

## P-Channel 60 V (D-S) MOSFET

### DESCRIPTION

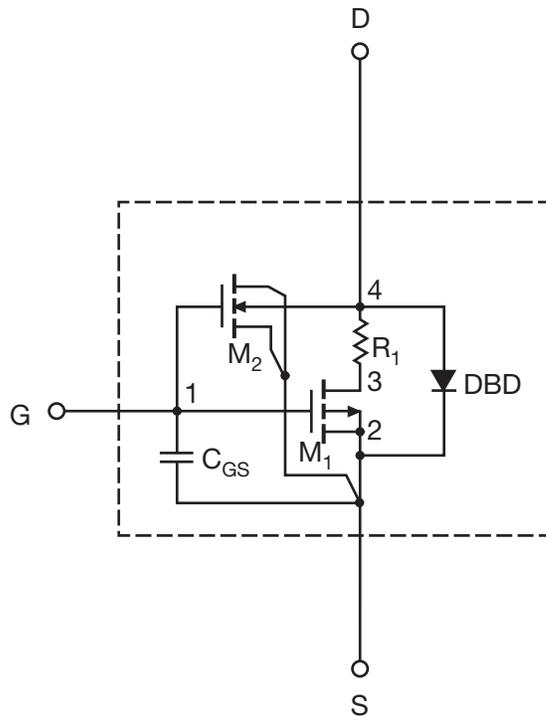
The attached SPICE model describes the typical electrical characteristics of the p-channel vertical DMOS. The subcircuit model is extracted and optimized over the -55 °C to 125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias near the threshold voltage.

A novel gate-to-drain feedback capacitance network is used to model the gate charge characteristics while avoiding convergence difficulties of the switched  $C_{gd}$  model. All model parameter values are optimized to provide a best fit to the measured electrical data and are not intended as an exact physical interpretation of the device.

### CHARACTERISTICS

- P-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the -55 °C to +125 °C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

### SUBCIRCUIT MODEL SCHEMATIC



### Note

- This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.



