Resistors

Lab Exercises

In this lab you will be learning what a resistor is, how to determine the value of a resistor, and how to draw, solve, build and measure resistive circuits.

Part 1: The resistor color code

You will be given three random resistors, perform the following for each:

- Write down the colors on the resistor in the form "____ - ____ - ____ - gold".
- Using your vast resources of the modern student, locate a resistor color code table, decipher each color and determine the value of the resistor.
- Using the tolerance stripe color, compute the possible value range for the resistor.

Part 2: Measuring resistance

Using the same three resistors from above, perform the following to each:

- Using a multimeter set to the expected resistance range, measure the resistance of the resistor and write down the measured value. Warning: Be sure to not place yourself in the circuit when measuring the resistors.
- Does the measured value match the expected value from part 1?
  - Yes? Go manufacturer!
  - No? Is it within the tolerance?
    % error = ((measured - expected) / expected) * 100%

Part 3: Simple resistive circuits

You are now done with your 3 resistors, please place them in the resistor bin. Find the resistor storage drawers and collect the following 6 resistors: 1x 10Ω 1x 100Ω 2x 1kΩ 1x 10kΩ, 1x 1MΩ.

For each circuit (a-f) below, perform the following 4 steps

1. Draw and fully label the circuit described.
2. Solve for the equivalent resistance, or Req, of the circuit.
3. Build the circuit on the breadboard. (Have a lab TA check your circuit)
4. Measure Req. for the circuit.

(a) Circuit consisting of a 10Ω resistor and a 100Ω resistor in series.

(b) Circuit consisting of a 1Ω resistor and a $1\mathrm{M}\Omega$ resistor in series.

(c) Circuit consisting of a $1\mathrm{k}\Omega$ resistor and a $1\mathrm{k}\Omega$ resistor in parallel.

(d) Circuit consisting of a 10Ω resistor and a $1\mathrm{M}\Omega$ resistor in parallel.

(e) Circuit consisting of a $1\mathrm{k}\Omega$ resistor, a $1\mathrm{k}\Omega$ resistor, and $10\mathrm{k}\Omega$ resistor in parallel.

(f) Circuit containing both parallel and series elements, a 10Ω resistor in parallel with 2 resistors in series, a 100Ω and $1\mathrm{k}\Omega$.

Part 4: Questions

1. In part 3b, what impact does the 10Ω resistor have on the circuit?
2. In part 3d, what impact does the $1\mathrm{M}\Omega$ resistor have on the circuit?