

ECSE-2210 Microelectronics Technology
Class Activity 17

1. What is the root cause of the delay in switching from the on-state to the off state?

2. Name the two mechanisms that act to remove the stored excess charge during the turn-off transient.

3. An ideal p^+n diode carrying a forward current I_F is suddenly reverse biased such that a current I_R flows through it at $t = 0^+$. The storage time measured was t_s . Determine what happens to t_s (increase or decrease) if:
 - a. Only I_F is increased.
 - b. Only $|I_R|$ is increased.
 - c. The hole lifetime, τ_p , is increased.

4.
 - a. An ideal p^+n diode carrying a forward current I_F is suddenly open circuited at $t = 0$. Sketch the expected variation of $p_n(x, t)$ versus x at progressively increasing times after open circuiting the diode.
 - b. Repeat the same if the diode above is reverse biased at $t = 0$ such that a current I_R flows through it at $t = 0^+$.

5. The hole lifetime of a $p^+ - n$ junction diode is measured by the diode recovery method. When the applied voltage is as shown in figure, the current through the diode was as shown. Determine the hole lifetime.

