



N- and P-Channel 1.8-V (G-S) MOSFET

CHARACTERISTICS

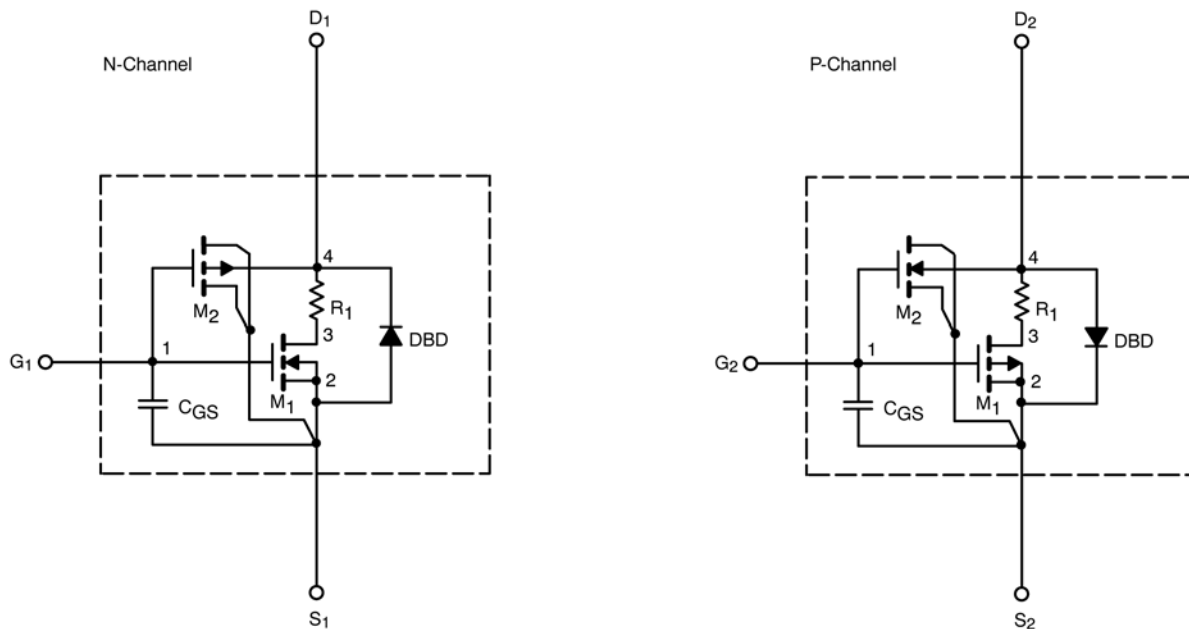
- N- and P-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS
- Apply for both Linear and Switching Application
- Accurate over the -55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

DESCRIPTION

The attached spice model describes the typical electrical characteristics of the n- and p-channel vertical DMOS. The subcircuit model is extracted and optimized over the -55 to 125°C temperature ranges under the pulsed 0-V to 5-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 Si1557DH



Vishay Siliconix

SPECIFICATIONS (T _J = 25°C UNLESS OTHERWISE NOTED)					
Parameter	Symbol	Test Condition	Typical	Unit	
Static					
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 100 μA	N-Ch	0.70	V
		V _{DS} = V _{GS} , I _D = -100 μA	P-Ch	0.80	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 4.5 V	N-Ch	17	A
		V _{DS} ≤ -5 V, V _{GS} = -4.5 V	P-Ch	6.6	
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 4.5 V, I _D = 1.2 A	N-Ch	0.15	Ω
		V _{GS} = -4.5 V, I _D = -0.77 A	P-Ch	0.43	
		V _{GS} = 2.5 V, I _D = 1 A	N-Ch	0.20	
		V _{GS} = -2.5 V, I _D = -0.6 A	P-Ch	0.72	
		V _{GS} = 1.8 V, I _D = 0.20 A	N-Ch	0.24	
		V _{GS} = -1.8 V, I _D = -0.20 A	P-Ch	1.06	
Forward Transconductance ^a	g _{fs}	V _{DS} = 5 V, I _D = 1.2 A	N-Ch	3.1	S
		V _{DS} = -5 V, I _D = -0.77 A	P-Ch	0.69	
Diode Forward Voltage ^a	V _{SD}	I _S = 0.39 A, V _{GS} = 0 V	N-Ch	0.73	V
		I _S = -0.39 V, V _{GS} = 0 V	P-Ch	-0.78	
Dynamic^b					
Total Gate Charge	Q _g	N-Channel V _{DS} = 6 V, V _{GS} = 4.5 V, I _D = 1.2 A P-Channel V _{DS} = -6 V, V _{GS} = -4.5 V, I _D = -0.1 A	N-Ch	0.72	nC
Gate-Source Charge	Q _{gs}		P-Ch	1.1	
			N-Ch	0.15	
Gate-Drain Charge	Q _{gd}		P-Ch	0.30	
			N-Ch	0.20	
			P-Ch	0.25	
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 6 V, R _L = 12 Ω I _D ≅ 0.5 A, V _{GEN} = 4.5 V, R _G = 6 Ω P-Channel V _{DD} = -6 V, R _L = 12 Ω I _D ≅ -0.5 A, V _{GEN} = -4.5 V, R _G = 6 Ω	N-Ch	15	ns
Rise Time	t _r		P-Ch	17	
			N-Ch	25	
Turn-Off Delay Time	t _{d(off)}		P-Ch	30	
			N-Ch	25	
Fall Time	t _f		P-Ch	15	
			N-Ch	10	
Source-Drain Reverse Recovery Time	t _{rr}		N-Ch	10	
		P-Ch	10		
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 0.39 A, di/dt = 100 A/μs	N-Ch	20	
		I _F = -0.39 A, di/dt = 100 A/μs	P-Ch	25	

