P-Channel 1.25-W, 1.8-V (G-S) MOSFET

CHARACTERISTICS

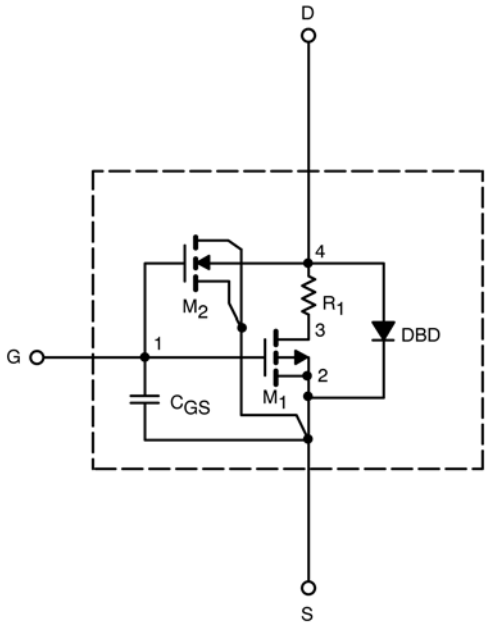
- P-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the −55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

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 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.

SUBCIRCUIT MODEL SCHEMATIC

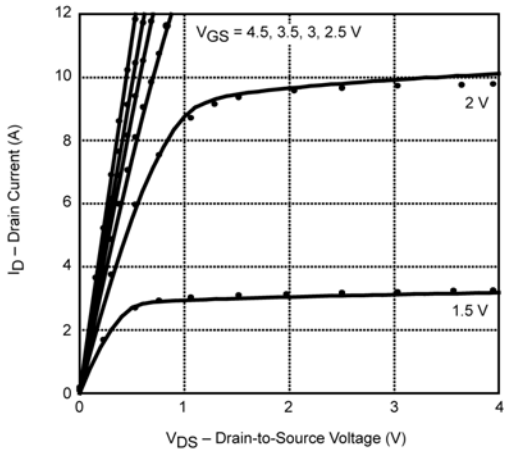


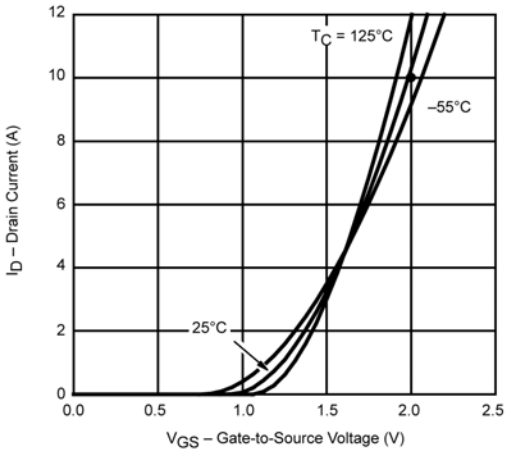
This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

