P2104A 1-Port Probe

Data Sheet

PDN Probe

1-Port PDN ‘Browser’ Probe

power integrity

PDN impedance testing

ripple

PCB resonances

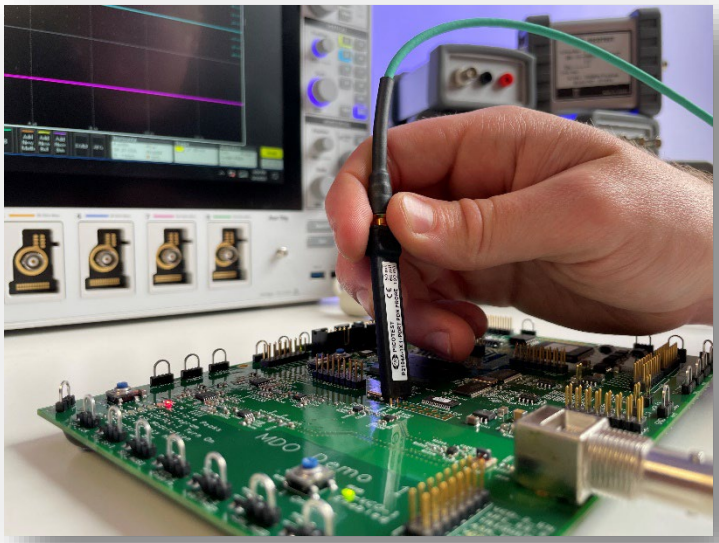
stability and NISM

noise

TDT/TDR

clock jitter

component validation and verification



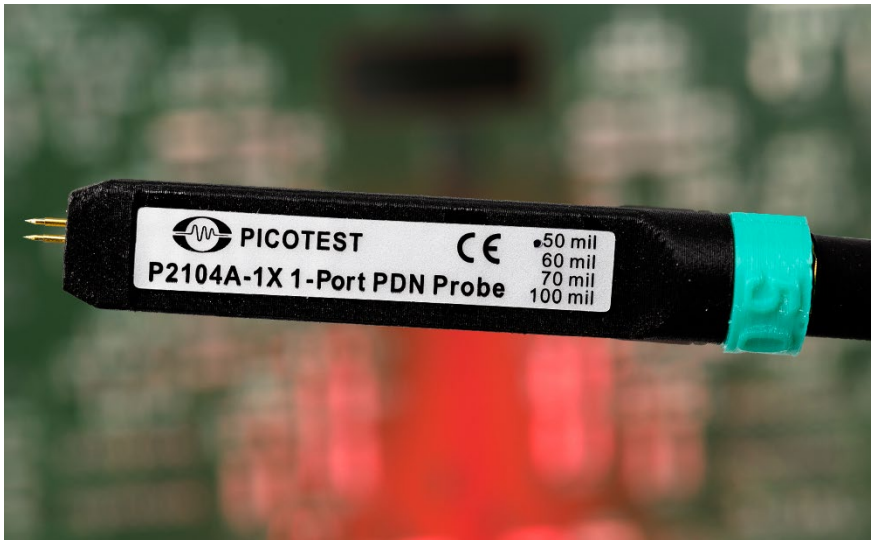
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PDN Probe

1-Port Probe

Don't confuse the 1-port Power Distribution Network (PDN) probe with a 10 to 1 ratio, passive oscilloscope probe. They have little in common with a 1-port PDN probe other than the improvement of the signal-to-noise ratio achieved by the lack of probe attenuation. The 1-port PDN probe is special in many respects and more complicated than meets the eye. The 2nd generation Picotest P2104A probe tackles the 1-port reflection measurement in unique and superior ways.

The Picotest P2104A probe is handheld browser style probe supporting DC to more than 6GHz. There are a few notable characteristics that assure high-quality, precise measurements.



You can quickly characterize multiple VRMs to ensure stability, review rail impedance, check ripple, and even verify if your simulation model.

