oscilloscope. A comprehensive range of settings gives you control over the number of spectrum bands, window types and display modes.

PicoScope software allows you to display multiple spectrum views with different channel selections and zoom factors, and see these alongside time-domain waveforms of the same data. A comprehensive set of automatic frequency-domain measurements can be added to the display, including THD, THD+N, SINAD, SNR and IMD. You can even use the AWG and spectrum mode together to perform swept scalar network analysis.

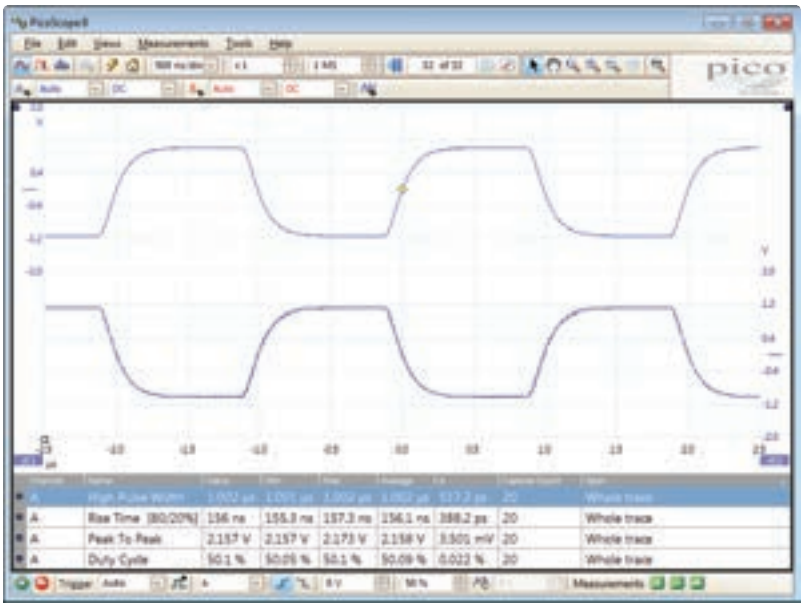


Automatic measurements

PicoScope allows you to automatically 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.

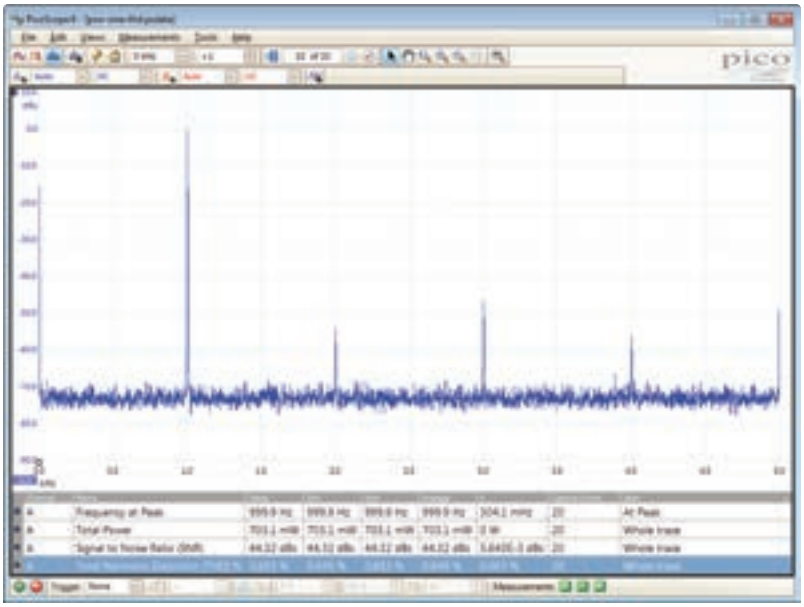
You can add as many measurements as you need on each view. Each measurement includes statistical parameters showing its variability.

For information on the measurements available in scope and spectrum modes, see **Automatic Measurements** in the **Specifications** table.



