Dual N-Channel 30 V (D-S) MOSFET with Schottky Diode

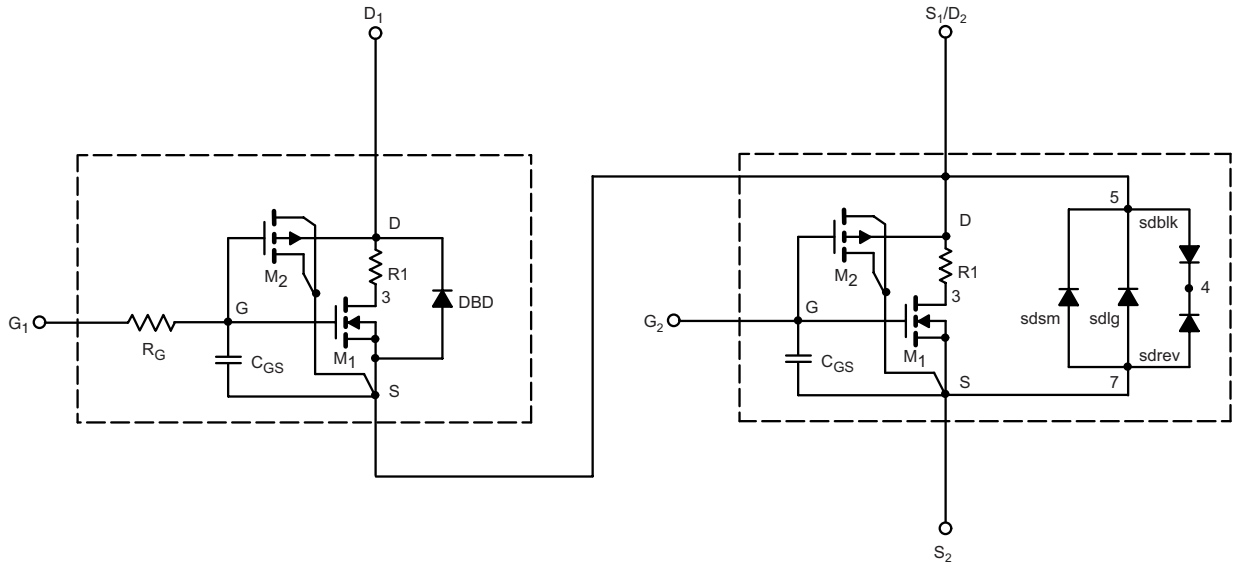
DESCRIPTION

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-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	Ch-1	1.7	-	V
			Ch-2	2	-	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	Ch-1	274	-	A
			Ch-2	382	-	
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 6.8 A	Ch-1	0.0158	0.0155	Ω
		V_{GS} = 10 V, I_D = 11.4 A	Ch-2	0.0092	0.0093	
		V_{GS} = 4.5 V, I_D = 6 A	Ch-1	0.0196	0.0185	
		V_{GS} = 4.5 V, I_D = 9.5 A	Ch-2	0.013	0.013	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 6.8 A	Ch-1	35	30	S
		V_{DS} = 15 V, I_D = 11.4 A	Ch-2	42	31	
Diode Forward Voltage[b]	V_{SD}	I_S = 1 A, V_{GS} = 0 V	Ch-1	0.71	0.73	V
		I_S = 1 A, V_{GS} = 0 V	Ch-2	0.41	0.47	
Dynamic[b]						
Total Gate Charge	Q_g	Channel 1 V_{DS} = 15 V, V_{GS} = 5 V, I_D = 6.8 A Channel 2 V_{DS} = 15 V, V_{GS} = 5 V, I_D = 11.4 A	Ch-1	8.4	7.8	nC
			Ch-2	13.2	11.6	
Gate-Source Charge	Q_{gs}		Ch-1	2.9	2.9	
			Ch-2	4.8	4.8	
Gate-Drain Charge	Q_{gd}		Ch-1	2.3	2.3	
			Ch-2	3.7	3.7	

