

Physics 3108

Lab 3: Device Characterisation



Background

At this point you should be completing a functional, computer controlled current source with the ability to measure the corresponding voltage.

Purpose

To use a voltage controlled current source with a voltage measurement capability in order to characterise resistors and diodes. To learn about 4 point probing and its importance for the accurate measurement of devices with small resistances.

See: http://www.allaboutcircuits.com/vol_1/chpt_8/9.html

Summary

Use your custom computer controlled current source to measure the characteristics of a silicon diode as well as the resistance of several low value resistors.

Procedure:

In industry it is rarely possible to have your equipment located right beside the device under test (DUT). Typically, the equipment used in the measurement will be on an equipment rack, or perhaps in another room. Then, many wires, cables and connections will be required to connect the DUT to the equipment used for the measurement.

For your testing, make sure that you have multiple connections between your measurement equipment (the current source and the NI USB-6001) and the DUT. You may want to purposely add extra parasitic resistance between connections to better compare the 2 and 4 wire measurements.

With this setup, measure the IV characteristics of a silicon diode and resistors whose nominal values are 1 Ohm, 0.1 Ohm and 0.01 Ohm.

Measurements

- Test each device for currents between 0 and 80mA
- Perform each measurement using the 2 point and 4 point measurement techniques.
- Save the data for each measurement.
- Superimpose the 2 wire and 4 wire IV curves on the same graph (please provide one graph per device), and put this in your report.
- Use the numerical analysis in your LabView program, or your graphing program to provide the series resistance of each device (for both methods of testing).

Submission due: Tuesday October 17, 2017