Channel	Name	Value	Min	Max	Average
A	High Pulse Width	1.002 µs	1.001 µs	1.002 µs	1.002 µs
A	Rise Time [80/20%]	156 ns	155.3 ns	157.3 ns	156.1 ns
A	Peak To Peak	2.157 V	2.157 V	2.173 V	2.158 V
A	Duty Cycle	50.1 %	50.05 %	50.1 %	50.09 %

15 scope mode measurements



Channel	Name	Value	Min
A	Frequency at Peak	999.9 Hz	999.9 Hz
A	Total Power	703.1 mW	703.1 mW
A	Signal to Noise Ratio (SNR)	44.32 dBc	44.32 dBc
A	Total Harmonic Distortion (THD) %	0.653 %	0.645 %

11 spectrum mode measurements

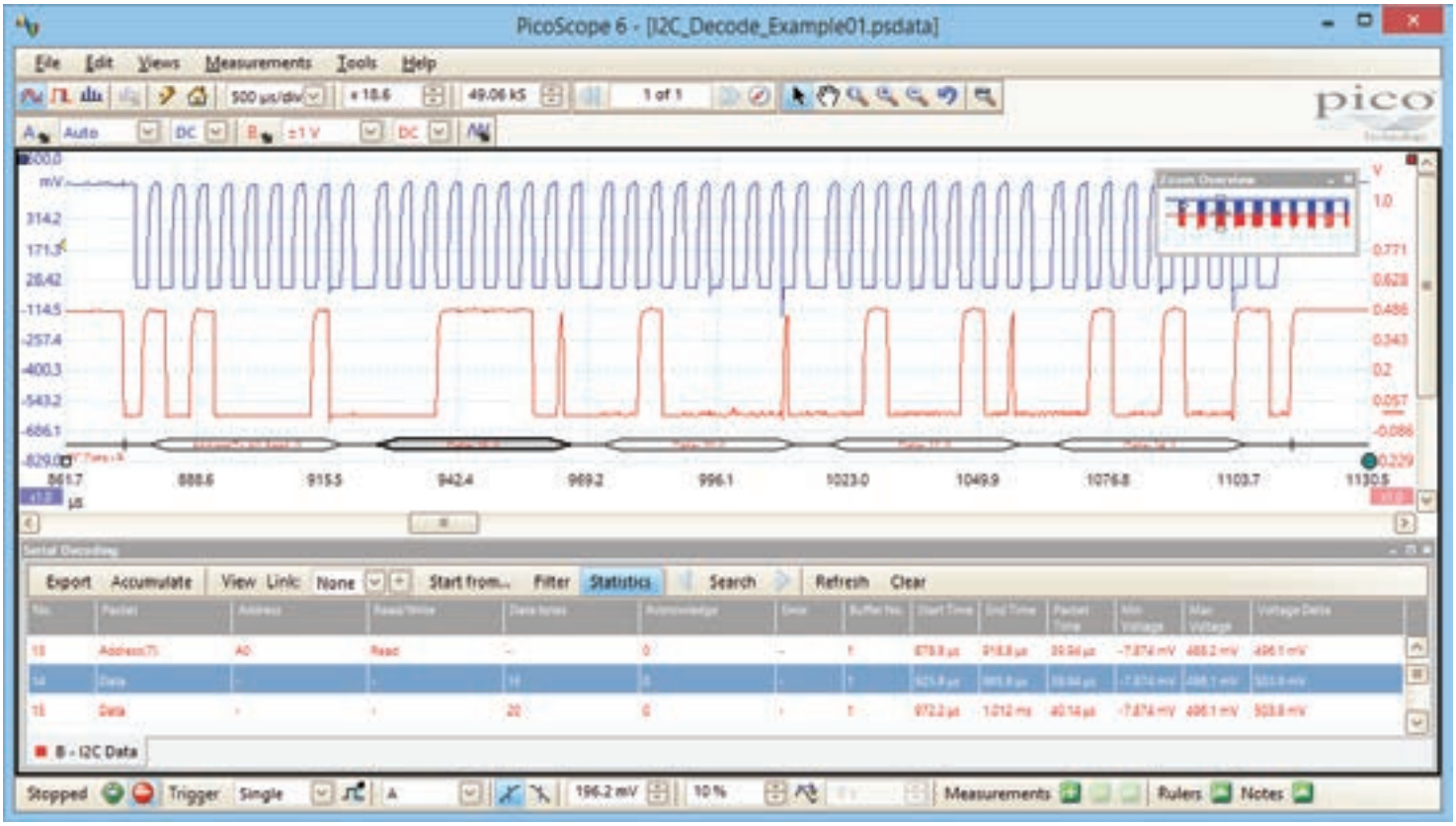
Serial decoding

The PicoScope 2200A Series oscilloscopes include serial decoding capability as standard. The decoded data can be displayed in the format of your choice: **in view**, **in window**, or both at once.

