pico® Technology

# PicoScope 9000 Series

## Sampling Oscilloscopes for Windows PCs

Telecoms engineering | Production testing | R&D | Semiconductor characterisation

*A complete sampling oscilloscope for your PC*

12 GHz bandwidth on 2 channels
Dual timebase from 10 ps/div
Up to 10 GHz trigger bandwidth
5 TS/s equivalent-time sampling rate

- High-resolution cursor and automatic waveform measurements with statistics
- Waveform processing including FFT
- Time and voltage histograms
- Eye-diagram measurements for NRZ and RZ
- Automated mask tests
- Intuitive Windows user interface
- Electrical standards compliance testing
- Semiconductor characterization
- Telecom service and manufacturing
- Timing analysis
- Digital system design and characterization
- Electronic mask drawing and display
- Automatic pass/fail limit testing
- High-speed serial bus pulse response

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## 12 GHz bandwidth

The wide bandwidth specification provides acquisition and measurement of fast signals with a rise time of 50 ps or faster. Timebase stability, accuracy, and resolution of 200 fs allow characterisation of jitter in the most demanding applications.

## 10 GHz prescaled trigger

The PicoScope 9000 Series has a built-in high-frequency trigger. The bandwidth of up to 10 GHz allows measurements of microwave components with extremely fast data rates.

## 1 GHz full-function direct trigger

The PicoScope 9000 Series is equipped with built-in direct trigger for signals up to 1 GHz repetition rate without using additional trigger units.

## Built-in 2.7 Gb/s clock recovery

The PicoScope 9211 has built-in clock recovery for serial data up to 2.7 Gb/s.

## Pulse parameter measurements

The PicoScope 9000 scopes quickly measure more than 40 pulse parameters. Up to ten simultaneous measurements or four statistics measurements are supported. No need to count graticules and estimate the waveform's position. The measurements conform to the IEEE standards.

## Kit contents

- PicoScope 9201 or 9211 Sampling PC Oscilloscope
- PicoScope 9000 Series Software CD
- Installation guide
- Two SMA M-F adapters/connector savers
- USB cable
- LAN cable (9211 only)
- Power supply - UK, US, EU or AUS/NZ
- Carry case

## Powerful mathematical analysis

The PicoScope 9000 Series supports up to four simultaneous mathematical combinations and functional transformation of acquired waveforms.

You can select any of the mathematical functions as a maths operator to act on the operand or operands. A waveform maths operator is a maths function that requires either one or two sources. The operators that involve two waveform sources are: Add, Subtract, Multiply, and Divide. The operators that involve one waveform source are: Invert, Absolute, Exponent, Logarithm, Differentiate, Integrate, Inverse, FFT, Interpolation, Smoothing.

## Histogram analysis

A histogram is a probability distribution that shows the distribution of acquired data from a source within a user-definable histogram window. The information gathered by the histogram is used to perform statistical analysis on the source.

Histograms can be constructed on waveforms on either the vertical or horizontal axes. The most common use for a vertical histogram is measuring and characterising noise on displayed waveforms, while the most common use for a horizontal histogram is measuring and characterising jitter on displayed waveforms.

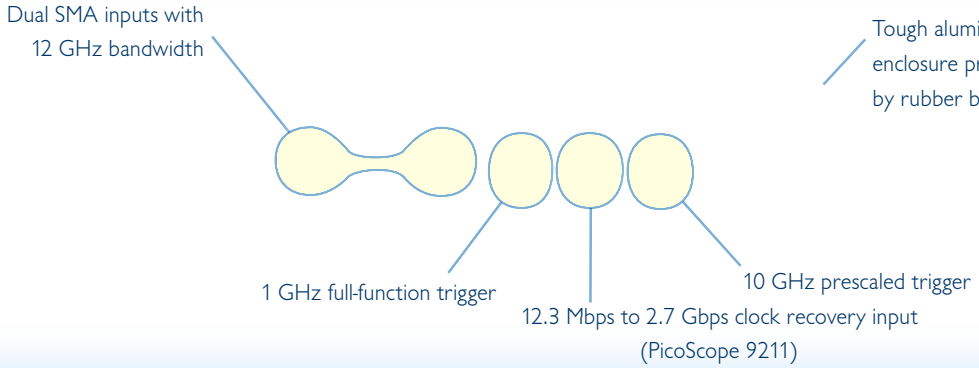
## Eye-diagram analysis

The PicoScope 9000 Series quickly measures more than 30 fundamental parameters used to characterise non-return-to-zero (NRZ) signals and return-to-zero (RZ) signals. Up to four parameters can be measured simultaneously.

