Semiconductor

Formula/Expression	Description	Symbols/Variables	SI Units	Constant Values
$n_e = n_h = n_i$	Density of charge carriers (electrons = holes)	n_e, n_h, n_i	m^{-3}	None
$n_e \cdot n_h = n_i^2$	Product of electron and hole concentrations	n_e, n_h, n_i	m^{-6}	None
$I = I_e + I_h$	Total current = electron current + hole current	I, I_e, I_h	Amperes (A)	None
$r_d = \Delta V / \Delta I$	Dynamic resistance of a diode	$r_d, \Delta V, \Delta I$	Ohms (Ω)	None
$I_L = I_S \cdot (e^{qV/kT} - 1)$	Diode current equation under bias	I_L, I_S, q, V, k, T	Amperes (A)	$q = 1.6 \times 10^{-19}\,\mathrm{C}, k = 1.38 \times 10^{-23}\,\mathrm{J/K}$
$E_g = E_C - E_V$	Energy bandgap relation (conduction and valence)	E_g, E_C, E_V	Electronvolts (eV)	None