- **In view** format shows the decoded data beneath the waveform on a common time axis, with error frames marked in red. These frames can be zoomed to investigate noise or distortion.
- **In window** 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, search for frames with specified properties, or define a start pattern to signal when the program should list the data.

It is also possible to create a spreadsheet to decode the hexadecimal data into user-defined text strings.

Serial protocols
UART/RS-232
SPI
I^2C
I^2S
CAN
LIN



Math channels

With PicoScope 6 you can perform a variety of mathematical calculations on your input signals and reference waveforms.

Use the built-in list for simple functions such as addition and inversion, or open the equation editor and create complex functions involving trigonometry, exponentials, logarithms, statistics, integrals and derivatives.

High-speed data acquisition and digitizing

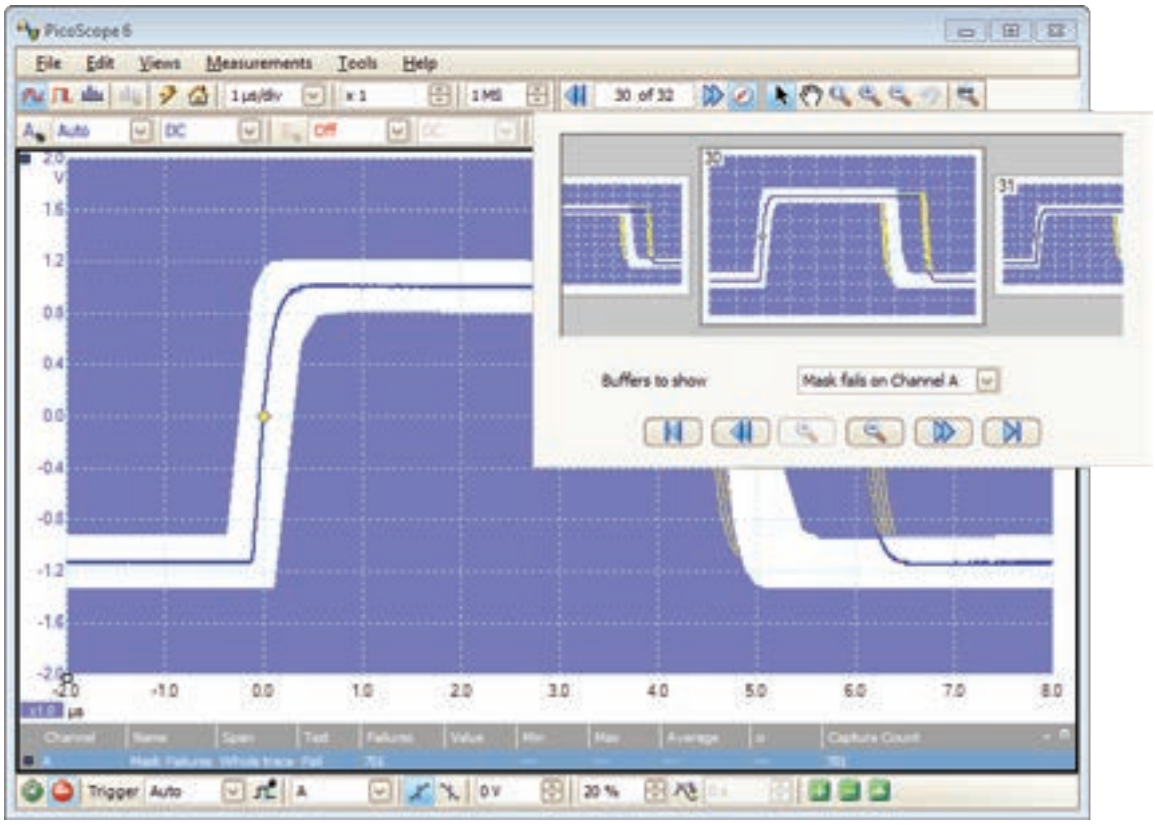
The supplied drivers and software development kit allow you to both write your own software and interface to popular third-party software packages such as LabVIEW and MATLAB.

