EEE381 Tech Memo

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To: Colin Bussert
Date: Performed: 09/20/18; Due: 09/27/18
Subject: Lab #01

1 Abstract

The goal of this exercise was to observe the relationship between the voltage and current through a diode and extract the leakage current, I_s, and the diode non-ideality factor, n. In addition, a half-wave rectifier was simulated and built in order to evaluate its performance.

2 Theory

In order to find the leakage current I_s and the diode non-ideality factor n, the diode current and voltage relationship must be understood. The expression for current through a diode can be seen in Equation 1.

$$i_D = I_s(\exp(qV_D/nkT) - 1) \tag{1}$$

Assuming that $V_D >> 0$, this equation can be simplified slightly to the form seen in Equation 2.

$$i_D = I_s \exp(qV_D/nkT) \tag{2}$$

When the natural log of i_D is plotted against V_D, the slope of the resulting line is a function of n (Equation 3).

$$\ln(i_D) = \ln(I_s) + (\frac{q}{nkT})V_D \tag{3}$$

Assuming room tempurature, the value of n can be found by looking at the slope of the line of Equation 3.
A concise presentation of the theory (1) underlying the analysis of a given device or circuit, and/or (2) guiding the design of a circuit to given specifications. Equations must be created using an equation edidtor, not cut-and-pasted or hand written. Supporting simulations to validate design and analysis, if any were required, should be included here.

3 Results and Discussion

Tables, graphs, equations, and prose should be used to convey all of the results in an easy-to-follow format. Details should be provided to explain how the experimental results were obtained. The text should explain any knowledge and/or information gained by performing the experiment. All questions posed in the labratory handout and/or by the TAs in lab should be answered.

All plots must be created using a software package (e.g. EXCEL or MATLAB). Tables and equations must not be hand drawn. Be sure to include comparisions between theoretical, simulation, and hardware results, as well as comparison to design specifications where appropriate.

4 Conclusion

A breif section contaning one or two paragraphs that concisely states the nature/objective of the assignment, the approch taken to complete the assignment, and general observations about the outcome(s). Breif commentary on agreement – or lack thereof – between theory and experiment would be appropriate, but specific results that were already reported and discussed at length in the *Results and Discussion* section should not be repeated.