

PicoScope[®] 5000 Series

Flexible resolution oscilloscopes

8 to 16 bit selectable hardware resolution Up to 200 MHz analog bandwidth Up to 512 MS buffer memory Up to 1 GS/s real-time sampling Up to 10 GS/s equivalent-time sampling Up to 200 MHz spectrum analyzer Built-in function generator or AWG USB-connected

SDK available with example programs • Free technical support Free software updates • Software compatible with Windows 7, 8 and 10



www.picotech.com

PicoScope: power, portability and versatility

Pico Technology continues to push the limits of PC oscilloscope design. For the first time in an oscilloscope, Pico Technology have used reconfigurable ADCs to offer a choice of 8-bit to 16-bit resolutions in a single product.

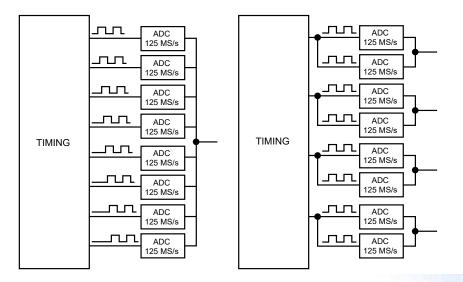
Flexible resolution

Most digital oscilloscopes gain their high sampling rates by interleaving multiple 8-bit ADCs. Despite careful design, the interleaving process introduces errors that always make the dynamic performance worse than the performance of the individual ADC cores.

The new PicoScope 5000 Series scopes have a significantly different architecture in which multiple high-resolution ADCs can be applied to the input channels in different time-interleaved and parallel combinations to boost either the sampling rate or the resolution.

In time-interleaved mode, the ADCs are interleaved to provide 1 GS/s at 8 bits (see left diagram). Interleaving reduces the performance of the ADCs, but the resulting (60 dB SFDR) is still much better than oscilloscopes that interleave 8-bit ADCs. This mode can also provide 500 MS/s at 12 bits resolution.

In parallel mode, multiple ADCs are sampled in phase on each channel to increase the resolution and dynamic performance (see right diagram). Sampling in parallel with multiple ADCs and combining the output reduces noise and also both the integral and differential nonlinearity. Using parallel mode, resolution is increased to 14 bits at 125 MS/s per channel (70 dB SFDR). If only two channels are required then resolution can be increased to 15 bits, and in single-channel mode all the ADCs are combined to give a 16-bit mode at 62.5 MS/s. The software gives the choice of selecting the resolution or leaving the scope in "auto resolution" mode where the optimum resolution is used for the chosen settings.



High bandwidth, high sampling rate

Most USB-powered oscilloscopes have real-time sampling rates of only 100 or 200 MS/s, but the PicoScope 5000 Series offers up to 1 GS/s, and a maximum bandwidth of 200 MHz. Equivalent time sampling (ETS) mode can be used to further boost the sampling rate to 10 GS/s for a more detailed view of repetitive signals.

Digital triggering

Most digital oscilloscopes sold today 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.

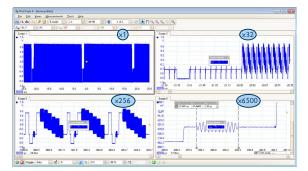
In 1991 we pioneered the use of fully digital triggering using the actual digitized data. This technique reduces trigger errors and allows our oscilloscopes to trigger on the smallest signals, even at the full bandwidth. Trigger levels and hysteresis can be set with high precision and resolution.

Digital triggering also reduces re-arm delay and this, combined with the segmented memory, allows the triggering and capture of events that happen in rapid sequence. At the fastest timebase you can use rapid triggering to collect 10,000 waveforms in under 20 milliseconds. Our mask limit testing function can then scan through these waveforms to highlight any failed waveforms for viewing in the waveform buffer.

Huge buffer memory

The PicoScope 5000 Series offers memory depths up to 512 million samples, more than any other oscilloscope in this price range.

Other oscilloscopes have high maximum sampling rates, but without deep memory they cannot sustain these rates on long timebases. Using its 512 MS buffer, the PicoScope 5444B can 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. Zoom factors of several million are possible.

Each captured waveform is stored in a segmented buffer so you can rewind and review up to 10,000 previous waveforms. No longer will you see a glitch on the screen only for it to vanish before you stop the scope. A mask can be applied to hide waveforms that are not of interest.

Advanced triggers

As well as the standard range of triggers found on all oscilloscopes, the PicoScope 5000 Series offers an industry-leading set of advanced triggers including pulse width, windowed and dropout triggers to help you capture the data you need.

Arbitrary waveform and function generator

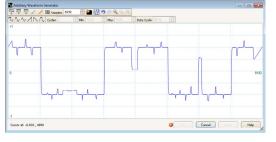
All units have a built-in function generator. As well as basic controls to set level, offset and frequency, more advanced controls allow you to sweep over a range of frequencies. Combined with the spectrum peak hold option this makes a powerful tool for testing amplifier and filter responses.

The PicoScope 5000 Series B models include an arbitrary waveform generator. Waveforms can be created or edited using the built-in AWG editor, imported from oscilloscope traces, or loaded from a spreadsheet.

Serial decoding

The PicoScope 5000 Series, with its deep memory, is ideal for serial decoding as it can capture thousands of frames of uninterrupted data. Protocols currently included are I²C, SPI, RS-232/UART, CAN, LIN and FlexRay. Expect this list to grow with free software updates.

