

N-Channel 40-V (D-S) 175°C MOSFET

CHARACTERISTICS

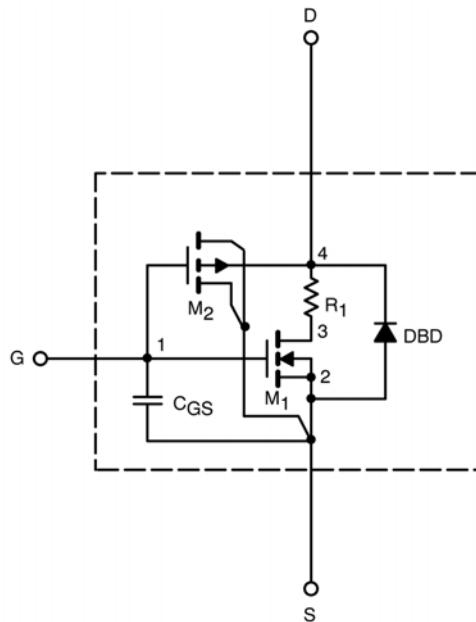
- N-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the -55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

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 to 10V 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 _{DS} = V _{GS} , I _D = 250 μA	3.7		V
On-State Drain Current ^a	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	1170		A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 30 A	0.0022	0.0022	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125°C	0.0031		
		V _{GS} = 10 V, I _D = 30 A, T _J = 175°C	0.0036		
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	87		S
Forward Voltage ^a	V _{SD}	I _S = 85 A, V _{GS} = 0 V	1	1.1	V
Dynamic^b					
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz	12450	15720	Pf
Output Capacitance	C _{oss}		1429	1400	
Reverse Transfer Capacitance	C _{rss}		786	800	
Total Gate Charge ^c	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 110 A	262	250	NC
Gate-Source Charge ^c	Q _{gs}		95	95	
Gate-Drain Charge ^c	Q _{gd}		57	57	
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.27 Ω I _D ≅ 110 A, V _{GEN} = 10 V, R _G = 2.5 Ω	43	50	Ns
Rise Time ^c	t _r		101	150	
Turn-Off Delay Time ^c	t _{d(off)}		75	70	
Fall Time ^c	t _f		43	25	

Notes

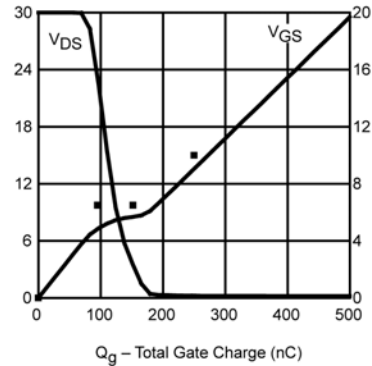
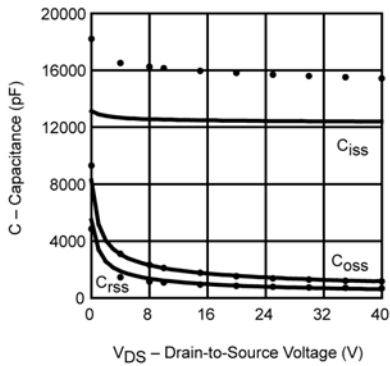
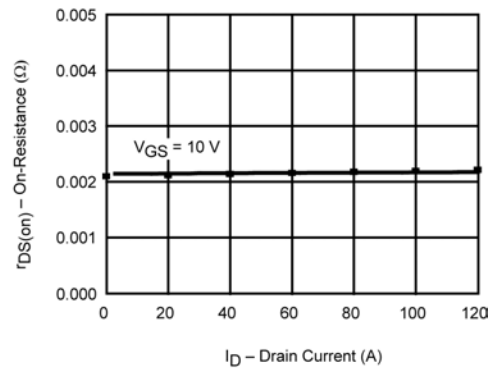
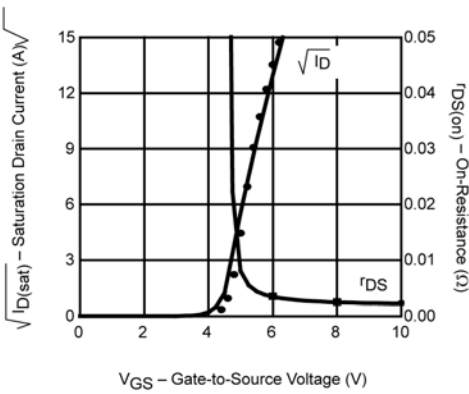
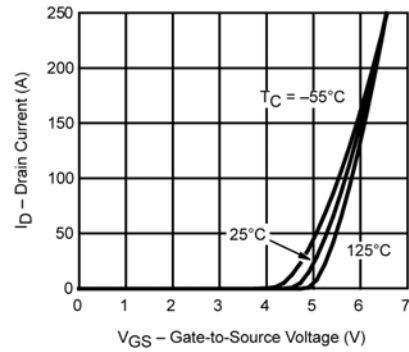
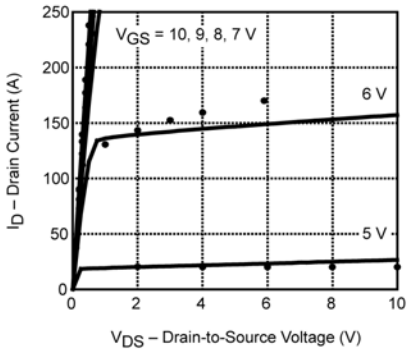
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.



SPICE Device Model SUM110N04-2m7H

Vishay Siliconix

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



Note: Dots and squares represent measured data.