Two-Port Shunt Thru Impedance

Description:

The two-port shunt thru method allows the measurement of ultra-low (uohms to ohms) impedance values. Limitations introduced due to the resistances of the ground braids of the two cables being in parallel with each other and in series with the DUT can be remedied by using a coaxial 50Ω common mode transformer or by using a semi-floating or differential input.

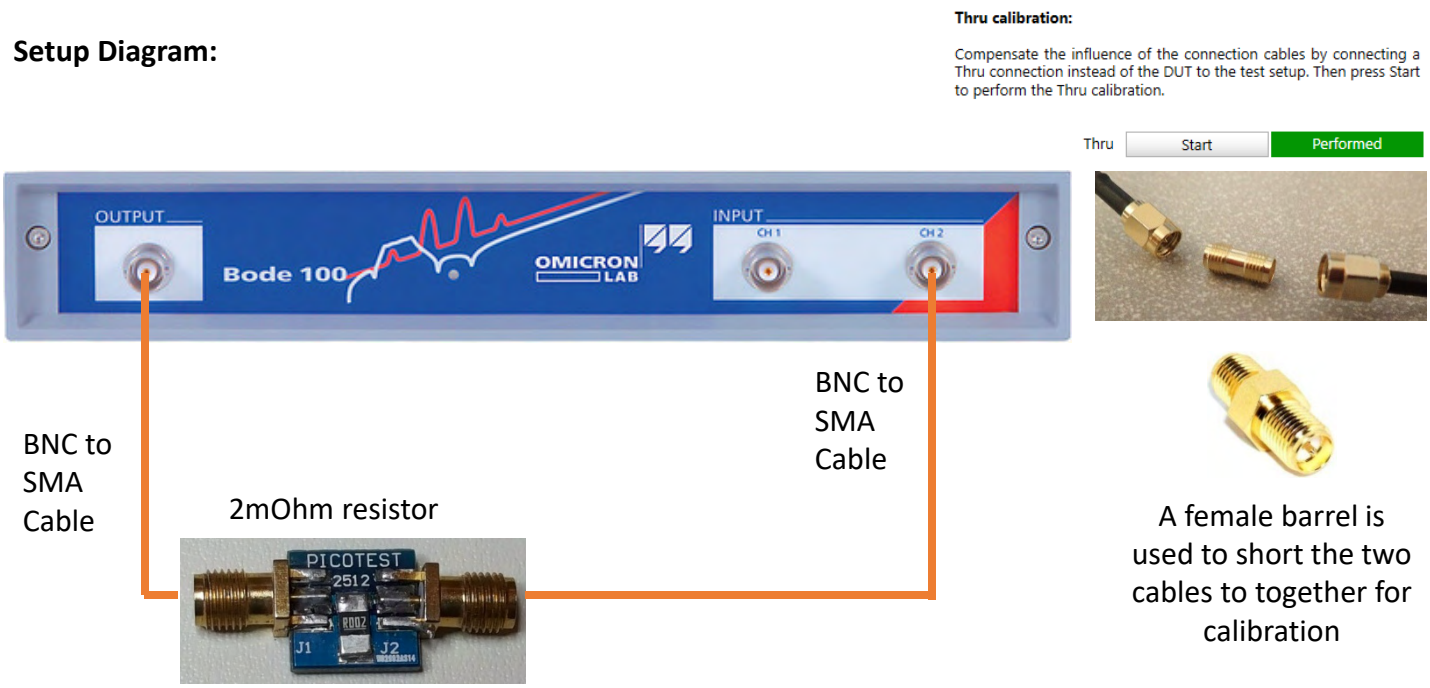
This test measures the impedance of a 2mΩ resistor.

Instrument	Bode 100 VNA
Injectors	J2102A Common Mode Transformer and J2113A Differential Amplifier
Probe point	N/A
Probes	N/A

Demo board settings: N/A

Setup Files: Open the setup file **2mOhm wandwo J2102A.bode3**
Calibration: Connect the OUTPUT of the Bode to CH2 of the VNA using cables and a barrel. Perform the THRU (Full Range) calibration.
Measurement Setup: Replace the barrel with the 2mΩ test resistor. Click the Single icon to run a single sweep. Trace 1 displays the impedance of the 2mΩ resistor.

