

**Power Electronics I**

**FALL 2015**

**EE 7410L– Sec. No: 03**

**TA: Dalvir Saini**

**Lab Number: 8**

**Lab Title: DYNAMIC CHARACTERSTICS OF PN-JUNCION DIODE**

**Name: NITIN ATTULURI**

**“I have neither given nor received aid on this assignment, nor have I observed any violation of the Honor code”**

**Signature: NITIN ATTULURI Date:11-16-2015**

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**Abstract**

* The main objective of this lab is to differentiate the characteristics of silicon and silicon carbide pn-junction diodes for different temperatures.
* By using the SABER circuit simulator we are observing the how the diode characteristics are varying with respect to the temperature.
* We are going to see the rectification properties of a power diode for different temperature of operation.

**Analysis**

The shockley diode equation for the forward and the reverse biased regions is

ID=IS(eVD/ηVT-1)

Where the reverse saturation current is

IS(T)=AJq(Dppno/Lp+Dnnpo/Ln)

In the bove the

AJ – Cross sectional area of the pn-junction diode

pno =ni2/ND - Concentration of holes in n- region

npo= ni2/NA - Concentration of electrons in p- region

Dn=µnoVT – Diffusion coefficient of electrons

Lp=(Dpτp)0.5-Diffusion length of electrons

Ln=(Dnτn)0.5-Diffusion length of holes

τp – Average lifetimes of the minority holes

τn- Average lifetimes of the minority electrons

The values of the represented symbols

AJ=1 cm2

τp = 0.1 µs

τp = 10µs

µno=1360cm2/Vs

µpo=480 cm2/Vs

ND=1015cm-3

NA=1016cm-3