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Vishay Siliconix

## N-Channel 40 V (D-S) 175 °C MOSFET

### **DESCRIPTION**

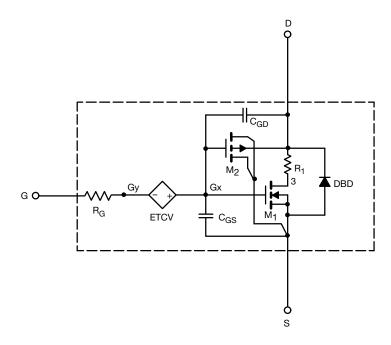
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over the - 55 °C to 125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias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



# **SPICE Device Model SQJ886EP**

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<b>SPECIFICATIONS</b> (T <sub>J</sub> = 25 °C, unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
Static					
Gate Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1.8	2	V
Drain-Source On-State Resistance <sup>a</sup>	В	$V_{GS} = 10 \text{ V}, I_D = 15.3 \text{ A}$	0.0036	0.0036	Ω
	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 13.8 A	0.0046	0.0045	
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 15.3 A	116	105	S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 10.1 A	0.8	0.8	V
Dynamic <sup>b</sup>					
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, f = 1 MHz	2340	2338	pF
Output Capacitance	C <sub>oss</sub>		363	356	
Reverse Transfer Capacitance	C <sub>rss</sub>		149	147	
Total Gate Charge <sup>c</sup>	Qg	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	38	43	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>		8	8	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>		7	7	

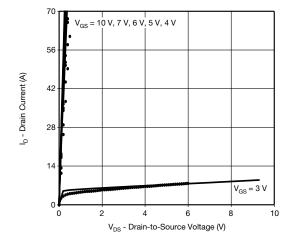
#### Notes

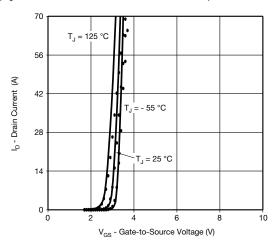
- a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

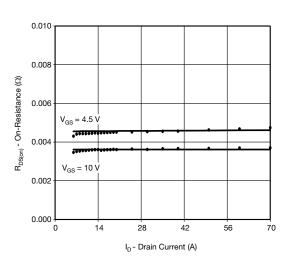
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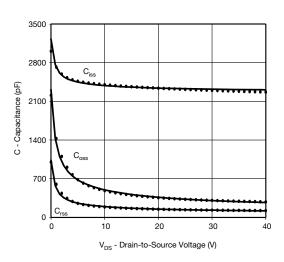
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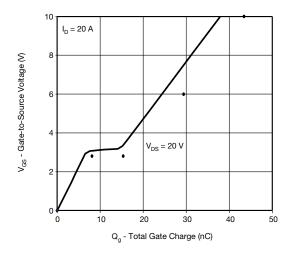
## **COMPARISON OF MODEL WITH MEASURED DATA** ( $T_J = 25$ °C, unless otherwise noted)

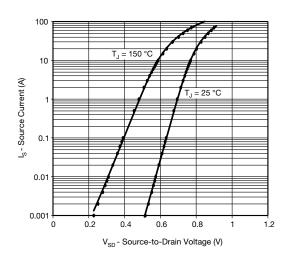












### Note

• Dots and squares represent measured data.



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