

ELECTRONICS

LAB 1: THE VOLTAGE DIVIDER

Construct a voltage divider from a (12 or 15V) power supply so that it will draw about 1 to 5 mA from the power supply and deliver a voltage of 5.0 ± 0.1 V. (Do a *pre-lab calculation* to figure out the values for resistances to be used).

The following items should be done:

1. Use a voltmeter (multimeter) to measure the voltage across the resistors to determine the current; only after this is done should the multimeter be placed in the circuit to measure I directly (and then remove it again).

2. Put a “load” (resistors) on your 5V output and measure the output voltage as a function of load resistance. (Make a plot with at least 6 points.) How do your measured voltages compare to the theoretical curve?

3. Construct your circuit using Electronics Workbench and record the voltages and currents it gives for parts (1) and (2).

4. Be creative and try other things -- this is your playtime!

Optional:

With a load in place (as in step 2), measure the short circuit current.** (This means short the output to ground, but make the current flow through your current meter). From $I_{\text{short circuit}}$ and $V_{\text{open circuit}}$ you can calculate the Thevenin equivalent circuit, using a variable regulated dc supply as the voltage source, check that its open circuit voltage and short circuit current match those of the circuit that it models. Then attach the same load as in the original circuit and see if it behaves identically.

****Caution:** It is not a good idea to measure the short circuit current in general. In this particular case, the current is low (in milliamps) and therefore safe to measure.