SLVAEQ9 : An Accurate Approach for Calculating the Efficiency of a Synchronous Buck Converter Using the MOSFET Plateau Voltage

[Incorrect]

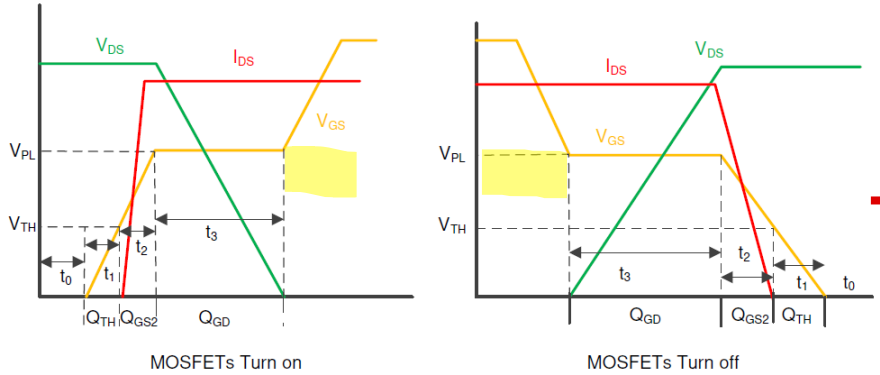

Figure 3. MOSFET Switch Transition

[Correct]

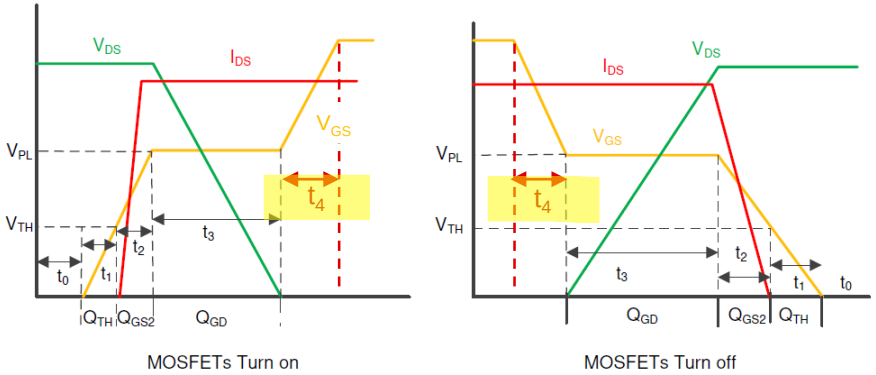

Figure 3. MOSFET Switch Transition

[Incorrect]

$$t_r = t_1 + t_2 = \left(\frac{Q_{gs2}}{V_{dr} - 0.5 \times \left(V_{pl} + V_{gs(th)} \right)} + \frac{Q_{gd}}{V_{dr} - V_{pl}} \right) (R_g + R_{drive})$$

$$t_{off} = t_3 + t_4 = \left(\frac{Q_{gs2}}{V_{dr} - 0.5 \times \left(V_{pl} + V_{gs(th)} \right)} + \frac{Q_{gd}}{V_{pl}} \right) \times (R_g + R_{drive})$$

[Correct]

$$tr = t_2 + t_3 = \left\{ \frac{Q_{gs2}}{V_{dr} - 0.5 \cdot (V_{PL} - V_{TH})} + \frac{Q_{gd}}{V_{dr} - V_{PL}} \right\} \cdot (R_g + R_{drive})$$

$$tf = t_2 + t_3 = \left(\frac{Q_{gs2}}{0.5 \cdot (V_{PL} - V_{TH})} + \frac{Q_{gd}}{V_{PL}} \right) \cdot (R_g + R_{drive})$$