N-Channel 30 V (D-S) MOSFET

DESCRIPTION

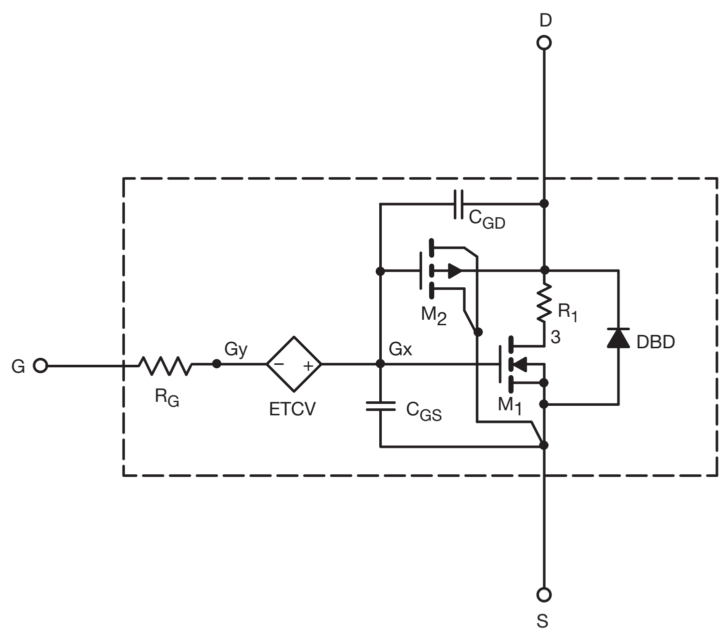
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over the - 55 °C to 125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias 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.

CHARACTERISTICS

- N-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

SUBCIRCUIT MODEL SCHEMATIC



Note

- This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

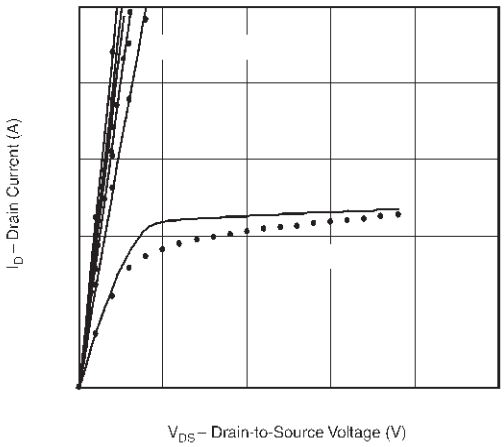
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)					
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**SIMULATED DATA**	**MEASURED DATA**	**UNIT**
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	1.6		V
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 15 A	0.0032	0.0032	Ω
		V_{GS} = 4.5 V, I_D = 10 A	0.0047	0.0045	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 15 A	59	65	S
Diode Forward Voltage[a]	V_{SD}	I_S = 3 A	0.73	0.74	V
Dynamic[b]					
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	2720	2730	pF
Output Capacitance	C_{oss}		548	540	
Reverse Transfer Capacitance	C_{rss}		205	205	
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 10 A	42	42.5	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 10 A	22	21.5	
Gate-Source Charge	Q_{gs}		6.9	6.9	
Gate-Drain Charge	Q_{gd}		7.1	7.1	

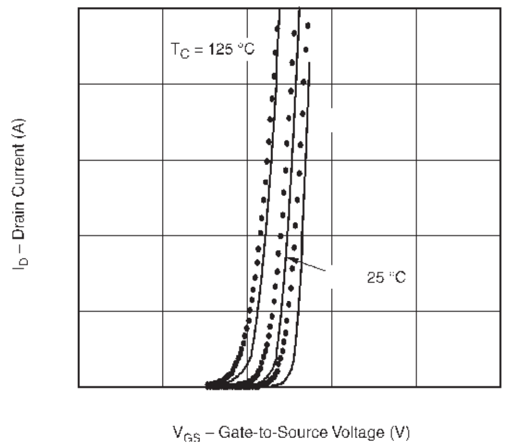
Notes

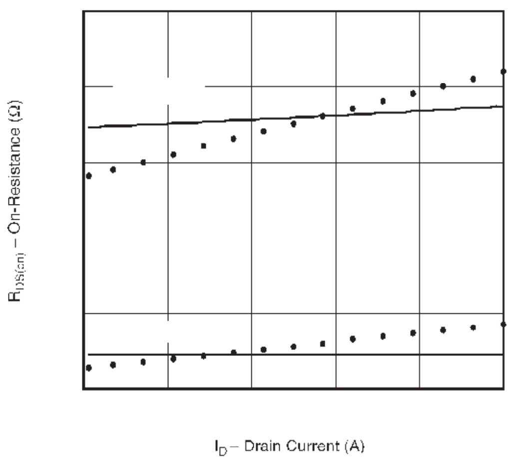
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