The 1-port probe simplifies a host of essential measurements including many in-circuit measurements:

- 1-port reflection impedance including active devices
- Ripple and noise, including high frequency PDN noise
- Component impedance measurements, RLC testing
- Measure stability/phase margin via output impedance
- Circuit sensitivity testing, injecting noise into a DUT

The 1-port test can measure impedances down to 100mohms. Various pitches (20, 31, 35, 40, 50, 60, 70, 80, 100, or 150 mil) are available, allowing you to connect to a wide variety of components. Various attenuations (1x, 2x, 5x, 10x) allow you to measure a wide range of output voltage.

FEATURES:

- Supports Wide Variety of Measurements
  - Impedance, Ripple, Noise TDT/TDR, 2 port impedance (using two P2104As), PCB resonances, clock jitter and Non-invasive stability
- High bandwidth - > 6 GHz Note: USABLE BANDWIDTH FOR VNA WITH CALIBRATION IS HIGHER
- Very flat frequency response
- Available in various attenuations and pin pitches: Optimized for sensitivity and SNR
- Use two P2104A 1-Port Probes for High Bandwidth 2-Port Measurements
- Bi-directional – send signals to the DUT for signal injection or receive signals from the DUT
- Use as a browser accessory with Power Rail probes
- Virtually no capacitive loading (< 1pf, 420fF typical)

* Calibration dependent
** Using the extended 2-Port setup

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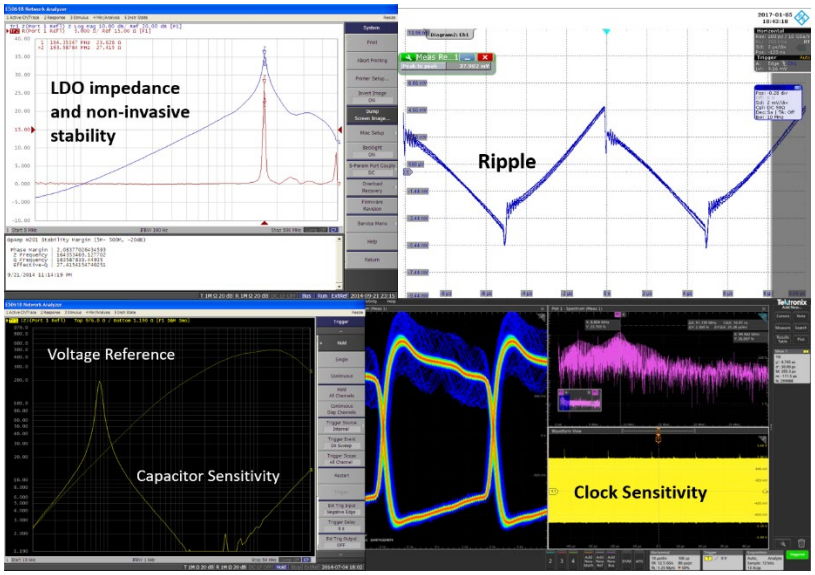
Impedance Measurement Demands New Probe Capabilities

The probe's characteristic impedance is precisely 50Ω. Poor connections between the probe cable and the probe connector or a mismatch between the probe cable and the probe head can result in small parasitic capacitance at the probe tip. This leads to poor frequency response and can add considerable (and erroneous) ringing to the measurement. Since the probe pins are inductive, it is important that the probe not be capacitive to assure that while the measurement is bandwidth limited due to the tip inductance, it will not ring.

The comfortable and easy to grip probe head is both small and slim so that it fits in confined spots and can be held for long periods of time. Of course, the probe can be used with any probe stand or probe station when hands-free operation is needed.

Probes are generally thought of as a tool to get a signal from a DUT to an instrument to be recorded. But a PDN probe is bidirectional, allowing signals to be delivered to the DUT as well as sending signals from the DUT to the measurement instrument. This is often desirable when troubleshooting or optimizing a design or clock jitter. By sending noise signals to the DUT the response can be evaluated.

