Dual N-Channel 30 V (D-S) MOSFET

DESCRIPTION

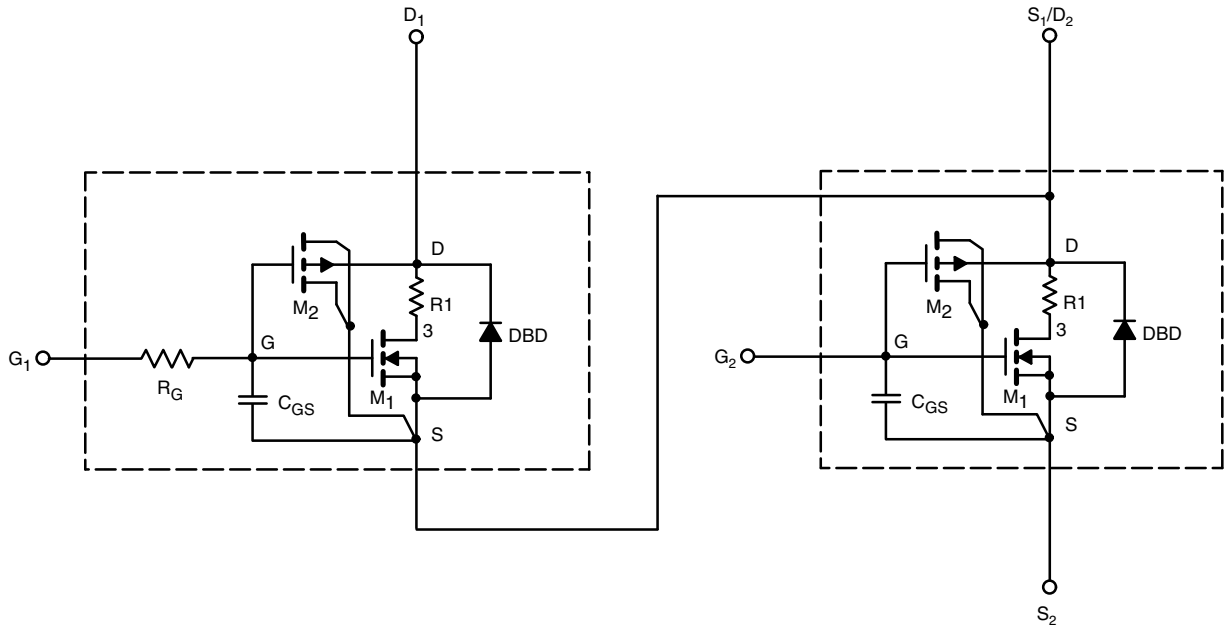
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over the - 55 °C to + 125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias 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- and P-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	1.3	-	V
			Ch-2	1.4	-	
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 13.8 A	Ch-1	0.0090	0.0100	Ω
		V_{GS} = 10 V, I_D = 20 A	Ch-2	0.0053	0.0053	
		V_{GS} = 4.5 V, I_D = 12.6 A	Ch-1	0.0100	0.0120	
		V_{GS} = 4.5 V, I_D = 20 A	Ch-2	0.0068	0.0068	
Forward Transconductance[a]	g_{fs}	V_{DS} = 10 V, I_D = 13.8 A	Ch-1	43	47	S
		V_{DS} = 10 V, I_D = 20 A	Ch-2	54	63	
Diode Forward Voltage[b]	V_{SD}	I_S = 10 A, V_{GS} = 0 V	Ch-1	0.82	0.85	V
		I_S = 10 A, V_{GS} = 0 V	Ch-2	0.78	0.80	
Dynamic[b]						
Input Capacitance	C_{iss}	Channel-1 V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz Channel-2 V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	Ch-1	766	790	pF
			Ch-2	2470	2600	
Output Capacitance	C_{oss}		Ch-1	192	190	
			Ch-2	488	485	
Reverse Transfer Capacitance	C_{rss}		Ch-1	78	76	
			Ch-2	210	215	
Total Gate Charge	Q_g	Channel-1 V_{DS} = 15 V, V_{GS} = 10 V, I_D = 13.8 A Channel-2 V_{DS} = 15 V, V_{GS} = 10 V, I_D = 20 A	Ch-1	14	14	nC
			Ch-2	43	43	
		Channel-1 V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 13.8 A Channel-2 V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 20 A	Ch-1	7	6.8	
			Ch-2	21	21	
Gate-Source Charge	Q_{gs}		Ch-1	2.6	2.6	
			Ch-2	8.1	8.1	
Gate-Drain Charge	Q_{gd}		Ch-1	1.9	1.9	
			Ch-2	6.5	6.5	

