

## E Series Power MOSFET with Fast Body Diode

### DESCRIPTION

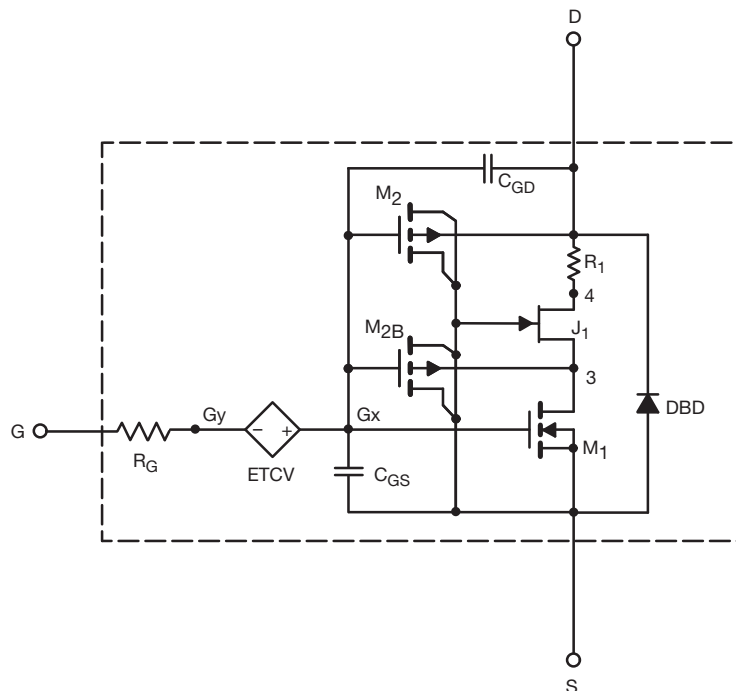
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over the 25 °C to 150 °C temperature ranges under the pulsed 0 V to 15 V gate drive. The saturated output impedance is best fit at the gate bias near 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 25 °C to 150 °C temperature range
- Model the gate charge

