

SPICE Device Model Si7613DN

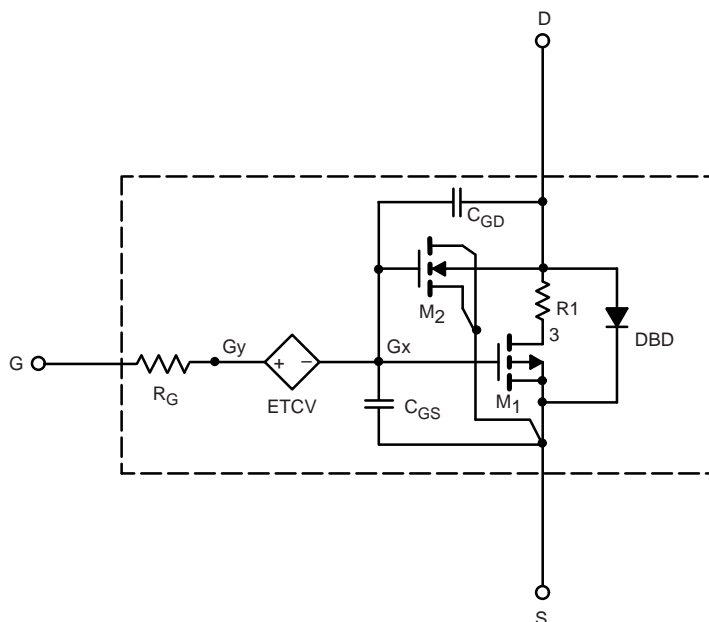
DESCRIPTION

The attached SPICE model describes the typical electrical characteristics of the p-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_{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.

SUBCIRCUIT MODEL SCHEMATIC

CHARACTERISTICS

- P-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, Transient, and Diode Reverse Recovery Characteristics



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)

