N-Channel 20-V (D-S) MOSFET

CHARACTERISTICS

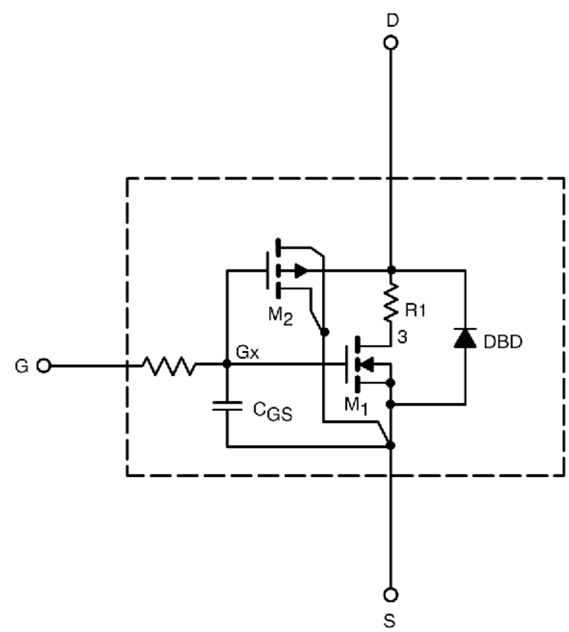
- N-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the - 55 °C to 125 °C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

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 °C to 125 °C temperature ranges under the pulsed 0 V to 4.5 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



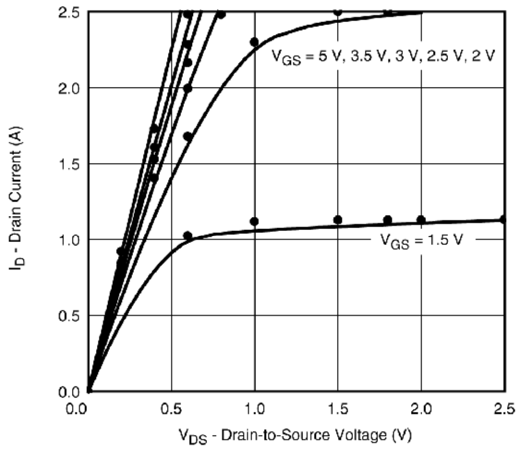
This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

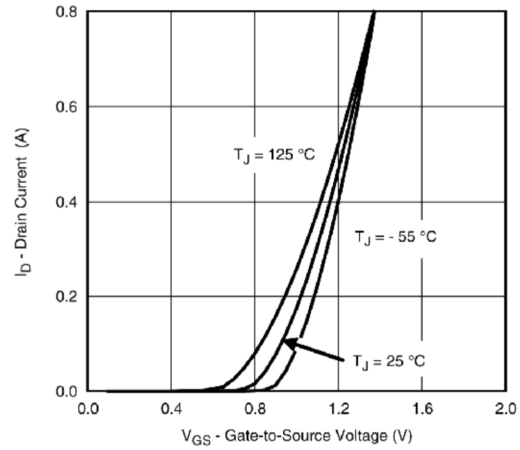
SPECIFICATIONS (T_J = 25 °C UNLESS OTHERWISE NOTED)

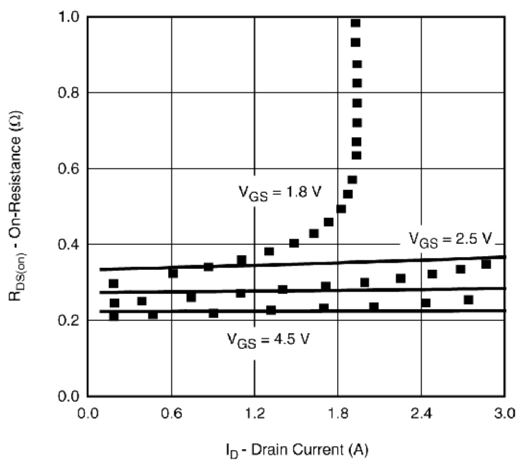
Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	0.37		V
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ 5 V, V_{GS} = 4.5 V	11		A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 0.606 A	0.316	0.336	Ω
		V_{GS} = 2.5 V, I_D = 0.505 A	0.390	0.395	
		V_{GS} = 1.8 V, I_D = 0.150 A	0.464	0.438	
Forward Transconductance[a]	g_{fs}	V_{DS} = 10 V, I_D = 0.606 A	1.7	2.1	S
Forward Voltage[a]	V_{SD}	I_S = 0.48 A	0.50	0.80	V
Dynamic[b]					
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	74	66	pF
Output Capacitance	C_{oss}		16	17	
Reverse Transfer Capacitance	C_{rss}		5	7	
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 5 V, I_D = 0.606 A	0.66	0.99	nC
		V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 0.606 A	0.61	0.92	
Gate-Source Charge	Q_{gs}		0.15	0.15	
Gate-Drain Charge	Q_{gd}		0.30	0.30	

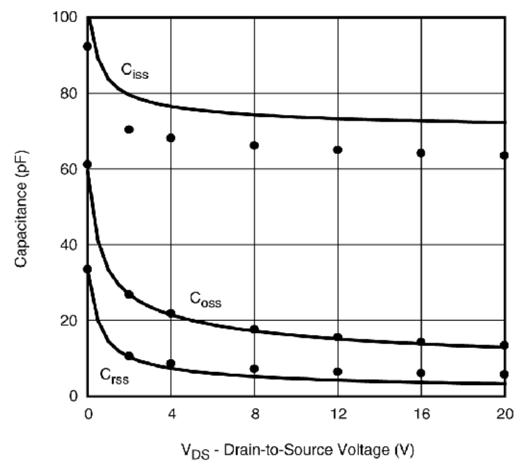
Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

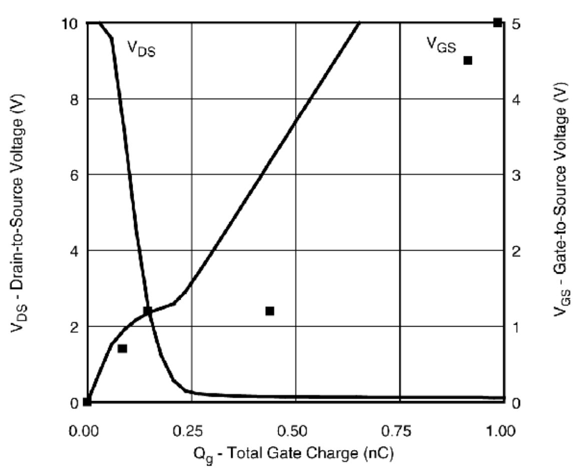
COMPARISON OF MODEL WITH MEASURED DATA (T_J = 25 °C UNLESS OTHERWISE NOTED)











Note: Dots and squares represent measured data.

Disclaimer

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