The drivers support data streaming, a mode that captures gap-free continuous data over the USB port directly to the PC's RAM or hard disk at a rate of 1 to 9.6 MS/s, so you are not limited by the size of the scope's buffer memory. Sampling rates in streaming mode are subject to PC specifications and application loading.

Mask limit testing

PicoScope allows you to draw a mask around any signal with user-defined tolerances. This has been designed specifically for production and debugging environments, enabling you to compare signals. Simply capture a known good signal, draw a mask around it, and then attach the system under test. PicoScope will capture any intermittent glitches and can show a failure count and other statistics in the **Measurements** window.

The numerical and graphical mask editors can be used separately or in combination, allowing you to enter accurate mask specifications, modify existing masks, and import and export masks as files.



Custom probe settings

The custom probes menu allows you to correct for gain, attenuation, offsets and nonlinearities of probes and transducers, or convert your waveform data to different units such as current, scaled voltage, temperature, pressure, power or dB. Definitions can be saved to disk for later use. Definitions for standard Pico-supplied oscilloscope probes and current clamps are built in, and you can also create your own using linear scaling or even an interpolated data table.

High-end features as standard

Buying a PicoScope is not like making a purchase from other oscilloscope companies, where optional extras considerably increase the price. With our scopes, high-end features such as resolution enhancement, mask limit testing, serial decoding, advanced triggering, automatic measurements, math channels, XY mode, segmented memory (where available), 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. Pico Technology have a long history of providing new features for free through software downloads. We deliver on our promises of future enhancements year after year, unlike many other companies in the field. Users of our products reward us by becoming lifelong customers and frequently recommending us to their colleagues.

PicoScope 6 software

The PicoScope software display can be as simple 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 channels, plus math channels and reference waveforms.

Oscilloscope controls: Controls such as voltage range, channel enable, timebase and memory depth are placed on the toolbar for quick access, leaving the main display area clear for waveforms.

Tools > Serial decoding: Decode multiple serial data signals and display the data alongside the physical signal or as a detailed table.
Tools > Reference channels: Store waveforms in memory or on disk and display them alongside live inputs. Ideal for diagnostics and production testing.
Tools > Masks: Automatically generate a test mask from a waveform or draw one by hand. PicoScope highlights any parts of the waveform that fall outside the mask and shows error statistics.

Channel options: Set axis offset and scaling, DC offset, zero offset, resolution enhancement, custom probes, and filtering here.

Auto setup button: Configures the timebase and voltage ranges for stable display of signals.

Waveform replay tools: PicoScope automatically records up to 10 000 of the most recent waveforms. You can quickly scan through to look for intermittent events, or use the Buffer Navigator to search visually.

