EE3810 Powering the Epilepsy Detection Circuit

Due **TUE 11/24**

Instructor: Won
Department of Electrical and Computer Engineering
California State University, Los Angeles
Fall 2015

1 Concepts

Physiology

1. EEG
2. epilepsy

Engineering

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 ±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 experience with prototyping
3. learn to use electronic test equipment
4. understand 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 (i.e., draw the circuit schematic and the give component values).
- Sketch the circuit schematic diagram of the power generation circuit.

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}.

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.
6. Add (a) rocker switch(es) to the circuit to add a power off mode to your circuit.

5 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.

3. How much power do you save by adding the switches?