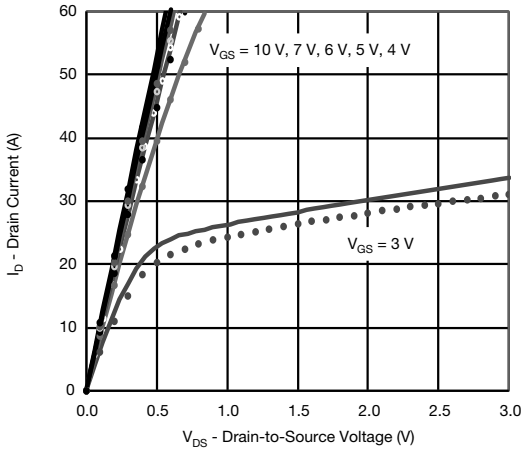
Notes

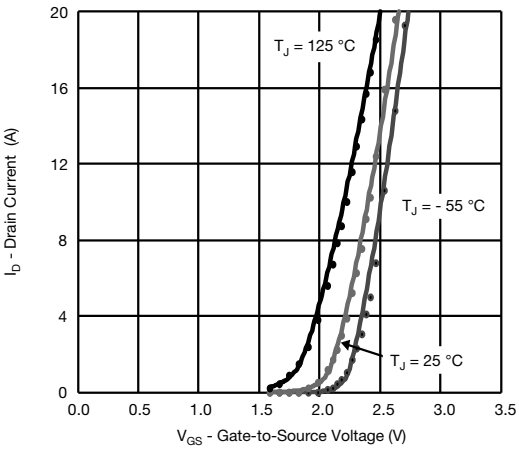
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

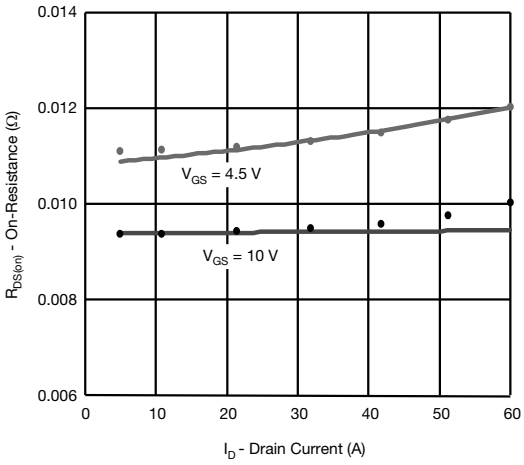
b. Guaranteed by design, not subject to production testing.

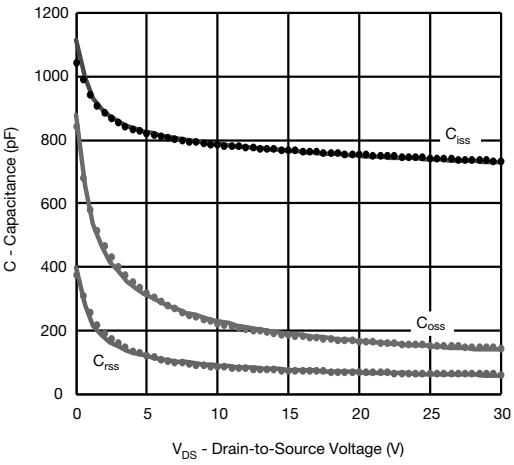
COMPARISON OF MODEL WITH MEASURED DATA T_J = 25 °C, unless otherwise noted

