

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

DESCRIPTION

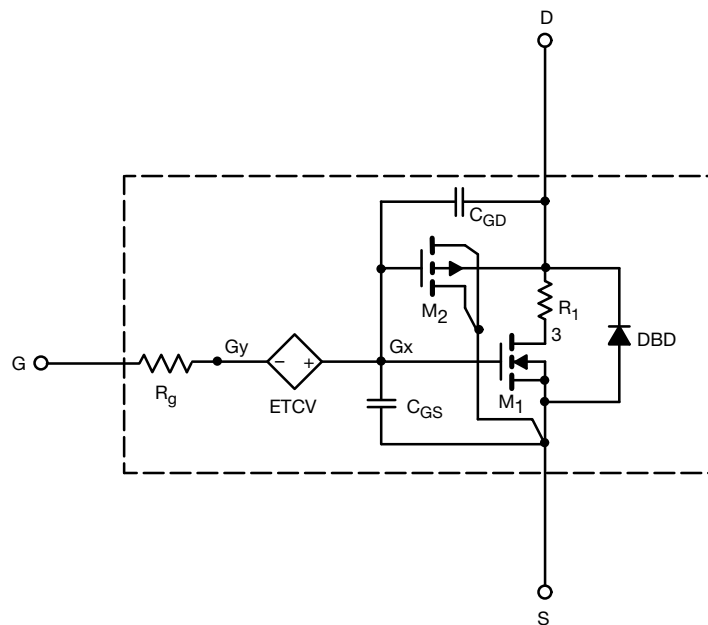
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over -55 °C to +125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias near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



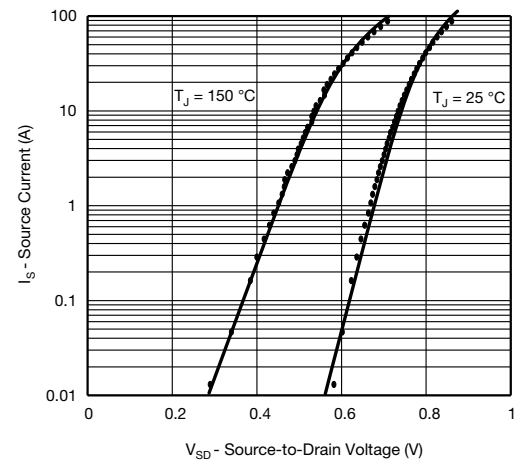
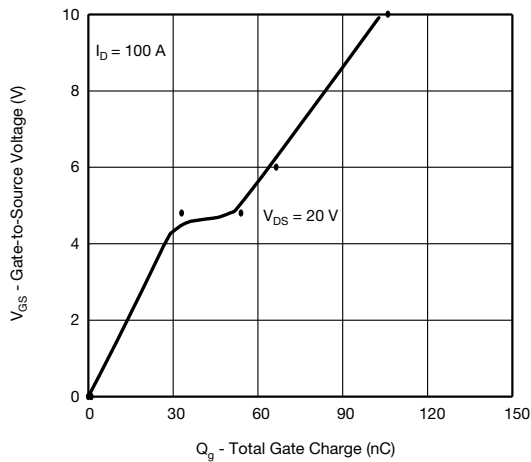
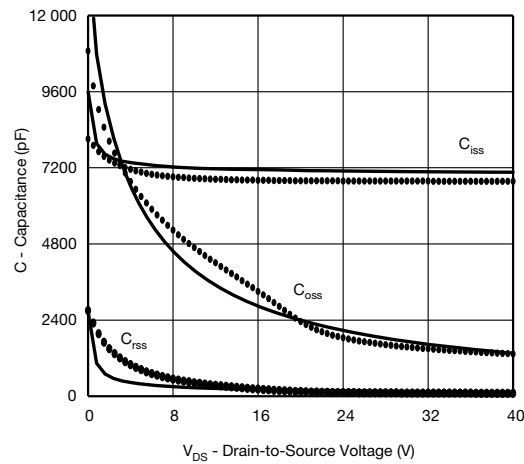
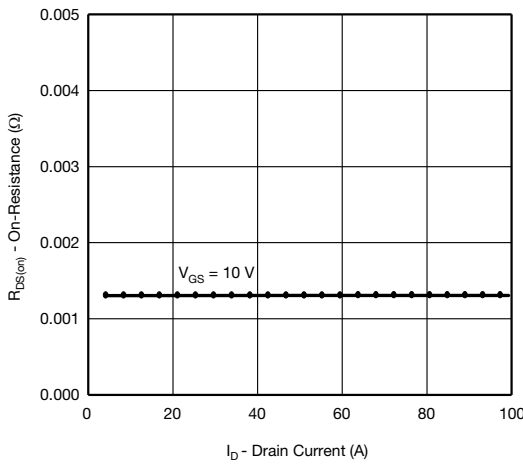
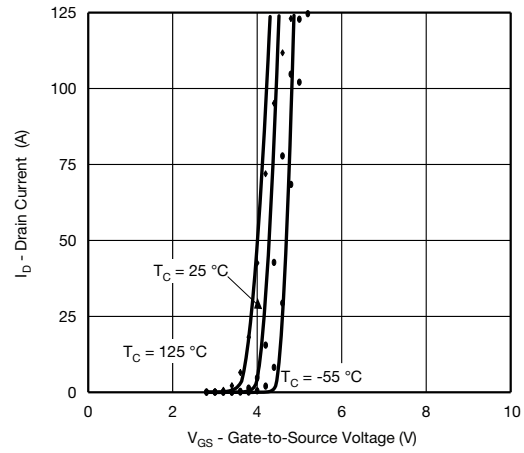
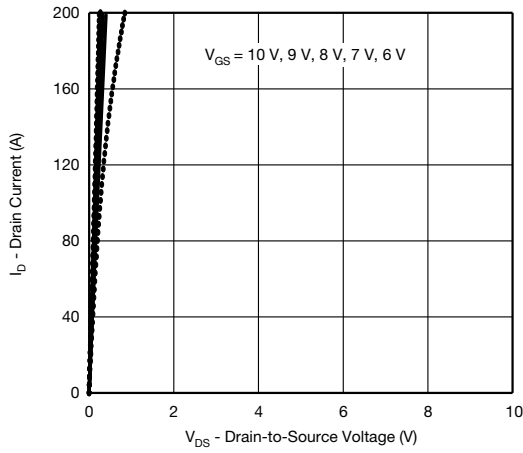
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
Static					
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	3	3	V
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\ \text{V}, I_D = 35\ \text{A}$	0.00131	0.00133	Ω
Forward transconductance ^a	g_{fs}	$V_{DS} = 15\ \text{V}, I_D = 35\ \text{A}$	201	143	S
Diode forward voltage	V_{SD}	$I_F = 60\ \text{A}$	0.82	0.83	V
Dynamic ^b					
Input capacitance	C_{iss}	$V_{DS} = 25\ \text{V}, V_{GS} = 0\ \text{V}, f = 1\ \text{MHz}$	7100	6783	pF
Output capacitance	C_{oss}		2010	1771	
Reverse transfer capacitance	C_{rss}		161	109	
Total gate charge	Q_g	$V_{DS} = 20\ \text{V}, V_{GS} = 10\ \text{V}, I_D = 100\ \text{A}$	104	106	nC
Gate-source charge	Q_{gs}		33	33	
Gate-drain charge	Q_{gd}		21	21	

Notes

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



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



Note

- Dots and squares represent measured data

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