

ELECTRONICS FOR ME

Laboratory 3

Purpose

At the conclusion of this lab, the student will:

1. Be able to measure and plot the i-v characteristics of a diode;
2. Be able to design and test a simple power supply circuit;

Procedure

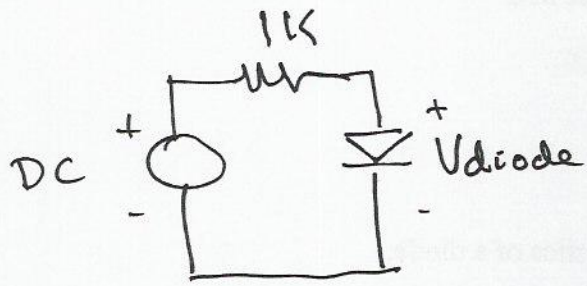
1. Build the circuit shown in Figure 1 (back side of this sheet; $R = 1000$ ohms) on the protoboard. For incremental increases of 0.2 volts up to 4 volts on the power supply, record the resultant diode voltage and current.
2. Reverse the polarity of the power supply (reverse bias) and record the resultant diode voltage and current in increments of 0.5 volt up to 10 volts.
3. Build a half-wave rectified power supply using your diode. Set the input voltage to your power supply to 10 volts peak at 1 KHz from the function generator. Use $R = 10K$ ohms. Determine the value of C for a ripple voltage of less than 1% and test this value in your circuit.

Data Analysis

For parts 1 and 2, plot the i-v characteristics of the diode. What voltage value would you choose to use for the fixed voltage diode model? Estimate the diode saturation current.

For part 3, show your calculation for C for the given ripple voltage requirement. Sketch or screen capture the waveform of the output voltage across the load resistor, the input signal, and the diode and compare. Does Kirchoff's Voltage Law apply here? Explain.

Forward Bias



Reverse Bias

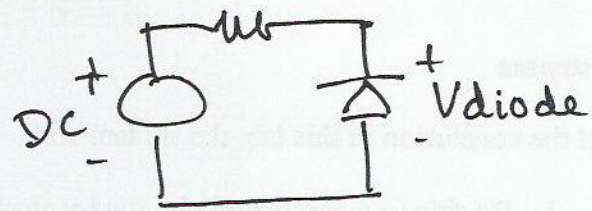
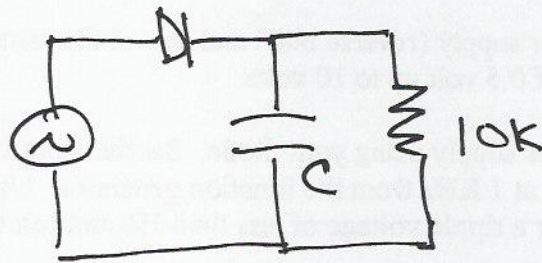


Figure 1



$$C = \frac{V_{DC} / V_r}{f R_L}$$

Half-Wave Rectifier