

1.4.2: Resistive Network Power Dissipation

Overview:

In this lab assignment, we will use KVL and KCL to analyze a simple circuit. The circuit will be constructed and tested and the actual circuit response compared to the expected response from the analysis.

Before beginning this lab, you should be able to:

- State Ohm's law from memory
- Use a digital multimeter to measure resistance, voltage, and current (Lab 1.1, 1.2.1)
- Use the Analog Discovery's arbitrary waveform generator (AWG) to apply constant voltages to a circuit (Lab 1.2.2)
- Use the Analog Discovery voltmeter to measure a constant voltage (Lab 1.2.1)
- Use color codes on resistors to determine the resistor's nominal resistance
- Use KVL and KCL for circuit analysis

After completing this lab, you should be able to:

- Measure power dissipation of a resistor in a resistive network

This lab exercise requires:

- Analog Discovery
- Digilent Analog Parts Kit
- Digital multimeter (optional)

Symbol Key:

DEMO

Demonstrate circuit operation to teaching assistant; teaching assistant should initial lab notebook and grade sheet, indicating that circuit operation is acceptable.

ANALYSIS

Analysis; include principle results of analysis in laboratory report.

SIM

Numerical simulation (using PSPICE or MATLAB as indicated); include results of MATLAB numerical analysis and/or simulation in laboratory report.

DATA

Record data in your lab notebook.

General Discussion:

This portion of the lab assignment concerns the circuit shown in Figure 1 below. A power supply is used to apply the 5V voltage difference. We wish to determine the power dissipated by the 4.7K Ω resistor.

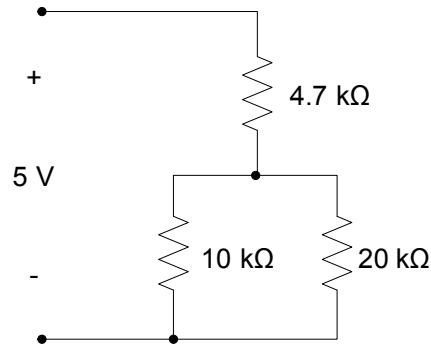


Figure 1. Circuit schematic.

Pre-lab:

ANALYSIS

Analyze the circuit of Figure 1 to estimate the power dissipated by the 4.7K Ω resistor.

Lab Procedures:

DATA

1. Construct the circuit of Figure 1. Measure and record the actual resistance values used in your circuit. Measure the parameters (voltages and/or currents) necessary to determine the power dissipated by the 4.7K Ω resistor. Determine the power dissipated by the 4.7K Ω resistor. Compare the measured power with your estimate from the pre-lab. Comment on any differences between the estimated and measured values.

ANALYSIS

DEMO

2. Demonstrate operation of your circuit to the Teaching Assistant. Have the TA initial the appropriate page(s) of your lab notebook and the lab checklist.