

# PicoConnect™ 900 Series

GIGABIT, RF, MICROWAVE AND PULSE PASSIVE PROBES



## High performance at low cost

Up to 9 GHz bandwidth  
Up to 18 Gb/s serial data rate  
From only \$699

## Gigabit AC and DC-coupled probe heads

For Ethernet, USB 3, HDMI, SATA, PCI, LVDS  
Down to 40 ps transition time

## RF, microwave and pulse probe heads

Up to 5 GHz bandwidth  
Down to 70 ps transition time

## Interchangeable heads and cables

Choice of divide ratios, speed and coupling

## Low input capacitance

0.3 pF typical

## Convenient

Available individually or as sets of six  
Supplied in handy storage case with precision  
low-loss cable and solder-in kit

[www.picotech.com](http://www.picotech.com)

The PicoConnect 900 Series low-invasive, high-frequency passive probes are designed for microwave and gigabit applications up to 9 GHz and 18 Gb/s. They deliver unprecedented performance and flexibility at a low price.

The probes employ a unique (patent pending) in-PCB construction to realize extremely low capacitance, coplanar microwave integrity, robust reliability and very low cost. The result is a family of miniature interchangeable passive probe heads that cover a range of division ratios, bandwidths and coupling types.



## THE SHAPE OF PROBES TO COME

Affordable probing and analysis for high-performance design and test

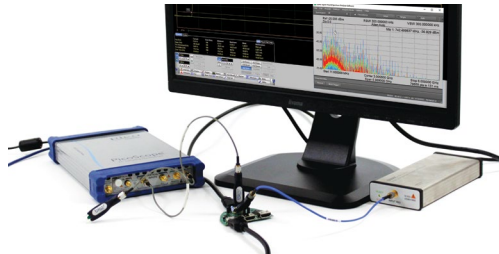
### Phenomenal value for money

At 1 GHz and above, and supplied by just a few manufacturers, most test probes are of familiar oscilloscope probe shape but with an active buffer amplifier within an enlarged probe body. They are mechanically complex, quite bulky, often heavy and always costly.

In a survey of probes with bandwidths above 3 GHz, we found that the PicoConnect passive probe solution was less than 20% of the cost of competing types – a saving that can apply across every measurement channel! PicoConnect probes are also cost-effective in applications at or under 1 GHz.

### Use with a wide range of instrumentation

The PicoConnect 900 Series passive probes are designed for use with any instrument having 50  $\Omega$  inputs, including oscilloscopes, spectrum analyzers, modulation analyzers and counters, without regard to manufacturer.



## Interchangeable division ratio

To avoid slew rate limitations, high-speed digital signals have moved to lower amplitudes, with some operating at only 100 mV swing. To raise probing impedance when using a low-cost probe, we have to divide this voltage to an even lower amplitude. The PicoConnect 900 Series of interchangeable probe heads provides three division ratios to suit each application. The 5:1 ratio is a particularly attractive and faster option when probing low-swing logic.

## AC or DC coupled probe head

Pico also brings the flexibility of AC or DC coupling, again through selection of interchangeable probe heads. Low-impedance probes load the probed signal, slightly reducing the amplitude. If the signal has a DC bias they will source or sink current to or from the signal source, potentially changing the device operating bias. The AC-coupled probe avoids this DC bias problem. Low-frequency 3 dB cut-off is less than 160 kHz on all AC-coupled models and droop of pulse top or base is < 0.1%/ns.

# THE FLEXIBLE HIGH-FREQUENCY PROBES

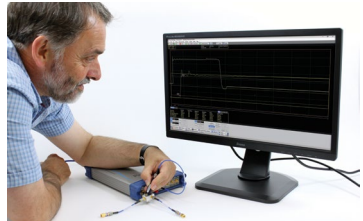
Choice of division ratio, AC/DC coupling, dynamic range and loading

## Load-compensated divide ratio for multiple typical line impedances

The PicoConnect 900 Series low-impedance probes are suited only to the probing of low-impedance test nodes, typically in the range 0  $\Omega$  to 100  $\Omega$ . Such nodes will usually be terminated transmission lines, generally 50  $\Omega$ , 45  $\Omega$  or 75  $\Omega$  single-ended. It will also be common to use two probes on 100  $\Omega$  or 90  $\Omega$  differential lines (50  $\Omega$  or 45  $\Omega$  single-ended). On the assumption of a test node impedance in this range, the PicoConnect 900 Series probes are ratio-compensated to give an error typically below 2.5% (0.2 dB) and no more than 11% (0.9 dB).

