

P2102A Data Sheet

PDN Probe

2-Port PDN 'Browser' Probe

power integrity

PDN impedance testing

ripple

PCB resonances

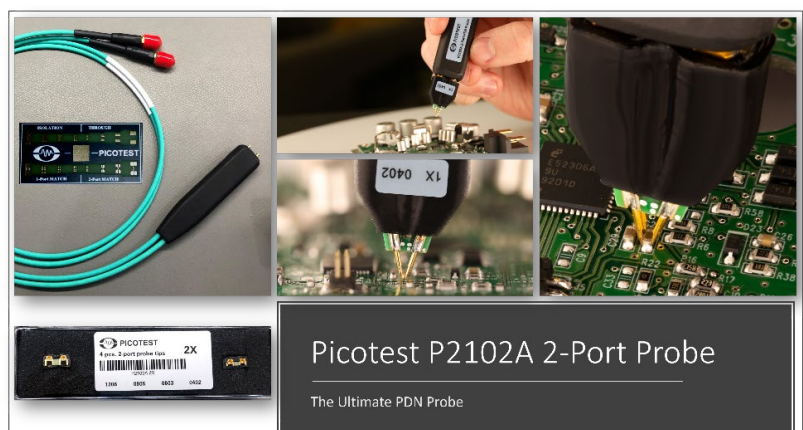
transient step load

stability and NISM

noise

TDT/TDR

clock jitter



PDN Probe

2-Port Probe

High speed printed circuit board (PCB) design requires well designed power delivery networks (PDN) to support today's FPGAs and custom mixed-signal ASICs. The PDN impedance and transient voltage

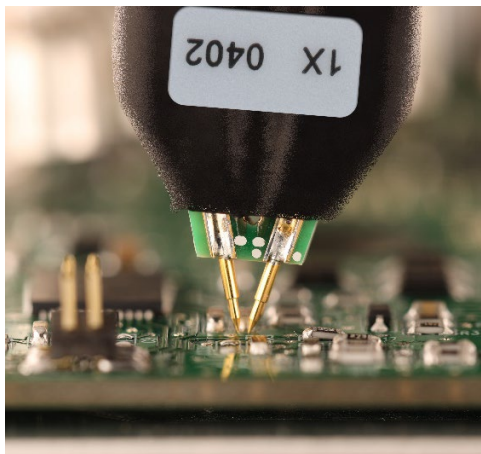
excursion performance contains important information that can tell a designer how a system will react to dynamic

currents. Vendor information for a VRM's (Voltage Regulator Module) output impedance is not generally available and not always accurate when it is. Further, measuring ultra-low impedance is a challenge for any design engineer. PDN problems are significant and costly. They can often require a board spin to fix.

The 2-port shunt-through measurement is the gold standard for measuring output impedance in the sub-milliohm region. But it can be a challenging measurement. Connecting the DUT requires attention to detail to ensure inductance is minimized.

With the Picotest P2102A Power Distribution Network (PDN) browser probe you can quickly characterize multiple VRMs to ensure stability, review rail impedance, check step excursions, and even verify if your simulation model is accurate.

The P2102A can measure sub-milliohm power rail impedances up to bandwidths of 300MHz. The probe comes with four (4) swappable heads (1206, 0805, 0603, and 0402); sizes that match common output capacitor sizes. It is available in different attenuations (1X, 2X, 5X, and 10X). This allows flexibility for users to measure across a wide range of voltages.



FEATURES:

- Supports Measuring: Impedance, Transient Step-Load, Ripple, Noise, TDT/TDR, 2-port impedance, PCB Resonances, Clock Jitter, and Non-invasive Stability
- Wide Bandwidth – 300MHz *
- Measures < 1mOhm *, Up to kOhms **
- Four (4) Interchangeable Probe Heads – Sizes 1206, 0805, 0603, and 0402
- Various Attenuations – 1X for optimum sensitivity and SNR, 2X, 5X, and 10X. Higher attenuation is for higher voltages, impedance, or reduced loading. Custom pitches available.
- True 4-Point Kelvin Measurement
- Browsing capability greatly eases testing of multiple rails and repeat measurements
- Virtually no capacitive loading
- Includes PDN Cables® for ultra-high shield attenuation and ultra-low shield resistance
- Rugged, ergonomic design; small form factor gets into tight places
- Supports Non-Invasive Stability Measurement (NISM)
- Supports the Extended Range 2-Port Shunt-Through measurement

* Calibration dependent

** Using the extended 2-Port setup

Impedance Measurement Demands New Probe Capabilities

High-speed applications put pressure on the measurement of power supply power rails to unprecedented levels. As an example, the measurement of PDN impedance for FPGAs, ASICs, and high-speed digital devices generally requires the measurement of impedance levels in the milliohm range. Measuring the high-speed step load response in power systems using two ports is difficult because of the need to connect two 50 ohm transmission lines to the output capacitor. To further compound this difficult task, these measurements often need to be made on very small circuits such as cell phones, solid state disk drives, and computer tablets, to name a few examples.

The P2102A uses a true 4-point connection to precisely measure impedance (2-port series and shunt-through), transient step load, ripple, noise, TDT/TDR, and clock jitter. A powerful added benefit is you can use Picotest's NISM algorithm, available in most VNAs, to assess the power supply's stability at the same time as you assess the PDN.

