

N-Channel 30 V (D-S) MOSFET

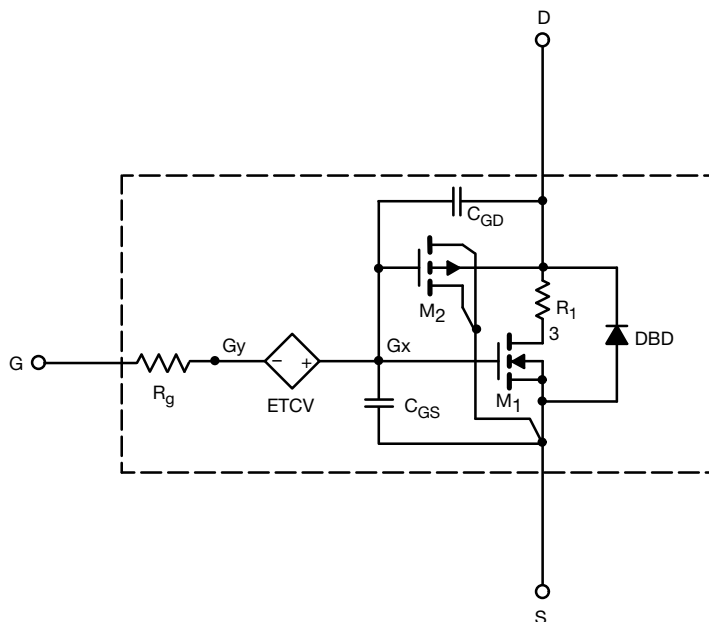
DESCRIPTION

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 +150 °C temperature ranges under the pulsed -16 V to +20 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 +150 °C temperature range
- Model the gate charge

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



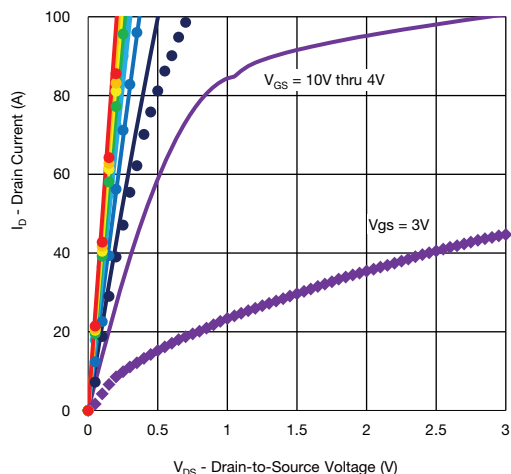
SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
Static					
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.5	-	V
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 10 A	0.0020	0.0023	Ω
		V _{GS} = 4.5 V, I _D = 7 A	0.0040	0.0035	
Forward transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 20 A	64	68	S
Dynamic ^b					
Input capacitance	C _{iSS}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	1607	1710	pF
Output capacitance	C _{oss}		651	655	
Reverse transfer capacitance	C _{rss}		69	68	
Total gate charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 10 A	25.5	24.1	nC
Gate-source charge	Q _{gs}	V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 10 A	12	11.7	
Gate-drain charge	Q _{gd}		3.2	4.2	
			2.5	2.8	
Drain-source body diode characteristics					
Body diode voltage	V _{SD}	I _S = 10 A	0.79	0.75	V

Notes

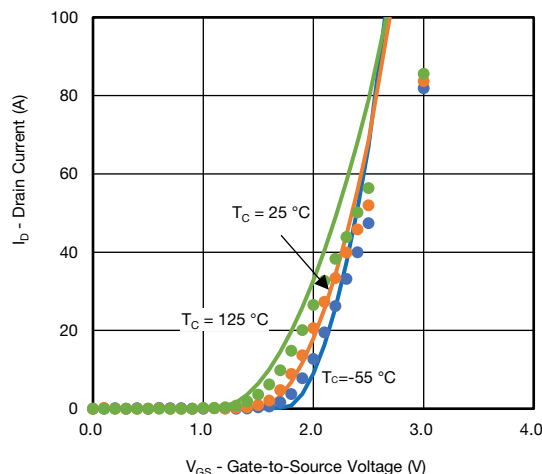
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
b. Guaranteed by design, not subject to production testing



