

N-Channel 20 V (D-S) MOSFET

DESCRIPTION

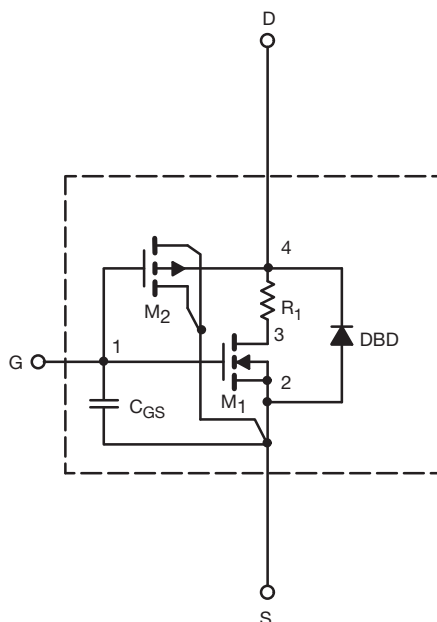
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over the - 55 °C to 125 °C temperature ranges under the pulsed 0 V to 4.5 V gate drive. The saturated output impedance is best fit at the gate bias 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.



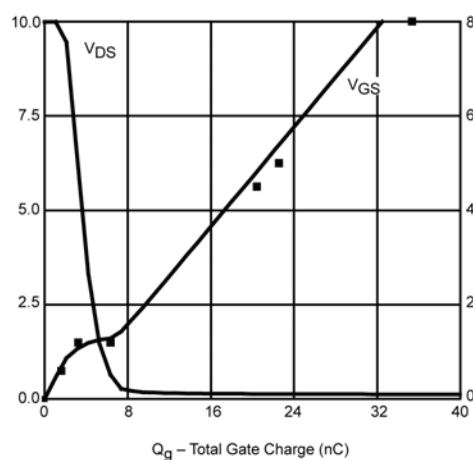
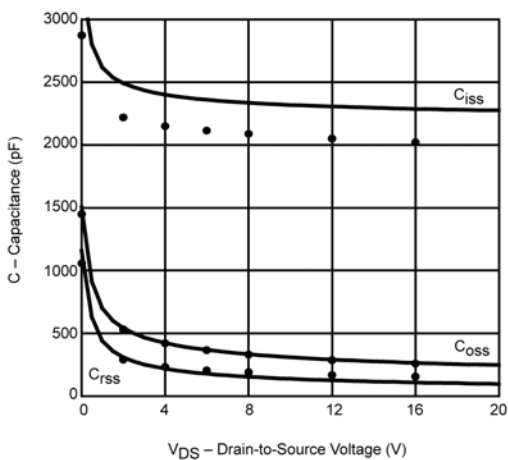
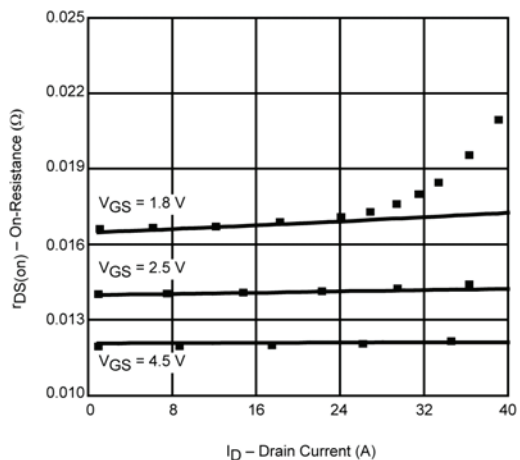
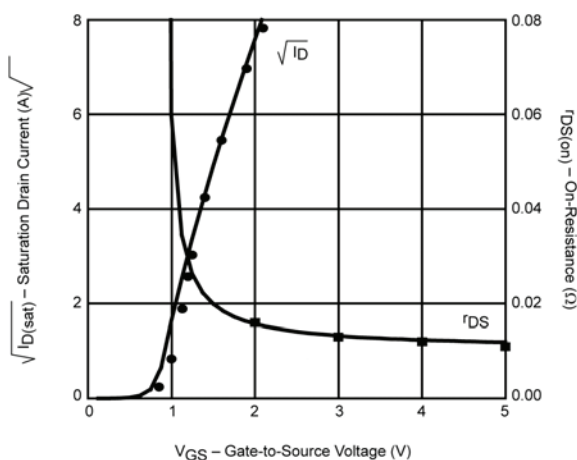
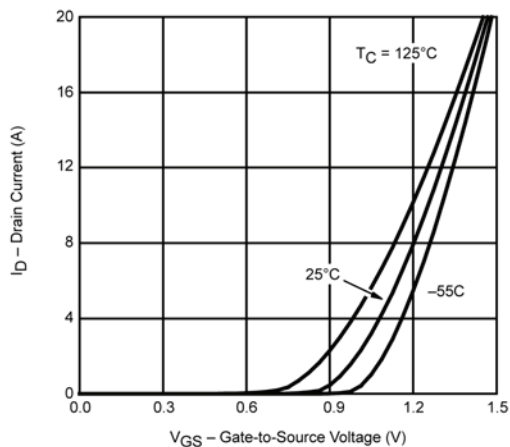
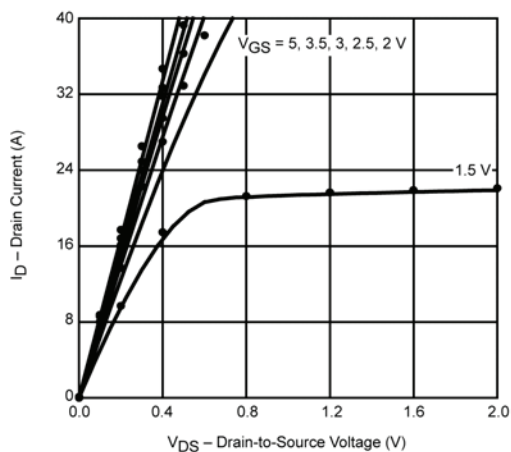
SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.5		V
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}$, $V_{GS} = 4.5\text{ V}$	305		A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}$, $I_D = 7.7\text{ A}$	0.012	0.012	Ω
		$V_{GS} = 2.5\text{ V}$, $I_D = 7.3\text{ A}$	0.014	0.014	
		$V_{DS} = 1.8\text{ V}$, $I_D = 4.8\text{ A}$	0.017	0.017	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}$, $I_D = 7.7\text{ A}$	30	46	S
Diode Forward Voltage ^a	V_{SD}	$I_S = 9.1\text{ A}$	0.72	0.85	V
Dynamic^b					
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	2320	2100	pF
Output Capacitance	C_{oss}		311	310	
Reverse Transfer Capacitance	C_{rss}		139	180	
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}$, $V_{GS} = 8\text{ V}$, $I_D = 9.3\text{ A}$	33	36	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 10\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 9.3\text{ A}$	19	21	
Gate-Drain Charge	Q_{gd}		3.3	3.3	

Notes

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



COMPARISON OF MODEL WITH MEASURED DATA ($T_J = 25^\circ\text{C}$, unless otherwise noted)



Note

- Dots and squares represent measured data.