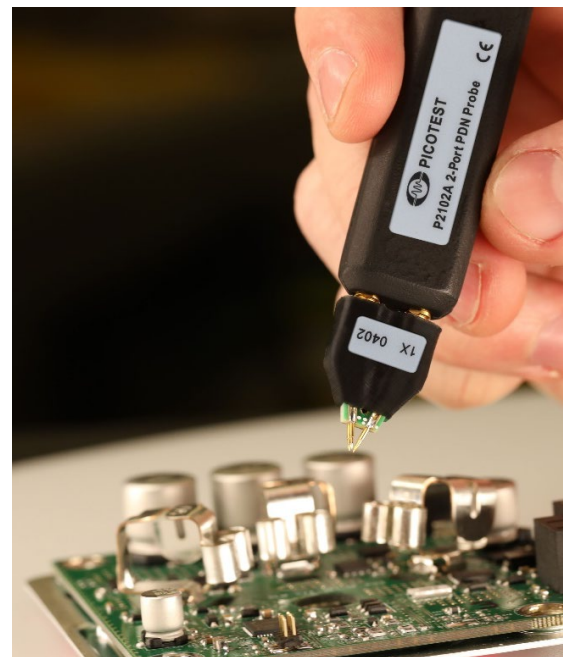
The P2102A is referred to as a 'browser' probe for its ability to easily and quickly be moved from point-to-point/rail-to-rail simply by reseating the probe points. The probe uses spring-loaded, angled pins to simplify landing it on a dense PCB, while eliminating the need to add additional SMA connections or other test points necessary for impedance measurements. It is especially useful when there are multiple rails to assess and there is not time or PCB iterations available to provide test point implementations for each. Repeated measurements are simplified because connection is by simply touching the tip to existing output capacitor pads. The slim body with extended tips provides good visibility of the target. Picotest's PDN Cable®, which reduces losses and errors in low impedance testing, is used to connect the probe to the instrument. In short, this 2-port P2102A probe is best suited for VRM, power plane, and decoupling measurements.

The 2-port probe also allows transient step load browsing since it can be used to transmit a load current step through one port, while measuring the voltage response from the other port, simultaneously.

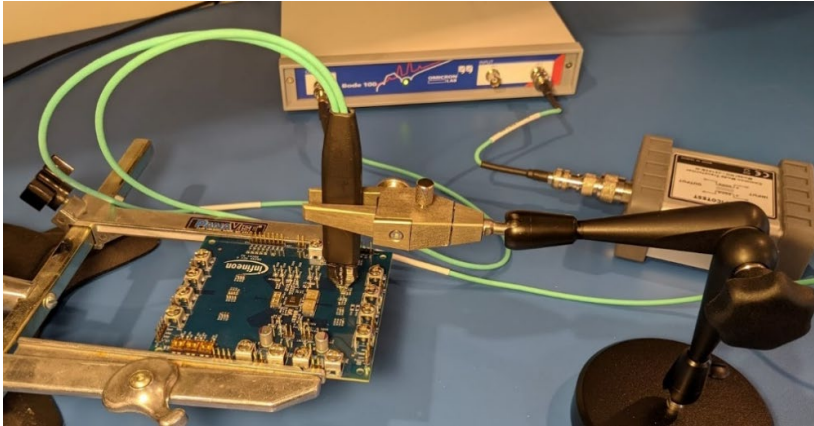
The probe is compatible with all 50 Ohm instruments, including vector network analyzers (VNAs), oscilloscopes, and spectrum analyzers, and the J2102B common mode transformer or J2113A ground isolator, which eliminate the DC ground loop present on most instruments.

HIGHLIGHTS:

- Support both transient step load testing in the time domain and impedance measurement in the frequency domain
- Browser class probes - greatly ease testing multiple power rails
- Rugged, comfortable, ergonomic design; small form factor gets into tight places
- Slim body with extended tips provides good visibility of the target
- Eliminates the need to solder coax



The rugged, ergonomic design and small form factor of the Picotest P2102A browser probe allows you to get into tight places.



The Picotest P2102A probe performs the popular 2-port shunt-through impedance test. It may be hand-held or used with a probe holder.

SPECIFICATIONS

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
P2102A 2-Port Probe		
Characteristic	Rating	
Bandwidth	DC>300MHz **	
Input C:	<1pF	
Attenuation	1X, 2X, 5X, or 10X – Selected when purchased, NOT user changeable	
Probe Connectors	SMA-Mini SMP - 1 meter length, BNC available as an option	
Interchangeable Probe Tip Size	Four (4) Included: 0402, 0603, 0805, and 1206	
Rise Time (each probe)	350 ps	
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	

* 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.

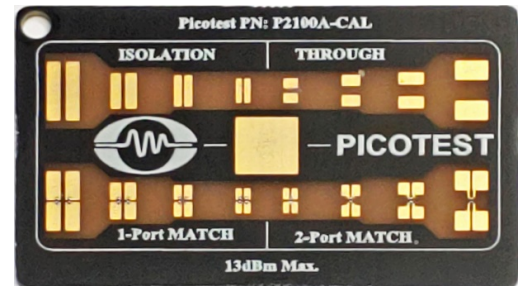
** Calibration dependent



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 Picotest J2102B, available separately, works with the probe to break the inherent ground loop present in the 2-port shunt-through test setup.



P2100A calibration board included with the probe.