



N-Channel 150-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-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.



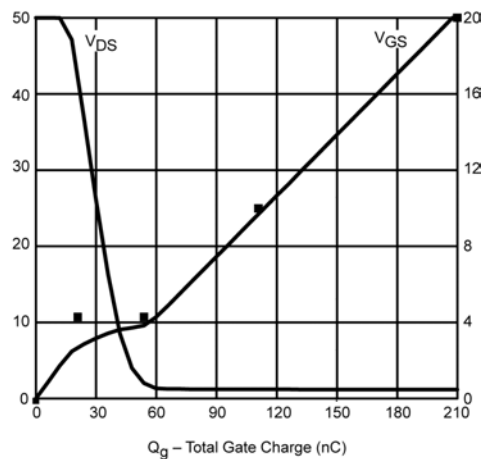
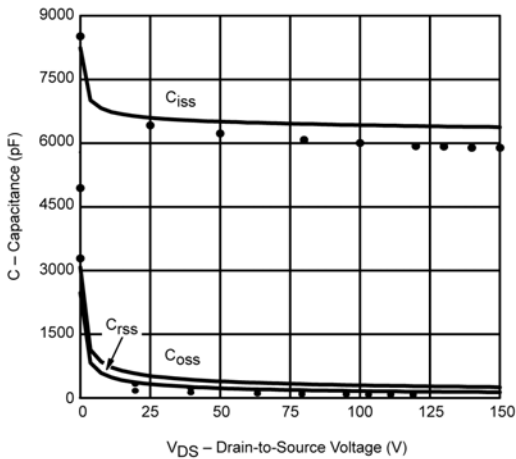
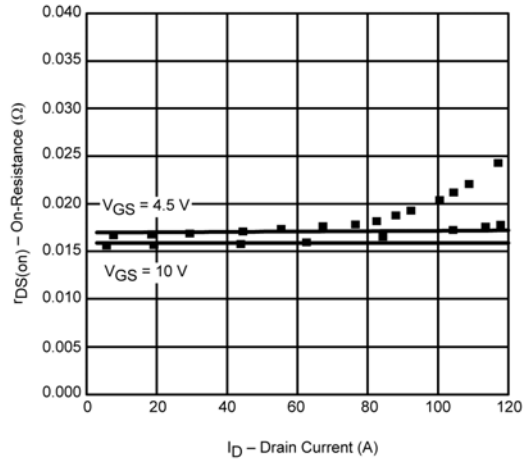
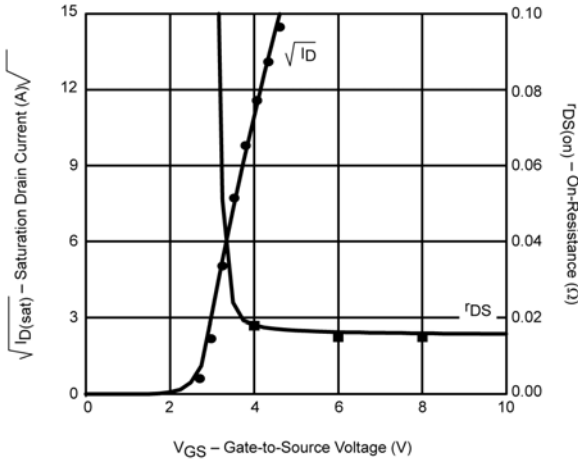
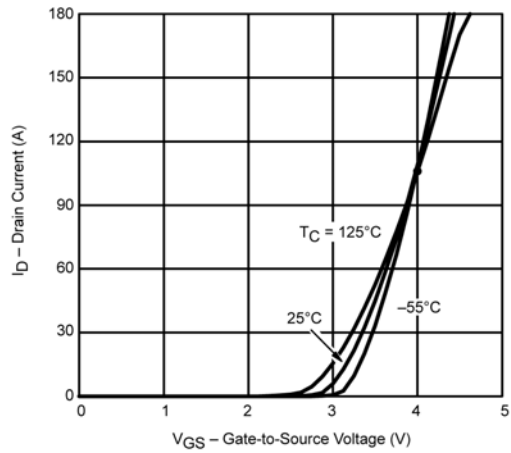
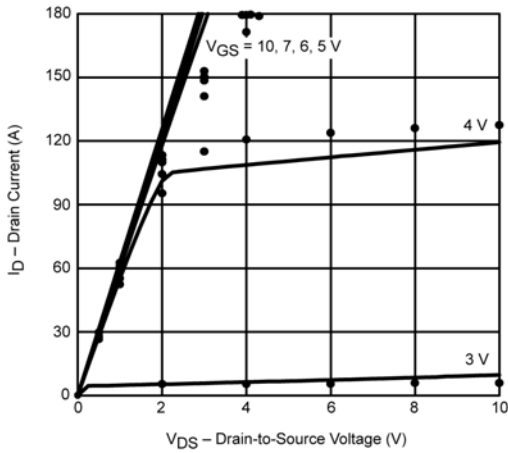
SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	1.7		V
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	314		A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10 \text{ V}, I_D = 30 \text{ A}$	0.016	0.016	Ω
		$V_{GS} = 10 \text{ V}, I_D = 30 \text{ A}, T_J = 125^\circ\text{C}$	0.023		
		$V_{GS} = 10 \text{ V}, I_D = 30 \text{ A}, T_J = 175^\circ\text{C}$	0.026		
		$V_{GS} = 4.5 \text{ V}, I_D = 20 \text{ A}$	0.017		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}, I_D = 30 \text{ A}$	93		S
Forward Voltage ^a	V_{SD}	$I_S = 80 \text{ A}, V_{GS} = 0 \text{ V}$	0.92	1	V
Dynamic^b					
Input Capacitance	C_{iss}	$V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	6590	6500	Pf
Output Capacitance	C_{oss}		510	520	
Reverse Transfer Capacitance	C_{rss}		320	270	
Total Gate Charge ^c	Q_g	$V_{DS} = 50 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 80 \text{ A}$	114	110	NC
Gate-Source Charge ^c	Q_{gs}		21	21	
Gate-Drain Charge ^c	Q_{gd}		33	33	
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 50 \text{ V}, R_L = 0.93 \Omega$ $I_D \cong 80 \text{ A}, V_{GEN} = 10 \text{ V}, R_G = 2.5 \Omega$	176	20	Ns
Rise Time ^c	t_r		43	100	
Turn-Off Delay Time ^c	$t_{d(off)}$		43	70	
Fall Time ^c	t_f		49	135	

Notes

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



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



Note: Dots and squares represent measured data.



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