### Mask testing

For eye-diagram masks, such as those specified by the SONET and SDH standards, the PicoScope 9000 Series supports on-board mask drawing for visual comparison. The display can be grey-scaled or colour-graded to aid in analysing noise and jitter in eye diagrams.

## PicoScope 9000 Series front panel



# PicoScope 9000 Series PC Sampling Oscilloscopes

| | |
|---|---|
| **Channels (vertical)** | |
| Number of channels | 2 (simultaneous acquisition) |
| Bandwidth | DC to 12 GHz |
| Pulse response rise time | 29.2 ps |
| RMS noise, maximum | < 2.5 mV |
| Scale factors (sensitivity) | 2 mV/div to 500 mV/div |
| Nominal input impedance | (50 ± 1) Ω |
| Input connectors | SMA (F) |
| **Timebase (horizontal)** | |
| Timebases | 10 ps/div to 2 ms/div (main, intensified, two delayed, or dual delayed) |
| Delta time interval accuracy | ±0.4% of of delta time interval ±15 ps ±100 ppm of delay setting |
| Time interval resolution | 200 fs minimum |
| **Trigger** | |
| Trigger sources | External direct trigger, external prescaled trigger, internal clock trigger, clock recovery trigger (9211 only) |
| Direct trigger bandwidth and sensitivity | 100 mV p-p DC to 100 MHz, increasing linearly from 100 mV p-p at 100 MHz to 400 mV p-p at 1 GHz |
| Prescaled trigger bandwidth and sensitivity | 200 mV p-p to 2 V p-p from 1 GHz to 8 GHz, 300 mV p-p to 1 V p-p to 10 GHz |
| Trigger RMS jitter, maximum | 3.5 ps + 20 ppm of delay setting |
| **Acquisition** | |
| ADC resolution | 16 bits |
| Digitising rate | DC to 100 kHz maximum |
| Acquisition modes | Sample (normal), average, envelope |
| Data record length | 32 to 4096 points maximum per channel in x2 sequence |
| **Display** | |
| Display resolution | Variable |
| Display style | Dots, vectors, variable persistence, infinite persistence, variable grey scaling, infinite grey scaling, variable colour grading, infinite colour grading |
| **Measurements and analysis** | |
| Marker | Vertical bars, horizontal bars (measure volts) or waveform markers (x and +) |
| Automatic measurements | Up to 40 automatic pulse measurements |
| Histogram | Vertical or horizontal |
| Mathematics | Up to four math waveforms can be defined and displayed |
| FFT | Up to two fast Fourier transforms can be run simultaneously with the built-in filters (Rectangular, Nicolson, Hanning, Flattop, Blackman- Harris and Kaiser-Bessel) |
| Eye diagram | Automatically characterises NRZ and RZ eye patterns. Measurements are based on statistical analysis of the waveform. |
| Mask test | Acquired signals are tested for fit outside areas defined by up to eight polygons. Standard or user-defined masks can be selected. |
| **Clock recovery (CDR; PicoScope 9211 only)** | |
| Sensitivity | 50 mV p-p typ from 12.3 Mb/s to 2.7 Gb/s continuous rate |
| Recovered clock RMS trigger jitter, maximum | 1.0% of unit interval |
| Maximum safe trigger input voltage | ±2 V (DC + peak AC) |
| Trigger input connector | SMA (F) |
| **General** | |
| Operating temperature range | +5 °C to +40 °C |
| Power | +6 VDC ± 5%. 1.9 A max. (2.3 A for PicoScope 9211). Mains adaptor supplied for UK/US/EU/AUS/NZ. |
| PC connection | USB 2.0 (compatible with USB 1.1) |
| LAN connection | 10/100 Mbit/s (PicoScope 9211 only) |
| PC requirements | Windows XP (SP2) or Vista, 32-bit versions |
| Dimensions | W 170 mm x D 255 mm x H 40 mm |
| Weight | 1.0 kg |

| Ordering information | £ | $ | € |
|---|---|---|---|
| PP463 PicoScope 9201 12 GHz PC Sampling Oscilloscope | 5,995 | 10,795* | 7 795* |
| PP473 PicoScope 9211 12 GHz PC Sampling Oscilloscope with CDR and LAN | 6,995 | 12,595* | 9 095* |

* Dollar and euro prices are subject to exchange rate fluctuations. Please contact Pico Technology for the latest prices before ordering.
Errors & omissions excepted.

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