Advanced Edge Window		and a second sec
Pulse Width IL Interval Window Pulse Width UL Level Dropout UL Window Dropout	Level Window Drection Entering Threshold 1 0 V Threshold 2 0 V Hysteresis 1.50 %	AND NAND OR NAND OR NANR OR XOR XNOR
j¶ Runt ≝ Logic	Trigger when the signal levels of all the selected logic condition at the same time.	channels agree with the chosen



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High-end features as standard

Buying a scope from some companies is a bit like buying a car. By the time you have added all the optional extras you need, the price has gone up considerably. With the PicoScope 5000 Series, high-end features such as mask limit testing, serial decoding, advanced triggering, measurements, math, XY mode, digital filtering and segmented memory are all included in the price.

To protect your investment, both the PC software and firmware inside the unit can be updated. We have a long history of providing new features for free as software downloads. Other companies make vague promises about future enhancements but we deliver on our promises year after year. Users of our products reward us by becoming lifelong customers, frequently recommending us to their colleagues.

The design of the PicoScope software ensures that maximum display area is available for waveform viewing. Even with a laptop you have a much bigger viewing area and higher resolution than a typical benchtop scope.

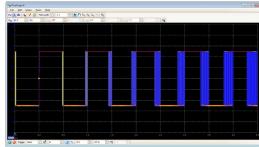
High signal integrity

Most oscilloscopes are built down to a price; ours are built up to a specification.

Careful front-end design and shielding reduces noise, crosstalk and harmonic distortion. Years of oscilloscope experience leads to improved pulse response and bandwidth flatness.

Persistence display modes

1.85V 1.85V 1.26V 1.26V 1.26V 1.26V 1.26V 1.26V 1.26V 1.26V 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 and digital color, or create a custom display mode.



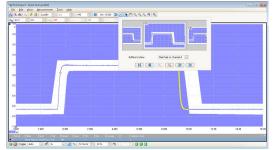
Mask limit testing

This feature is specially designed for production and debugging environments. Capture a signal from a known working system, and PicoScope will draw a mask around it with your specified tolerance. Connect the system under test, and PicoScope will highlight any parts of the waveform that fall outside the mask area. The highlighted details persist on the display, allowing the scope to catch intermittent glitches while you work on something else. The measurements window counts the number of failures, and can display other measurements and statistics at the same time. You can import and export masks as files.

Spectrum analyzer

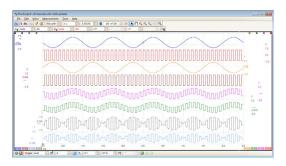
With a click of a button, you can display a spectrum plot of the selected channels with a maximum frequency up to 200 MHz. A full range of settings gives you control over the number of spectrum bands, window types and display modes: instantaneous, average, or peakhold.

You can 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, including THD, THD+N, SNR, SINAD and IMD, can be added to the display.



Math channels

Create new channels by combining input channels and reference waveforms. Choose from a wide range of arithmetic, logarithmic, trigonometric and other functions. Define a function using the push-button control panel or type an equation in the text box.



High-speed data acquisition/digitizer

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

If the scope's ultra-deep memory isn't enough, the driver supports data streaming, a mode that captures gap-free continuous data through the USB port directly to the PC's RAM or hard disk at a rate of over 10 MS/s (maximum speed is PC-dependent).

Custom probe settings

The custom probes feature allows you to correct for gain, attenuation, offsets and nonlinearities in special probes, or to convert to different units of measurement (such as current, power or temperature). You can save definitions to disk for later use.

Portability

Pico Technology oscilloscopes are small, light and portable. In 2-channel mode the 5000 Series scopes can be powered from USB only, making them ideal for the engineer on the move. The external power supply is only needed when operating more than 2 channels. The 5000 Series oscilloscopes are suitable for field use in many applications, such as design, research, test, education, service and repair.

PicoScope 6 software

The display can be as simple or as complex as you need. Begin with a single view of one channel, and then expand the display to include any number of live channels, math channels and reference waveforms.

Auto setup button:

Configures the collection time and voltage range for stable display of signals.

Channel options:

Filtering, offset, resolution enhancement, custom probes and more.

Oscilloscope controls: Controls such as voltage range, scope resolution, channel enable, timebase and memory depth.

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

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.

Spectrum view: View FFT data alongside scope view or independently.

Tools: Including serial decoding. Generates standard reference signals or (on channels, macro selected scopes) arbitrary waveforms. recorder, alarms Includes frequency and mask limit sweep mode. testing.

Signal generator:

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.

Zoom and pan tools: PicoScope allows a zoom factor of several million, which is necessary when working with the deep memory of the 5000 Series scopes. Either use the zoom-in, zoom-out and pan tools, or click and drag in the zoom overview window for fast navigation.

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

🛶 PicoScope 6 - [serial decoding.psdata] Elle Edit Views Measurements Tools Help 💦 🕕 🎝 🖓 🚮 🛛 100 µs/div 🖂 🛛 🗤 1 16 Bits 2 MS 8 of 8 🔾 🖉 🖹 🥐 🔍 🔍 🤤 M O C V B, ±2 V Scope 1 534.0 µs 63.3 µs 0.744 0.856 1.656 -2.0 \bigcirc -2.4 Spectrum 1 -4.24 -34.82 -45.01 -49.68 -55.21 25.0 Frequency at Peak At Peak 9.993 kHz 90.993 kHz 9.993 kHz 0 Hz

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

Views: PicoScope is carefully designed to make the best use of the display area. You can add new scope and spectrum views with automatic or custom layouts.

