

Problem: Errors in Low Resistance Measurements

Probable Cause: Resistance of the test leads

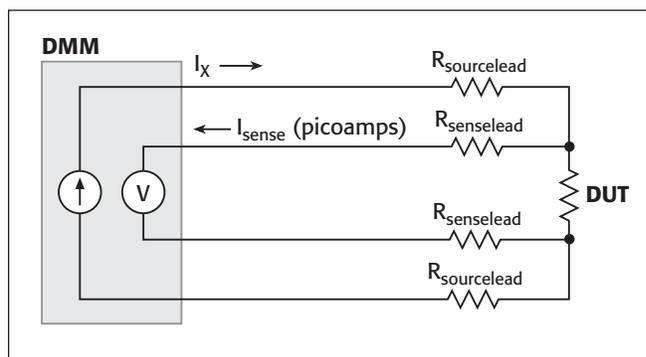
In low resistance measurements, the resistance of the test leads can be a significant fraction of the resistance to be measured, or can even exceed it, and can cause measurement errors.

Remedies

A. The four-wire resistance technique—With the four wire resistance technique (also called the Kelvin connection), the test current is forced through the DUT through one set of leads, while the voltage across it is measured through a separate set of sense leads. Negligible current flows through the sense leads (they are connected to a high-resistance input on the instrument), so they do not create any voltage drop, and the voltage measured by the meter is essentially the same as the voltage across the DUT.

Note that the voltage sensing leads should be connected as close as possible to the DUT to avoid including any of the resistance of the test leads in the measurement.

B. Use of the null function on the ohmmeter—Use the two-wire resistance technique and null out the test lead resistance. Some



The four-wire resistance technique removes the resistance in the source leads from the measurement loop.

ohmmeters have a null (Zero, Relative, etc.) function. Short the test leads at the end, then enable the null feature, which will subtract the test lead resistance from the readings.

One drawback with this technique is that measurement may drift over time, and sometimes it is not practical to keep on “nulling” the test lead resistance to keep the measurement on track. KEITHLEY

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