

E Series Power MOSFET with Fast Body Diode

DESCRIPTION

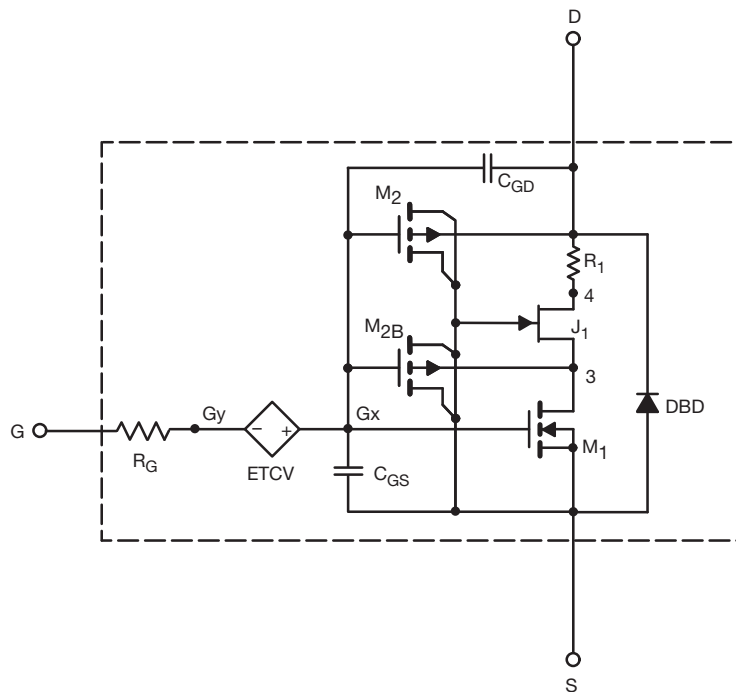
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over 25 °C to 150 °C temperature ranges under the pulsed 0 V to 15 V gate drive. The saturated output impedance is best fit at the gate bias near the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