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

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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.

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

Math channels: Combine input channels and reference waveforms using simple arithmetic, or create custom equations with trigonometric and other functions.

VERTICAL	PicoScope 5242A	PicoScope 5442A	PicoScope 5242B	PicoScope 5442B	PicoScope 5243A	PicoScope 5443A	PicoScope 5243B	PicoScope 5443B	PicoScope 5244A	PicoScope 5444A	PicoScope 5244B	PicoScope 5444B
Number of channels	2	4	2	4	2	4	2	4	2	4	2	4
Bandwidth (-3 dB)		1 0 0	ЧНz				MHz				MHz	
()						N	mode: 60 MHz) switchable			(except 16-bit	mode: 60 MHz)	
Bandwidth limiting (–3 dB)						,	5 ns			1	3 ns	
Rise time (calculated, 10% to 90%)		5.8	ns				: mode: 5.8 ns)				: mode: 5.8 ns)	
Input connectors						BNCs on	front panel					
Resolution*							15 or 16 bits					
enhanced vertical resolution)							olution + 4 bits)					
nput characteristics							13 pF, ±1 pF					
nput coupling							/DC					
nput sensitivity						2 mV/div	to 4 V/div					
nput ranges						0 mV to ±20 V f		0				
Analog offset range) mV (10, 20, 50 ±2.5 V (500 mV ±20 V (5, 10						
Analog offset control accuracy					±1% of o	ffset setting, addi	tional to basic D	C accuracy				
DC accuracy												
50 mV to $\pm 20 \text{ V}$		≥ 12-bit m	ode: ±0.25% ty			max @ 20 - 30°				full scale max @	20 - 30°C)	
10 mV and ±20 mV ranges				A	II modes: ±2%	typical @ 25°C (:		max @ 20 - 50	C)			
Overvoltage protection						± 100 V (D0	C + AC peak)					
0	the lowest voltag	e ranges: ±10 mV	= 8 bits • ±20 m	רע = 12 bits. All o	ther ranges can	× ×	C + AC peak)					
Overvoltage protection Maximum effective resolution is limited on	the lowest voltag	e ranges: ±10 mV	= 8 bits • ±20 m	nV = 12 bits. All o	ther ranges can	× ×	C + AC peak)					
Overvoltage protection Maximum effective resolution is limited on HORIZONTAL	the lowest voltag	e ranges: ±10 mV 8-bit mode	= 8 bits • ±20 m	nV = 12 bits. All o 12-bit moc	5	use full resolution.	C + AC peak)		15-bit mode		16-bit mode	e
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Noise (on 50 mV range)	8-bit mode 120 μV RMS • 12-bit mo	ode 110 µV RMS • 14-bit mode 100 µV RMS • 15-bit mode 8.	5 μV RMS • 16-bit mode 70 μV RMS
Bandwidth flatness	(+0.3 dB, -3 dB) from DC to full bandwidth	(+0.3 dB, -3 dB) from DC to full bandwidth	(+0.3 dB, -3 dB) from DC to full bandwidth

