

Equations in Article

$$I_{DS} = K_1(T) * \ln \left(1 + \exp \left(\frac{V_{GS} - b_1}{c_1} \right) \right) * \frac{(m_1 + n_1 * V_{GS}) * V_{DS}}{1 + P_1(T) * (d_1 + e_1 * V_{GS}) * V_{DS}} \quad V_{DS} > 0$$

$$I_{DS} = -K_2(T) * \ln \left(1 + \exp \left(\frac{V_{GD} - b_2}{c_2} \right) \right) * \frac{V_{SD}}{1 + P_2(T) * V_{SD}} \quad V_{DS} \leq 0$$

$$K_1(T) = K_1 * [1 - l_1 * (T - 25)]$$

$$K_2(T) = K_2 * [1 - l_2 * (T - 25)]$$

$$P_1(T) = [1 - h_1 * (T - 25)]$$

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Equations in LtSpice

$$I_{DS} = K * \ln \left(1 + \exp \left(\frac{V_{GS} - 1.7}{\frac{slp}{26}} \right) \right) * \frac{V_{DS}}{1 + \max(x0_0 + x0_1 * (V_{GS} + 4.1), 0.2) * V_{DS}} \quad V_{DS} > 0$$

$$I_{DS} = -K * \ln \left(1 + \exp \left(\frac{V_{GD} - 1.7}{\frac{slp}{21}} \right) \right) * \frac{V_{SD}}{1 + \max(x0_0 + x0_1 * (V_{GD} + 6.1), 0.2) * V_{SD}} \quad V_{DS} \leq 0$$

$$K = cur * 0.8 * \left(\frac{T - 25 + 273}{300} \right)^{-2.7}$$

$$cur = \left\{ \left(\frac{0.85}{3.6} \right) * \left(0.069 * \frac{75}{80} \right) * 295 \right\} = 0,4685890625$$

