

FORMULA SHEET

$$E_g \text{ (Silicon Energy Gap)} = 1.1 \text{ eV}$$

$$q \text{ (Electron charge)} = 1.6 \times 10^{-19} \text{ Coulombs}$$

$$\epsilon_{ox} \text{ (Permittivity of Oxide)} = 0.34 \times 10^{-12} \text{ F/cm}$$

$$\epsilon_{si} \text{ (Permittivity of Silicon)} = 1.06 \times 10^{-12} \text{ F/cm}$$

$$n_i \text{ (Silicon intrinsic concentration at Room Temperature)} = 1.5 \times 10^{10} \text{ cm}^{-3}$$

$$\mu_n \text{ (Electron mobility at Room Temperature)} = 600 \text{ cm}^2/\text{V.s}$$

$$\mu_p \text{ (Hole mobility at Room Temperature)} = 250 \text{ cm}^2/\text{V.s}$$

$$V_{bi} = \frac{KT}{q} \ln \frac{N_A N_D}{n_i^2}$$

$$\phi_{Fp} = \frac{KT}{q} \ln \frac{n_i}{N_A}$$

$$\phi_{Fn} = \frac{KT}{q} \ln \frac{N_D}{n_i}$$

$$\frac{KT}{q} = 0.025 \text{V (at Room Temperature)}$$

$$\text{Workfunction } q\Phi_s = q\chi + (E_c - E_F)$$

$$Q_B = -\sqrt{2q \cdot N_A \cdot \epsilon_{si} \cdot |\phi_F - \phi_S|}$$

$$x_d = \sqrt{\frac{2\epsilon_{si} \cdot |\phi_F - \phi_S|}{q \cdot N_A}}$$

$$V_T(V_{SB}) = V_{T0} + \gamma(\sqrt{|2\phi_F - V_{SB}|} - \sqrt{|2\phi_F|})$$

$$\gamma = \frac{\sqrt{2qN_A \epsilon_{si}}}{C_{ox}}$$