### SUBCIRCUIT MODEL SCHEMATIC



### Note

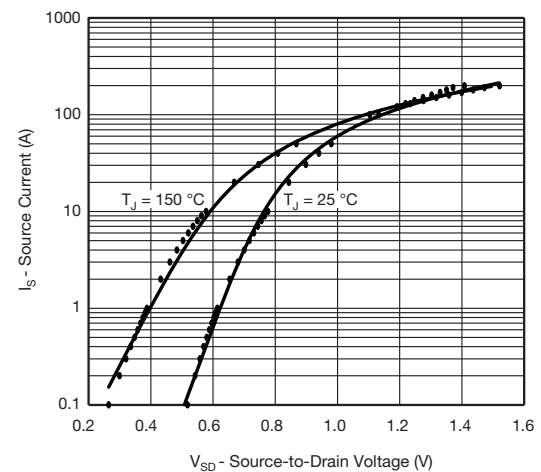
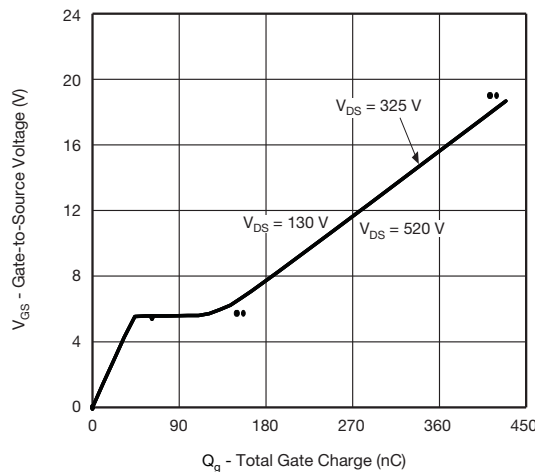
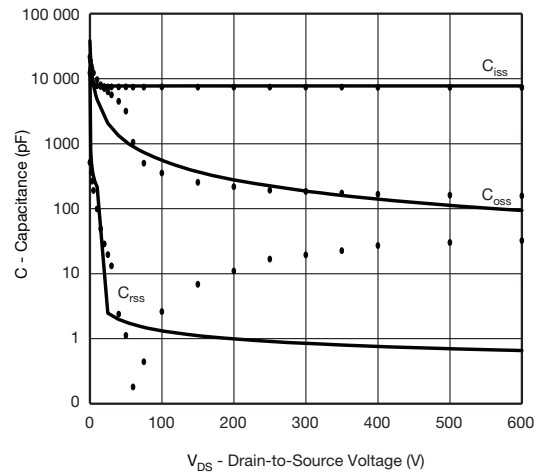
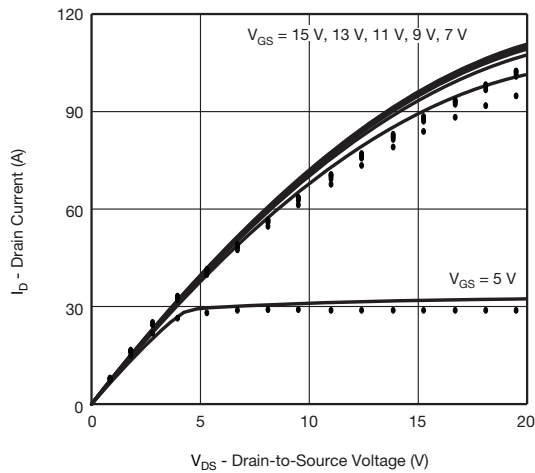
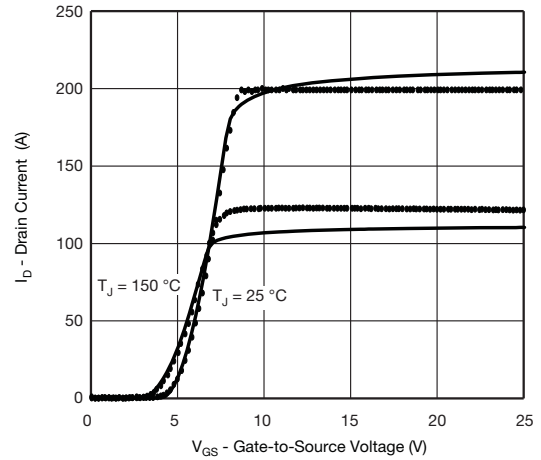
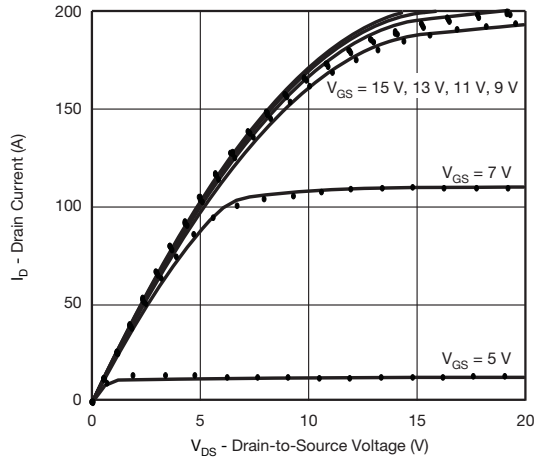
- This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.



<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
<b>Static</b>					
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	3	-	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ , $I_D = 30.5\text{ A}$	0.045	0.041	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 30\text{ V}$ , $I_D = 30.5\text{ A}$	39	23	S
<b>Dynamic</b>					
Input Capacitance	$C_{iss}$	$V_{DS} = 100\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$	7720	7407	pF
Output Capacitance	$C_{oss}$		558	351	
Reverse Transfer Capacitance	$C_{rss}$		2	3	
Total Gate Charge	$Q_g$	$V_{DS} = 520\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 30.5\text{ A}$	240	247	nC
Gate-Source Charge	$Q_{gs}$		50	65	
Gate-Drain Charge	$Q_{gd}$		80	93	
<b>Drain-Source Body Diode Characteristics</b>					
Diode Forward Voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_S = 30.5\text{ A}$ , $V_{GS} = 0\text{ V}$	0.90	0.90	V
Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_F = I_S = 30.5\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 25\text{ V}$	220	237	ns
Reverse Recovery Charge	$Q_{rr}$		2.3	1.9	$\mu\text{C}$



## 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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