University of Maryland Baltimore County
Department of Computer Science and Electrical Engineering

CMPE 314 Lab 1
Diode Characteristics and Diode-Based Circuit

I. Objective

Measure and study the I-V characteristics of diode.

II. Equipment and Parts

Oscilloscope, DC power supply, digital multi-meter, function generator, diodes, resistors, breadboard.

III. Experiments and Procedures

Part (A). I-V Characteristics of Diode

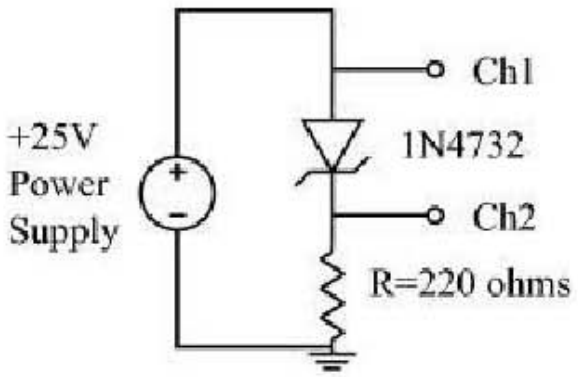

Figure 1: Diode I-V characteristics measurement circuit

(1) Use a Zener diode to construct the circuit shown in Figure 1. (Use diode 1N4732)

(2) Sweep the DC power supply from 0V to 5V with appropriate step (0.2 V). Use a multi-meter to measure the diode voltage and current each time. Plot the forward I-V curve of the diode (V in horizontal). Determine the turn-on voltage of the diode.

(3) Reverse the polarity of the power supply and sweep from 0V up to 25V (in step of 0.5 V, finer step when change of current is large). Use a multi-meter to measure the diode voltage and current each time. Plot the I-V curve of the diode. What is the break down voltage?

(4) Compare the experimental I-V curves to that of ideal diode model and linear piece-wise diode model. What are I_s and n for this diode based on a fit to the ideal model? What are the forward resistance r_f and the Zener resistance r_Z?

Part (B). Diode Circuit

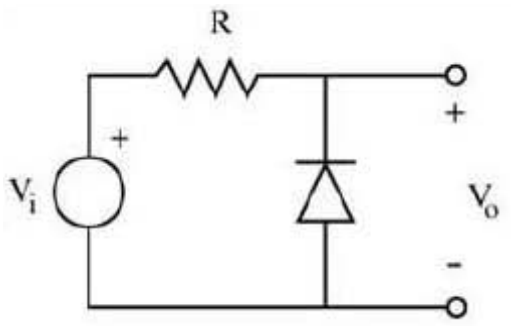

Figure 2. Diode measurement circuit

Replace the DC power supply with the signal generator. The circuit will be connected as in Figure 2. Connect Vi and Vo to the two channels of the oscilloscope. Set Vi to be a sinusoid of 5 kHz frequency. Vary the input amplitude in the signal generator from 0 to 10 V in steps of 1 V and observe the input and output waveforms. In order to read the waveform correctly, the oscilloscope should be AC coupled to read the input waveform but should be DC coupled to read the output waveform. Record the input and output peak-peak voltages. Also, record the waveforms. Explain the observed output waveforms. What kind of circuit is this?