

SPICE Device Model Si7456DP Vishay Siliconix

N-Channel 100-V (D-S) MOSFET

CHARACTERISTICS

- N-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS

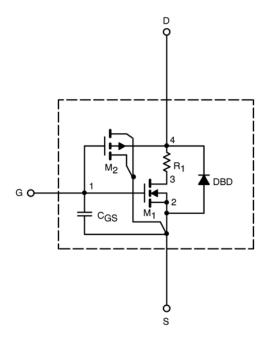
- · Apply for both Linear and Switching Application
- Accurate over the -55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

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 $C_{\rm gd}$ 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.

Document Number: 71565 www.vishay.com S-60145—Rev. B, 13-Feb-06 1

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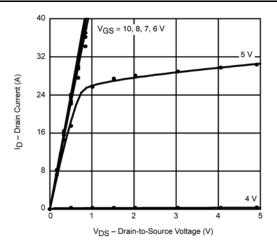
SPECIFICATIONS (T _J = 25°C UNLESS OTHERWISE NOTED)					
Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
Static					•
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250 μ A	2.88		V
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	240		Α
Drain-Source On-State Resistance ^a	_	V _{GS} = 10 V, I _D = 9.3 A	0.021	0.021	Ω
	r _{DS(on)}	V_{GS} = 6 V, I_{D} = 8.8 A	0.022	0.023	
Forward Transconductance ^a	g _{fs}	$V_{DS} = 15 \text{ V}, I_D = 9.3 \text{ A}$	40	35	S
Diode Forward Voltage ^a	V_{SD}	$I_S = 4.3 \text{ A}, V_{GS} = 0 \text{ V}$	0.74	0.80	V
Dynamic ^b	•		.		-
Total Gate Charge	Q_g	V_{DS} = 50 V, V_{GS} = 10 V, I_{D} = 9.3 A	40	36	nC
Gate-Source Charge	Q _{gs}		10	10	
Gate-Drain Charge	Q_{gd}		8.6	8.6	
Turn-On Delay Time	t _{d(on)}	$V_{DD} = 50 \text{ V}, \text{ R}_L = 50 \Omega$ $I_D \cong 1 \text{ A}, V_{GEN} = 10 \text{ V}, \text{ R}_G = 6\Omega$ $I_F = 4.3 \text{ A}, \text{ di/dt} = 100 \text{ A/}\mu\text{s}$	24	20	ns
Rise Time	t _r		30	10	
Turn-Off Delay Time	t _{d(off)}		36	46	
Fall Time	t _f		69	26	
Source-Drain Reverse Recovery Time	t _{rr}		49	50	

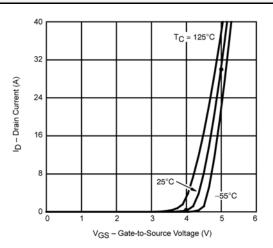
a. Pulse test; pulse width \leq 300 μ s, duty cycle \leq 2%. b. Guaranteed by design, not subject to production testing.

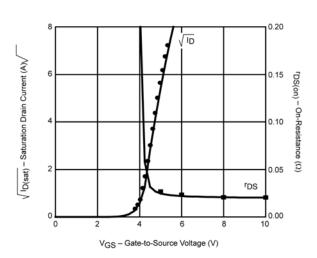


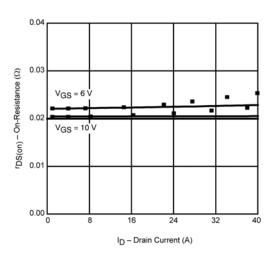
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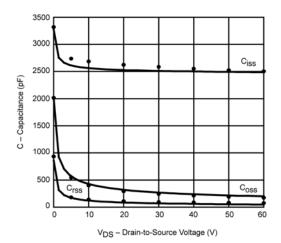
COMPARISON OF MODEL WITH MEASURED DATA (TJ=25°C UNLESS OTHERWISE NOTED)

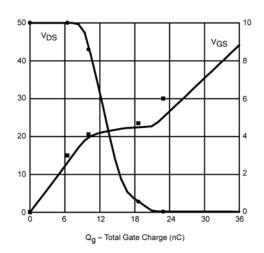












Note: Dots and squares represent measured data.



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Document Number: 91000 Revision: 18-Jul-08

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