Audia idea utique signalsalf-sine, white noise, PRBSalf-sine, white noise, PRBSalf-sine, white noise, PRBSStandard signal frequency $DC to 20 MHz$ Output frequency accuracy $\pm 50 ppm (\pm 5 ppm/year)$ $\pm 2 ppm (\pm 1 ppm/year)$ $\pm 2 ppm (\pm 1 ppm/year)$ Output frequency resolution $< 50 mHz$ $\pm 2 V mith \pm 1\% DC accuracy$ Output requency resolution $\leq 50 mHz$ $\pm 2 V range$ Output voltage range $\pm 2 V with \pm 1\% DC accuracy$ $\pm 2 V range$ Amplitude flatness $< 2 dB to 20 MHz, typical @ 50 \Omega load$ SFDR $< 2 dB to 20 MHz, typical @ 50 \Omega output impedanceConnector typeBNC, 50 \Omega output impedanceOvervoltage protection\pm 20 VSweep modesUp, down, or alternating, with selectable start/stop frequencies and incrementsAVG (B models only)14 bits (output step sizeUpdate rate0 00 MS/s0 0 MS/sesolution14 bits (output step sizeapproximately 0.25 mV)approximately 0.25 mV)Burfer size14 bits (output step sizeapproximately 0.25 mV)approximately 0.25 mV)Bandwidth0 < 10 ns2 < 0 0 MLZ- 20 0 MLZapproximately 0.25 mV)approximately 0.25 mV)Bandwidth- 20 MHZ2 < 10 ns- 20 MLZ3 V pk-pk1 kHz$	TRIGGERING	PicoScope 5242A/5442A	PicoScope 5242B/5442B	PicoScope 5243A/5443A	PicoScope 5243B/5443B	PicoScope 5244A/5444A	PicoScope 5244B/5444B	
Advanced strgger fs Edge, Window, Pulse width, Window gala with, Dropout, Window dropout, Timerual, Rust pulse, Logi: Yanger opies (FS mode) Digital triggering provides 1 LSB accuracy up to ful handwidth of scope. • €15' mode: Typical 10 mV p-p. at ful bandwidth Maximum prestrigger capture 100% of capture size Maximum prestrigger capture 4 billion sample Trigger fram file 4 provide sample Trigger fram file 4 provide sample Trigger fram file 4 provide sample Trigger fram file Up to 10,000 waveforms in a 20 ms burst EXTERAL TRIGGER INFU 500 ms file External Trigger fram file 60 MHz 100 MHz 200 MHz Vorger grange 610 MHz 100 MHz 200 MHz Vorserolitig protection ±150 V (DC + AC peak) 100 V (DC + AC peak) ENTERNET 50 prom (55 prom/year) 52 prom (50 ms file 100 MHz Sanderd output signal 6 Signal registers 100 MHz 100 MHz Sanderd output signal 6 Signal registers 100 V (DC + AC peak) 100 V (DC + AC peak) External Signal registers 5 Signal registers 100 V (DC + AC peak) 100 V (DC + AC p	Source			All ch	annels			
Trigger types: (ETS mode) Rights Fearbitry Digital triggering provides 12.85 accuratory to e 165 mode: Typical 10 mV p.p. at full bandwidth Maximum poort rigger capture 4 fullions anycle Trigger treatme time < 2 µs on fastate timebase	Trigger modes			None, Auto, Repeat, Single	, Rapid (segmented memory)			
Sensity in the post frigger capture is be added with a scope. * ET mode: Typical 10 mV p-p. at full bandwidth of scope. * ET mode: Typical 10 mV p-p. * 10 mV p	Advanced triggers		Edge, Window, Puls	e width, Window pulse width, D	Propout, Window dropout, Inter	rval, Runt pulse, Logic		
Maximum pre-trigger capture 1000 strigger capture size Maximum pre-trigger capture < 2 μs on fastest timebase	Trigger types (ETS mode)			Rising	, falling			
Maximum post-rigger rayme 4 billion samples Frigger rate Up to 10,000 waveforms in a 20 ms burst EXTENAL TRIGGER INPUT Edga, pulse width, dropour, interval, logic Frigger rate Front panel BK_L, 1 M0,41% [1 3p ± 1p E Bandwidth 60 MHz 100 MHz 200 MHz Voltage range ±10 VOLD C + AC peak) 200 MHz Voltage range ±10 VOLD C + AC peak) 200 MHz Voltage range ±10 VOLD C + AC peak) 200 MHz Voltage range ±10 VOLD C + AC peak) 200 MHz Voltage range ±10 VOLD C + AC peak) 200 MHz Standard singe range £10 Pm my viden sing, Gaussin, Instand, Instand, With note, PMBS Ramp up/down, sing, Gaussin, Instand, Instand, With note, PMBS Standard singel requency DC to 20 MHz Standard singel requency 12 ppm (si 1 pm/year) 12 ppm (si 1 pm/year) Output forquency resolution ≤2 8to 20 MHz Standard singel requency 12 ppm (si 1 pm/year) 12 prm (si 1 pm/year) Output forquency resolution ≤2 8to 20 MHz Standard singel resolution 12 prm (si 1 pm/year) 12 ppm (si 1 pm/year) Output forgue range 12 V	Sensitivity		Digital triggering provides 1	LSB accuracy up to full bandwid	th of scope. • ETS mode: Typica	l 10 mV p-p, at full bandwidth		
Trigger resem time	Maximum pre-trigger capture			100% of a	apture size			
Up to 10,000 waveforms in a 20 ms burstEXTENUAL TRIGGER INPUTUsing the width, dropout, interval, logicTrigger typesEdge, pulse width, dropout, interval, logicIngue tharacteristicsBandwidth60 MHz200 MHzVoltage range200 MHz200 MHzVoltage range45 V, DC coupledVoltage rotection***********************************	Maximum post-trigger capture			4 billior	1 samples			
Note that RIGGER INPUT Trigger types Edge, pulse width, dropout, interval, logic Bandwidth 60 MHz 100 MHz 200 MHz Bandwidth 60 MHz 100 MHz 200 MHz Volage range ±5 V, DC coupled 200 MHz Overvolage protection ±100 V(Cc + AC peak) Ramp up/down, sinc, Gaussin, halfane, white noise, PRBS Ramp up/down, sinc, Gaussin, halfane, white noise, PRBS Ramp up/down, sinc, Gaussin, halfane, white noise, PRBS Pulse Protection Standard signal frequency Cho to 20 MHz OL to 20 MHz Qualiane, white noise, PRBS Ramp up/down, sinc, Gaussin, halfane, white noise, PRBS Ramp up/down, sinc, Gaussin, halfa	Trigger re-arm time			< 2 µs on fas	stest timebase			
Trigger types Edge pulse width, dropout, itterval, log: Input characteristics From panel BNC, 1MD ±1% 13 pf ±1 pf 200 MHz Bandwidth 60 MHz 100 MHz 200 MHz Votage range ±5 V, DC coupled 200 MHz Overvotage protection ±100 V (DC + AC pask) F FUNCTION GENERATOR Sindard signife requency Barnp up/down, sinc, Gaussian half-anc, white note, PRBS Ramp up/down, sinc, Gaussian half-anc, white note, PRBS SO mHz Output votag	Maximum trigger rate			Up to 10,000 wavef	orms in a 20 ms burst			
