

PN Junction Ideal Diode Equation

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PN Junction – Ideal Diode Equation

$$I_D = I_S \left[e^{\left(\frac{qV_A}{nkT} \right)} - 1 \right] = I_S \left[e^{\left(\frac{V_A}{nV_T} \right)} - 1 \right]$$

$$I_S = qA \left[\frac{D_N}{L_N} n_{p0} + \frac{D_P}{L_P} p_{n0} \right]$$

Proportional to Area (A)

Inversely proportional to Doping (n_{p0} , p_{n0})

Typically, $10^{-12}\text{A} - 10^{-18}\text{A}$

n

Accounts for non-idealities

Typically, between 1 and 2