



N-Channel 20-V (D-S) MOSFET

CHARACTERISTICS

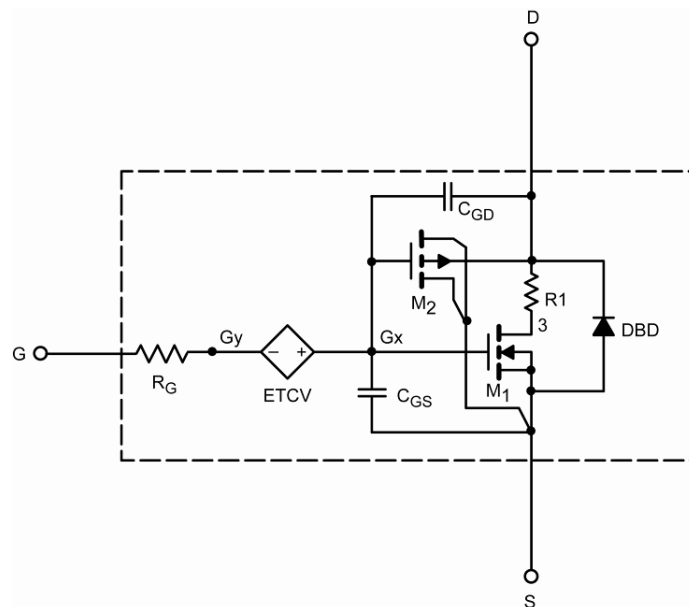
- N-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the - 55 °C to 125 °C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

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_{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



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

SPICE Device Model SiR410DP

Vishay Siliconix



SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.5		V
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	0.004	0.004	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 19.4\text{ A}$	0.005	0.005	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	80	70	S
Body Diode Voltage	V_{SD}	$I_S = 10\text{ A}$	0.79	0.80	V
Dynamic^b					
Input Capacitance	C_{is}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	1560	1600	pF
Output Capacitance	C_{oss}		503	500	
Reverse Transfer Capacitance	C_{rss}		200	200	
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	25	27	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	13	16.7	
Gate-Source Charge	Q_{gs}		4.5	4.5	
Gate-Drain Charge	Q_{gd}		3.5	3.5	