Front panel BNC, 1M 01 41% [13 pF ±1 pFBandwidth60 MHz100 MHz200 MHzVoltage range±3 V, DC coupledOverologge protection±100 V (DC + AC peak)FINAL TOTAL STREAM ON Standard output signalsSine, square, triangle. DC voltageSine, square, triangle. DC voltageConduction (Singal anglitude into ite, PRBSSine, square, triangle. DC voltageConduction (Singal anglitude and offset adjustable into ite, PRBSSingal anglitude and offset adjustable into item avecConduction (Singal anglitude and offset adjustable inter waveSingal anglitude and offset adjustable inter waveConduction (Singal anglitude and offset adjustable inter wave <td colsp<="" td=""><td>EXTERNAL TRIGGER INPUT</td><td></td><td></td><td></td><td></td><td></td><td></td></td>	<td>EXTERNAL TRIGGER INPUT</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	EXTERNAL TRIGGER INPUT						
Bandwidth 60 MHz 100 MHz 200 MHz Voltage range ±5 V, DC coupled	Trigger types							
Voltage range ±5 V, DC coupled Overvoltage protection ±100 V (DC + AC peak) FUNCTION GENERATOR Standard output signals Sine, square, triangle, DC voltage Advanced output signals Ramp up/down, sinc, Gaussian, Indiane, white noise, RBS Ramp up/down, sinc, Gaussian, Indiane, Wite noise, RBS Ramp up/down, sinc, Gaussian, Indiane, Wite noise, RBS Couplet voltage adjustiment S2 ppm (s1 ppm/year) S2 ppm (s1 ppm/year) S2 ppm (s1 ppm/year) S2 ppm (s1 ppm/year)	Input characteristics			Front panel BNC, 1 I	MΩ ±1% 13 pF ±1 pF			
Overvoltage protection $\pm 100 V (DC + AC peak)$ FUNCTION CENTERATOR Standard output signals Sine, square, triagle, DC voltage Advanced output signals Namp up/down, sinc, Gaussian, halisine, white noise, PRBS Among up/down, sinc, Gaussian, halisine, white noise, PRBS Ramp up/down, sinc, Gaussian, halis r		60	MHz			200) MHz	
PUNCTION GENERATOR Standard output signals Sine, square, triangle, DC voltage Advanced output signals Ramp up/down, sinc, Gausdan, half-sine, white noise, PRBS Ramp up/down, sinc, Gausdan, half-sine, white noise, PRBS Pamp up/down, sinc, Gausdan, half-sine, white noise, PRBS Pamp up/down, sinc, Gausdan, half-sine, white noise, PRBS Path up/war) £2 pm (±1 pm//year) £2 pm (±1 pm//year) £2 pm (±1 pm//year) £2 pm (±1 pm//year) Utput requency resolution \$50 mHz Output voltage range £2 V with ±1% DC accuracy Output voltage range £2 V with ±1% DC accuracy Output voltage range \$2 V with ±1% DC accuracy Output voltage range \$2 V with ±1% DC accuracy \$2 V more rall ± 2 V range Amplitude flatness \$2 dB to 20 MHz, typical @ 50 Q load \$50 R \$60 RQ \$50 R \$20 V \$2 V erv oft till scale sine wave \$20 V \$20 QMS/s \$20 V \$20 QMS/s \$20 MHz \$20 QMS/s \$20 MHz \$20 QMS/s \$20 MHz \$20 MHz \$20 MHz \$20 MHz \$20 MHz \$20 MHz \$20								
Standard output signalsSine, square, triangle, DC voltageAdvanced output signalsamp up/down, sinc, Gaussian halfsine, white noise, PRBSamp up/down, sinc, Gaussian halfsine, white noise, PRBSamp up/down, sinc, Gaussian halfsine, white noise, PRBSStandard signal frequency $DC to 20 MHz$ Output frequency accuracy $\pm 50 \text{ ppm}/\text{ser})$ $\pm 2 \text{ ppm}(\pm 1 \text{ ppm}/\text{year})$ $\pm 2 \text{ ppm}(\pm 1 \text{ ppm}/\text{year})$ Output frequency resolution $< 50 \text{ mHz}$ Output voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U vangeOutput voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U rangeOutput voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U rangeOutput voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U rangeOutput voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U rangeOutput voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U rangeOutput voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U rangeOutput voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U rangeOutput voltage range $\pm 2 \text{ V with } 1\% DC accuracy$ U rangeOutput voltage range adjustnetin and paperso. 0.25 mV steps within overall $\pm 2 \text{ V range}$ U rangeGonector type $\pm 20 \text{ U range}$ $\pm 20 \text{ U range}$ $\pm 20 \text{ U range}$ Gonector type $U \text{ J d bit (output register) accuracy output impedance20 \text{ MS}^{3}= 40 \text{ MS}^{3}Buffer size16 kS-3 \text{ 32 kS}-4 \text{ 48 kS}= 41 bits (output register) approximately 0.25 mV)= 41 \text{ bits (output $	Overvoltage protection			±100 V (D0	C + AC peak)			
Advanced output signalsRamp up/down, sinc, Gaussian, half-sine, white noise, PRBSRamp up/down, sinc, Gaussian, half-sine, white noise, PRBSRump up/d	FUNCTION GENERATOR							
Advanced output signalsall fairine, white noise, PRBSall fairine, white noise, PRBSall fairine, white noise, PRBSStandard signal frequency $\pm 50 \text{ ppm} (\pm 5 \text{ ppm}/year)$ $\pm 2 \text{ ppm} (\pm 1 \text{ ppm}/year)$ $\pm 2 \text{ ppm} (\pm 1 \text{ ppm}/year)$ Output frequency resolution $\leq 50 \text{ mHz}$ $\pm 2 \text{ V mith } \pm 1\% \text{ DC accuracy}$ $\pm 2 \text{ V mith } \pm 2 \text{ V range}$ Output voltage range $\pm 2 \text{ V mith } \pm 1\% \text{ DC accuracy}$ $\pm 2 \text{ V range}$ $\pm 2 \text{ V range}$ Amplitude flatness $\leq 2 \text{ dB to } 20 \text{ MHz}$, typical $\oplus 50 \Omega \text{ load}$ $\pm 2 \text{ V range}$ SFDR $\pm 2 \text{ V range}$ $\pm 2 \text{ V range}$ $\pm 2 \text{ V range}$ Connector type $ SUPA, voltage noise, noi$	Standard output signals							
Output frequency accuracy $\pm 50 \text{ ppm} (\pm 5 \text{ ppm})/\text{year}$ $\pm 2 \text{ ppm} (\pm 1 \text{ ppm})/\text{year}$ $\pm 2 \text{ ppm} (\pm 1 \text{ ppm})/\text{year}$ Output frequency resolution<50 mHz	Advanced output signals	-		-		-	Ramp up/down, sinc, Gaussian, half-sine, white noise, PRBS	
Output frequency resolution < 50 mHz Output voltage range $\pm 2V$ with $\pm 1\%$ DC accuracy Output voltage adjustment Signal amplitude and offset adjustable in approx. 0.25 mV steps within overall $\pm 2V$ range Amplitude flatness < 24 Bto 20 MHz, typical @ 50.0 load	Standard signal frequency			DC to	20 MHz			
