

Example Simulation

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.ic V(g) = 0
.tran 0 50n 0 1p

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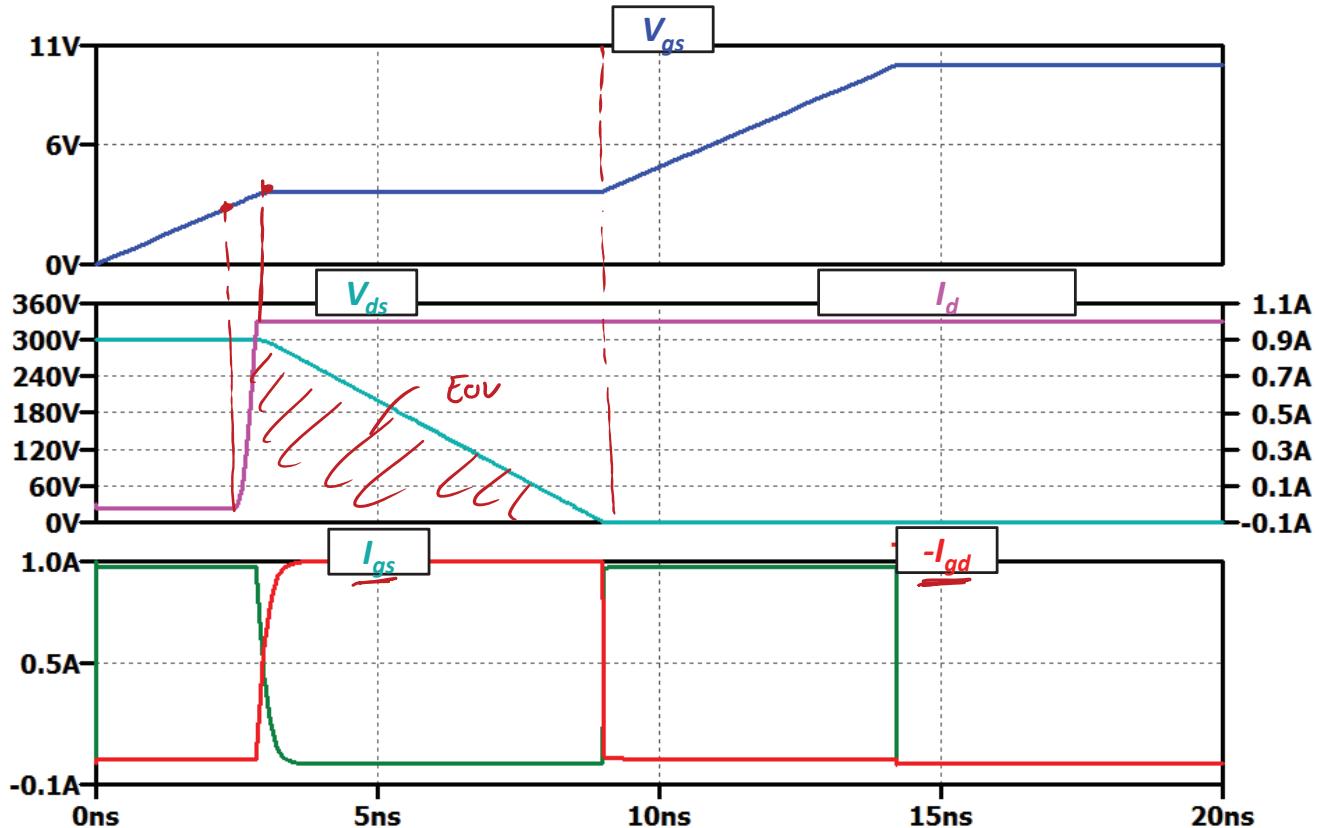
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I=IF(V(g)<10,1,0)
.model myD D(n=.01)
.model testFET VDMOS(Rg=.1 Rd=0 Rs=0 Vto=3 Kp=9 Cgdmax=0p
+ Cgdmin=0p Cgs=0p Cjo=1.5f Is=26p Rb=0m Vds=600 Ron=385m Qg=0n)