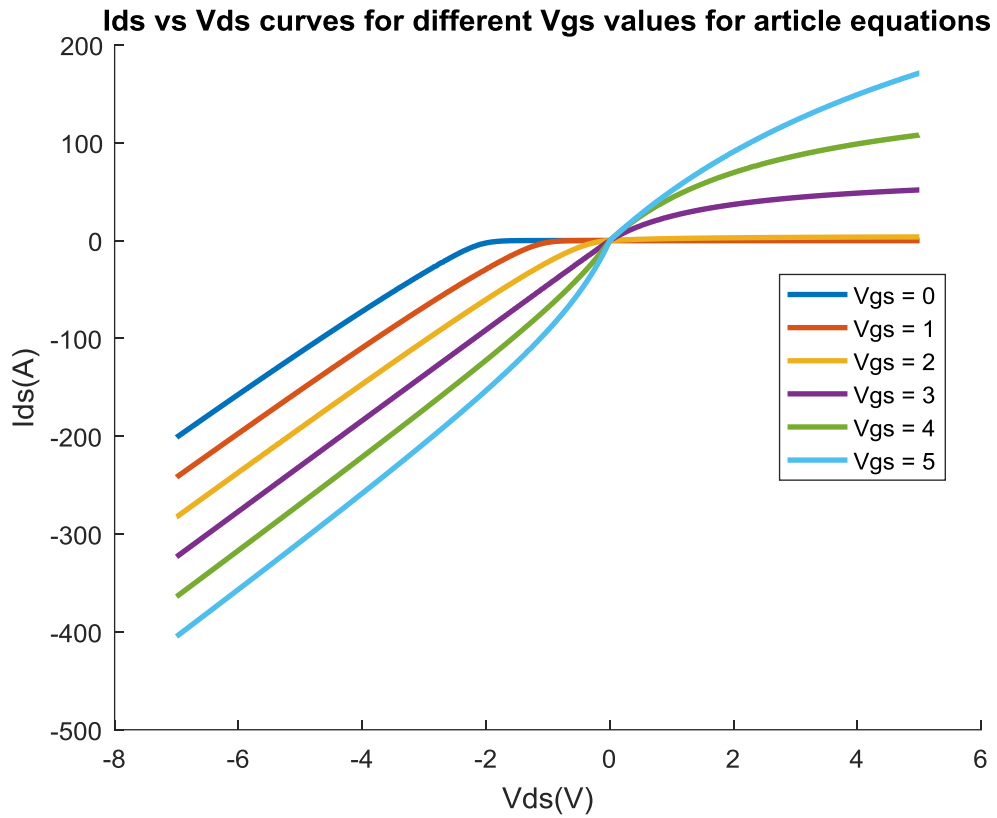


Figure 1: Article Equations

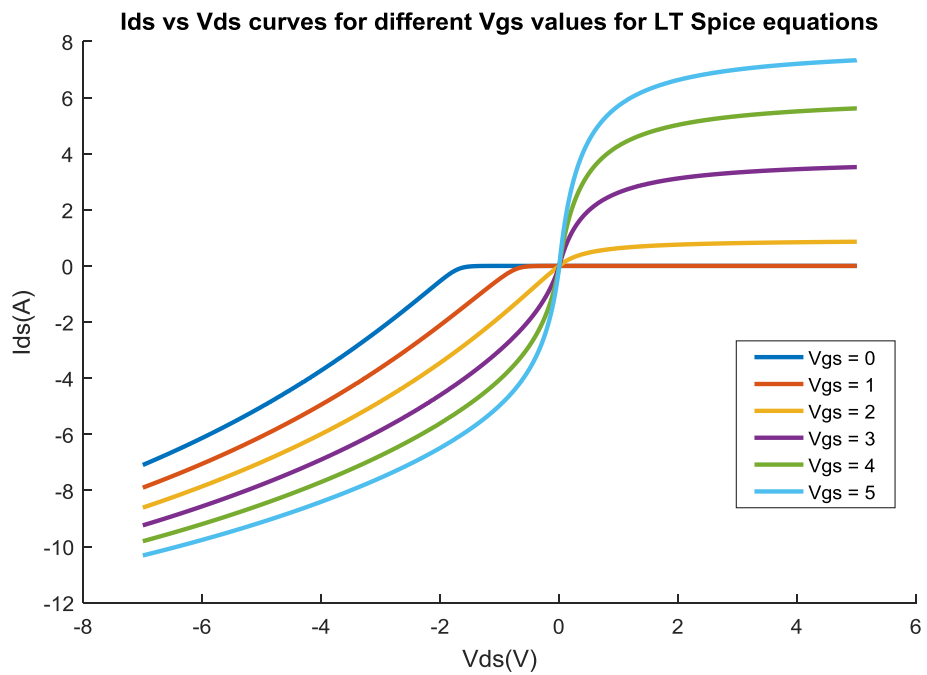


Figure 2: LT Spice Equations