±2 V with ±1% DC accuracy Output voltage range ± 2 V with ±1% DC accuracy Output voltage adjustment Signal amplitude and offset adjustable in approx. 0.25 mV steps within overall ± 2 V range Amplitude flatness < 2 dB to 20 MHz, typical @ 50 Q load SFDR > 70 dB, 10 kHz full scale sine wave Connector type BNC, 50 Q output impedance Overvoltage protection ± 20 V Sweep modes Up, down, or alternating, with selectable start/stop frequencies and increments AWG (B models only) Update rate 200 MS/s - 200 MS/s Update rate - 200 MS/s - 48 kS Resolution - 14 bits (output step size approximately 0.25 mV) - 14 bits (output step size approximately 0.25 mV) - 14 bits (output step size approximately 0.25 mV) - 14 bits (output step size approximately 0.25 mV) - 200 MHz - 200 MHz Bandwidth - > 20 MHz - > 20 MHz - 200 MHz - 200 MHz Bandwidth - > 20 MHz -	Output frequency accuracy	±50 ppm (±	5 ppm/year)	±2 ppm (±	1 ppm/year)	±2 ppm (±	1 ppm/year)	
Output voltage adjustmentSignal amplitude and offset adjustable in approx. 0.25 mV steps within overall ± 2 V rangeAmplitude flatness< 2 dB to 20 MHz, typical @ 50 Q load	Output frequency resolution							
Amplitude flatness < 2 dB to 20 MHz, typical @ 50 Ω load	Output voltage range			±2 V with ±1	% DC accuracy			
SFDR > 70 dB, 10 kHz full scale sine wave Connector type BNC, 50 Ω output impedance Overvoltage protection ±20 V Sweep modes Up, down, or alternating, with selectable start/stop frequencies and increments AWG (B models only) Update rate 200 MS/s - 200 MS/s Update rate - 200 MS/s - 200 MS/s 48 kS Buffer size - 16 kS - 32 kS - 48 kS Resolution - 14 bits (output step size approximately 0.25 mV) - 48 kS - 49 bits (output step size approximately 0.25 mV) - 49 bits (output step size approximately 0.25 mV) - 40 mapproximately 0.25 mV) - 200 MHz - 20 MHz - 48 kS - 48 kS - - 48 kS - <	Output voltage adjustment		Signal ampli	tude and offset adjustable in app	rox. 0.25 mV steps within overa	all ± 2 V range		
Connector type BNC, 50 Ω output impedance Overvoltage protection $\pm 20 V$ Sweep modes Up, down, or alternating, with selectable start/stop frequencies and increments AWG (B models only) V Update rate - $200 MS/s$ - $200 MS/s$ Buffer size - 16 k5 - $32 kS$ - $48 kS$ Resolution - 14 bits (output step size approximately 0.25 mV) - $14 bits (output step size approximately 0.25 mV) - 200 MLz - >20 MLz - - 10 ns - 10 ns - 10 ns $	Amplitude flatness			< 2 dB to 20 MHz	, typical @ 50 Ω load			
Overvoltage protection $\pm 20 V$ Sweep modes Up, down, or alternating, with selectable start/stop frequencies and increments AWG (B models only) V Update rate - 200 MS/s - 200 MS/s - 200 MS/s Buffer size - 16 kS - 32 kS - 48 kS 48 kS Resolution - 14 bits (output step size apprximately 0.25 mV) - 14 bits (output step size apprximately 0.25 mV) - 14 bits (output step size apprximately 0.25 mV) - 14 bits (output step size apprximately 0.25 mV) - 14 bits (output step size apprximately 0.25 mV) - 0 ADMHz - > 20 MHz - - 10 ms - -	SFDR			> 70 dB, 10 kHz	full scale sine wave			
Up, down, or alternating, with selectable start/stop frequencies and incrementsAWG (B models only)Update rate-200 MS/s-200 MS/sBuffer size-16 kS-32 kS-48 kSResolution-14 bits (output step size approximately 0.25 mV)-14 bits (output step size approximately 0.25 mV)14 bits (output step size approximately 0.25 mV)14 bits (output step size approximately 0.25 mV)-14 bits (output step size approximately 0.25 mV)Bandwidth-> 20 MHz-> 20 MHz-> 20 MHzRise time (10% to 90%)-< <10 ns-< <10 ns<< <10 nsPROBE COMPENSATION OUTPUTOutput characteristics<<600 Ω </td <td>Connector type</td> <td></td> <td></td> <td>BNC, 50 Ω οι</td> <td>ıtput impedance</td> <td></td> <td></td>	Connector type			BNC, 50 Ω οι	ıtput impedance			
AWG (B models only)Update rate-200 MS/s-200 MS/sBuffer size-16 kS-32 kS-48 kSResolution-14 bits (output step size approximately 0.25 mV)-14 bits (output step size approximately 0.25 mV)-20 MHz-> 20 MHz-10 ns-10 ns-10 ns-10 ns-10 ns<	Overvoltage protection			±2	20 V			
Update rate - 200 MS/s - 200 MS/s - 200 MS/s Buffer size - 16 kS - 32 kS - 48 kS Resolution - 14 bits (output step size approximately 0.25 mV) - 14 bits (output step size approximately 0.25 mV) 14 bits (output	Sweep modes		Up, do	own, or alternating, with selectab	le start/stop frequencies and in	crements		
Update rate - 200 MS/s - 200 MS/s - 200 MS/s Buffer size - 16 kS - 32 kS - 48 kS Resolution - 14 bits (output step size approximately 0.25 mV) - 14 bits (output step size approximately 0.25 mV) 14 bits (output	AWG (B models only)							
Resolution14 bits (output step size approximately 0.25 mV)14 bits (output step size approximately 0.25 mV)14 bits (output step size approximately 0.25 mV)Bandwidth- > 20 MHz- > 20 MHz- > 20 MHzRise time (10% to 90%)- < 10 ns- < 10 ns < 10 ns < 10 ns < 10 ns PROBE COMPENSATION OUTPUT Output characteristics 600Ω Output frequency 1 kHz $< 3 \text{ V pk-pk}$		-	200 MS/s	-	200 MS/s	-	200 MS/s	
Resolution approximately 0.25 mV)	Buffer size	-	16 kS	-	32 kS	-	48 kS	
Bandwidth-> 20 MHz-> 20 MHz-> 20 MHzRise time (10% to 90%)-< 10 ns	Resolution	-		-		-		
PROBE COMPENSATION OUTPUTOutput characteristicsOutput frequencyOutput frequencyOutput level3 V pk-pk	Bandwidth	-		-		-		
Output characteristics600 ΩOutput frequency1 kHzOutput level3 V pk-pk	Rise time (10% to 90%)	-	< 10 ns	-	< 10 ns	-	< 10 ns	
Output frequency 1 kHz Output level 3 V pk-pk	PROBE COMPENSATION OUTPL	JT						
Output level 3 V pk-pk	Output characteristics			60	Ω 00			
	Output frequency			1	kHz			
	Output level			3 V	pk-pk			
	Overvoltage protection							