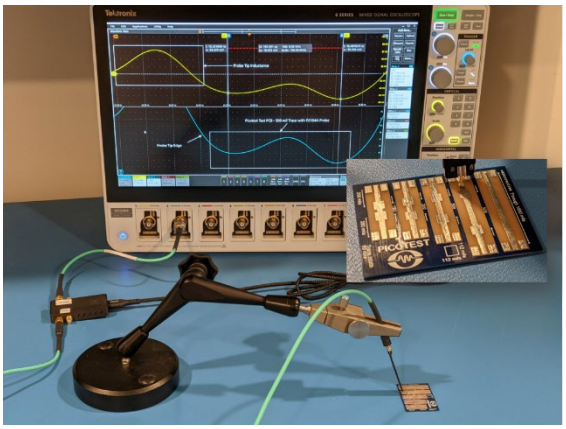
The probe is compatible with all 50 Ohm instruments, including vector network analyzers (VNAs), oscilloscopes, and spectrum analyzers.



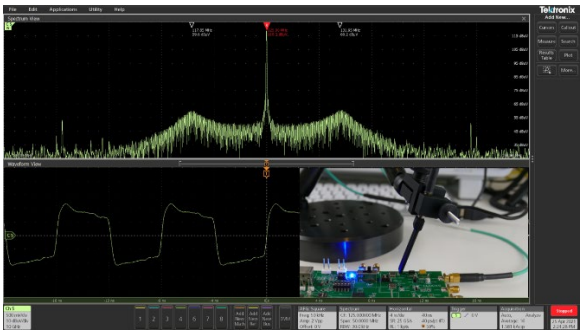
A few examples of measurements using a 1-port PDN probe; ripple, clock-jitter sensitivity, power supply VRM impedance, and the output impedance NISM stability test.

HIGHLIGHTS:

- Applications: Power Integrity, Power Electronics, Signal Integrity
- Browser class probes - greatly ease the testing of multiple power rails
- 50 ohm impedance compatible with all 50 Ohm instruments
- Rugged, comfortable, ergonomic design; small form factor gets into tight places
- Slim body with spring tips provides good visibility of the target
- Includes PDN Cable ® for optimum performance



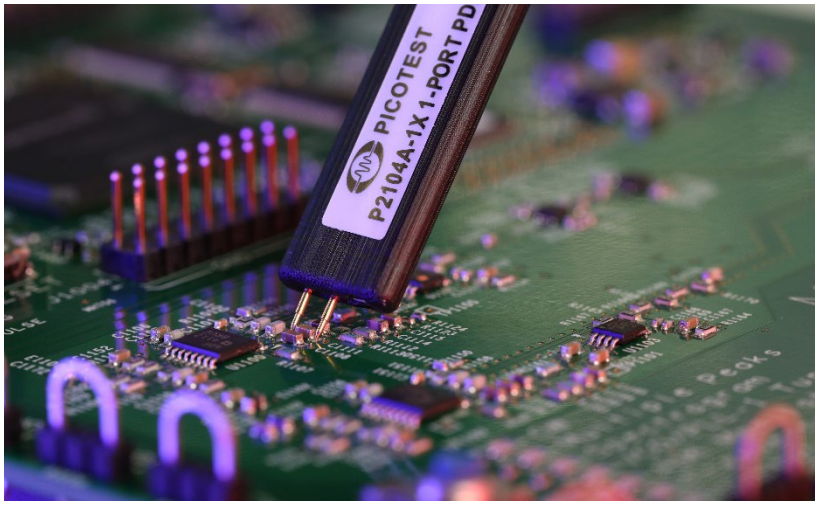
The Picotest P2104A pairs with the J2154A Differential TDR to measure PCB traces, capacitance, and inductance



Clock Jitter testing with the P2104A

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SPECIFICATIONS



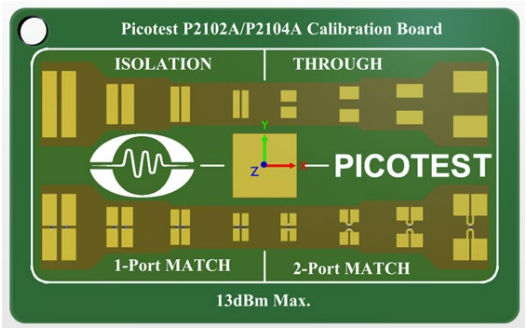
Placing and connecting the P2104A is easy.

