N-Channel 100-V (D-S) MOSFET

CHARACTERISTICS

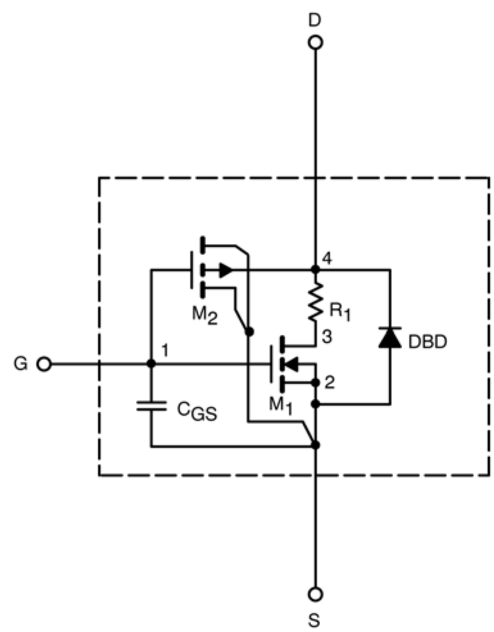
- N-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the −55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

DESCRIPTION

The attached spice model describes the typical electrical characteristics of the n-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

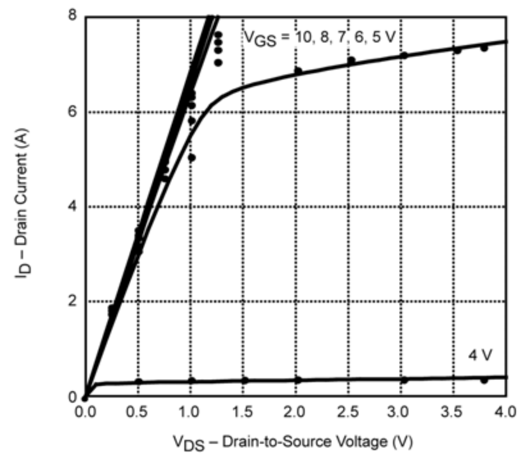


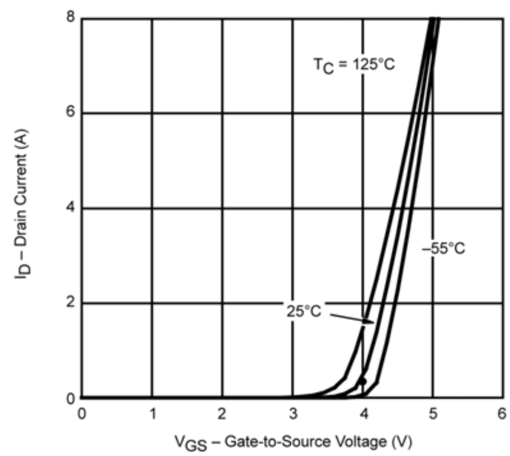
This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

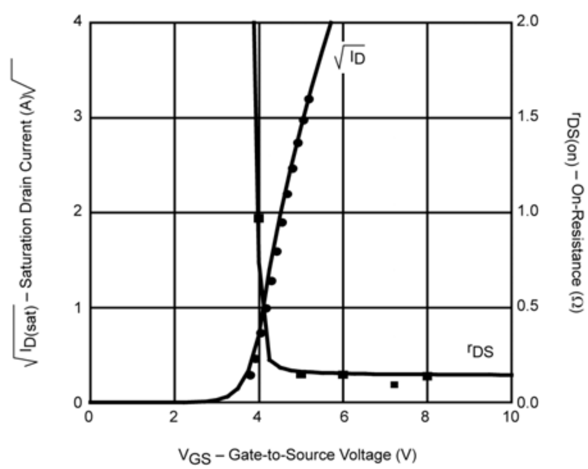
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)				
Parameter	**Symbol**	**Test Conditions**	**Typical**	**Unit**
Static				
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	3	V
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq 5$ V, V_{GS} = 10 V	34	A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 2.4 A	0.146	Ω
		V_{GS} = 6 V, I_D = 2.3 A	0.154	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 2.4 A	8.1	S
Diode Forward Voltage[a]	V_{SD}	I_S = 1.7 A, V_{GS} = 0 V	0.72	V
Dynamic[b]				
Total Gate Charge[b]	Q_g	V_{DS} = 50 V, V_{GS} = 10 V, I_D = 2.4 A	6.06	nC
Gate-Source Charge[b]	Q_{gs}		1.5	
Gate-Drain Charge[b]	Q_{gd}		1.4	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 50 V, R_L = 50 Ω $I_D \cong 1$ A, V_{GEN} = 10 V, R_G = 6 Ω	8	ns
Rise Time[b]	t_r		10	
Turn-Off Delay Time[b]	$t_{d(off)}$		23	
Fall Time[b]	t_f		30	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.7 A, di/dt = 100 A/µs	52	

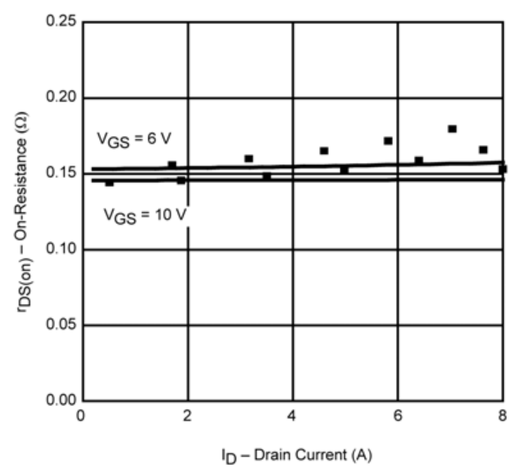
Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%
b. Guaranteed by design, not subject to production testing.

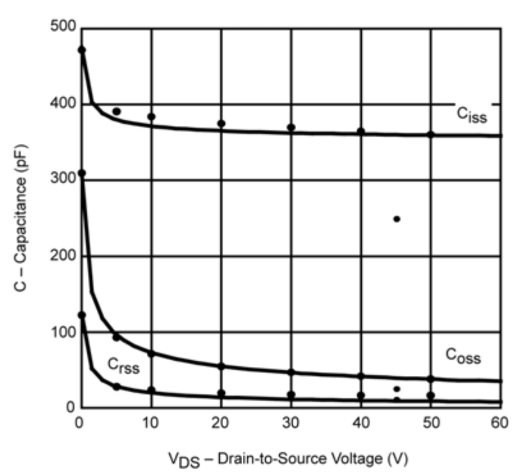
COMPARISON OF MODEL WITH MEASURED DATA (T_J=25°C UNLESS OTHERWISE NOTED)

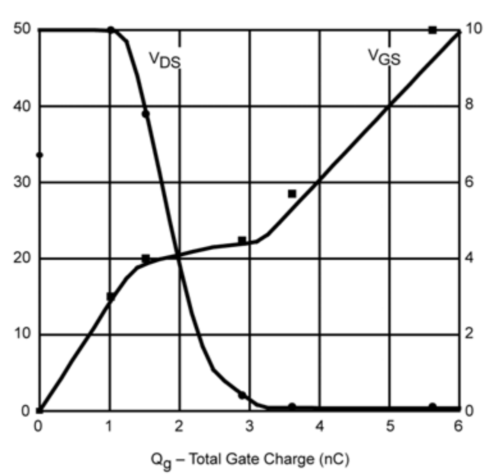












Note: Dots and squares represent measured data.

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