Notes

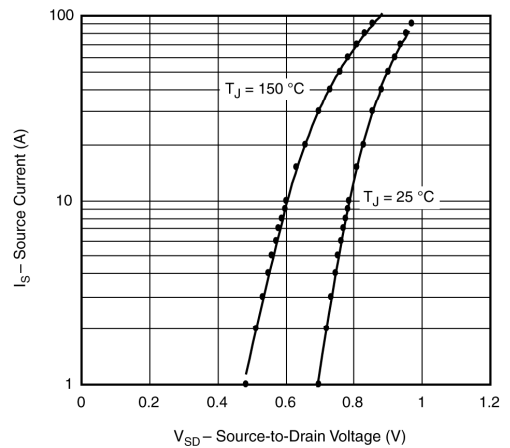
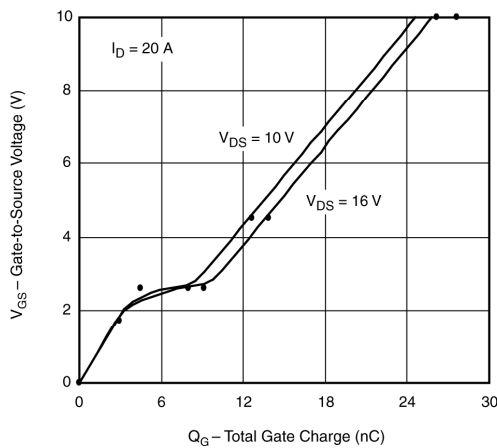
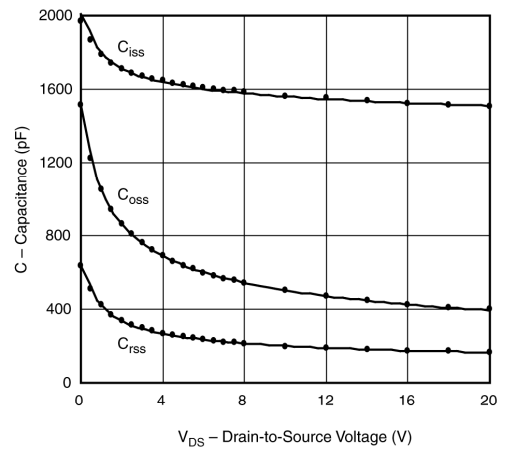
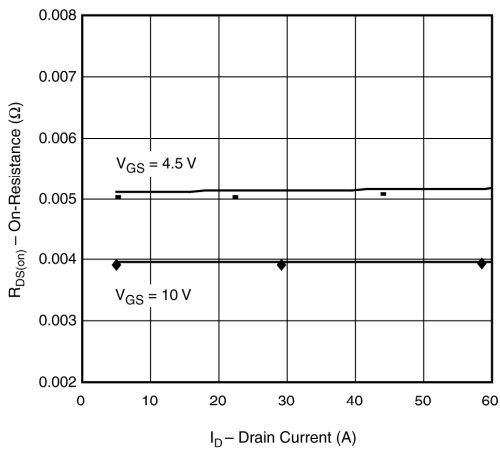
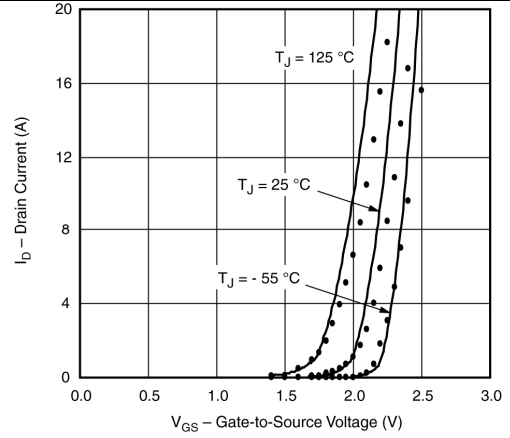
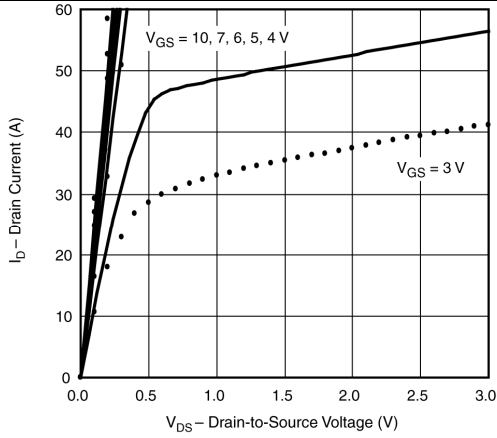
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.



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COMPARISON OF MODEL WITH MEASURED DATA ($T_J = 25\text{ }^\circ\text{C}$ UNLESS OTHERWISE NOTED)



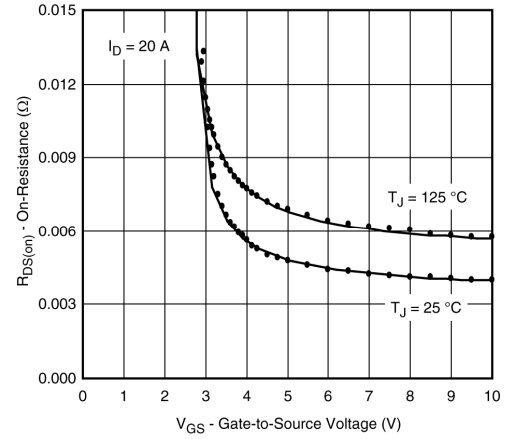
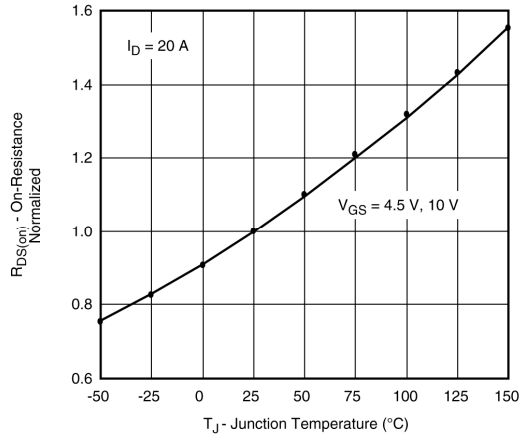
Note: Dots and squares represent measured data.

SPICE Device Model SiR410DP

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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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