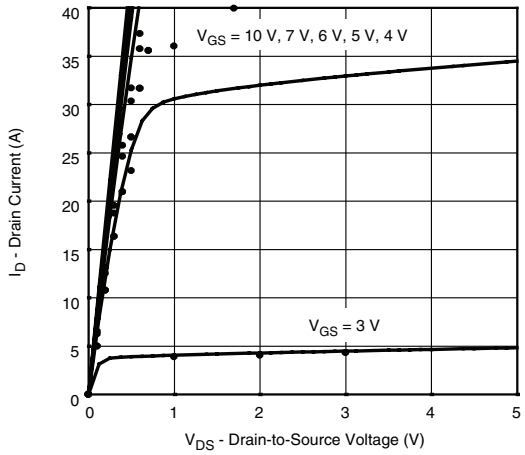
Notes

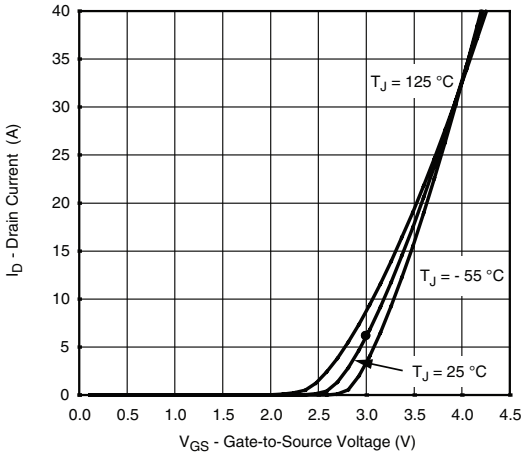
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

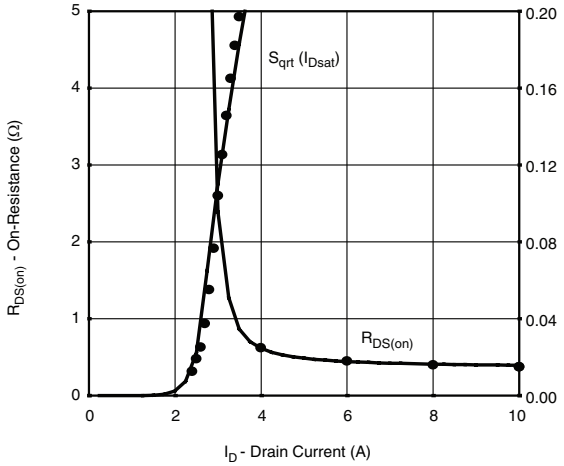
b. Guaranteed by design, not subject to production testing.

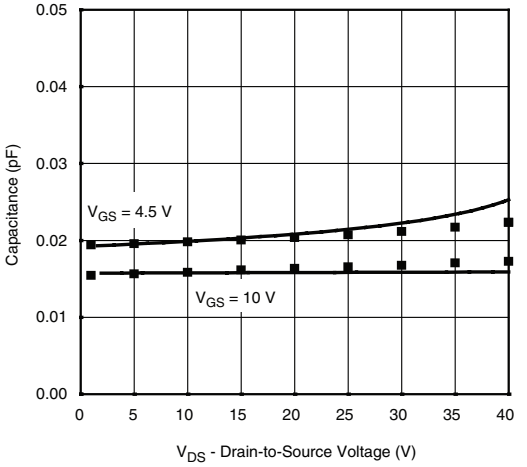
COMPARISON OF MODEL WITH MEASURED DATA T_J = 25 °C, unless otherwise noted