Probe Voltage and Probe Impedance	Impedance: Maximum Tip voltage 50 ohms: 5 Vrms (1X Attenuation) 100 ohms: 8.9 Vrms (2X Attenuation) 250 ohms: 11 Vrms (5X Attenuation) 500 ohms: 14Vrms (10X Attenuation)	VNA Port Voltage * 5Vrms 4.45Vrms 2.2Vrms 1.4Vrms

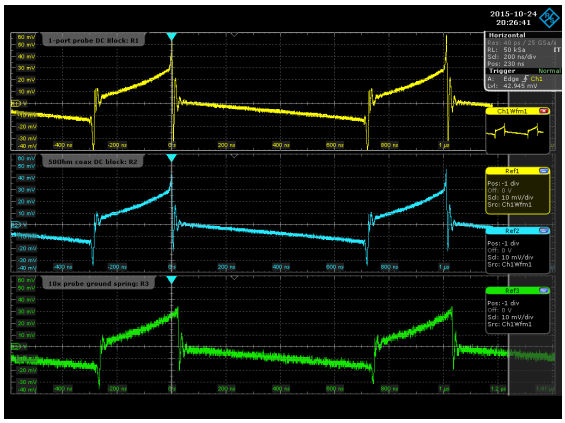
P2104A 1-Port Probe	
Characteristic	**Rating**
Bandwidth	DC-6GHz-8GHz * 20, 31, 35, 40, 50, 60, 70, 80, 100, or 150 mil - 1X Attenuation **
Impedance Range	Typical 1-port impedance reflection floor -ceiling limits (~100mohms – ~100k ohms). Not probe dependent. See your instrument's manual
Input C:	<1pF
Attenuation	1X, 2X, 5X, 10X – Selected when purchased, NOT user changeable
Probe Connectors	SMA-Mini SMP - 1 meter length, BNC available as an option
Interchangeable Probe Tip Size	Available in various pitches 50, 60, 70, 80, and 100mil, Probe Pitch is Fixed
Rise Time (each probe)	58ps (100 mil), 50ps (70/60 mil), and 44ps (50 mil)
Operating Temperature	0 to 45° C (32° F to 104° F) at 80% Relative Humidity
Nominal Length with Cable	1 meter
Probe Pitch	Fixed
Calibrator Board	S-O-L-T and Isolation – Included with probe
Calibrator Board Resistor Rating	30mW (Supports 13dBm)
Maximum Relative Humidity	80% at 31° C max
Usage	Indoor
Altitude	3000 m (9850 feet)
Absolute Maximum Voltage	< 50VAC and 75VDC
Pin Resistance	Typical: 15m Ohms, Maximum 30m Ohms

* Note: The maximum Port Voltage shown is based on the specified maximum tip voltage. Consult your VNA's manual to verify the VNA port voltage is below the ratings of your instrument.
** Calibration dependent

Caution: To avoid equipment damage and/or severe injuries death or death do not use this probe close to voltages higher than 50 VAC or 75 VDC.



The P2104A includes a S-O-L-T and Isolation calibration board.



Comparison of the ripple measurement using the three different methods. Note that the 1-Port probe (top) has about the same fidelity as the direct connection (middle) while the 10x scope probe is noisier (bottom).

For more information on Picotest products, applications, or services, please contact Picotest at info@picotest.com.

This information is subject to change without notice.

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