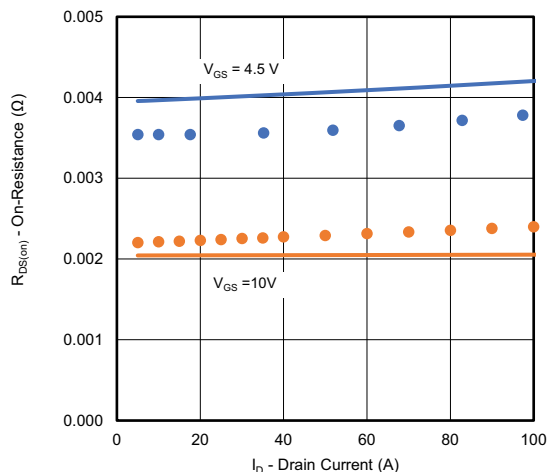
COMPARISON OF MODEL WITH MEASURED DATA ($T_J = 25^\circ\text{C}$, unless otherwise noted)



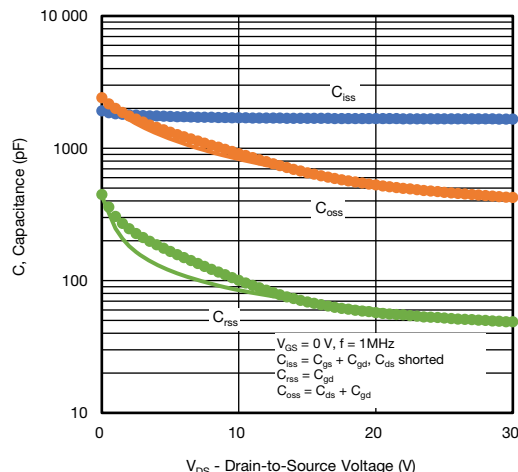
Output Characteristics



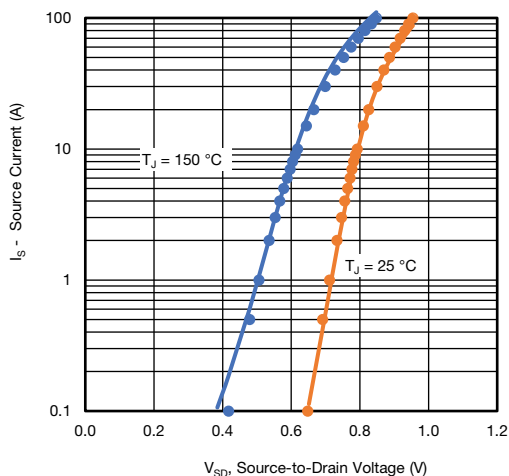
Transfer Characteristics



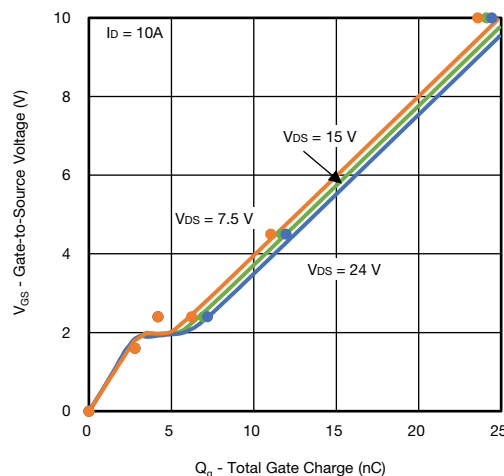
On-Resistance vs. Drain Current (A)



Capacitance



Source-Drain Diode Forward Voltage



Gate Charge

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