

$$V_{DS,sat} = V_{GS} - V_{FB} - 2\phi_F - \frac{qN_a\epsilon_s}{C_{ox}^2} \left\{ \sqrt{1 + 2 \frac{C_{ox}^2}{qN_a\epsilon_s} (V_{GB} - V_{FB})} - 1 \right\}$$