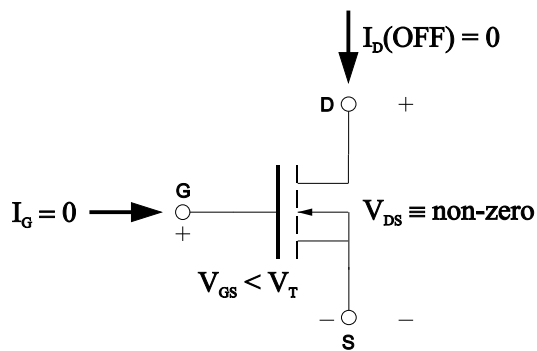
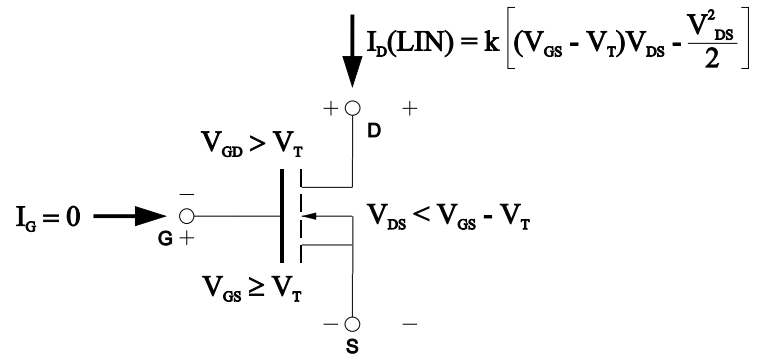


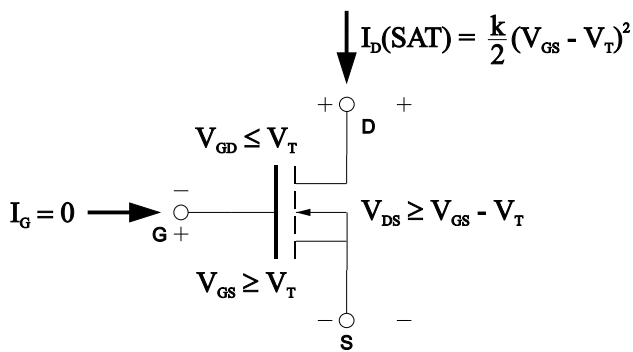
NMOS Modes of Operation



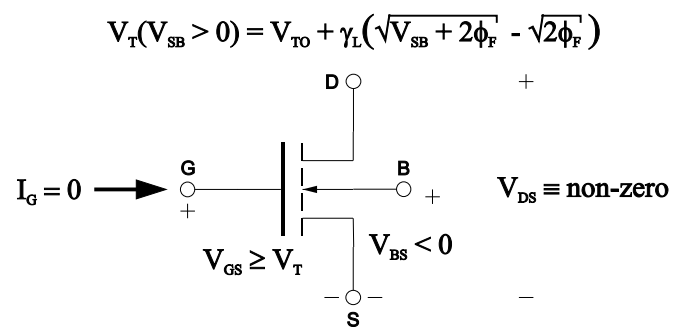
(a) cutoff mode



(b) linear mode



(c) saturation mode



(d) body-bias effect on threshold voltage

LINEAR

$$I_D(\text{LIN}) = k \left[(V_{GS} - V_T)V_{DS} - \frac{V_{DS}^2}{2} \right]$$

SATURATION

$$I_D(\text{SAT}) = \frac{k}{2} (V_{GS} - V_T)^2$$