



N-Channel Enhancement-Mode Transistor

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_{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.



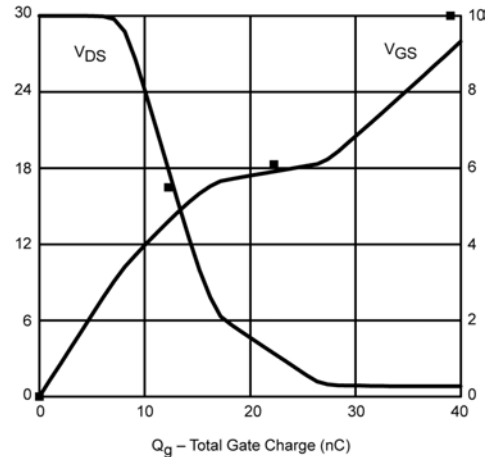
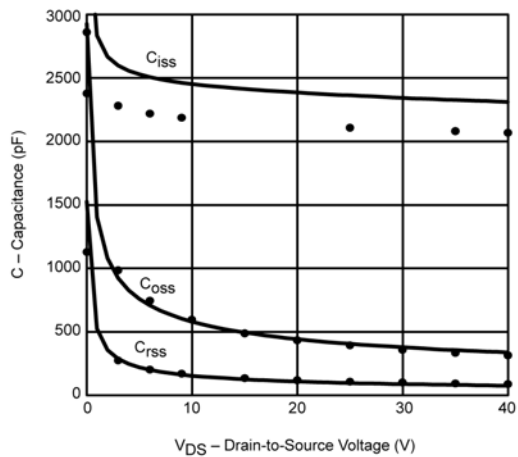
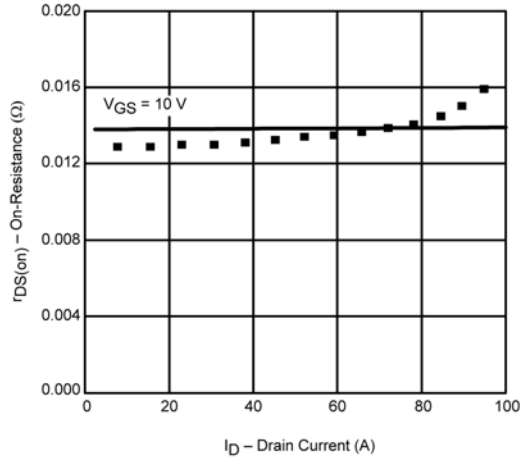
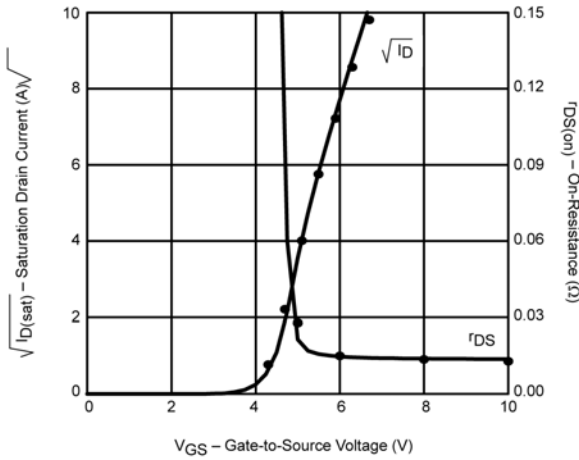
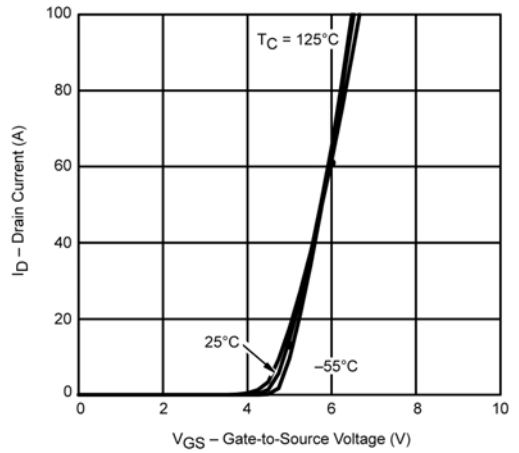
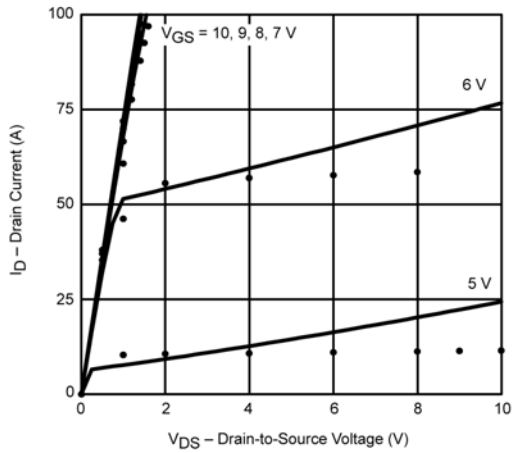
SPECIFICATIONS (T _J = 25°C UNLESS OTHERWISE NOTED)					
Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
Static					
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	3.2		V
On-State Drain Current ^a	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	349		A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 30 A	0.014	0.014	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125°C	0.021		
		V _{GS} = 10 V, I _D = 30 A, T _J = 175°C	0.024		
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	46	49	S
Forward Voltage ^a	V _{SD}	I _S = 60 A, V _{GS} = 0 V	0.91		V
Dynamic^b					
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz	2364	2000	pf
Output Capacitance	C _{oss}		407	400	
Reverse Transfer Capacitance	C _{rss}		98	115	
Total Gate Charge ^b	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 60 A	40	39	nC
Gate-Source Charge ^b	Q _{gs}		12	12	
Gate-Drain Charge ^b	Q _{gd}		10	10	
Turn-On Delay Time ^b	t _{d(on)}	V _{DD} = 30 V, R _L = 0.50 Ω I _D ≅ 60 A, V _{GEN} = 10 V, R _G = 2.5 Ω	12	12	ns
Rise Time ^b	t _r		11	11	
Turn-Off Delay Time ^b	t _{d(off)}		26	25	
Fall Time ^b	t _f		11	15	
Reverse Recovery Time ^c	t _{rr}	I _F = 60 A, di/dt = 100 A/μs	55	60	

Notes

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



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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