$$V_{GB} < V_{FB}$$

$$Q_G = C_{ox}(V_{GB} - V_{FB})$$

$$Q_B = |Q_G|$$

$$\varphi_{bi}$$

$$+$$

$$\varphi_{bi}$$

$$-$$

$$\varepsilon_{ox} = 3.9\varepsilon_0$$

$$\varepsilon_s = 11.7\varepsilon_0$$

$$t_{ox} \sim 1\text{nm}$$

$$0$$

$$x$$

$$+$$

$$V_{ox}$$

$$-$$

$$+$$

$$V_{dep}$$

$$-$$

$$X_{d0}$$

$$E_{ox}$$

$$C_{ox}$$

$$C_{dep}$$

$$V_{GB} > V_{FB}$$

$$Q_G(V_{GB}) = -Q_B$$

$$Q_B = -qN_A X_d(V_{GB})$$

$$V_{FB} < 0\text{V}$$

$$E_{dep}(x)$$

$$V_{GB} = V_{FB}$$

$$Q_G(V_{FB}) = 0\text{V}$$

$$V_{GB} = V_T$$

$$\Psi_s$$

$$V_{GB} = V_{FB}$$

$$Q_G(V_{GB} = V_{FB}) = 0\text{C}$$

$$Q_B(V_{GB} = V_{FB}) = 0\text{C}$$

$$+$$
$$2\ \varphi_p$$
$$-$$

$$V_{GS} - V_T$$

$$E_{ox}$$

$$E_{dep}(x)$$