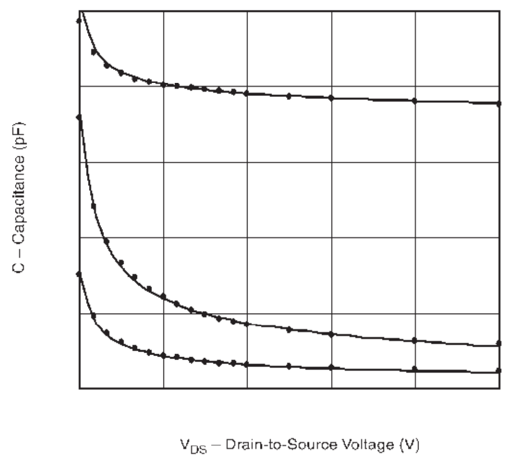
b. Guaranteed by design, not subject to production testing.

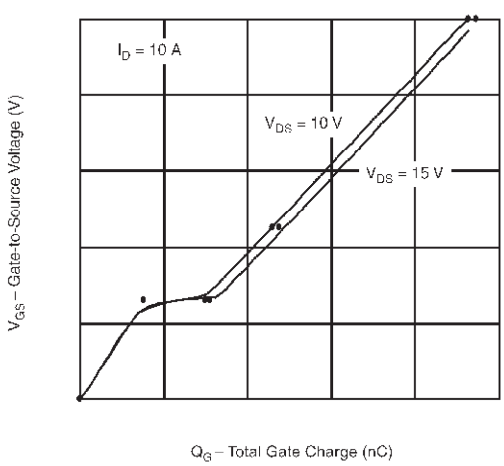
COMPARISON OF MODEL WITH MEASURED DATA (T_J = 25 °C, unless otherwise noted)

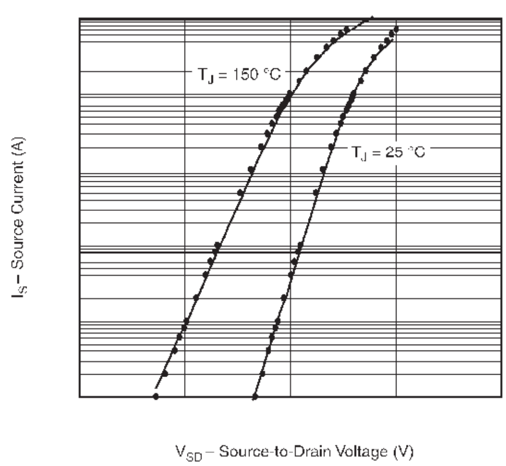








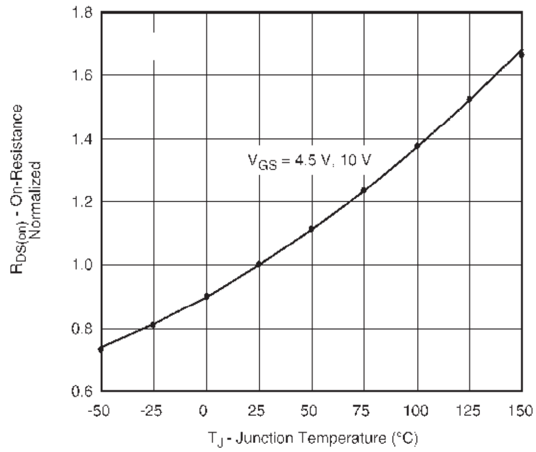


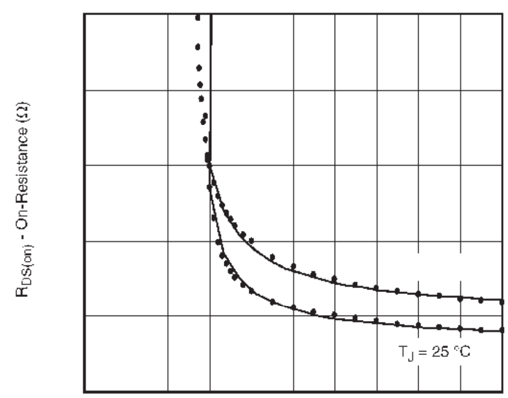


Note

- Dots and squares represent measured data.

COMPARISON OF MODEL WITH MEASURED DATA (T_J = 25 °C, unless otherwise noted)





Note

- Dots and squares represent measured data.