

$$I = qA \left\{ \left[\frac{D_n n_{p0}}{L_n} \coth\left(\frac{w'_p}{L_p}\right) + \frac{D_p p_{n0}}{L_p} \coth\left(\frac{w'_n}{L_n}\right) + n_i^2 b x_d \right] (e^{V_a/V_t} - 1) + \frac{q n_i x'}{2\tau} (e^{V_a/2V_t} - 1) \right\}$$