

$$J_n = \frac{qD_n N_c}{V_t \varepsilon_s} \sqrt{\frac{2q(\phi_i - V_a)N_d}{V_t}} \exp\left(-\frac{\phi_B}{V_t}\right) \left[\exp\left(\frac{V_a}{V_t}\right) - 1\right]$$