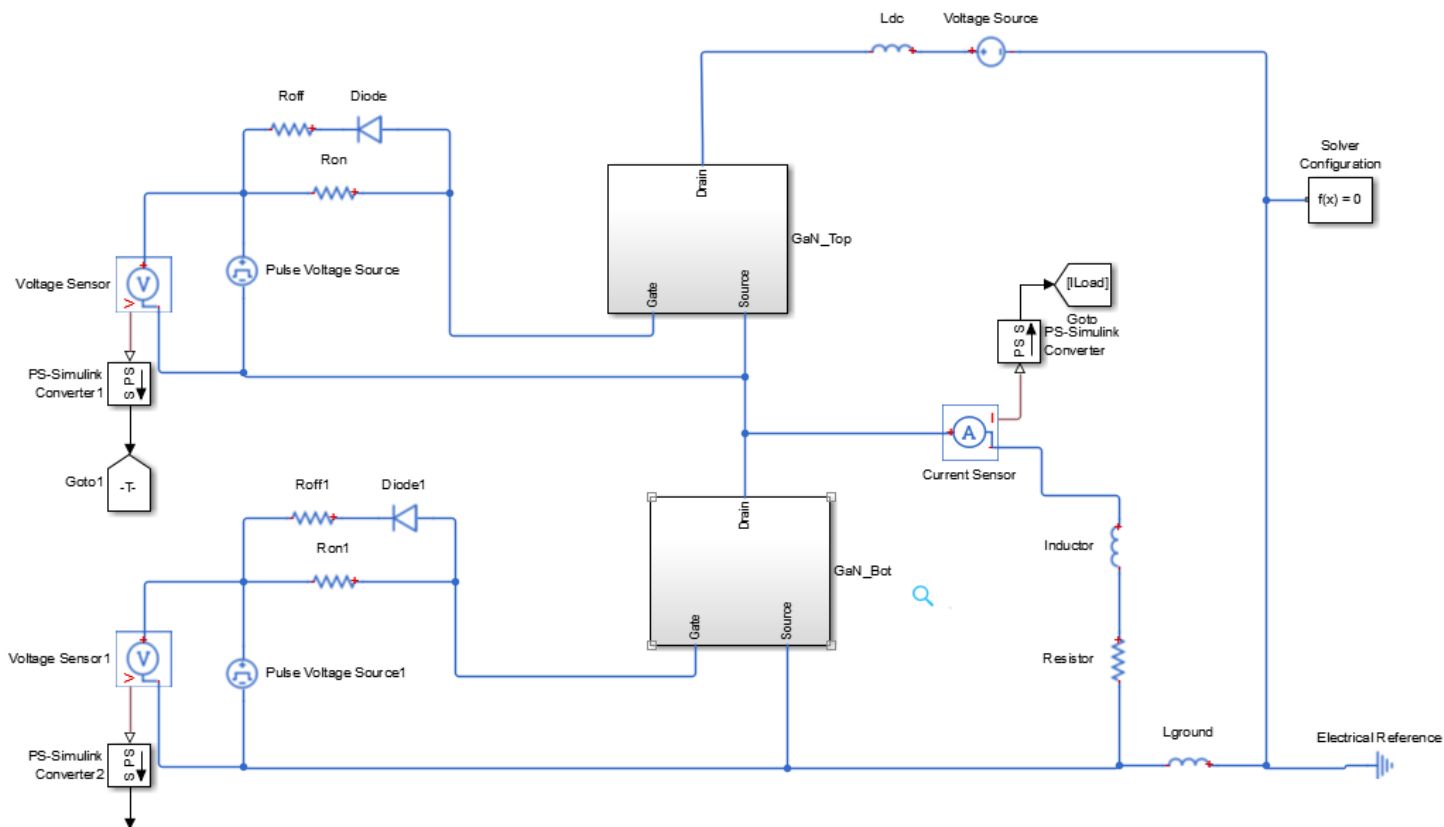


Figure 3: Half Bridge Circuit

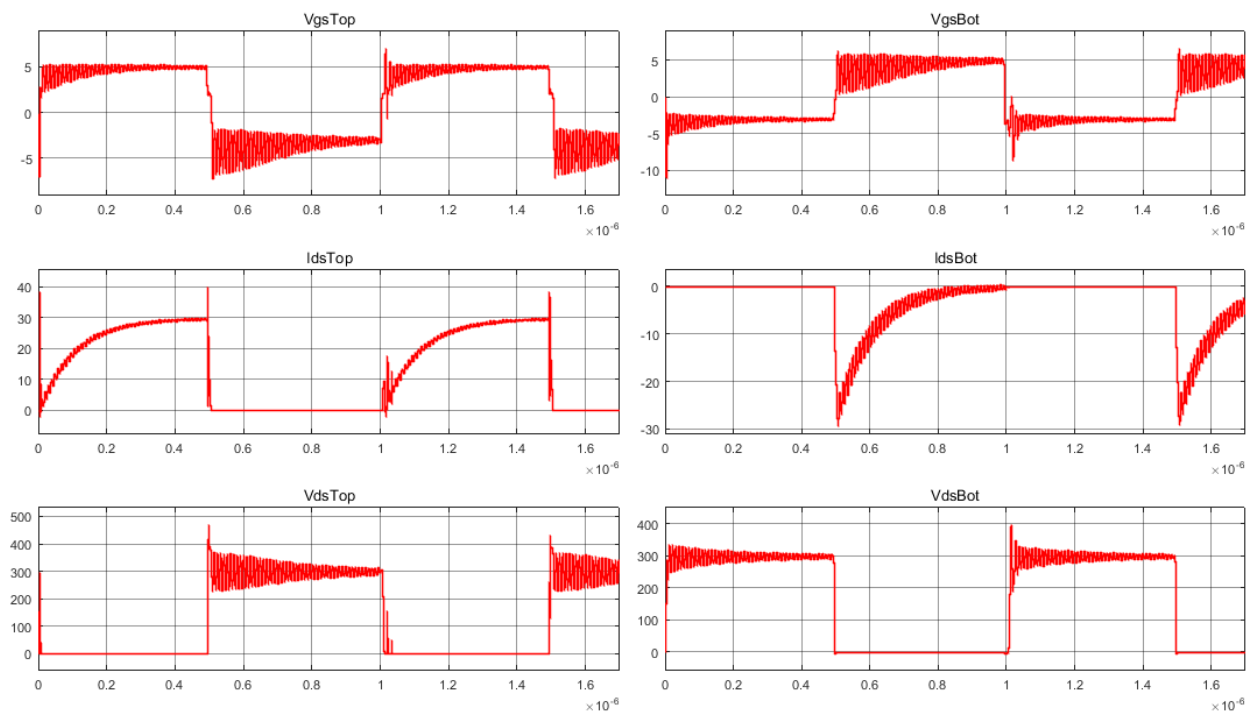


Figure 4: Vgs, Ids, Vds; LEFT -> TOP