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

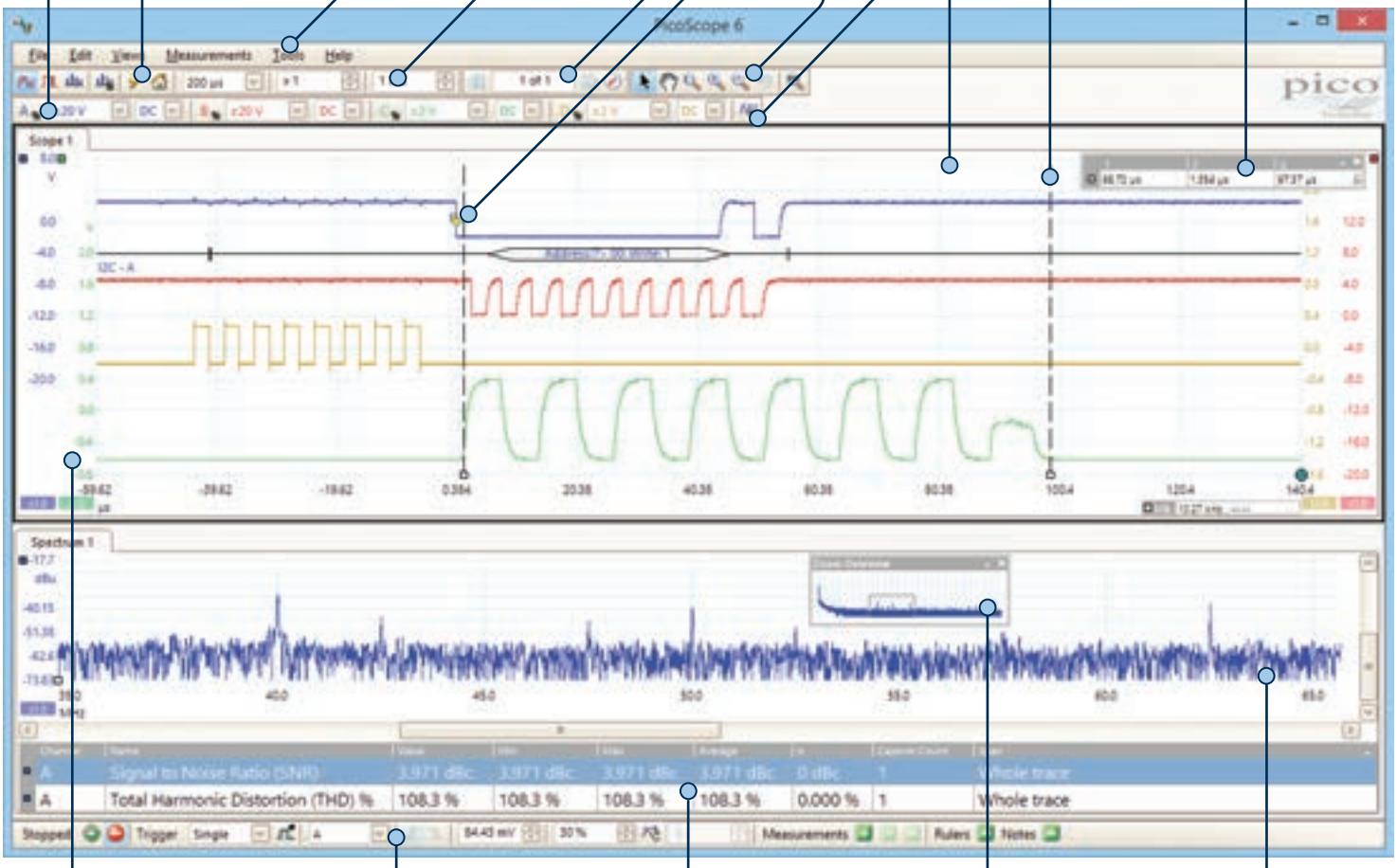
Zoom and pan tools: PicoScope makes it easy to zoom into large waveforms. Either use the zoom-in, zoom-out and pan tools, or click and drag in the Zoom Overview window for fast navigation.

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

Views: PicoScope is carefully designed to make the best use of the display area. The waveform view is much bigger and higher resolution than a typical benchtop scope. You can add new scope and spectrum views with automatic or custom layouts.

Rulers: Each axis has two rulers that can be dragged across the screen to make quick measurements of amplitude, time and frequency.

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



Movable axes: The vertical axes can be dragged up and down. This feature is particularly useful when one waveform is obscuring another. There's also an *Auto Arrange Axes* command.

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

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

Zoom overview: Click and drag for quick navigation in zoomed views.

Spectrum view: View FFT data alongside scope view or in dedicated spectrum mode.

