

## Automotive N-Channel 100 V (D-S) 175 °C MOSFET

### DESCRIPTION

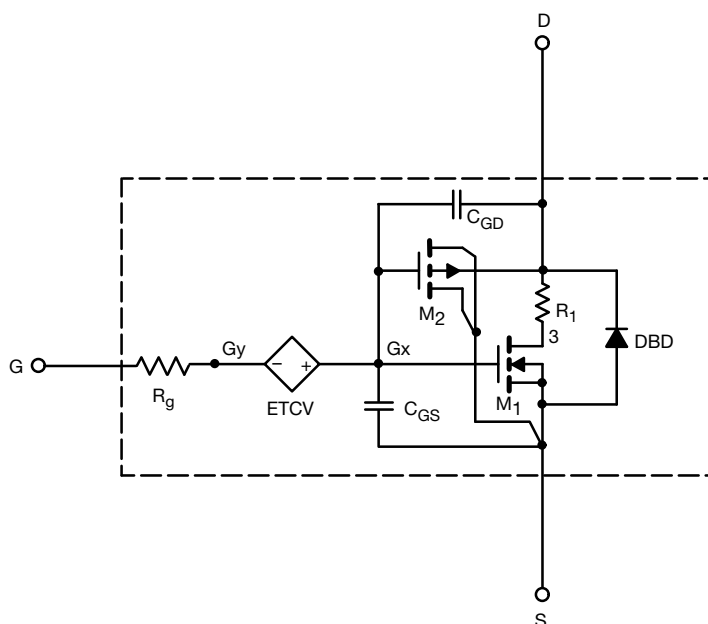
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over -55 °C to +125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias near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



