MOSFET capacitance calculation
(saturation region)

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

\[ C_{gs} = \frac{2}{3} W L C_{ox} + W C_{gso} \]
\[ = \frac{2}{3} W L C_{ox} + W L_D C_{ox} \]
\[ C_{gd} = W C_{gdo} \]
\[ = W L_D C_{ox} \]

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

\[ C_{db} = \frac{C_j A_D}{\left(1 + \frac{V_{th}}{V_{th}}\right)^{m_j}} + \frac{C_{SW} P_D + C_G W}{\left(1 + \frac{V_{th}}{V_{th}}\right)^{m_jSW}} \]
\[ A_D = W 2 HDIF \]
\[ P_D = W + 4 HDIF \]

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