Setup Diagram:



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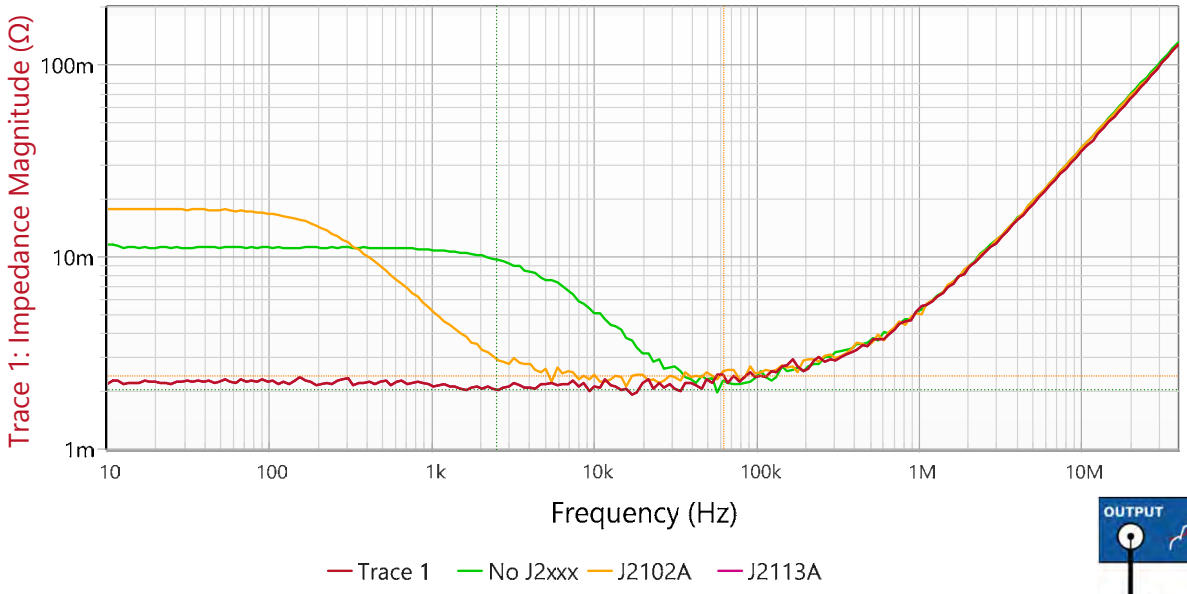
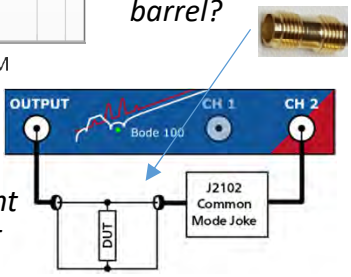
Measurement Results:



Why do the measurement results change when the J2102A is used?

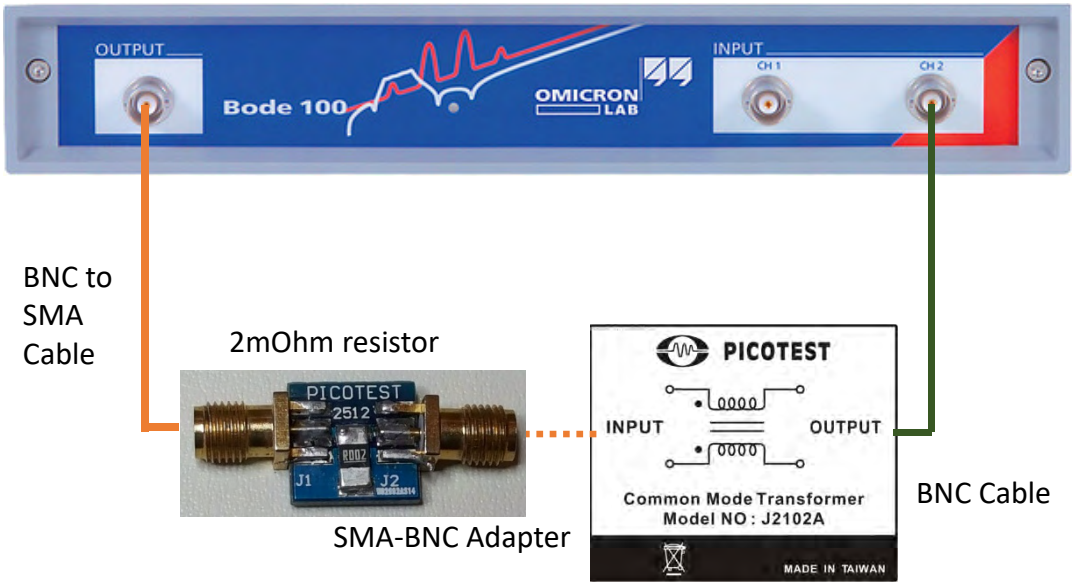
Why do you get an open impedance when you put in a shorting barrel?



Because in shunt there is no DUT

Other things to try:

- Redo the measurement with the J2102A and the J2113A. Note the new impedance measurement results.



The blue trace is the impedance measurement with the common mode transformer. At lower frequencies the impedance measured is close to 2mΩ. The red trace is without the J2102A and is inaccurate at lower frequencies do to the ground loop that exists in the measurement. The J2102A common mode transformer removes the influence cable braid currents (ground loops) down to about 10kHz. The J2113A removes the influence down to DC.

Additional Resources (Power Integrity, pages 123-139):
http://electronicdesign.com/boards/how-measure-ultra-low-impedances

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