B = 7.3 x 10^{15} [$cm^{-3}K^{-3/2}$] for Si

E_g =1.12 [eV] for Si

k_B = 8.62 x 10^{-5} [eV/K]

k_B = 1.3806 x 10^{-23} [J/K]

q = 1.60 x 10^{-19} [C]

$\varepsilon_S = 11.7\ \varepsilon_0$

ε_0 = 8.854 x 10^{-14} [F/cm]

$$n = p = n_i = BT^{3/2}e^{-E_g/2kT} \text{ [1/cm}^3\text{]}$$

$$p_n n_n = p_p n_p = n_i^2$$

$$J_{drift} = q\left(p\mu_p + n\mu_n\right)E \text{ [A/cm}^2\text{]}$$

$$\rho = \frac{1}{\sigma} = \frac{1}{q\left(p\mu_p + n\mu_n\right)} \text{ [}\Omega\cdot\text{cm]}$$

$$R = \rho\frac{l}{A} = \rho\frac{\text{length}}{\text{width}\times\text{height}} \text{ [}\Omega\text{]}$$

$$J_p = -qD_p\frac{dp(x)}{dx} \text{ [A/cm}^2\text{];}$$

$$J_n = qD_n\frac{dn(x)}{dx} \text{ [A/cm}^2\text{]}$$

$$V_T = \frac{k_B T}{q} \text{ [V];}$$

$$r_d = \frac{V_T}{I_D} \text{ [}\Omega\text{];}$$

$$\frac{D_n}{\mu_n} = \frac{D_p}{\mu_p} = V_T$$

$$V_0 = V_T \ln\left(\frac{N_A N_D}{n_i^2}\right) \text{ [V]}$$

$$I_D = I_S\left(e^{V/V_T} - 1\right) \text{ [A]}$$

$$V = V_T \ln\left(\frac{I}{I_s} + 1\right) \text{ [V]}$$

$$I_S = Aqn_i^2\left(\frac{D_p}{L_p N_D} + \frac{D_n}{L_n N_A}\right) \text{ [A]}$$