Lab 2 Power Field Effect Transistors

Driving an LED

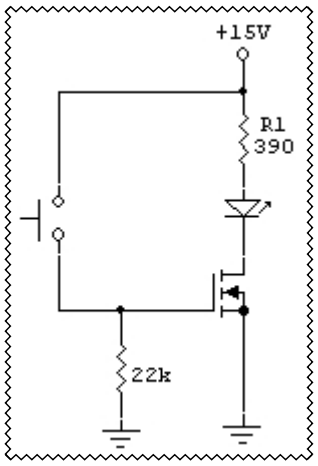

Fig. 1

1. Assemble the circuit in Fig. 1

2. Assume that $R_{DS} = 5\Omega$ and that $V_{LED} = 2.25V$

3. Calculate I_D _____

4. Measure V_{LED} _____

5. Measure I_D _____

6. Using the value of V_{LED} from step 4, calculate a new value for the current limiting resistor R1 so that I_D is approximately 20mA.

7. Rebuild the circuit using the new value of R1 and measure I_D_____

8. How close is the measured value of I_D to the new specification of 20mA?

D. C. Motor Control

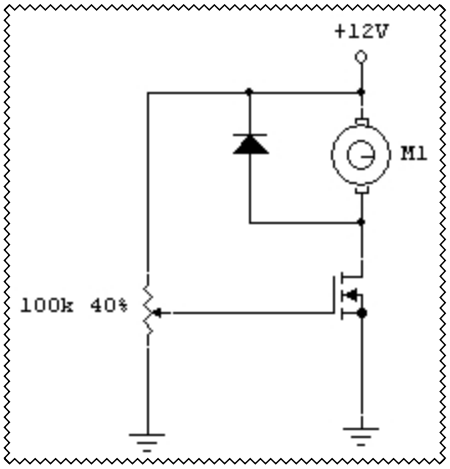

Fig. 2

1. Assemble the circuit in Fig. 2 using a D.C. motor.

2. Vary the potentiometer so that speed of the motor varies.

3. Measure V_{GS} for the following conditions:

4. Motor turns on: V_{GS} = _____

5. Motor speed maximum: V_{GS} = _____

6. Motor turns off: V_{GS} = _____

4. Reverse the polarity of the D.C. Motor and repeat steps 4, 5, 6.

Motor turns on: V_{GS} = _____

Motor speed maximum: V_{GS} = _____

Motor turns off: V_{GS} = _____

5. Is there a difference in the operation of the motor when the polarity was reversed?

Soft Turn-On (Soft Start)

1. Assemble the circuit in Fig. 3.

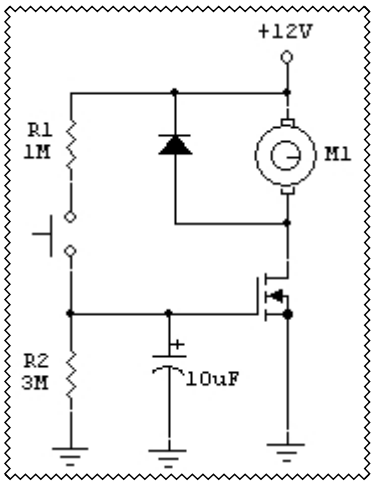

Fig. 3

2. Calculate the time constant of the resistor-capacitor network connected to the gate. $\tau = RC =$ _____

3. Connect a voltmeter across the capacitor.

4. Close the switch and observe the voltmeter as the voltage rises.

5. Use a watch and note the time when the motor starts. t = _____

6. Open the switch and once again observe the voltmeter and note the time for the motor to stop. t = _____

7. Replace the capacitor with a $22\mu F$ capacitor. Repeat steps 2 to 6. What is the effect of a larger capacitor on the operation of the circuit?