



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

CHARACTERISTICS

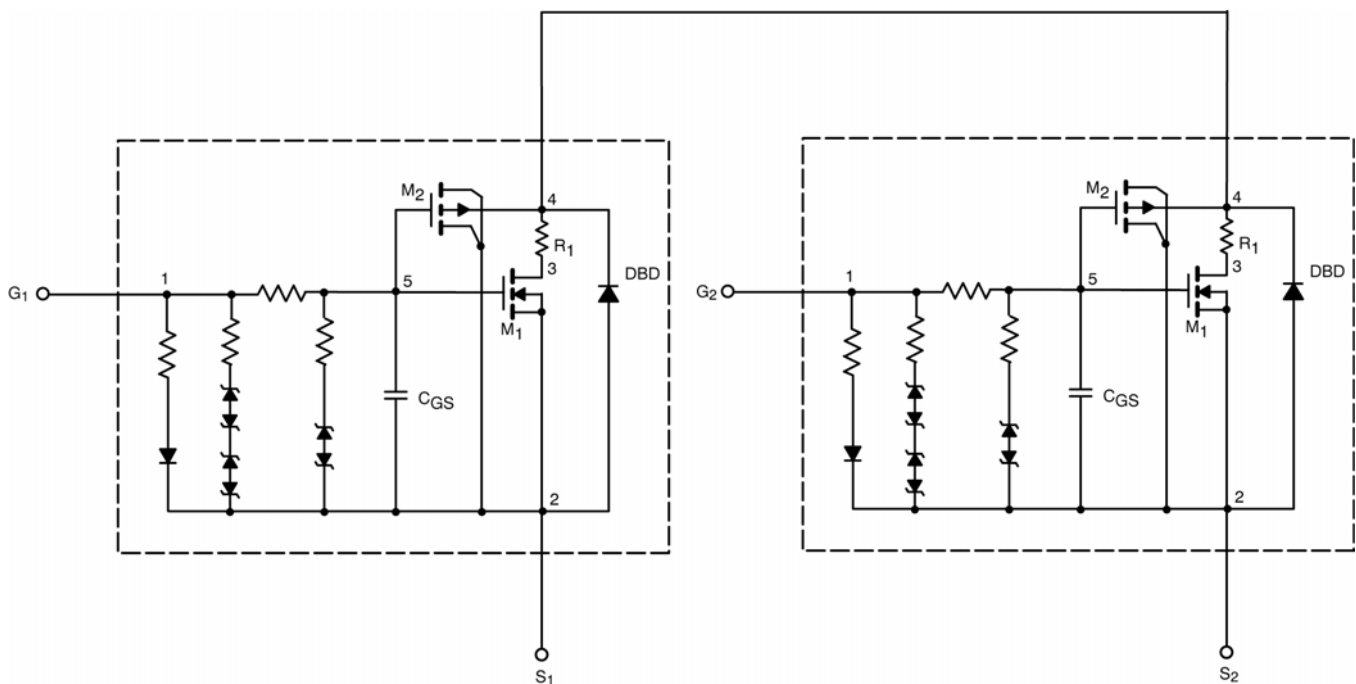
- N-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the -55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

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 ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{SS} = V_{GS}, I_D = 250 \mu\text{A}$	0.47		V
On-State Drain Current ^a	$I_{SS(on)}$	$V_{SS} = 5 \text{ V}, V_{GS} = 4.5 \text{ V}$	197		A
Drain-Source On-State Resistance ^a	$R_{sS(on)}$	$V_{GS} = 4.5 \text{ V}, I_{SS} = 1 \text{ A}$	0.018	0.020	Ω
		$V_{GS} = 3.7 \text{ V}, I_{SS} = 1 \text{ A}$	0.019	0.022	
		$V_{GS} = 2.5 \text{ V}, I_{SS} = 1 \text{ A}$	0.024	0.026	
		$V_{GS} = 1.8 \text{ V}, I_{SS} = 1 \text{ A}$	0.032	0.032	
Forward Transconductance ^a	g_{fs}	$V_{SS} = 10 \text{ V}, I_{SS} = 1 \text{ A}$	17	31	S
Dynamic^b					
Turn-On Delay Time	$t_{d(on)}$	$V_{SS} = 10 \text{ V}, R_L = 10 \Omega$ $I_{SS} \cong 1 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_G = 6 \Omega$	8.3	3	μs
Rise Time	t_r		4.1	4.5	
Turn-Off Delay Time	$t_{d(off)}$		61	55	
Fall Time	t_f		3.9	15	

