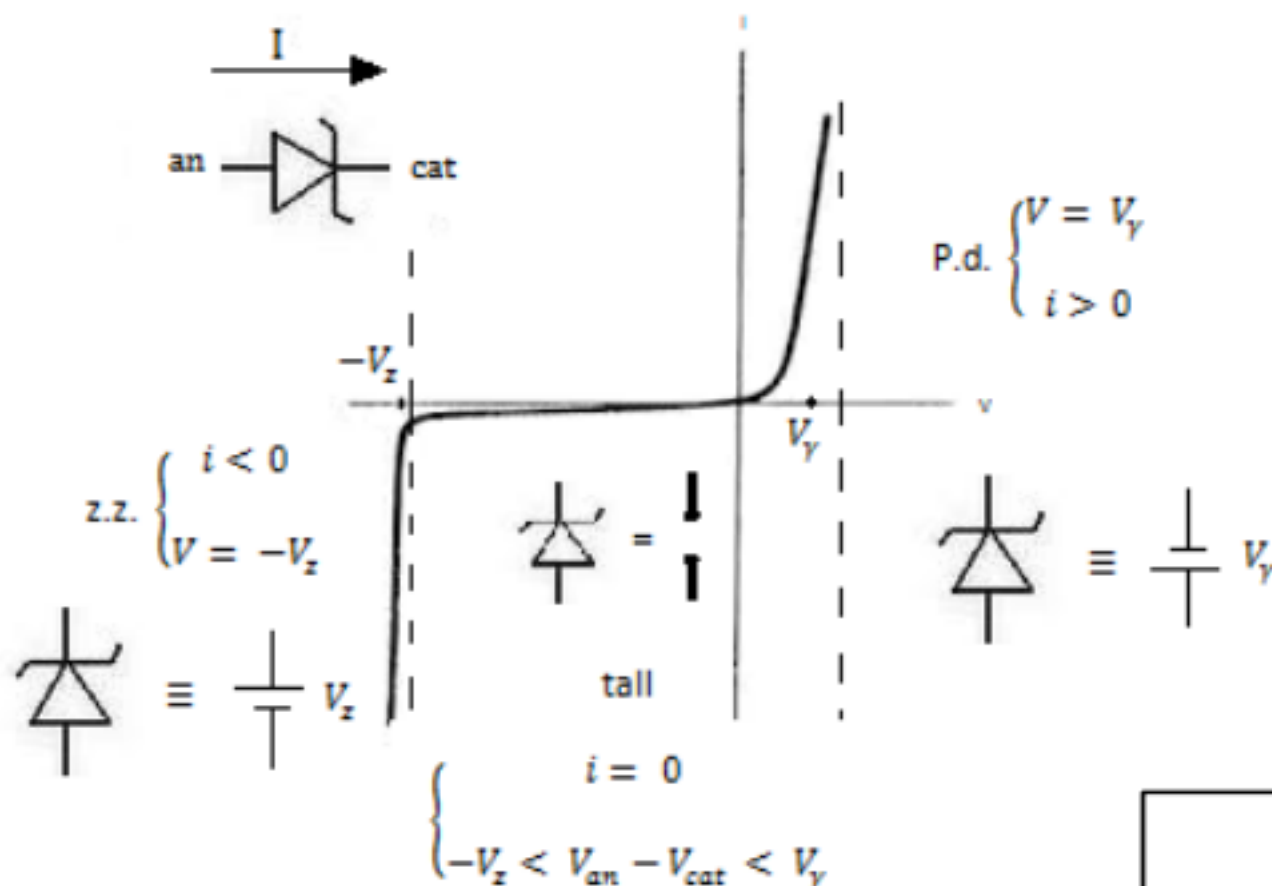
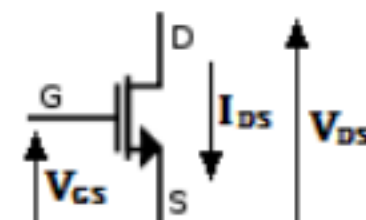


Diode Zener:



Diode nMos:



- $V_{GS} < V_T \Rightarrow \text{OFF} \quad I_{DS} = 0$
- $V_{GS} > V_T \Rightarrow \text{ON}$
 - $0 < V_{DS} < V_{GT} \Rightarrow$
Ohm. $I_{DS} = \beta \cdot \left(V_{GT} \cdot V_{DS} - \frac{V_{DS}^2}{2} \right)$
 - $V_{DS} > V_{GT} \Rightarrow$
Sat. $I_{DS} = \frac{\beta}{2} \cdot V_{GT}^2$

Diode pMos:

- $V_{GS} > V_T \Rightarrow \text{OFF} \quad I_{DS} = 0$
- $V_{GS} < V_T \Rightarrow \text{ON}$
 - $0 > V_{DS} > V_{GT} \Rightarrow$ Ohm. $I_{DS} = \beta \cdot \left(V_{GT} \cdot V_{DS} - \frac{V_{DS}^2}{2} \right)$
 - $V_{DS} < V_{GT} \Rightarrow$ Sat. $I_{DS} = \frac{\beta}{2} \cdot V_{GT}^2$

Recta Carga $V_{DS} + R_D I_{DS} - V_{DD} = 0$

$V_{GT} = V_{GS} - V_T$

$t_{pLH} = \frac{1,7 C_L}{\beta_p V_{DD}}$

$t_{pHL} = \frac{1,7 C_L}{\beta_n V_{DD}}$

$t_p = \frac{t_{pLH} + t_{pHL}}{2}$

$\tau = \frac{t_p}{\ln 2}$

pot: $p = f \cdot C_L \cdot V_{DD}^2$ (W) prod. delay - pot.: $p \cdot t_p$