VISHAY®

N-Channel 60-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 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.

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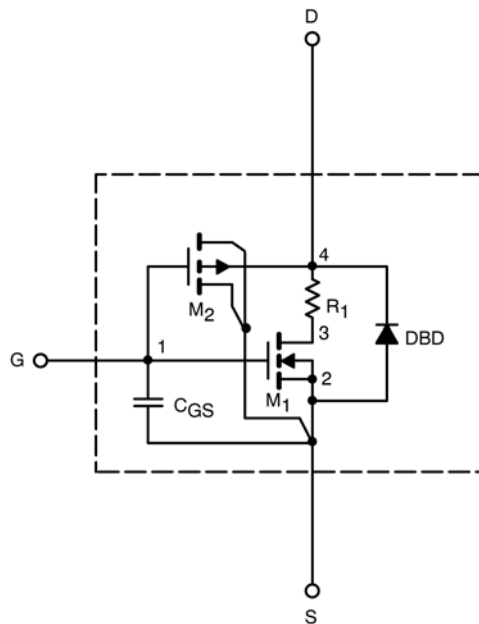
This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)					
Static					
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1.6		V
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	4		A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 500 mA	1.1	1.1	Ω
		V_{GS} = 4.5 V, I_D = 200 mA	1.6	1.6	
Forward Transconductance[a]	g_{fs}	V_{DS} = 10 V, I_D = 200 mA	240	550	S
Diode Forward Voltage[a]	V_{SD}	I_S = 200 mA, V_{GS} = 0 V	0.85	0.87	V
Dynamic[b]					
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 250 mA	0.30	0.40	nC
Gate-Source Charge	Q_{gs}		0.11	0.11	
Gate-Drain Charge	Q_{gd}		0.15	0.15	

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)
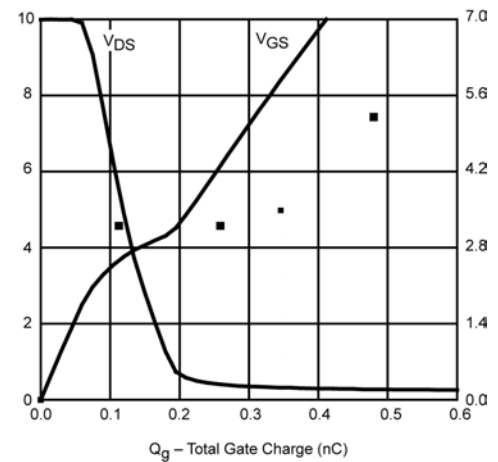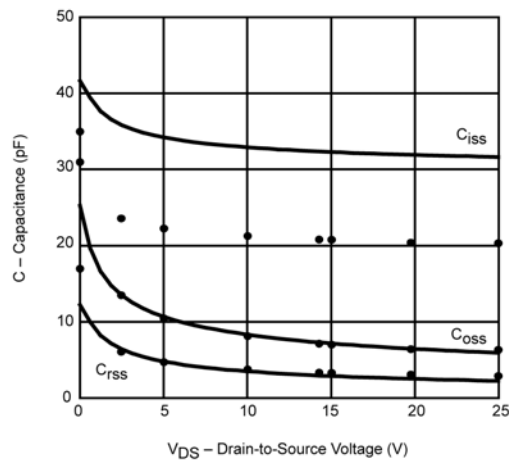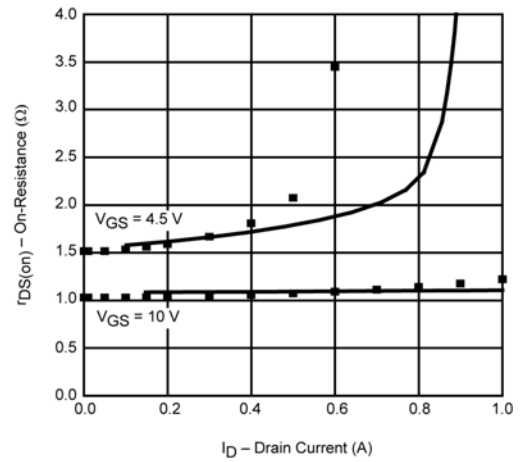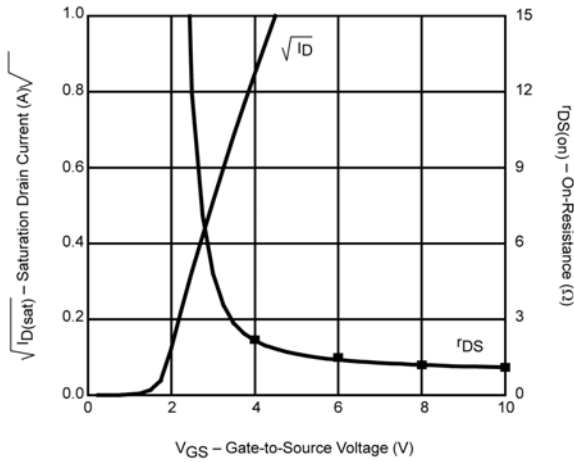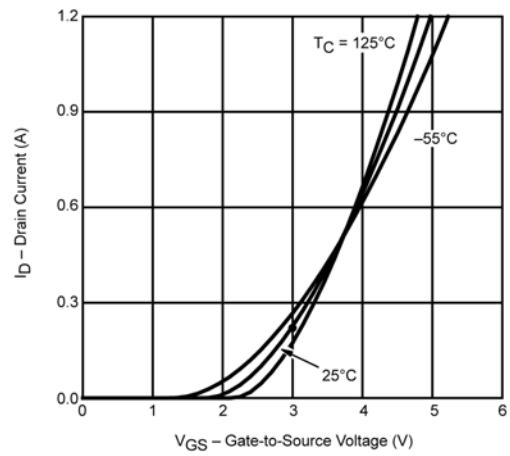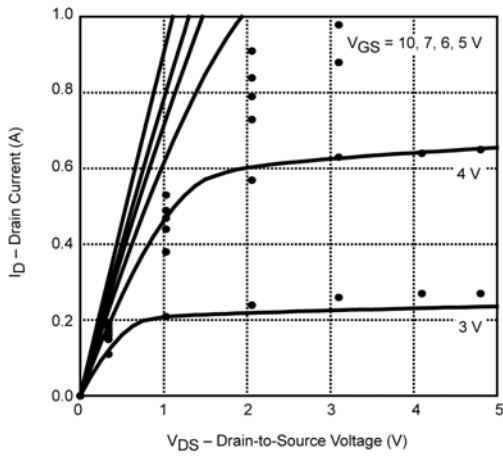
Note: Dots and squares represent measured data.