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

CHARACTERISTICS

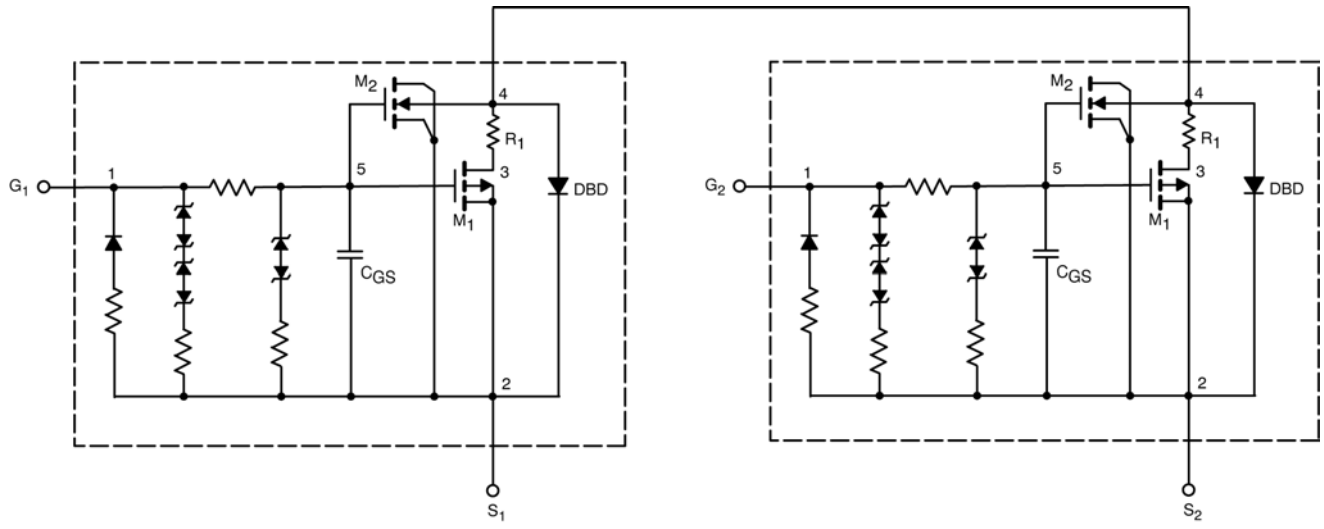
- P-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the −55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

DESCRIPTION

The attached spice model describes the typical electrical characteristics of the p-channel vertical DMOS. The subcircuit mode is extracted and optimized over the −55 to 125°C temperature ranges under the pulsed 0-to-5V 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

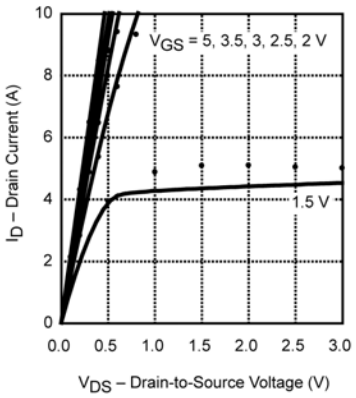


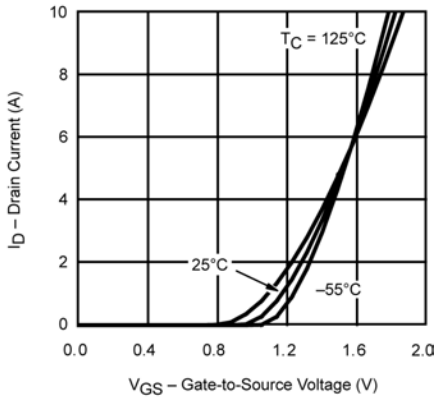
This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

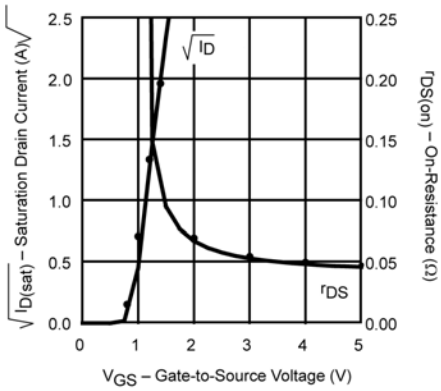
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)					
Parameter	**Symbol**	**Test Conditions**	**Simulated Data**	**Measured Data**	**Unit**
Static					
Gate Threshold Voltage	$V_{GS(th)}$	V_{SS} = V_{GS}, I_D = – 250µA	0.49		V
On-State Drain Current[b]	$I_{D(on)}$	V_{SS} = – 5V, V_{GS} = – 4.5V	42		A
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = – 4.5V, I_{SS} = – 1A	0.046	0.048	Ω
		V_{GS} = – 2.5V, I_{SS} = – 1A	0.060	0.062	
		V_{GS} = – 1.8V, I_{SS} = – 1A	0.075	0.081	
Forward Transconductance[b]	g_{fs}	V_{SS} = –10V, I_{SS} = – 1A	6.2	7	S
Dynamic[a]					
Turn-On Delay Time	$t_{d(on)}$	V_{SS} = – 10V, R_L = 10Ω I_{SS} ≅ – 1A, V_{GEN} = – 4.5V, R_G = 6Ω	2	2.3	µs
Rise Time	t_r		2	2.2	
Turn-Off Delay Time	$t_{d(off)}$		2.1	1.3	
Fall Time	t_f		7	9	

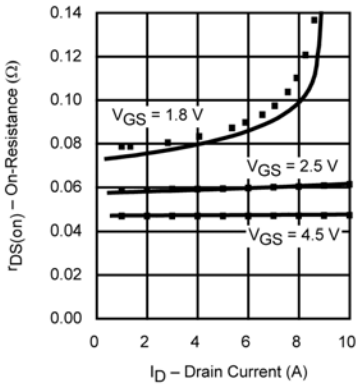
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.

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









Note: Dots and squares represent measured data.