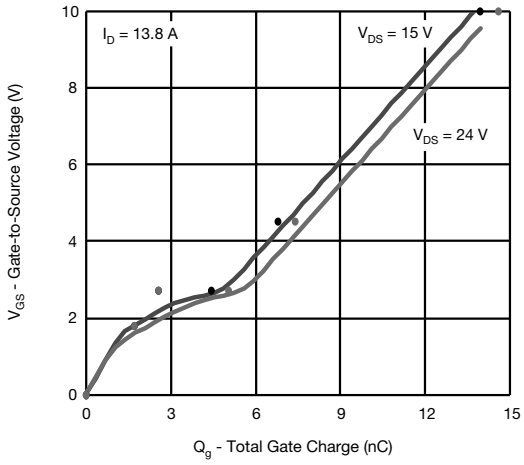
Channel-1 MOSFET

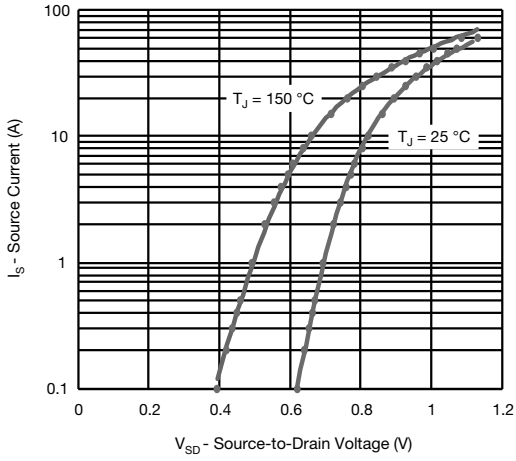










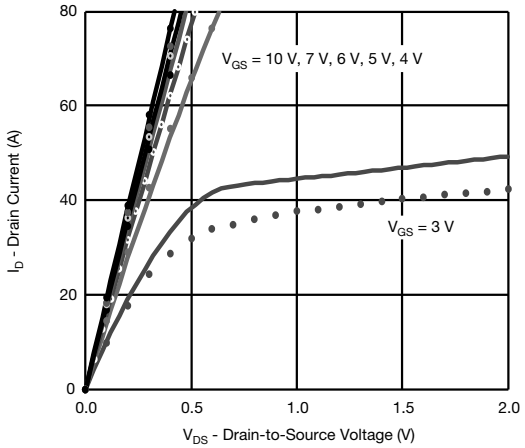


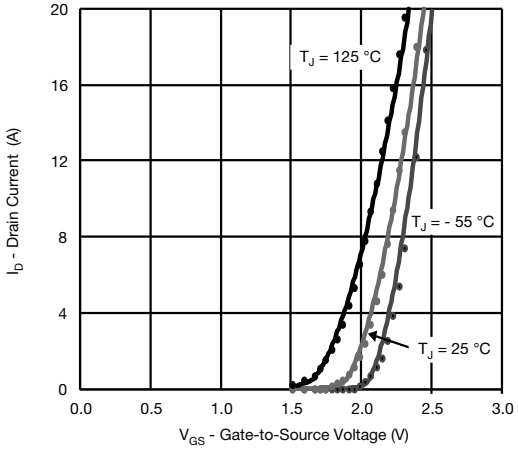
Note

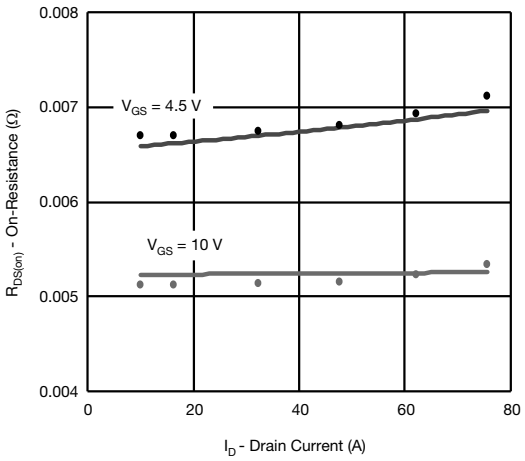
- Dots and squares represent measured data.

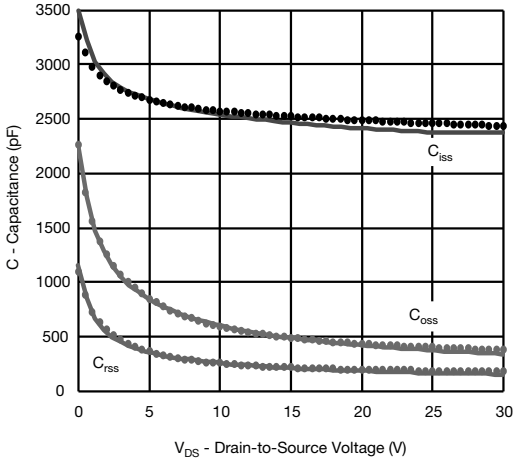
COMPARISON OF MODEL WITH MEASURED DATA T_J = 25 °C, unless otherwise noted

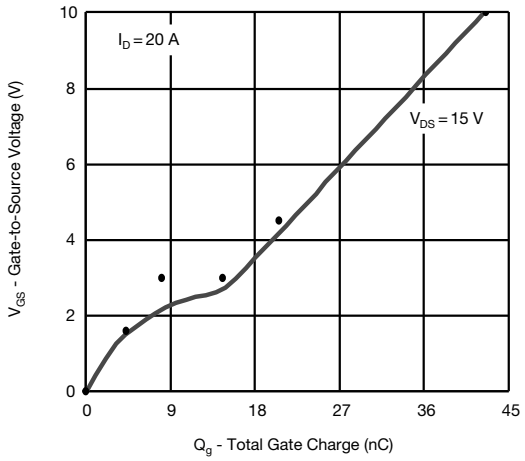
Channel-2 MOSFET

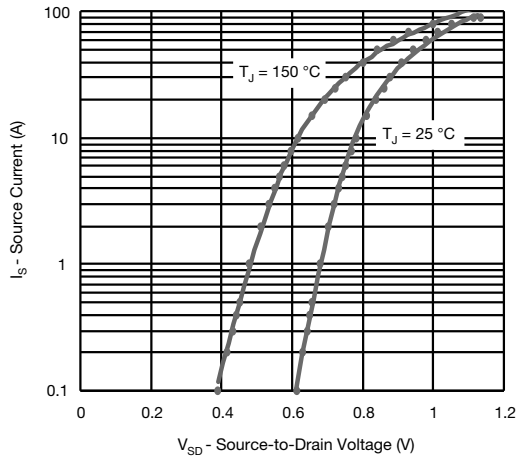












Note

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