

# Accurate Low Impedance Measurements

## The 2-Port Shunt-Through Impedance Measurement is Essential for Power Integrity Applications

The 2-port shunt-through measurement is the gold standard for measuring milliohm impedance levels with a VNA while supporting measurement at very high frequencies. These capabilities make it ideal for measuring power distribution networks.

Unfortunately, this measurement includes an undesirable ground loop. Left uncorrected, the ground loop introduces significant errors when measuring milliohm impedances. These errors are dependent on the cable quality, cable length, and other factors.

Picotest offers both passive and active ground isolating solutions spanning frequency ranges from DC to more than 500MHz supporting most applications. Picotest also offers 50 Ohm hand-held probes and high-quality cables that support this measurement. These Picotest solutions can also be used with oscilloscopes and other instruments that include ground loops.

### J2102A Common Mode Transformer

The simplest and lowest cost method for eliminating a ground loop is to add a wideband common mode transformer to the measurement, such as the Picotest J2102A Common Mode Transformer.

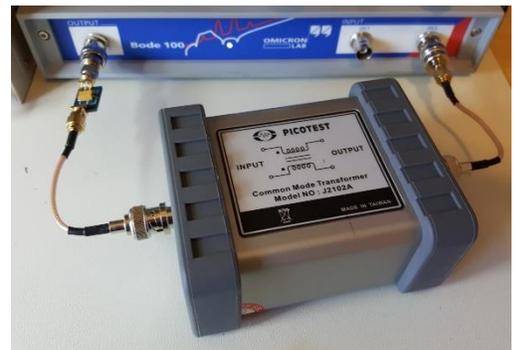


### J2113A Differential Amplifier

The J2113A is a solid-state Semi-Floating Differential Amplifier (SFA), or ground loop isolator, that provides OPTIMUM isolation for low impedance measurements. It allows measure both lower and higher in frequency than that achievable with a common mode transformer.



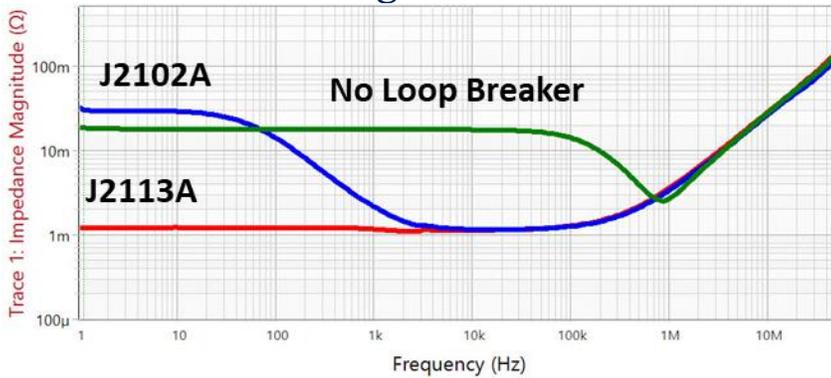
- The Picotest J2102A - Common Mode Transformer and J2113A - Differential Amplifier are used to break the ground loop in all commercial VNAs, oscilloscopes, and spectrum analyzers
- Both Picotest solutions support the 2-port shunt-through impedance measurement required for component and Power Distribution Network (PDN) measurement
- Both greatly attenuate the effects of the low frequency ground loops
- The J2102A supports measurements from  $\sim 3$  kHz to 100 MHz. The maximum input voltage is 50V.
- The J2113A supports measurements from DC to 500MHz. The maximum input voltage is 1.9 V. It is optimized for pulse response.



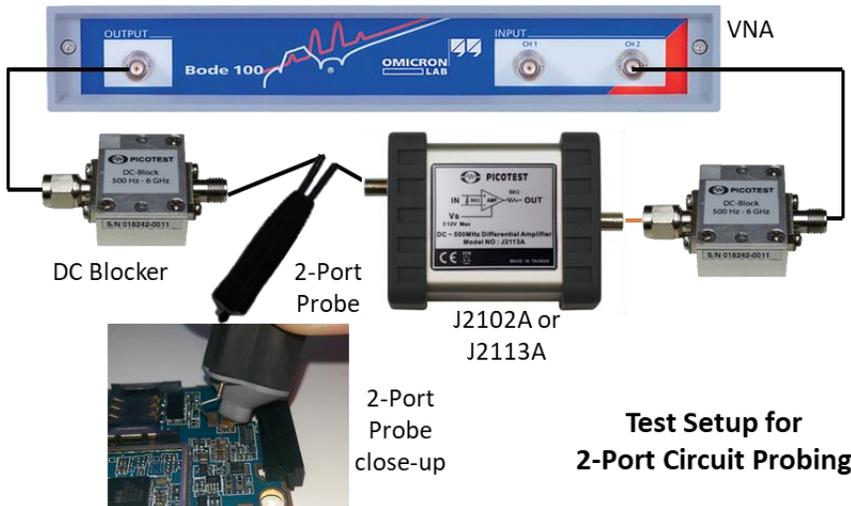
2-Port Shunt-Through test setup using the Bode 100 VNA and the J2102A



## 2-Port Shunt-Through Measurement



A known 1 mΩ resistor measured using 2-port shunt-through impedance measurements using the Bode 100, which can measure up to 50MHz. The J2113A provides maximum frequency range compared to the J2102A. The error in the measurement is twenty times higher when ground loop is present. This shows the importance of breaking the ground loops in order to achieve a high-fidelity measurement.



## 2-Port Testing Products

**Power Integrity Station Bundle** Includes all products, accessories, and options needed to perform the 2-Port and other PDN tests

### Individual Products

|                                 |  |
|---------------------------------|--|
| <b>OMICRON Lab Bode 100 VNA</b> | Vector Network Analyzer 1Hz – 50MHz, includes Picotest NISM stability measurement software   |
| <b>J2102A</b>                   | Common Mode Transformer<br>3dB Bandwidth: 1Hz - 100MHz<br>Insertion Loss: 0.2dB typ. (1Hz – 100 MHz)<br>Return Loss: 20dB typ. (1Hz – 100 MHz)<br>Maximum input voltage: 50V |
| <b>J2113A</b>                   | Semi-Floating Differential Amplifier<br>3dB Bandwidth: DC-800 MHz<br>Maximum Input Voltage: 1.9V<br>Typical CMRR - > 57dB  |
| <b>P21B01</b>                   | PDN Probe Bundle<br>includes 1-Port and 2-Port 50 Ohm Transmission Line PDN Probes, Accessory Kit, and two P2130A DC Blockers  |

To learn how this solution can address your specific needs please contact Picotest:

877-914-7426

[info@picotest.com](mailto:info@picotest.com)

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



**P21B01** PDN Probe Bundle and DC Blocks (2-Port Probe shown)



**PCK01** High Performance Cable and Connector Kit

Picotest provides products that are designed to simplify measurements while providing the ultimate resolution and fidelity.

This information is subject to change without notice.

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