



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

CHARACTERISTICS

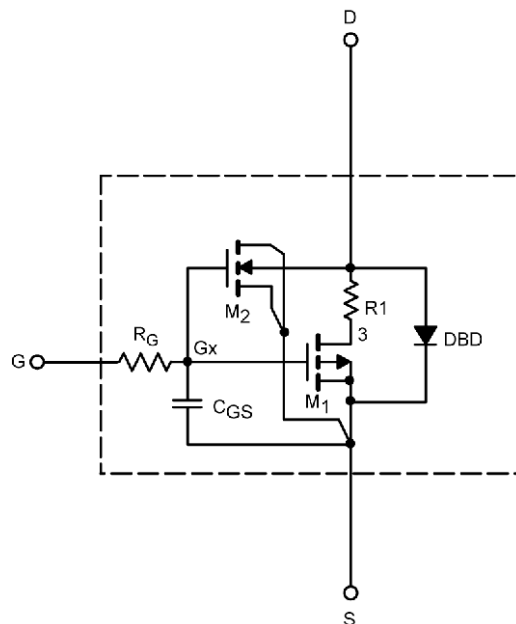
- P-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the - 55 °C to 125 °C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

DESCRIPTION

The attached spice model describes the typical electrical characteristics of the P-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 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	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$	0.83		V
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5 \text{ V}, I_D = -15 \text{ A}$	0.0062	0.0068	Ω
		$V_{GS} = -2.5 \text{ V}, I_D = -11.2 \text{ A}$	0.0105	0.0112	
		$V_{GS} = -1.8 \text{ V}, I_D = -5 \text{ A}$	0.0176	0.0156	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15 \text{ V}, I_D = -4 \text{ A}$	30	27	S
Diode Forward Voltage	V_{SD}	$I_S = -10 \text{ A}$	-0.84	-0.76	V
Dynamic^b					
Input Capacitance	C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	3751	3729	pF
Output Capacitance	C_{oss}		539	542	
Reverse Transfer Capacitance	C_{rss}		473	475	
Total Gate Charge	Q_g	$V_{DS} = -10 \text{ V}, V_{GS} = -4.5 \text{ V}, I_D = -16 \text{ A}$	40	57	nC
			25	35.5	
Gate-Source Charge	Q_{gs}	$V_{DS} = -10 \text{ V}, V_{GS} = -2.5 \text{ V}, I_D = -16 \text{ A}$	4.5	4.5	
Gate-Drain Charge	Q_{gd}		16.1	16.1	

Notes

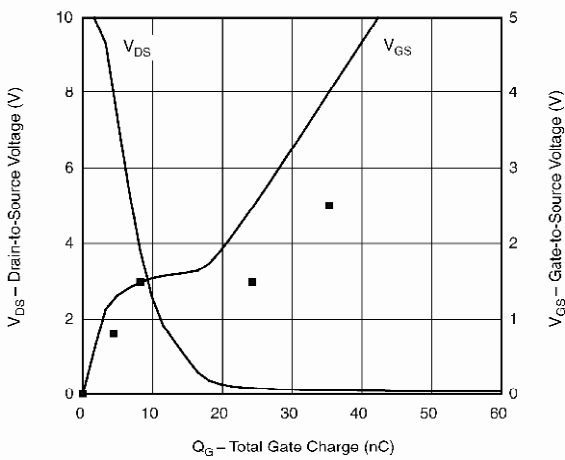
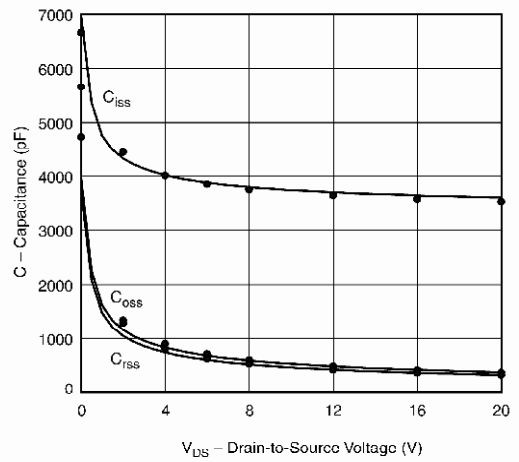
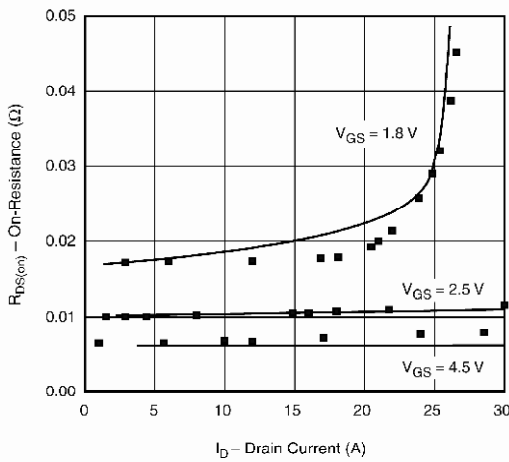
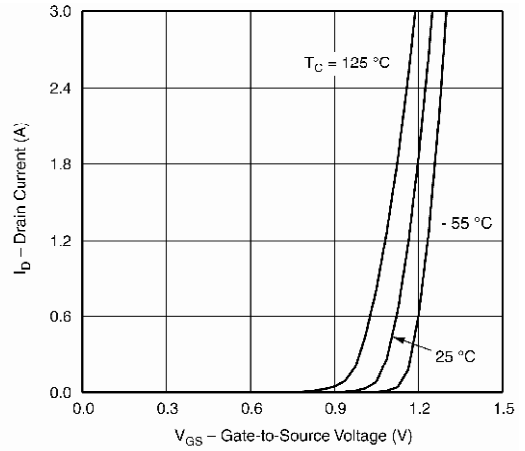
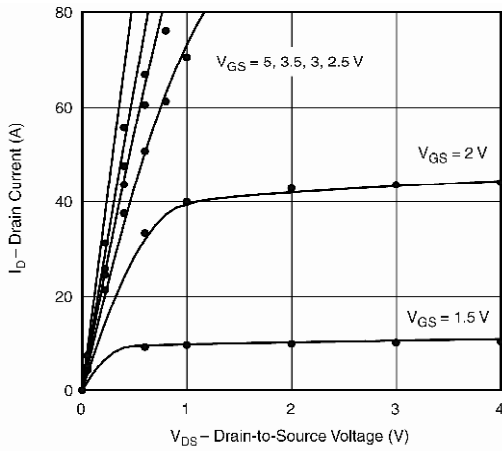
- a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.



SPICE Device Model Si7123DN

Vishay Siliconix

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



Note: Dots and squares represent measured data.



Disclaimer

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