# N-Channel 30-V (D-S) 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

Vishay Siliconix
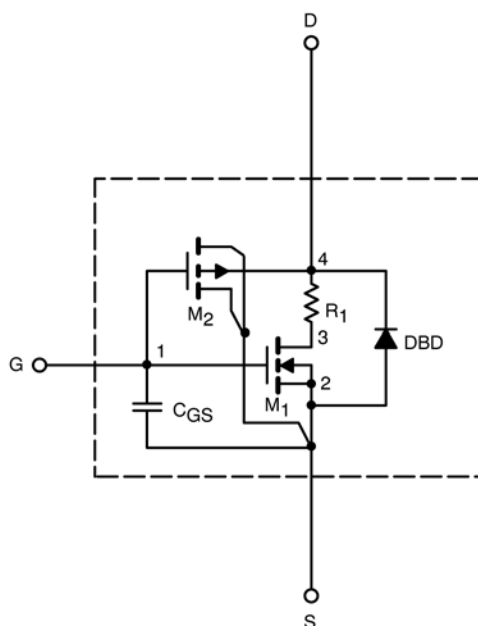
Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)					
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	0.95		V
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	1008		A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A	0.0046	0.0046	Ω
		V_{GS} = 4.5 V, I_D = 15 A	0.0056	0.0056	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 20 A	62	80	S
Diode Forward Voltage[a]	V_{SD}	I_S = 2.7 A	0.73	0.72	V
Dynamic[b]					
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	4358	3780	pF
Output Capacitance	C_{oss}		533	555	
Reverse Transfer Capacitance	C_{rss}		236	250	
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 20 A	63	69	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 20 A	31	30	
Gate-Source Charge	Q_{gs}		7.5	7.5	
Gate-Drain Charge	Q_{gd}		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)
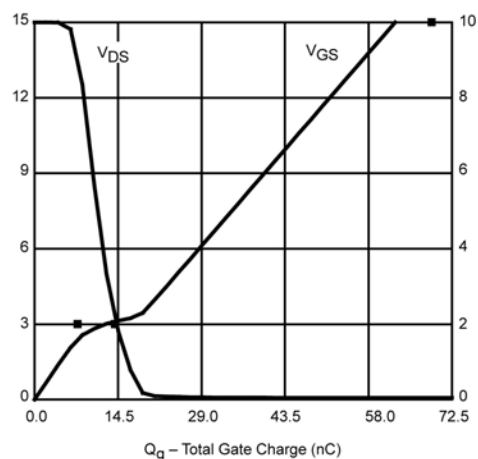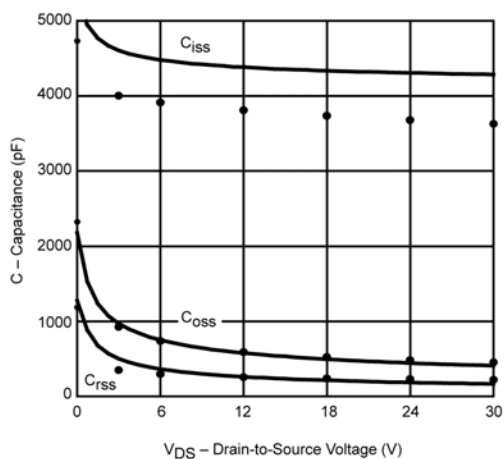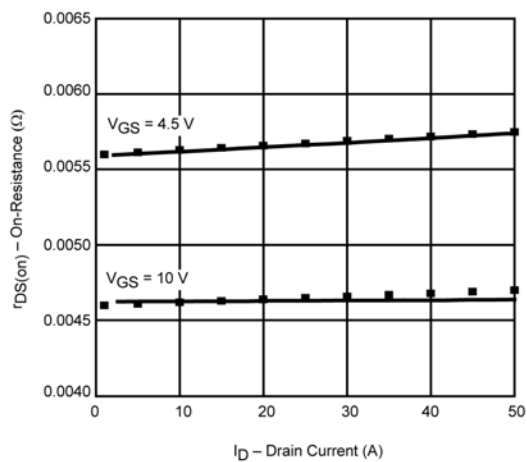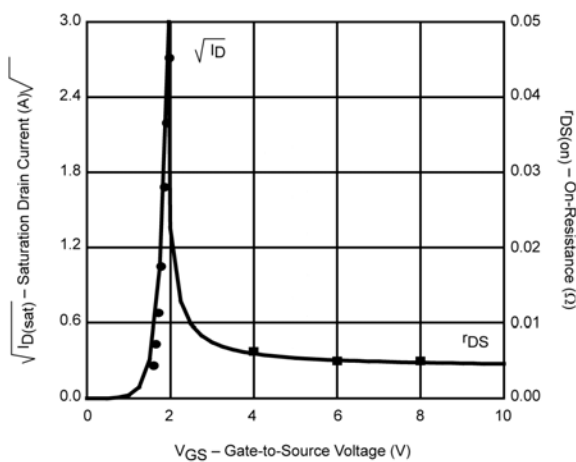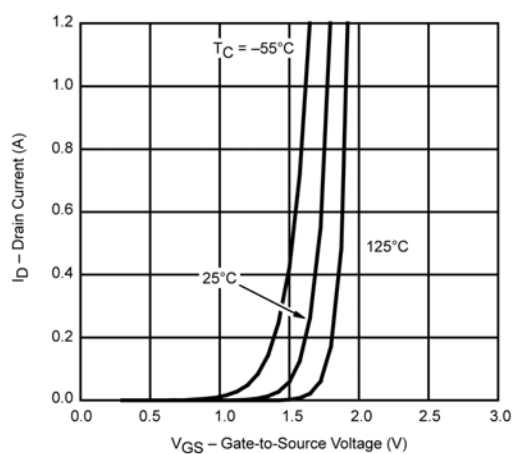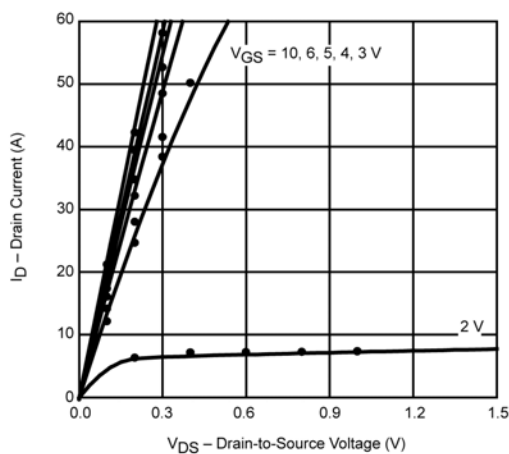
Note: Dots and squares represent measured data.