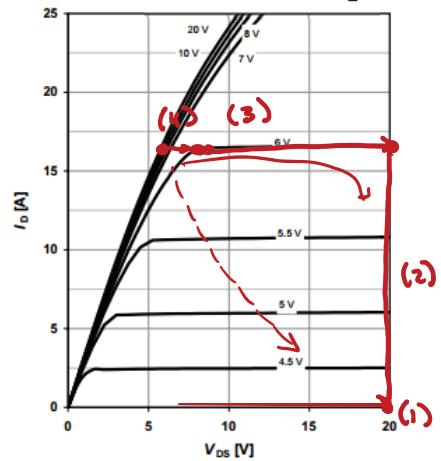
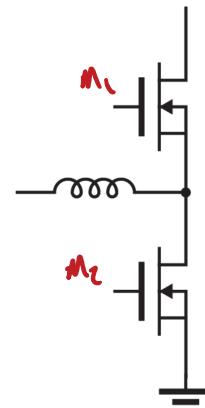
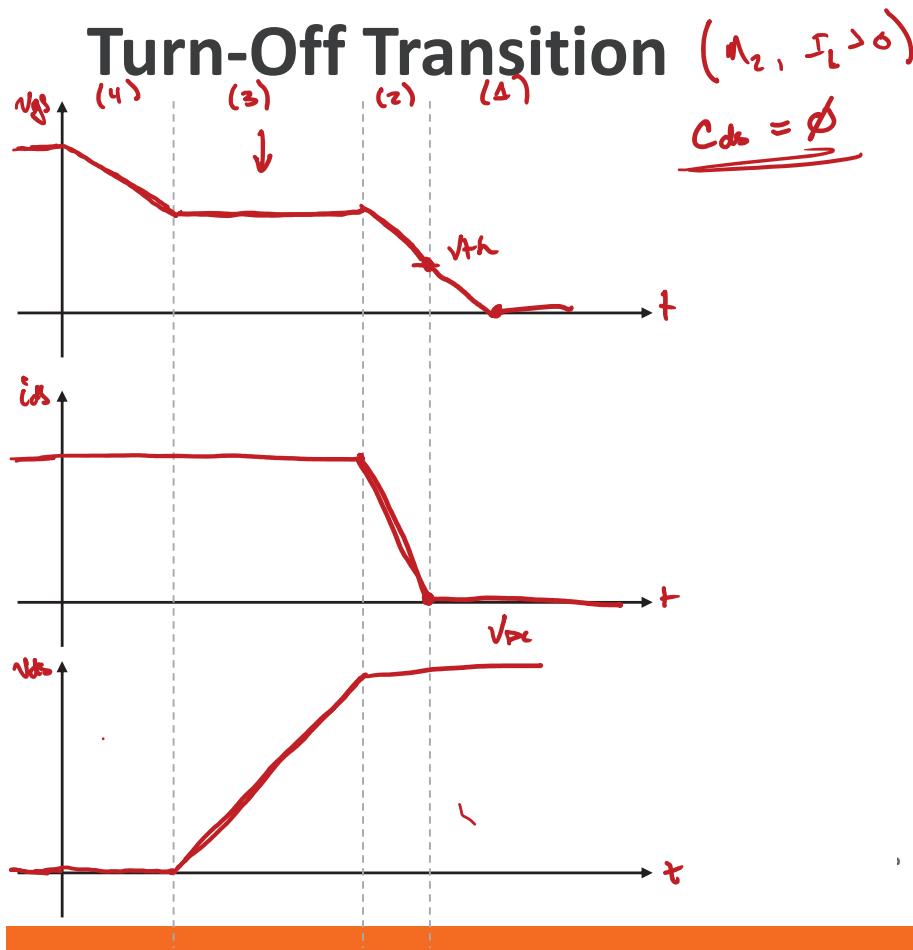
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Simulation Waveforms – Turn On

