Automotive N-Channel 40 V (D-S) 175 °C MOSFET

DESCRIPTION

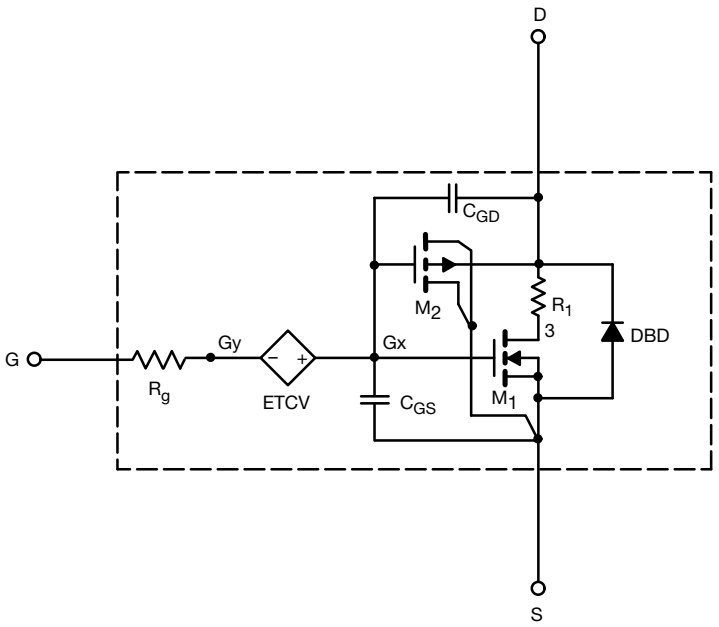
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over -55 °C to +125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias near 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 -55 °C to +125 °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.

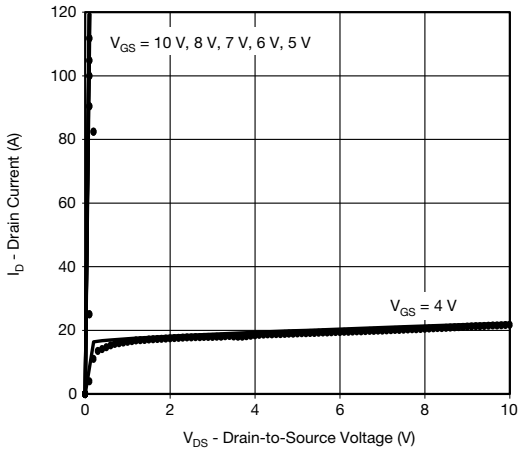
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)					
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**SIMULATED DATA**	**MEASURED DATA**	**UNIT**
Static					
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	3	3	V
Drain-Source On-State Resistance [a]	$R_{DSö(on)}$	V_{GS} = 10 V, I_D = 20 A	0.0008	0.0008	Ω
Forward Transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 15 A	308	122	S
Diode Forward Voltage [a]	V_{SD}	I_F = 50 A	0.8	0.8	V
Dynamic [b]					
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	10 900	11 367	pF
Output Capacitance	C_{oss}		5990	6000	
Reverse Transfer Capacitance	C_{rss}		470	615	
Total Gate Charge [c]	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 10 A	135	125	nC
Gate-Source Charge [c]	Q_{gs}		40	35	
Gate-Drain Charge [c]	Q_{gd}		16	13	

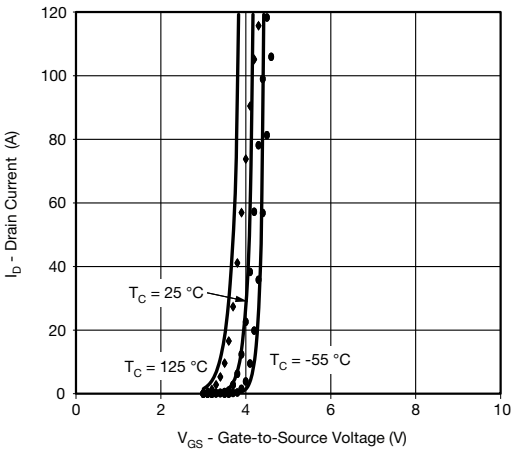
Notes

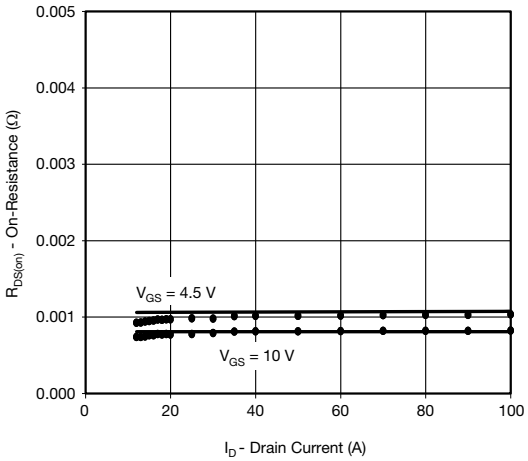
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

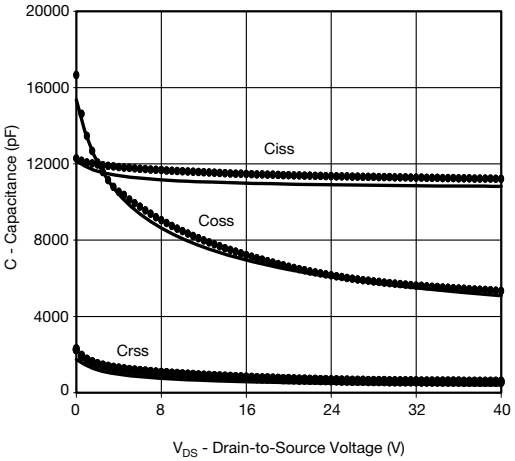
b. Guaranteed by design, not subject to production testing

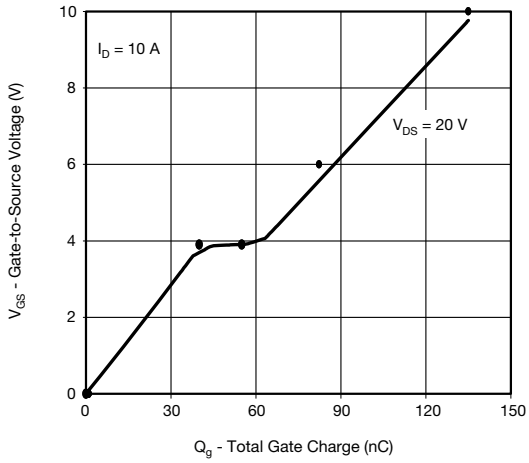
COMPARISON OF MODEL WITH MEASURED DATA (T_J = 25 °C, unless otherwise noted)

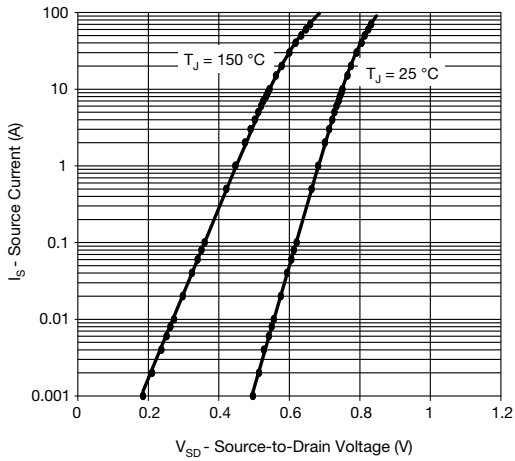












Note

- Dots and squares represent measured data.