

## P-Channel 12 V (D-S) MOSFET

### DESCRIPTION

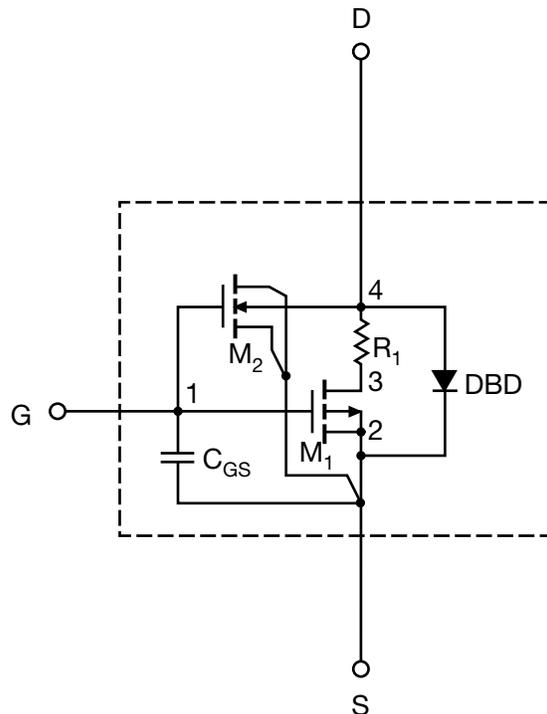
The attached SPICE model describes the typical electrical characteristics of the p-channel vertical DMOS. The subcircuit model is extracted and optimized over the -55 °C to 125 °C temperature ranges under the pulsed 0 V to 5 V gate drive. The saturated output impedance is best fit at the gate bias near 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