SW, RIGHT -> BOTTOM SW

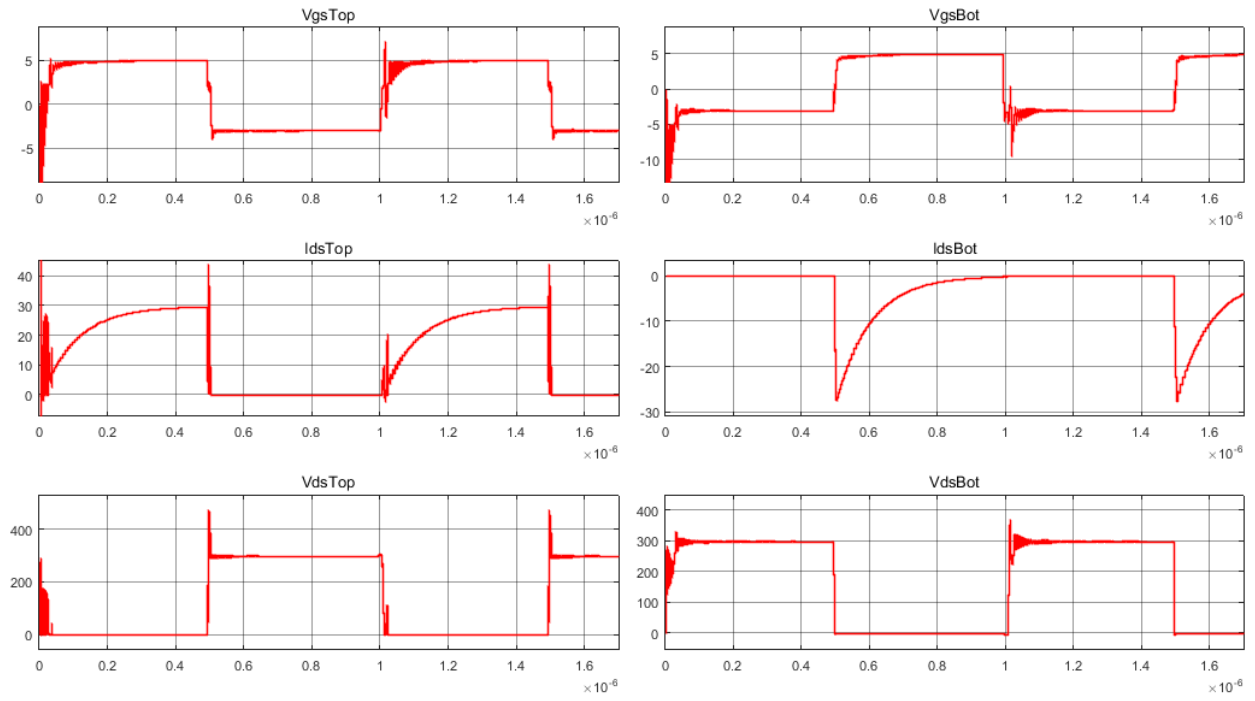


Figure 5: Inductances are eliminated

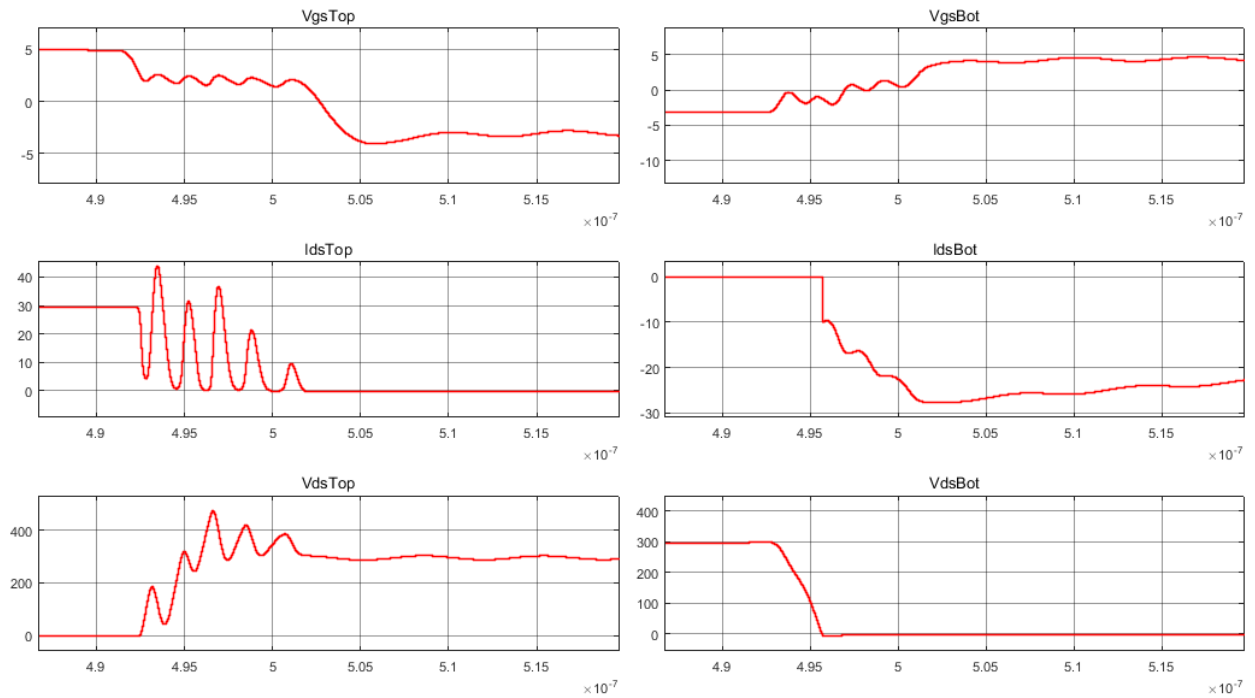