## High-energy pulse and burst applications

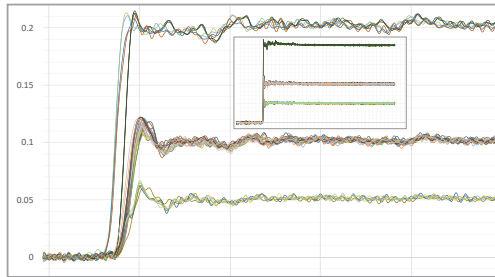
Employing MELF resistor technology, the PicoConnect 900 Series RF and microwave models can be used for high-amplitude narrow pulse or burst applications such as high-energy physics, radar or RF imaging. Detailed specifications at [www.picotech.com](http://www.picotech.com).



## Low-invasive probing

Probing a transmission line inevitably causes a mismatch on the line and disturbs signal amplitude. This we can compensate, but spectral phasing and flatness present more of a challenge. The PicoConnect approach is to minimize disturbance and measurement errors by ensuring exceptionally low probe-tip capacitance at all probe bandwidths.

Typically, with PicoConnect probes, broadband signals can be probed without disturbing circuit or system function and your measurements will be supported by a market-leading pulse response.



PicoConnect passive probe family pulse shapes - first 2 ns (inset 17 ns)  
(Corrected TDT using PicoScope 9311 20 GHz TDT/TDR sampling oscilloscope relative to reference through-path)

## PROBING WAS A COMPROMISE... UNTIL NOW

Minimally invasive probing for transmission lines



## Designed for reliability

Low-cost, highly repeatable, very robust and high-integrity coplanar microwave design and screening are all simultaneously achieved through within-substrate assembly of components and edge-of-substrate assembly of test pins and connectors (patent pending).

Passive design ensures tolerance of static discharge, inherently linear and low-noise signal integrity without significant overload recovery error or latency.



PicoConnect™ 900 Series probe

- PicoConnect 900 Series probe head
- Precision 600 mm 085 low-loss cable
- SMA-to-BNC adaptor (RF and microwave probes only, max. 3 GHz usage)
- Set of interchangeable gold-plated probe and sprung ground tips
- Two coils of solder-in gold-plated wire
- User's Guide
- Storage and carry case

## PICOCONNECT™ 900 SERIES PROBES

### Pack contents



PicoConnect™ 900 Series kit

- All the above, but with six interchangeable probe heads and two low-loss cables
- All six probes in a flexible cost-saving kit – two probes effectively free!

Model	911   912	913   914	915   916
Nominal division ratio	20:1	10:1	5:1
Bandwidth (-3 dB)	> 4 GHz	> 4 GHz	> 5 GHz
Max. usable data rate (fundamental)	8 Gb/s	8 Gb/s	10 Gb/s
Transition time	< 87.5 ps	< 87.5 ps	< 70 ps
Probe tip impedance (nominal)	960 $\Omega$	440 $\Omega$	230 $\Omega$
Probe tip capacitance (typical)	0.3 pF	0.3 pF	0.3 pF
Probe tip capacitance (maximum)	0.4 pF	0.4 pF	0.4 pF
Coupling <sup>[1]</sup>	AC   DC	AC   DC	AC   DC
Continuous AC voltage (maximum) <sup>[2]</sup>	14 V RMS	10 V RMS	8 V RMS
DC block voltage (max.) <sup>[2]</sup>	50 V   N.A.	50 V   N.A.	50 V   N.A.

## SPECIFICATIONS: RF, MICROWAVE AND PULSE PROBES

Download full specifications from [www.picotech.com](http://www.picotech.com)

### Notes

- [1] AC models pass all frequencies above 160 kHz (-3 dB).
- [2] 150 V peak subject to the RMS limitation and non-hazardous signal and connection within the meaning of EN61010 and the Low Voltage Directive.

Model	921   922	923   924	925   926
Nominal division ratio	20:1	10:1	5:1
Bandwidth (-3 dB)	> 6 GHz	> 7 GHz	> 9 GHz
Max. usable data rate (fundamental)	12 Gb/s	14 Gb/s	18 Gb/s
Transition time	< 58.3 ps	< 50 ps	< 38.8 ps
Probe tip impedance (nominal)	515 Ω	250 Ω	220 Ω
Probe tip capacitance (typical)	0.3 pF	0.3 pF	0.3 pF
Probe tip capacitance (maximum)	0.4 pF	0.4 pF	0.4 pF
Coupling <sup>[1]</sup>	AC   DC	AC   DC	AC   DC
Continuous AC voltage (maximum) <sup>[2]</sup>	7 V RMS	5 V RMS	5 V RMS
DC block voltage (max.) <sup>[2]</sup>	50 V   N.A.	50 V   N.A.	50 V   N.A.

## SPECIFICATIONS: GIGABIT PROBES

Download full specifications from [www.picotech.com](http://www.picotech.com)

All models	
Safety approvals	EN61010-031:2002+A1 2008 safety requirements for hand-held probe assemblies for electrical measurement and test
Output connector (probe head)	SMA(f)
Dimensions (probe head)	68 x 19 x 11 mm
Probe tip pitch (nominal)	5 mm
Weight (probe head)	5 g