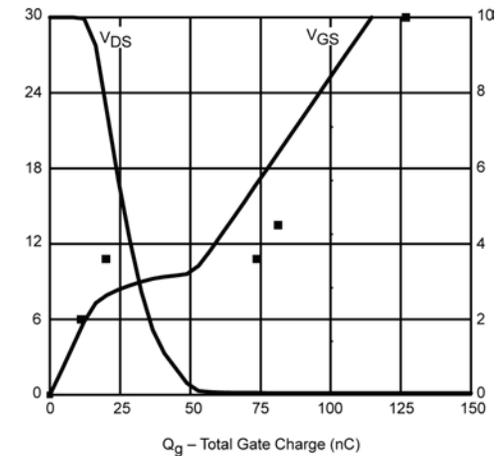
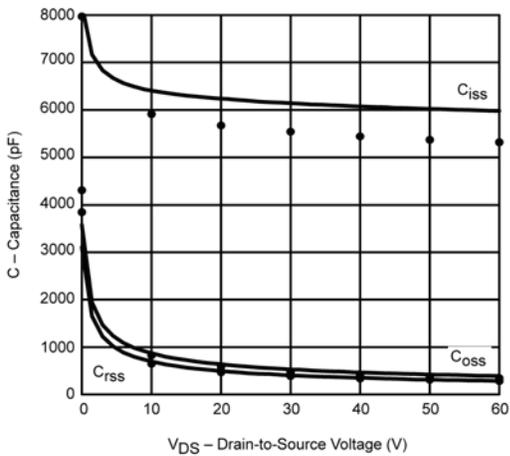
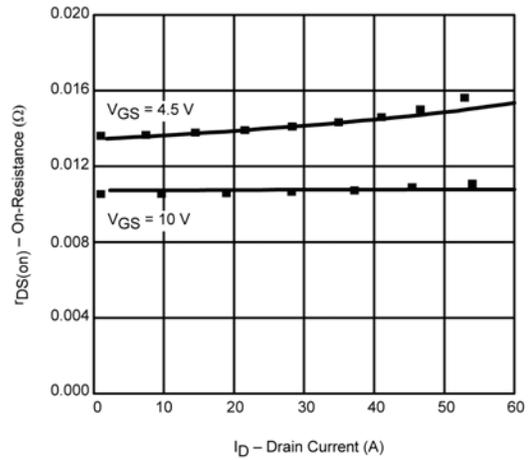
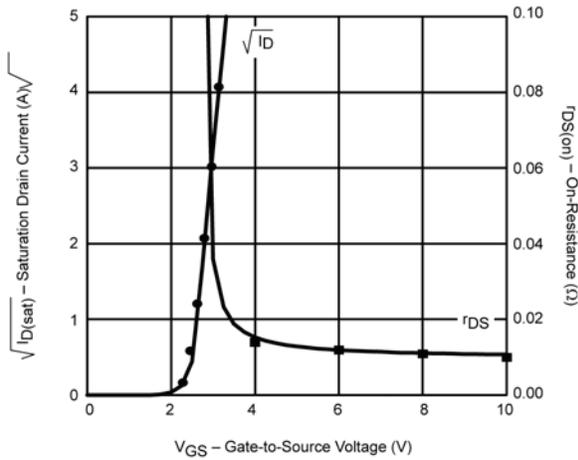
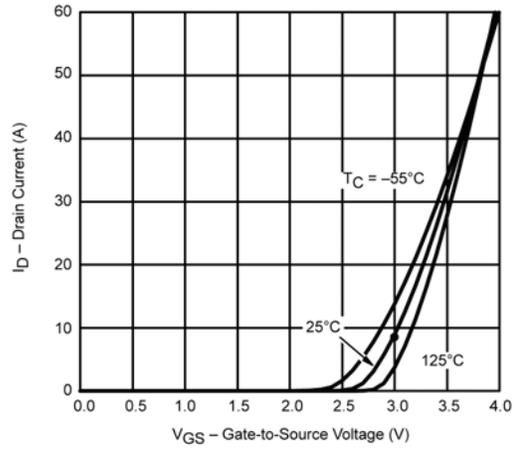
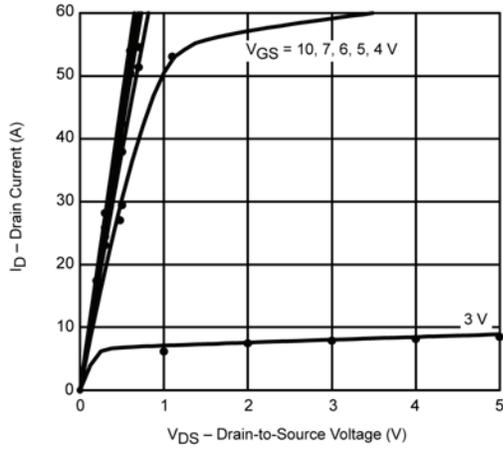
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
<b>Static</b>					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	1.9	-	V
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	442	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -14.4\text{ A}$	0.0110	0.0115	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -12.6\text{ A}$	0.014	0.015	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -14.4\text{ A}$	45	31	S
Diode Forward Voltage	$V_{SD}$	$I_S = -4.5\text{ A}, V_{DS} = 0\text{ V}$	-0.84	-0.80	V
<b>Dynamic<sup>b</sup></b>					
Total Gate Charge	$Q_g$	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -14\text{ A}$	117	127	nC
Gate-Source Charge	$Q_{gs}$		20	20	
Gate-Drain Charge	$Q_{gd}$		54	54	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -30\text{ V}, R_L = 30\text{ }\Omega$ $I_D = -1\text{ A}, V_{GEN} = -10\text{ V}, R_g = 6\text{ }\Omega$	22	20	ns
Rise Time	$t_r$		21	20	
Turn-Off Delay Time	$t_{d(off)}$		192	205	
Fall Time	$t_f$		68	190	

**Notes**

- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.



## COMPARISON OF MODEL WITH MEASURED DATA ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



### Note

- Dots and squares represent measured data.