Figure 6: Top Switch Turns OFF, Bottom Switch Turns ON

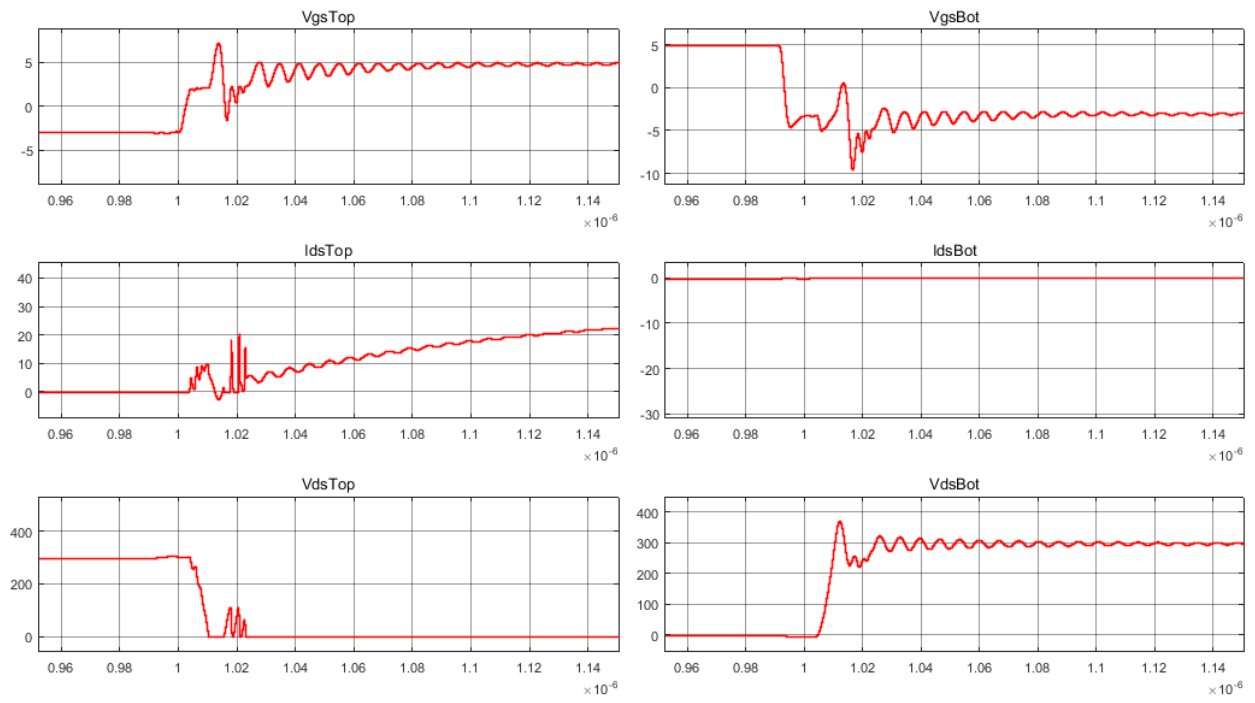


Figure 7: Top Switch Turns ON, Bottom Switch Turns ON