
ece340_lab3

1 Objective

In this lab, we will investigate the current-voltage characteristics of pn junction diodes and several diode circuit configurations.

2 Experiments

2.1 Diode I/V curves

Refer to Figure 1. For each of three different diodes, measure the I_D vs. V_D curves for currents ranging from $10\mu\text{A}$ to 10mA . Choose points in between which *approximately* follow a 1-2-5 sequence. For example, $10\mu\text{A}$, $20\mu\text{A}$, $50\mu\text{A}$, $100\mu\text{A}$, $200\mu\text{A}$, and so on. You will need to determine an appropriate resistance to yield the required current range as the power supply voltage is varied. Change the voltage source from 1V to 20V in the 1-2-5 sequence, measure V_D , then calculate I_D . You will need to change the resistor value after each voltage step cycle to a different value. To help estimate the resistor values required, assume the diode voltage is between 0.4 and 0.7V .

Plot the results with the current on both linear and logarithmic scales.

For each diode, find the parameters I_S and n which best fit the diode equation:

$$I_D = I_S \left[\exp \frac{V_D}{n \cdot V_T} - 1 \right]$$

2.2 Diode circuits

Construct each of the circuits in Figures 2-4. Apply a $5V_{p-p}$ sinusoid at 1kHz and use the $1n914$ diodes. For each circuit, sketch V_{in} and resulting V_{out} . Vary the signal generator's amplitude and frequency and observe the characteristics of the circuit.

2.3 Report

Refer to the document "DRAFT Lab Report Guidelines 2014.pdf" on Blackboard for the format for your report.