Product selector

Model	PicoScope 2204A	PicoScope 2205A	PicoScope 2206A	PicoScope 2207A	PicoScope 2208A
Bandwidth (–3 dB)	10 MHz	25 MHz	50 MHz	100 MHz	200 MHz
Maximum sampling rate	100 MS/s	200 MS/s	500 MS/s	1 GS/s	1 GS/s
Buffer memory	8 kS	16 kS	32 kS	40 kS	48 kS
Function generator + AWG	100 kHz	100 kHz	1 MHz	1 MHz	1 MHz

Detailed specifications

VERTICAL					
Input channels	2				
Bandwidth (–3 dB)	10 MHz	25 MHz	50 MHz	100 MHz	200 MHz
Rise time (calculated)	35 ns	14 ns	7 ns	3.5 ns	1.75 ns
Vertical resolution	8 bits				
Enhanced vertical resolution	Up to 12 bits				
Input ranges	±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V, ±20 V				
Input sensitivity	10 mV/div to 4 V/div (10 vertical divisions)				
Input coupling	AC / DC				
Input characteristics	BNC, 1 MΩ ‖ 14 pF		BNC, 1 MΩ ‖ 13 pF		
Analog offset range (vertical position adjustment)	-		±250 mV (50 mV to 200 mV ranges) ±2.5 V (500 mV to 2 V ranges) ±20 V (5 V to 20 V ranges)		
DC accuracy	±3% of full scale				
Overvoltage protection	±100 V (DC + AC peak)				
HORIZONTAL (TIMEBASE)					
Maximum sampling rate (real-time) 1 ch. 2 ch.	100 MS/s 50 MS/s	200 MS/s (ChA) 100 MS/s	500 MS/s 250 MS/s	1 GS/s 500 MS/s	1 GS/s 500 MS/s
Equivalent sampling rate (ETS)	2 GS/s	4 GS/s	5 GS/s	10 GS/s	10 GS/s
Maximum sampling rate (streaming)	1 MS/s		9.6 MS/s		
Timebase ranges	10 ns to 5000 s/div	5 ns to 5000 s/div	2 ns to 5000 s/div	1 ns to 5000 s/div	500 ps to 5000 s/div
Buffer memory (shared between active channels)	8 kS	16 kS	32 kS	40 kS	48 kS
Buffer memory (streaming mode)	2 MS per channel in PicoScope software.		100 MS (shared) in PicoScope software.		
	Up to available PC memory when using SDK.				
Maximum buffers (normal triggering)	10 000				
Max. buffers (rapid block triggering)	Not available		32		
Timebase accuracy	±100 ppm		±50 ppm		
Sample jitter	< 30 ps RMS		< 5 ps RMS		
DYNAMIC PERFORMANCE (typical)					
Crosstalk (full bandwidth)	Better than 200:1 (equal ranges)		Better than 400:1 (equal ranges)		
Harmonic distortion	< –50 dB at 100 kHz, full-scale input				
SFDR	> 52 dB at 100 kHz, full-scale input				
Noise	< 150 µV RMS (±50 mV range)		< 200 µV RMS (±50 mV range)		
Bandwidth flatness (at scope input)	(+0.3 dB, –3 dB) from DC to full bandwidth				
TRIGGERING					
Sources	Ch A, Ch B				
Trigger modes	None, auto, repeat, single		None, auto, repeat, single, rapid (segmented memory)		
Advanced triggers	Edge, window, pulse width, window pulse width, dropout, window dropout, interval, logic.				
Trigger types, ETS	Rising or falling edge				
Trigger sensitivity	Digital triggering provides 1 LSB accuracy up to full bandwidth In ETS mode, typical 10 mV p-p at full bandwidth				
Maximum pre-trigger capture	100% of capture size				
Maximum post-trigger delay	4 billion samples				
Trigger re-arm time	PC-dependent		< 2 µs on fastest timebase		
Maximum trigger rate	PC-dependent		Up to 32 waveforms in a 64 µs burst		