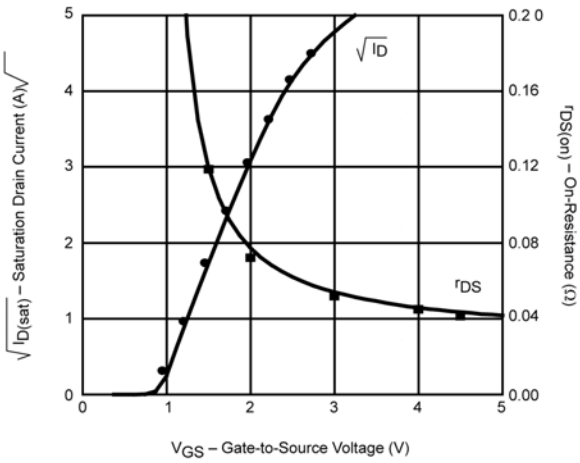
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)				
Parameter	**Symbol**	**Test Condition**	**Typical**	**Unit**
Static				
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = –250 μA	0.78	V
On-State Drain Current [a]	$I_{D(on)}$	V_{DS} ≥ –5 V, V_{GS} = –4.5 V	77	A
		V_{DS} ≥ –5 V, V_{GS} = –2.5 V	20	
Drain-Source On-State Resistance [a]	$r_{DS(on)}$	V_{GS} = –4.5 V, I_D = –3.5 A	0.044	Ω
		V_{GS} = –2.5 V, I_D = –3.0 A	0.063	
		V_{GS} = –1.8 V, I_D = –2.0 A	0.095	
Forward Transconductance [a]	g_{fs}	V_{DS} = –5 V, I_D = –3.5 A	10	S
Diode Forward Voltage [a]	V_{SD}	I_S = –1.6 A, V_{GS} = 0 V	0.80	V
Dynamic [b]				
Total Gate Charge	Q_g	V_{DS} = –4 V, V_{GS} = –4.5 V, I_D = –3.5 A	9	nC
Gate-Source Charge	Q_{gs}		2	
Gate-Drain Charge	Q_{gd}		1.5	
Input Capacitance	C_{iss}	V_{DS} = 0 V, V_{GS} = –4 V, f = 1 MHz	1237	pF
Output Capacitance	C_{oss}		370	
Reverse Transfer Capacitance	C_{rss}		205	
Switching [c]				
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = –4 V, R_L = 4 Ω I_D ≅ –1 A, V_{GEN} = –4.5 V, R_G = 6 Ω	31	ns
Rise Time [c]	t_r		23	
Turn-Off Delay Time [c]	$t_{d(off)}$		54	
Fall Time	t_f		13	

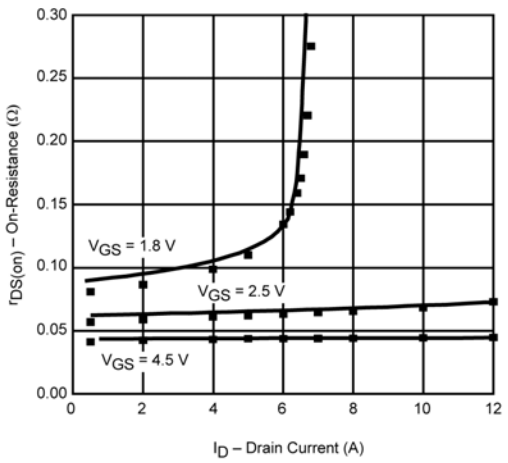
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. For design aid only, not subject to production testing.
c. Switching time is essentially independent of operating temperature.

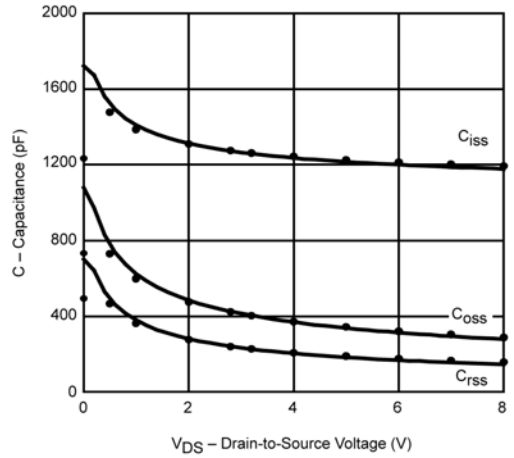
COMPARISON OF MODEL WITH MEASURED DATA (T_J=25°C UNLESS OTHERWISE NOTED)

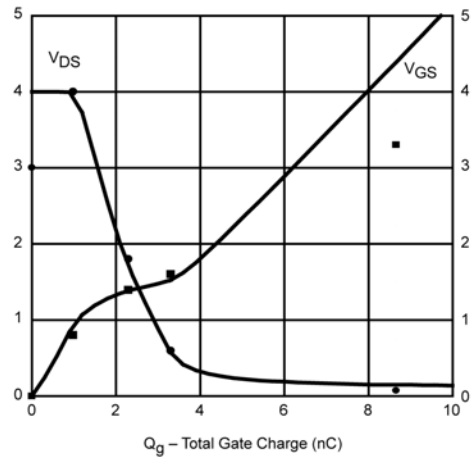












Note: Dots and squares represent measured data.

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