SPECTRUM ANALYZER	PicoScope 5242A/5442A	PicoScope 5242B/5442B	PicoScope 5243A/5443A	PicoScope 5243B/5443B	PicoScope 5244A/5444A	PicoScope 5244B/5444B
Frequency range	DC to	60 MHz	DC to	100 MHz	DC to	200 MHz
Display modes			Magnitude, av	erage, peak hold		
Windowing functions		Rectangula	ar, Gaussian, triangular, Blackmai	n, Blackman-Harris, Hamming, ⊢	lann, 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, delay, average, frequ	x^y, sqrt, exp, ln, log, abs, norm 1ency, derivative, integral, min, m	n, sign, sin, cos, tan, arcsin, arcco nax, peak, duty, highpass, lowpa	s, arctan, sinh, cosh, tanh, ss. bandpass, bandstop	
Operands		// 0/ 1		(time), reference waveforms, pi		
AUTOMATIC MEASUREMENTS						
Scope mode	AC RMS, true RMS, freq	uency, cycle time, duty cycle, D	C average, falling rate, rising rate	e, low pulse width, high pulse wi	dth, fall time, rise time, minimur	n, maximum, peak to peak
Spectrum mode	Fi	requency at peak, amplitude at	peak, average amplitude at peak	, total power, THD %, THD dB,	THD+N, SFDR, SINAD, SNR, I	MD
Statistics			Minimum, maximum, av	verage, standard deviation		
SERIAL DECODING						
Protocols	1-Wire, ARINC 429, C	AN, CAN-FD, DCC, DMX512,	Ethernet 10Base-T, Ethernet 100	Base-TX, FlexRay, I ² C, I ² S, LIN,	PS/2, SENT, SPI, UART (RS-23	32/RS-422/RS-485), USB
MASK LIMIT TESTING						
Statistics			Pass/fail, failure	count, total count		
DISPLAY						
Interpolation			Linear c	or sin(x)/x		
Persistence modes			Digital color, analog	intensity, custom, fast		
GENERAL						
PC connectivity			USB 2.0 hi-speed (USB 1.1, U	SB 3.0 and USB 3.1 compatible)		
Power requirements		1 A (2 channels) from 2 U	ISB ports (double-headed cable s	upplied) or 1.5 A at 5 V (up to 4	t channels) from AC adaptor	
Dimensions				(including connectors)		
Weight				.5 kg		
Temperature range		1 0	0 °C to 40 °C (20 °C to 30 °C f	,, 0		
Humidity range		Operating: 5	%RH to 80 %RH non-condensir		on-condensing.	
Environment			Dry locations only;	up to 2000 m altitude		
Safety approvals			Designed to E	N 61010-1:2010		
EMC approvals				6 and FCC Part 15 Subpart B		
Environmental approvals				/EEE compliant		
Software/PC requirements				oft Windows 7, 8 or 10 Microsoft Windows 7, 8 or 10		
Accessories		USB	cable(s), 2 or 4 probes in probe	e case, AC adaptor for 4-channel	scope	
Languages			nese, Czech, Danish, Dutch, Eng Corean, Norwegian, Polish, Portu			

