

ECSE-2210 Microelectronics Technology
Class Activity 24

1. Explain why MS diodes switch very rapidly (compared to p-n diodes) from the forward-bias on-state to the reverse-bias off-state.

2. Consider a Tungsten/n-Si Schottky barrier diode with a barrier height, Φ_B , of 0.67eV. If Richardson's constant A^* is 120 A/(cm² K²), calculate the reverse saturation current, I_s . Also, calculate the current, I , for a forward bias of 0.3 V. Assume a cross sectional junction area of $A = 1 \text{ cm}^2$.

3. Consider a p-n junction diode with a cross sectional area $A = 1 \text{ cm}^2$ and the following parameters.

<u>p-side</u>	<u>n-side</u>
$N_A = 10^{18} \text{ cm}^{-3}$	$N_D = 10^{16} \text{ cm}^{-3}$
$L_n = 16 \text{ }\mu\text{m}$	$L_p = 10 \text{ }\mu\text{m}$
$D_n = 25 \text{ cm}^2/\text{s}$	$D_p = 10 \text{ cm}^2/\text{s}$

Calculate the reverse saturation current. Also calculate the forward current, I , when the device is biased at 0.3 V. (Note: Compare this to the Schottky diode case).