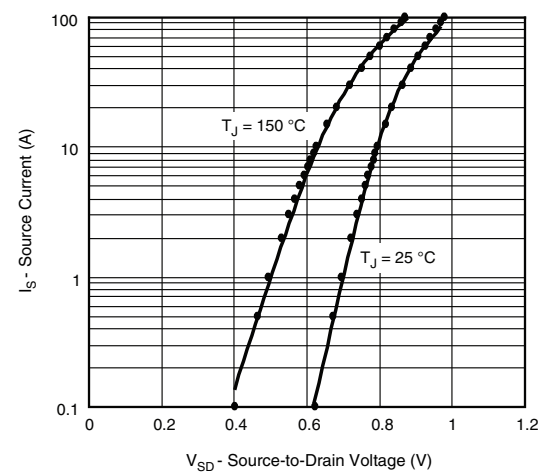
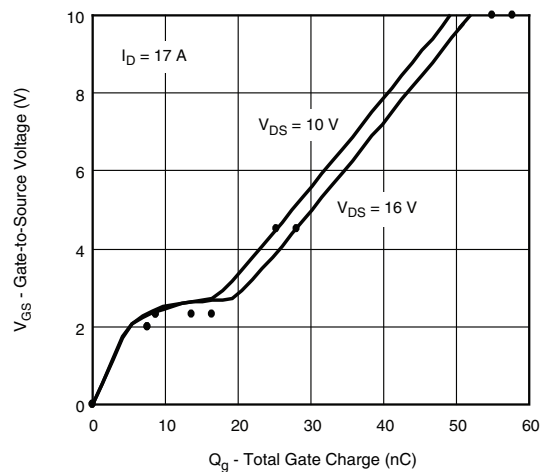
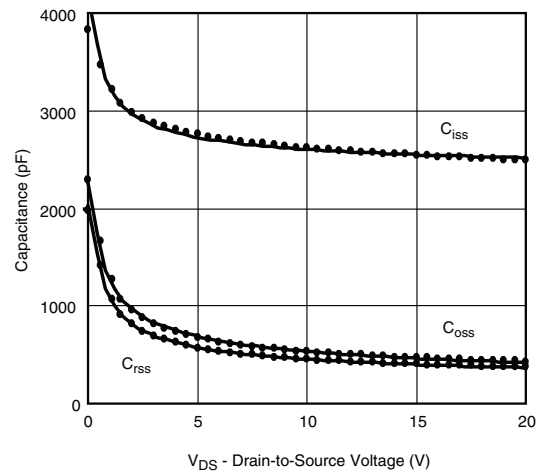
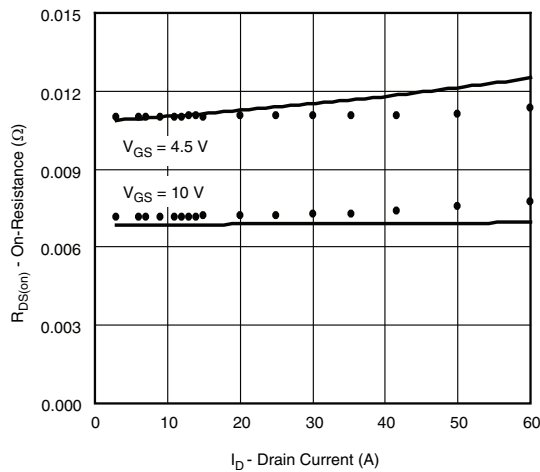
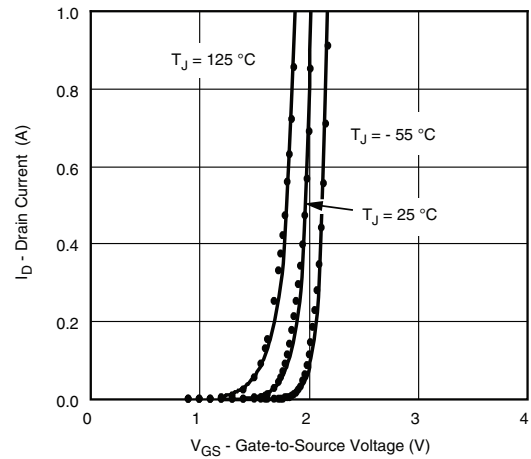
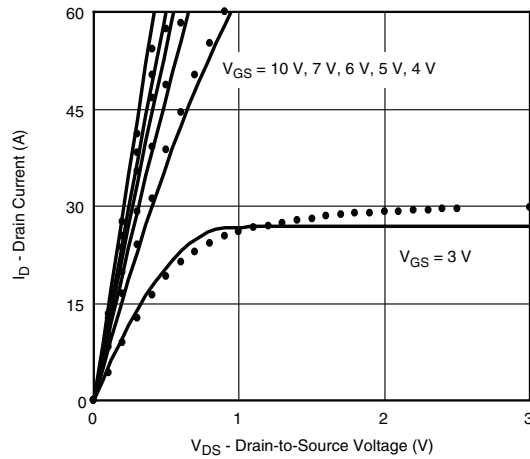
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
Static					
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	1.2	-	V
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -17\text{ A}$	0.007	0.0072	Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -13.6\text{ A}$	0.011	0.011	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}$, $I_D = -14.4\text{ A}$	32	40	S
Diode Forward Voltage ^a	V_{SD}	$I_S = -10\text{ A}$	-0.79	-0.80	V
Dynamic^b					
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	2610	2620	pF
Output Capacitance	C_{oss}		535	535	
Reverse Transfer Capacitance	C_{rss}		455	455	
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -17\text{ A}$	50	58	nC
			26	28.1	
Gate-Source Charge	Q_{gs}	$V_{DS} = -10\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -17\text{ A}$	8.8	8.8	
Gate-Drain Charge	Q_{gd}		7.6	7.6	

Notes

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, 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)

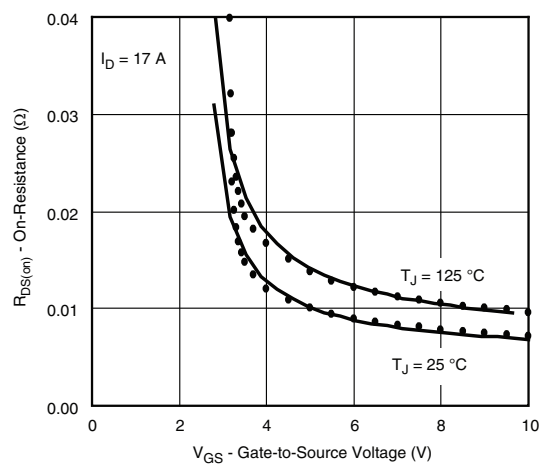
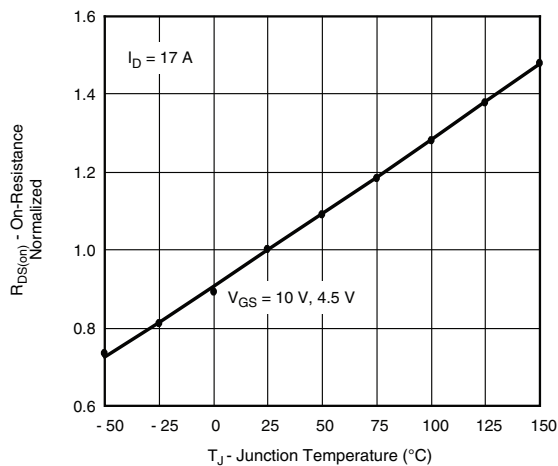


Note

- Dots and squares represent measured data.



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



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