

EE3810 Lab 10
Powering the Epilepsy Detection Circuit Instructor: Won
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1 Concepts

1. power sources
2. energy capacity
3. voltage regulator
4. dual polarity
5. power efficiency

2 Objectives

In this experiment, you will create the power generation circuit to power up your a pseudo epileptic seizure detection system and enables the system to be portable. Thus, the power generation circuit will meet the following specifications:

1. runs off two 9V batteries
2. provides a $\pm 5V$ power supply and stable operation
3. does not dissipate power when seizure detection is not needed
4. indicates to the user when power is being used

You will also

1. understand the value of the voltage regulation
2. gain more experience with prototyping and using electronic test equipment
3. consider the value of adding indicators and switches to circuits

3 Pre-lab reading / assignment

- Read the "Basic Concepts of Linear Regulator" article (Linear Technology Application Note 140)
- Design a voltage divider circuit that produces V_{DD} and V_{SS} that could be used to power the detection circuit using 9V batteries. (Draw the circuit schematic and the give component values).

4 Procedure

In this lab, you will create a 5V power supply to run the seizure detection circuit in one of two ways: 1) using a simple resistive voltage divider; and 2) using the voltage regulators (MCP1702 and MC79L05).

4.1 Voltage Divider

1. Wire up the voltage dividers.
2. Measure V_{DD} and V_{SS} , the outputs of the voltage dividers.
3. Now, power up the the seizure detection circuit by connecting your voltage divider.
4. Again, measure V_{DD} and V_{SS} .
5. Measure battery power consumed.

4.2 Voltage Regulator Power Generation Circuit

1. Wire up the power generation circuit.
2. Measure V_R^+ and V_R^- , the outputs of the voltage regulator.
3. Now, power up the the seizure detection circuit by connecting your power generation circuit.
4. Again, measure V_R^+ and V_R^- , the output of the voltage regulator.
5. Measure battery power consumed.

5 Questions

Summarize the advantages and disadvantages of using the linear regulator, and ways to further improve the design of the power generation circuit. In doing so, you will want to *include* answer to the following questions.

1. With the voltage divider, how did V_{DD} change from when the epilepsy detection circuit was disconnected to when it was connected? Explain what caused this change.
2. Similarly for the voltage regulator circuit, how did V_R change from when the epilepsy detection circuit was disconnected to when it was connected? Again, explain the output behavior.