SUBCIRCUIT MODEL SCHEMATIC



Note

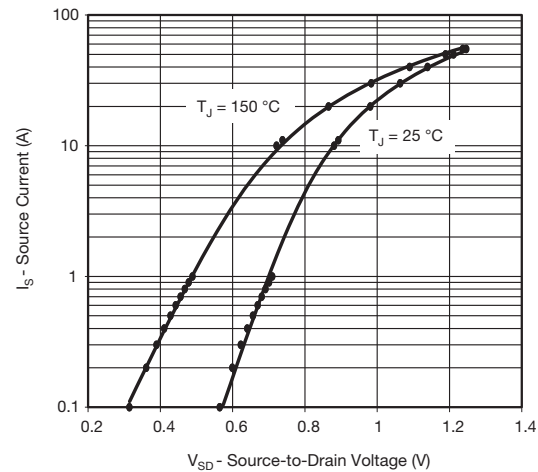
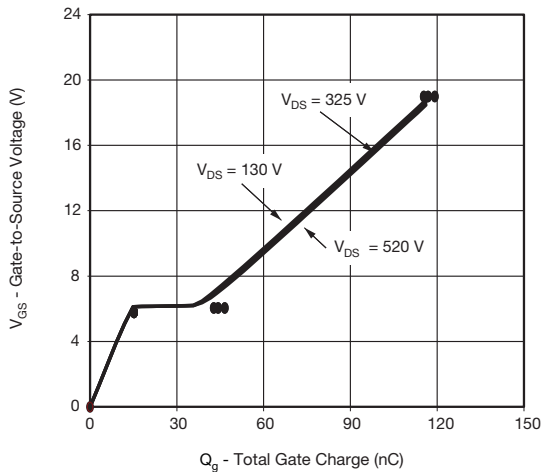
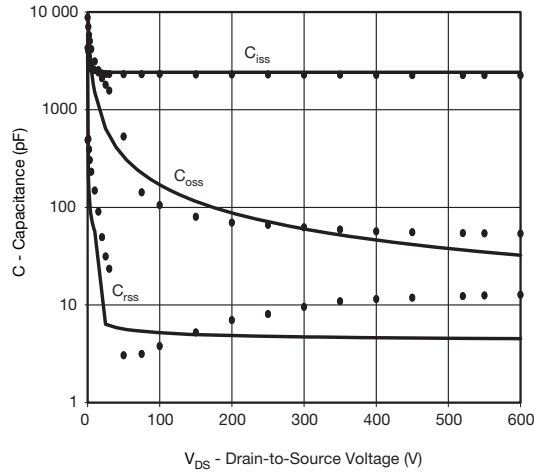
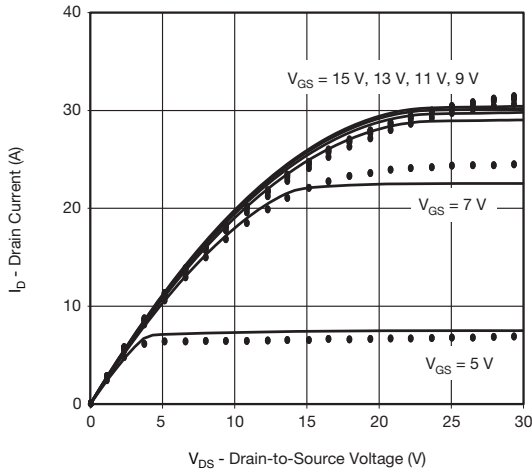
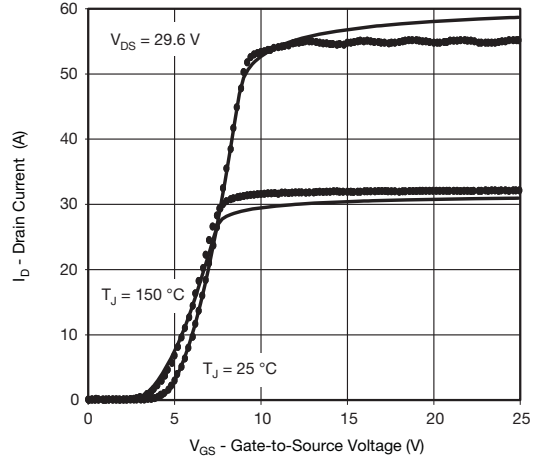
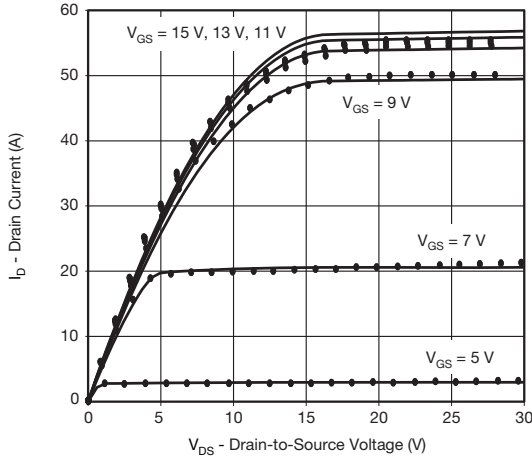
- This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.



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	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	3	-	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 11\text{ A}$	0.17	0.15	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 30\text{ V}$, $I_D = 11\text{ A}$	9	7	S
Dynamic					
Input Capacitance	C_{iss}	$V_{DS} = 100\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	2420	2322	pF
Output Capacitance	C_{oss}		172	105	
Reverse Transfer Capacitance	C_{rss}		5	4	
Total Gate Charge	Q_g	$V_{DS} = 520\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 11\text{ A}$	67	71	nC
Gate-Source Charge	Q_{gs}		14	14	
Gate-Drain Charge	Q_{gd}		33	33	
Drain-Source Body Diode Characteristics					
Diode Forward Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}$, $I_S = 11\text{ A}$, $V_{GS} = 0\text{ V}$	0.90	0.90	V
Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}$, $I_F = I_S = 11\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_R = 25\text{ V}$	160	160	ns
Reverse Recovery Charge	Q_{rr}		1.2	1.2	μC



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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