	PicoScope 2204A	PicoScope 2205A	PicoScope 2206A	PicoScope 2207A	PicoScope 2208A
FUNCTION GENERATOR					
Standard output signals	Sine, square, triangle, DC voltage, ramp, sinc, Gaussian, half-sine				
Pseudorandom output signals	None		White noise, PRBS		
Standard signal frequency	DC to 100 kHz		DC to 1 MHz		
Sweep modes	Up, down, dual with selectable start/stop frequencies and increments				
Triggering	-		Free-run or up to 1 billion waveform cycles or frequency sweeps. Triggered from scope trigger or manually.		
Output frequency accuracy	±100 ppm		±50 ppm		
Output frequency resolution	< 0.01 Hz				
Output voltage range	±2 V				
Output adjustments	Any amplitude and offset within ±2 V range				
Amplitude flatness (typical)	< 1 dB to 100 kHz		< 0.5 dB to 1 MHz		
DC accuracy	±1% of full scale				
SFDR (typical)	> 55 dB at 1 kHz full-scale sine wave		> 60 dB at 10 kHz full-scale sine wave		
Output characteristics	Front panel BNC, 600 Ω output impedance				
Overvoltage protection	±10 V				
ARBITRARY WAVEFORM GENERATOR					
Update rate	1.548 MS/s		20 MS/s		
Buffer size	4 kS		8 kS		
Resolution	12 bits				
Bandwidth	> 100 kHz		> 1 MHz		
Rise time (10% to 90%)	< 2 µs		< 120 ns		
SPECTRUM ANALYZER					
Frequency range	DC to 10 MHz	DC to 25 MHz	DC to 50 MHz	DC to 100 MHz	DC to 200 MHz
Display modes	Magnitude, average, peak hold				
Windowing functions	Rectangular, Gaussian, triangular, Blackman, Blackman-Harris, Hamming, Hann, flat-top				
Number of FFT points	Selectable from 128 to half available buffer memory 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				
Operands	A, B (input channels), T (time), reference waveforms, constants, Pi				
AUTOMATIC MEASUREMENTS					
Scope mode	AC RMS, true RMS, cycle time, DC average, duty cycle, 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 plus noise, SFDR, SINAD, SNR, IMD				
Statistics	Minimum, maximum, average and standard deviation				
SERIAL DECODING					
Protocols	CAN, LIN, I²C, UART/RS-232, SPI, I²S, FlexRay				
MASK LIMIT TESTING					
Statistics	Pass/fail, failure count, total count				
DISPLAY					
Interpolation	Linear or sin(x)/x				
Persistence modes	Digital color, analog intensity, custom, or none				
GENERAL					
PC connectivity	USB 2.0 (USB 1.1 and 3.0 compatible). USB cable included.				
Power requirements	Powered from USB port				
Dimensions (including connectors)	142 x 92 x 19 mm				
Weight	< 0.2 kg (7 oz)				
Temperature range	Operating: 0 °C to 50 °C (20 °C to 30 °C for stated accuracy). Storage: –20 °C to +60 °C.				
Humidity range	Operating: 5% to 80% RH non-condensing. Storage: 5% to 95% RH non-condensing.				
Safety approvals	Designed to EN 61010-1:2010				
Compliance	RoHS, WEEE, and LVD compliant. Tested to meet EN61326-1:2006 and FCC Part 15 Subpart B.				
Software included	PicoScope 6, Windows and Linux SDK, example programs (C, Visual Basic, Excel VBA, LabVIEW)				
PicoScope software PC requirements	Microsoft Windows XP (SP3), Windows Vista, Windows 7 or Windows 8 (not Windows RT). 32- or 64-bit				
Languages	Chinese (simplified & traditional), Czech, Danish, Dutch, English, Finnish, French, German, Greek, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Romanian, Russian, Spanish, Swedish, Turkish				

Kit contents and accessories

Your PicoScope 2200A Series oscilloscope kit contains the following items:

- PicoScope 2200A Series oscilloscope
- USB cable
- Two x1/x10 passive probes (with kits PP906 to PP910)
- Quick Start Guide
- Software and reference CD

Probes

wo x1/x10 passive probes are included, chosen to match the bandwidth of your scope.

PicoScope model	Probes included (kits PP906 to PP910)	Order code
2204A 2205A 2206A	60 MHz probes (2)	MI007
2207A	150 MHz probes (2)	TA132
2208A	250 MHz probes (2)	TA131

Hand-held oscilloscopes

Also available in the PicoScope 2000 Series, the PicoScope 2104 and 2105 single-channel hand-held oscilloscopes are the ultimate in compact design.
See www.picotech.com for details.