

MOSFET capacitance calculation (saturation region)

Use the following formulas for the MOSFET capacitances to get your hand calculations to agree with SPICE.

$$\begin{aligned}C_{gs} &= \frac{2}{3} W L C_{ox} + W C_{gso} \\ &= \frac{2}{3} W L C_{ox} + W L_D C_{ox} \\ C_{gd} &= W C_{gdo} \\ &= W L_D C_{ox}\end{aligned}$$

C_{ox} can be calculated from the SPICE parameter t_{ox} .
 L_D is a SPICE parameter.

$$\begin{aligned}C_{db} &= \frac{C_j A_D}{\left(1 + \frac{V_{DB}}{PB}\right)^{m_j}} + \frac{C_{SW} P_D + C_G W}{\left(1 + \frac{V_{DB}}{PB_{SW}}\right)^{m_{jSW}}} \\ A_D &= W 2 HDIF \\ P_D &= W + 4 HDIF\end{aligned}$$

C_j , C_{SW} , C_G , PB , m_j and $HDIF$ are SPICE parameters.
Default values: $PB = PB_{SW} = 0.8V$, $m_j = 1/2$, $m_{jSW} = 1/3$.