Notes

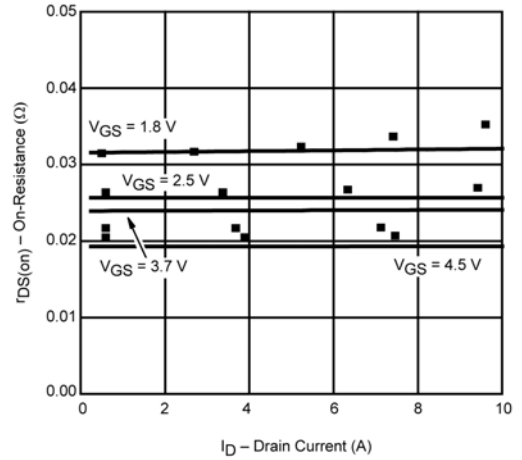
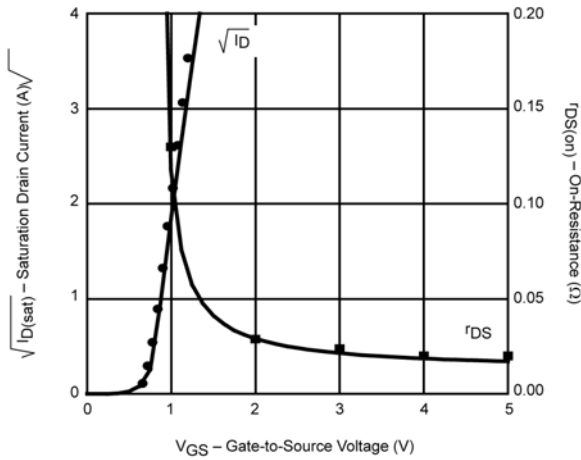
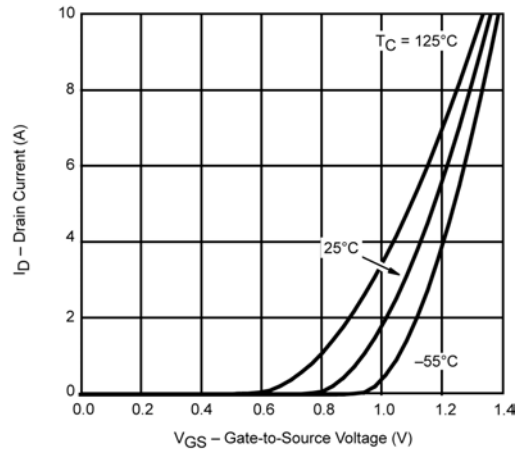
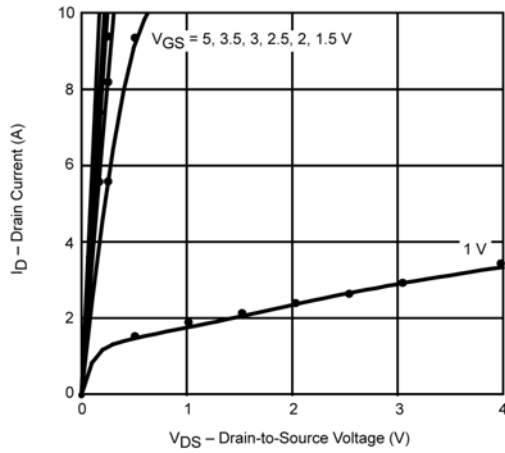
- a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.



SPICE Device Model Si8900EDB

Vishay Siliconix

COMPARISON OF MODEL WITH MEASURED DATA ($T_J=25^\circ\text{C}$ UNLESS OTHERWISE NOTED)



Note: Dots and squares represent measured data.



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