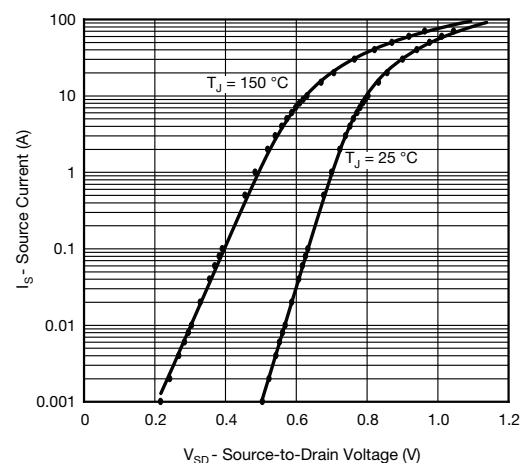
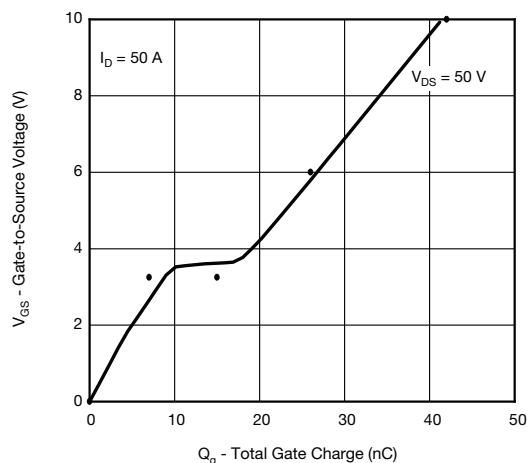
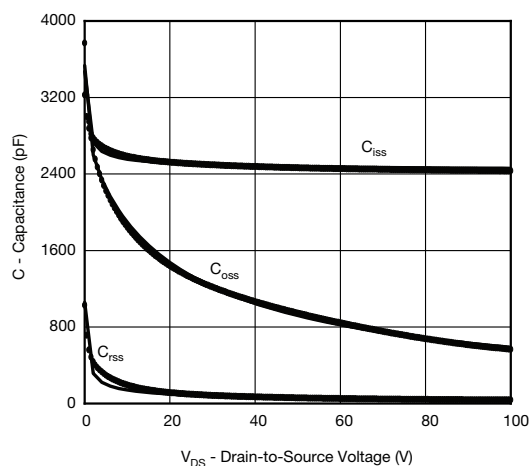
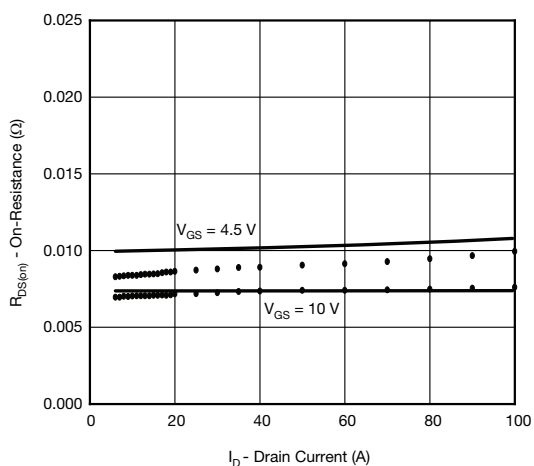
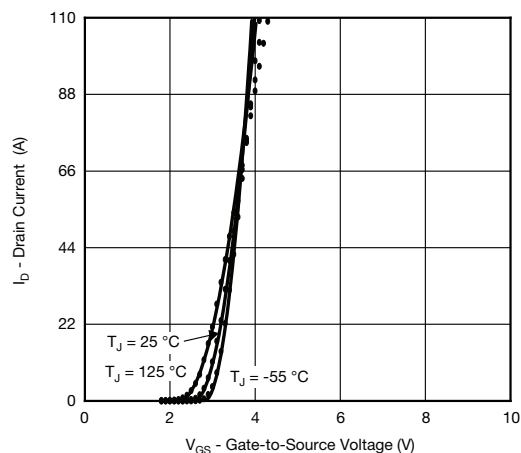
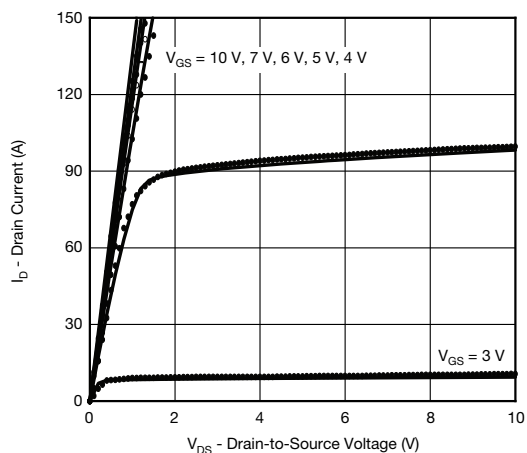
SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
<b>Static</b>					
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$	2	2	V
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\ \text{V}$ , $I_D = 25\ \text{A}$	0.0073	0.0072	$\Omega$
		$V_{GS} = 4.5\ \text{V}$ , $I_D = 20\ \text{A}$	0.0100	0.0087	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\ \text{V}$ , $I_D = 25\ \text{A}$	70	80	S
Diode Forward Voltage	$V_{SD}$	$I_F = 25\ \text{A}$	0.88	0.88	V
<b>Dynamic <sup>b</sup></b>					
Input Capacitance	$C_{iss}$	$V_{DS} = 25\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $f = 1\ \text{MHz}$	2510	2550	pF
Output Capacitance	$C_{oss}$		1380	1350	
Reverse Transfer Capacitance	$C_{rss}$		89	101	
Total Gate Charge	$Q_g$	$V_{DS} = 50\ \text{V}$ , $V_{GS} = 10\ \text{V}$ , $I_D = 50\ \text{A}$	42	42	nC
Gate-Source Charge	$Q_{gs}$		7	7	
Gate-Drain Charge	$Q_{gd}$		8	8	

**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 ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)



### Note

- Dots and squares represent measured data.

Copyright: Vishay Intertechnology, Inc.