### 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.



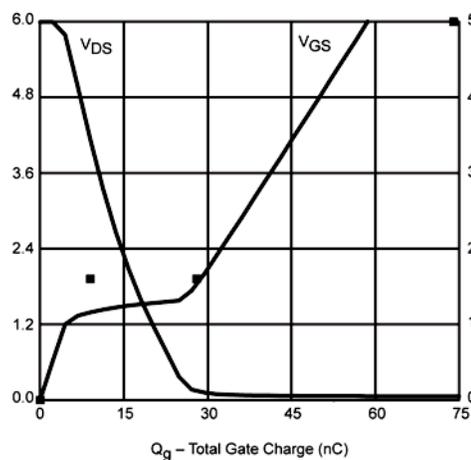
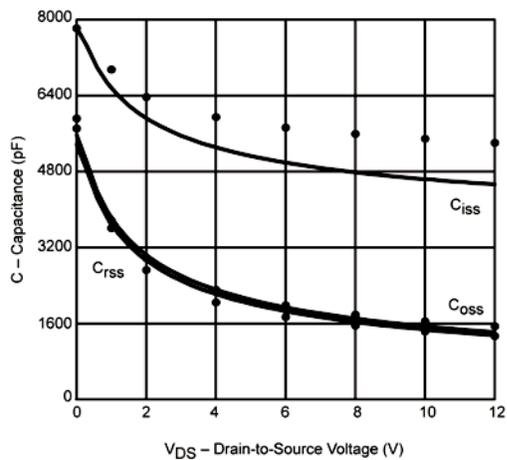
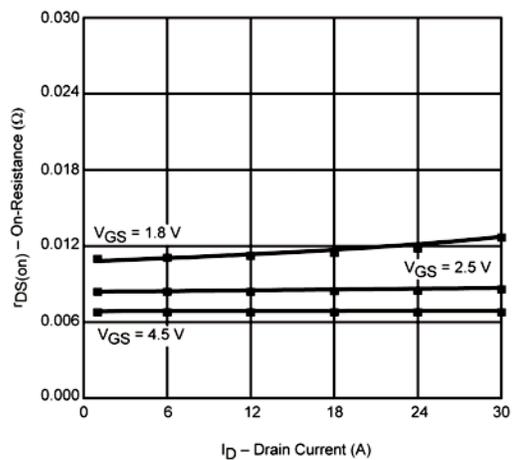
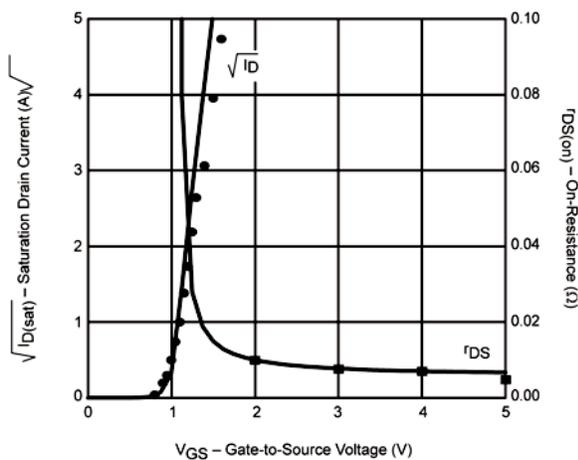
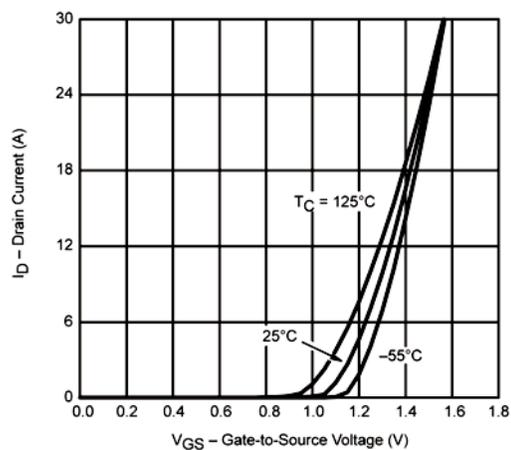
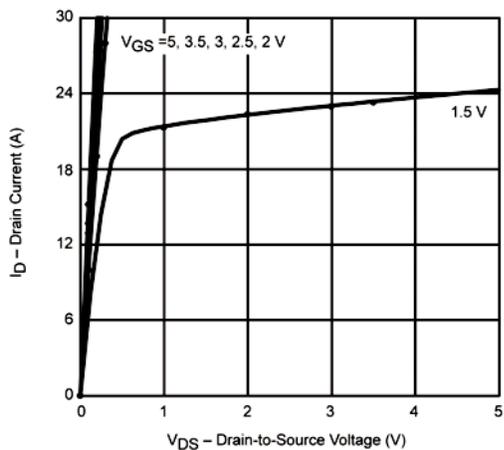
SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
<b>Static</b>					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	0.73	-	V
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	468	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -9.5\text{ A}$	0.0069	0.0068	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -8.5\text{ A}$	0.0085	0.0085	
		$V_{GS} = -1.8\text{ V}, I_D = -7.5\text{ A}$	0.0110	0.0112	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -9.5\text{ A}$	30	45	S
Diode Forward Voltage	$V_{SD}$	$I_S = -1.3\text{ A}, V_{GS} = 0\text{ V}$	-0.80	-0.58	V
<b>Dynamic<sup>b</sup></b>					
Total Gate Charge	$Q_g$	$V_{DS} = -6\text{ V}, V_{GS} = -5\text{ V}, I_D = -9.5\text{ A}$	59	74	nC
Gate-Source Charge	$Q_{gs}$		9	9	
Gate-Drain Charge	$Q_{gd}$		19	19	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -6\text{ V}, R_L = 6\text{ }\Omega$ $I_D = -1\text{ A}, V_{GEN} = -10\text{ V}, R_g = 6\text{ }\Omega$	53	50	ns
Rise Time	$t_r$		58	75	
Turn-Off Delay Time	$t_{d(off)}$		270	270	
Fall Time	$t_f$		102	200	

**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.