

DC Biased Inductor Measurements

Accurate DC biased inductor measurements are important in power electronics

The most important component in a switching power supply is its power inductor. A power inductor has high permeability core around which the windings are wound. It saturates when the current flowing through the conductors is larger than its saturation value. Saturation is a material property of the magnetic core. DC bias current through an inductor affects the inductance versus frequency plot. So, it is important to measure the inductance versus frequency under DC current.

Ultra-low impedances are accurately measured using a vector network analyzer (VNA) in 2-port shunt-through configuration. Visit <https://www.picotest.com/measurements/2-port.html> for 2-port shunt-through measurement. Picotest introduces a measurement solution to measure inductance in 2-port shunt-through method with DC current using J2121A line injector.

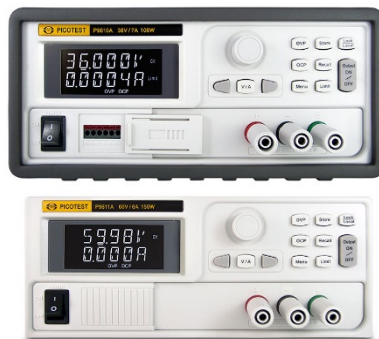
J2121A Line Injector for Inductor DC Bias Measurements

The J2121A line injector is used to combine the oscillator signal from the VNA with the DC current bias. It can be used to inject up to 20A of current at 400 V DC and has a bandwidth of 100Hz - 1MHz. The J2121A can also be used for PSRR and DC-DC converter input impedance testing.



P9610A/ P9611A Power supplies

The P9610A or P9611A power supplies can be used to provide the DC bias constant current for the inductor under test. More than one supply can be paralleled to source higher current if the measurement needs more current.



Visit https://www.picotest.com/products_P9610A_11A.html for more information on the Picotest power supplies.

- The Picotest J2121A – high power line injector allows you to measure DC biased inductors using the 2-port shunt-through impedance test configuration. It can measure up to 20A DC of bias current and supports up to 400V DC (includes the 270V military bus and all satellite busses) with a bandwidth of 100Hz - 1MHz.
- The Picotest P9610A or P9611A can be used to inject the DC bias current into the inductor for testing. The P9610A can source up to 7A of current with a programming resolution of 0.21mA and P9611A can source up to 6A of current with a programming resolution of up to 1mA. For higher current more than one supply can be paralleled.

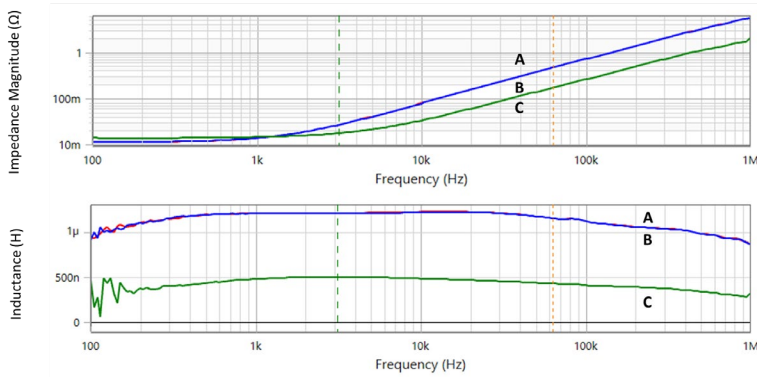


DC biased 3.3uH 6.5A inductor measured using the Bode 100 Vector Network Analyzer and the J2121A. The current source is the Picotest P9610A and/or P9611A. They are paralleled for higher currents.

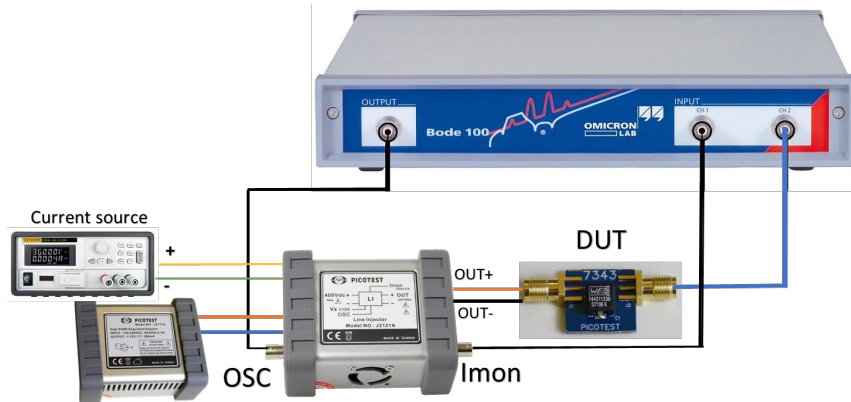
The entire solution is available from Picotest.



DC Biased Inductor Measurement



Test results of a DC biased WE744311330, 3.3UH 6.5A inductor measured in the 2-Port shunt-through configuration using the Bode 100 VNA and J2121A. Four cases are shown. Case A shows the impedance of the inductor at 1A which is 0.9 μH. Case B shows the impedance value at 6A which is overlaid on case A since the inductor is rated for 6.5A. Case C shows that the same inductor lost considerable inductance at 13A.



DC biased inductor measurement setup using a VNA and the J2121A line injector. The +12V supply to the line injector is fed from (included) J2171A power supply. The DUT is connected in 2-port shunt-through configuration. The current monitor output of the J2121A is connected to CH1 of the VNA. The VNA oscillator output is connected to input of the J2121A.

DC biased inductor measurement testing products

J2121A Line Injector	J2121A + J2171A - 200mA Low Noise Power Supply 1-ohm Calibration Fixture
Bode 100	Vector Network Analyzer (VNA) + Frequency Response Analyzer (FRA)
P9610A	Mixed mode power supply Output voltage = 0 to 36V Maximum current output = 7A Current programming resolution = 0.21mA
P9611A	Mixed mode power supply Output voltage = 0 to 60V Maximum current output = 6A Current programming resolution = 1mA

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

877-914-7426

info@picotest.com

www.picotest.com



Products used in this test



J2171A High PSRR Regulated Adaptor (included with the J2121A)



Bode 100 Vector Network Analyzer



P9610A/P9611A Mixed Mode Power Supply

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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