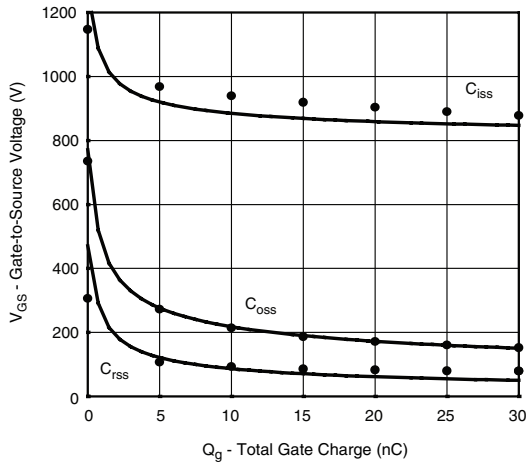
Channel 1

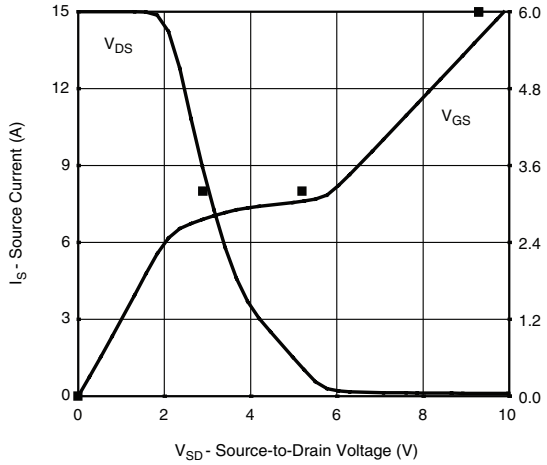










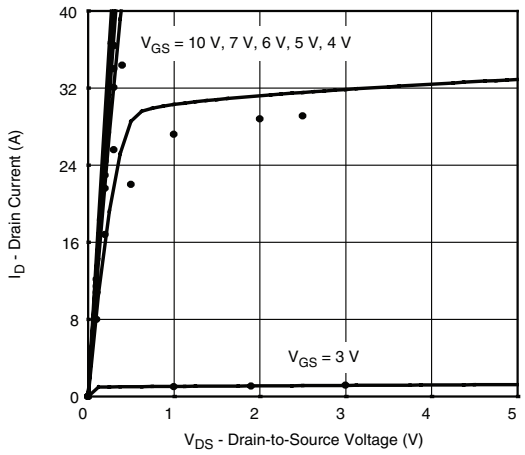


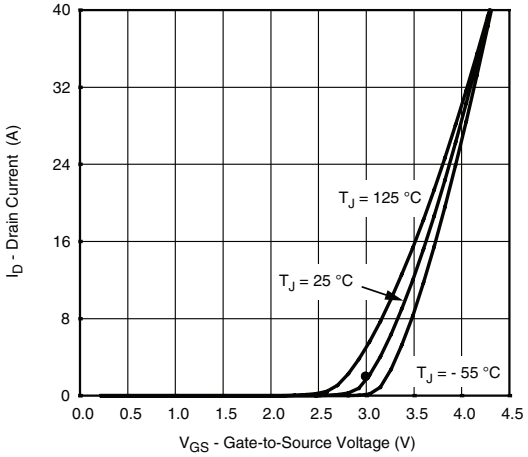
Note

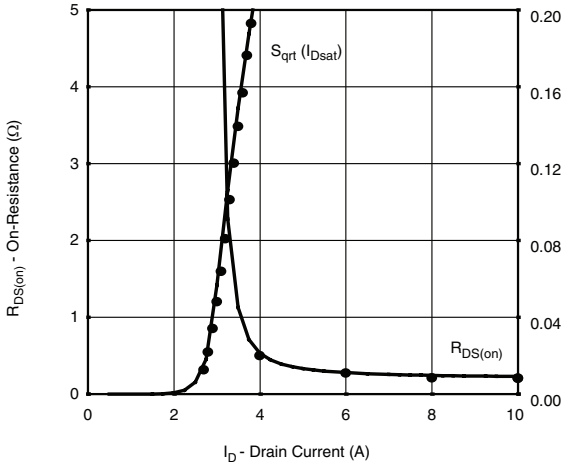
Dots and squares represent measured data.

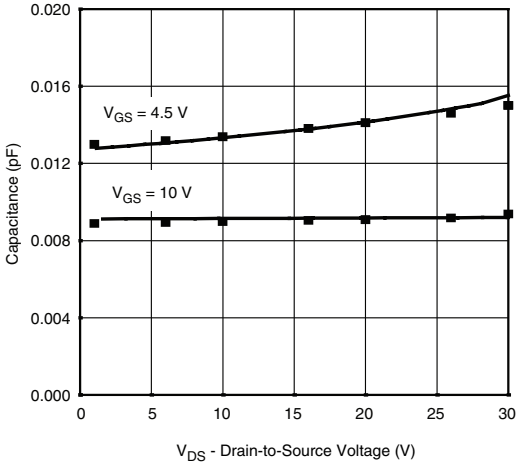
COMPARISON OF MODEL WITH MEASURED DATA T_J = 25 °C, unless otherwise noted

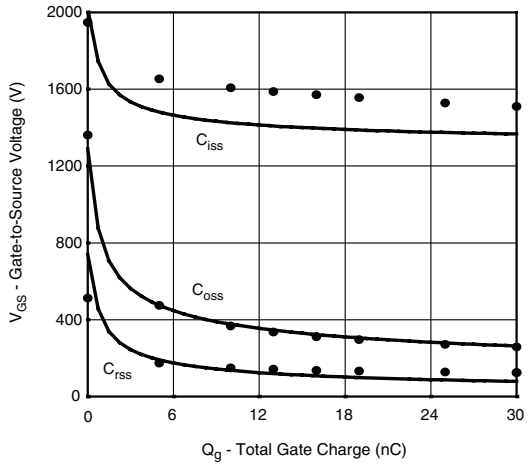
Channel 2

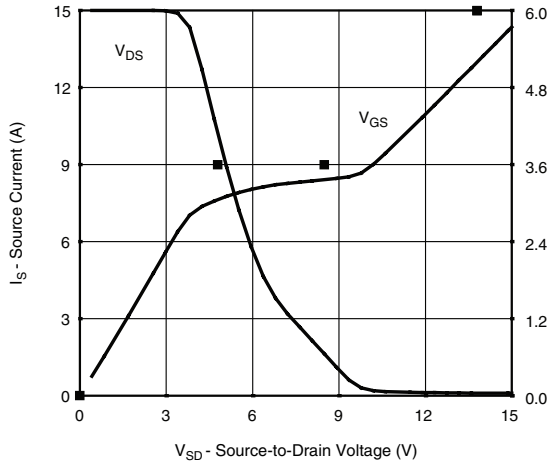












Note

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