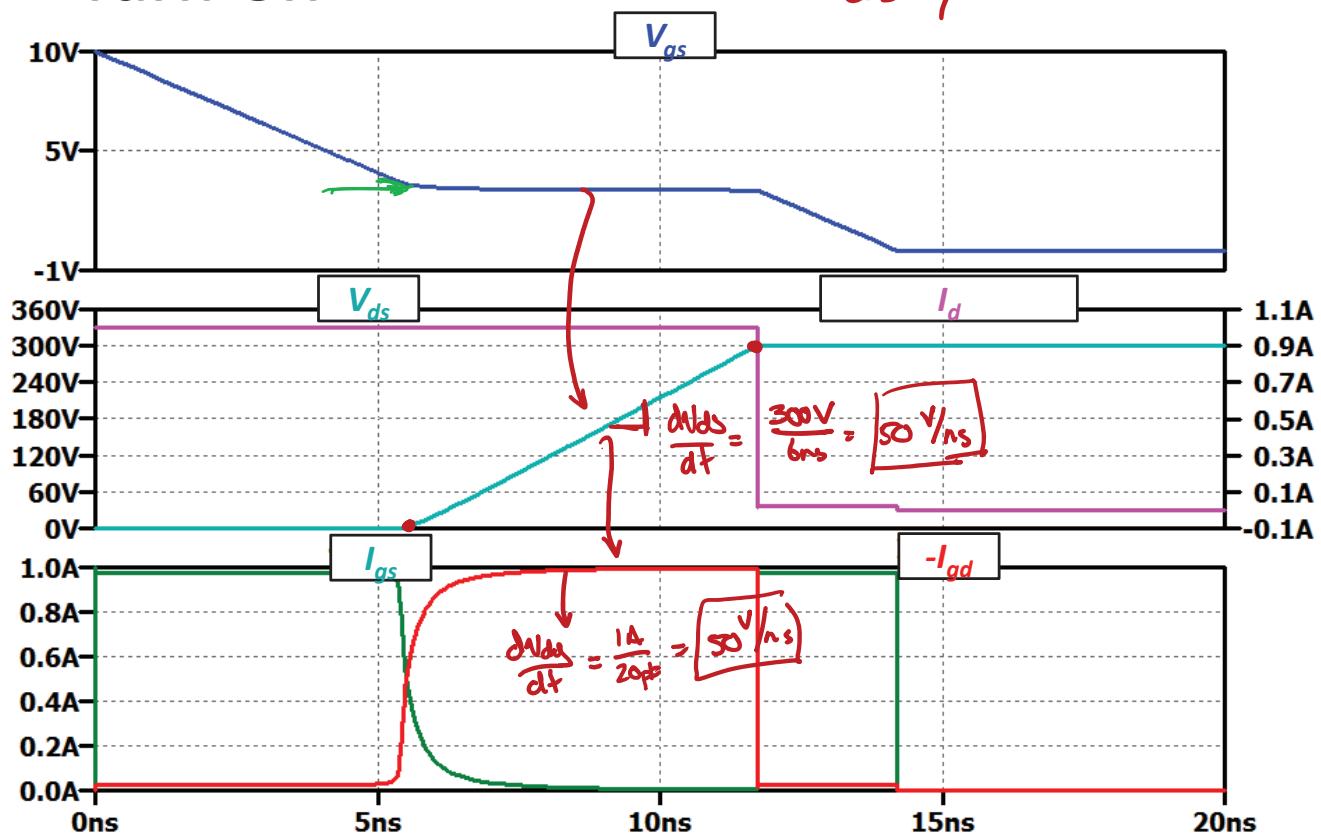


Turn-Off Transition



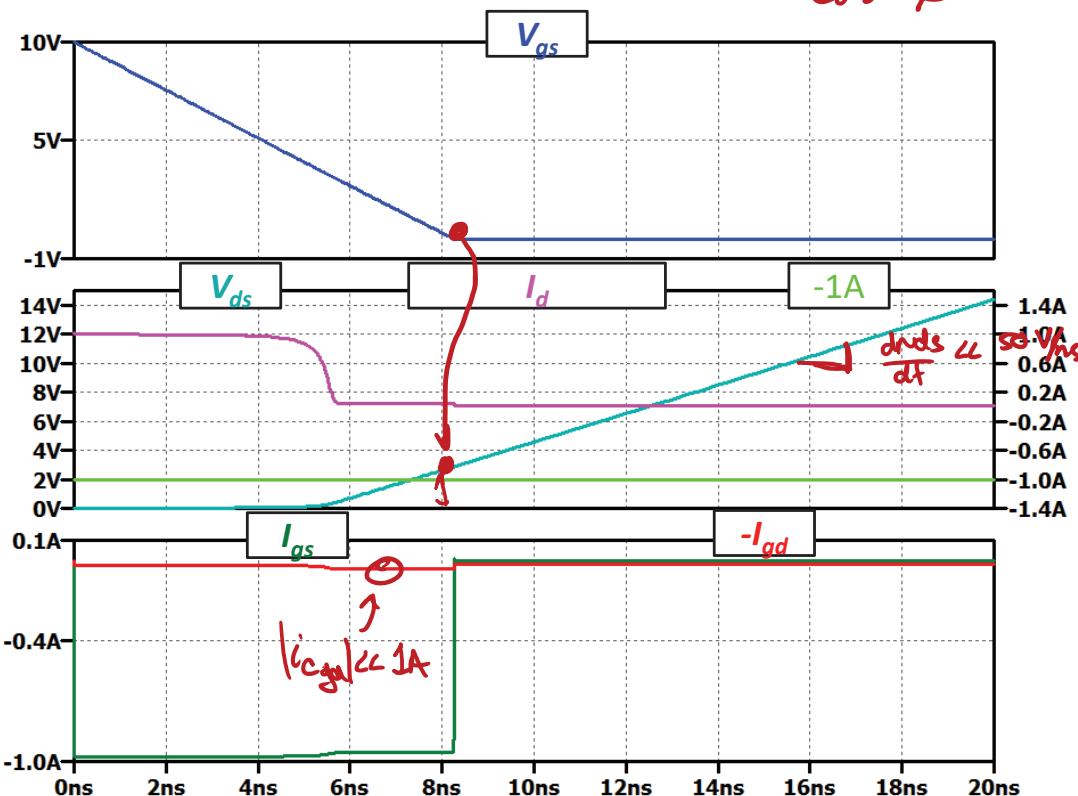
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Turn-off



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Turn-Off (Drain Dominated)

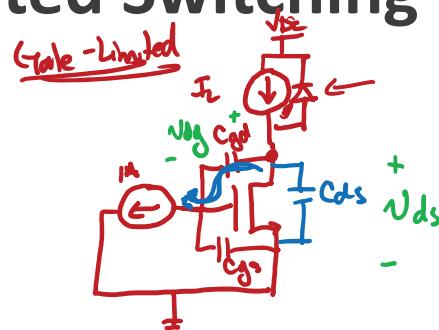


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Gate- vs. Drain-Limited Switching

Drain-Limited
(Ideal) FET turns fully off before V_{ds} begins to rise
(fast gate driver)

$$\frac{dV_{ds}}{dt} = \frac{I_L}{C_{ds}}$$



$$V_{ds} = V_{dg} + V_{gs} \quad \text{clamped at } V_m$$

$$\frac{dV_{ds}}{dt} = \frac{dV_{dg}}{dt} + \phi$$

$$\frac{dV_{dg}}{dt} = \frac{i_{dg}}{C_{dg}} = \frac{I_g}{C_{dg}} = \frac{dV_{ds}}{dt}$$

$$\frac{I_g}{C_{dg}} \gg \frac{I_L}{C_{ds}}$$

$$\text{then } P_{ov(\text{off})} \approx \phi$$

if opposite is true

$$\frac{I_L}{C_{ds}} \gg \frac{I_g}{C_{dg}}$$

$$\rightarrow P_{ov(\text{off})} = P_{ov(\text{on})}$$

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Simulation Results: Cds Sweep