Connections

The front panels of the 2-channel PicoScope 5000 Series oscilloscopes have:

- 2 x BNC analog input channels
- 1 x BNC external trigger input
- 1 x BNC AWG/function generator output
- 1 x probe compensation output



Kit contents and accessories

Your PicoScope 5000 Series oscilloscope kit contains the following items:

- PicoScope 5000 Series oscilloscope
- 2 x probes (2-channel scopes)
- 4 x probes (4-channel scopes)
- Double-headed USB 2.0 cable
- Standard USB 2.0 cable (4-channel scopes only)

- DC power supply (4-channel scopes only)
- Quick Start Guide
- Software and Reference CD

The front panels of the 4-channel PicoScope 5000 Series oscilloscopes have:

- 4 x BNC analog input channels
- 1 x BNC external trigger input
- 1 x BNC AWG/function generator output
- 1 x probe compensation output



Probes

Your PicoScope 5000 Series oscilloscope kit comes with probes specifically trimmed to match the performance of your oscilloscope. The part numbers for these probes are as follows:

60 MHz

MI007

250 MHz

TA131

150 MHz

TA132

The rear panels of all oscilloscopes in the PicoScope 5000 Series have:	

- 1 x DC power socket
- 1 x USB 2.0 port



Ordering information

ORDER CODE	DESCRIPTION	NUMBER OF CHANNELS	BANDWIDTH	OUTPUT	BUFFER SIZE	PROBES SUPPLIED	USD*	EUR*	GBP*
PP863	PicoScope 5242A	-	60 MHz	Function generator	16 MS	2 × 40 MLI=	1155	979	799
PP864	PicoScope 5242B	_		AWG	32 MS	2 x 60 MHz	1315	1115	909
PP865	PicoScope 5243A	2	100 MHz	Function generator	64 MS	21E0 MUL	1485	1255	1035
PP866	PicoScope 5243B	- <u>2</u>		AWG	128 MS	2 x 150 MHz	1645	1395	1135
PP867	PicoScope 5244A	-	200 MHz	Function generator	256 MS	22E0 MU	1805	1535	1245
PP868	PicoScope 5244B			AWG	512 MS	2 x 250 MHz	1975	1675	1365
PP869	PicoScope 5442A		60 MHz	Function generator	16 MS	4	1565	1325	1085
PP870	PicoScope 5442B	-		AWG	32 MS	4 x 60 MHz	1805	1535	1245
PP871	PicoScope 5443A	1	100 MHz	Function generator	64 MS	4 150 MLL-	2055	1745	1415
PP872	PicoScope 5443B	4		AWG	128 MS	4 x 150 MHz	2305	1955	1595
PP873	PicoScope 5444A	-	200 MHz	Function generator	256 MS	4	2545	2165	1765
PP874	PicoScope 5444B	_	200 MHZ	AWG	512 MS	4 x 250 MHz	2795	2375	1925

UK global headquarters:	North America regional office:	Asia-Pacific regional office:	
Pico Technology James House Colmworth Business Park St. Neots Cambridgeshire PE19 8YP United Kingdom	Pico Technology 320 N Glenwood Blvd Tyler Texas 75702 United States	Pico Technology Room 2252, 22/F, Centro 568 Hengfeng Road Zhabei District Shanghai 200070 PR China	
 2 +44 (0) 1480 396 395 	 ☎ +1 800 591 2796 ♣ +1 620 272 0981 	會 +86 21 2226-5152	
sales@picotech.com	⊠ sales@picotech.com	⊠ pico.china@picotech.com	viet/

* Prices correct at the time of publication. Sales taxes not included. Please check www.picotech.com for the latest prices before ordering.

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