Notes

- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.

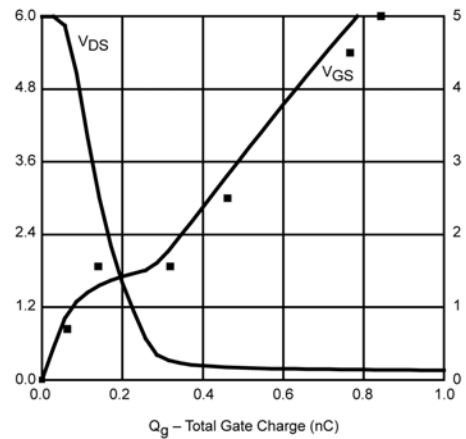
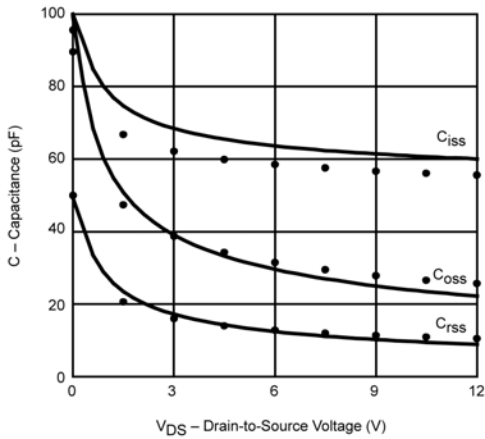
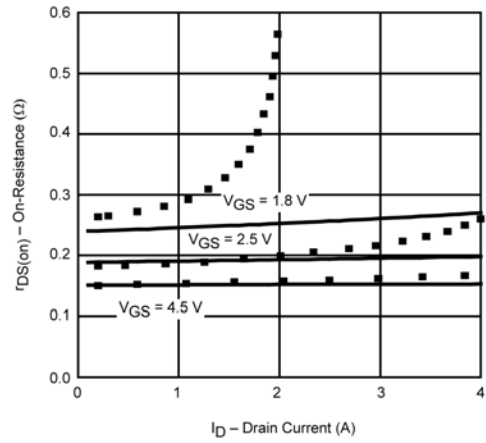
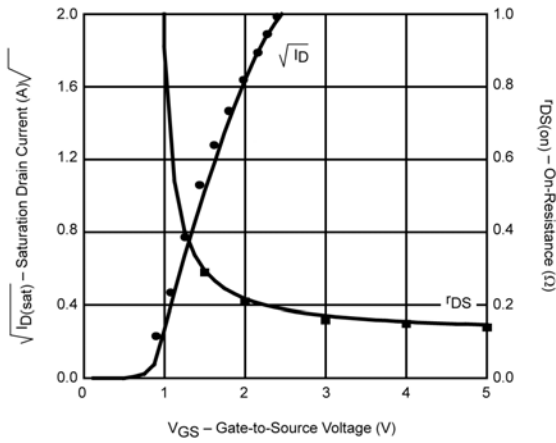
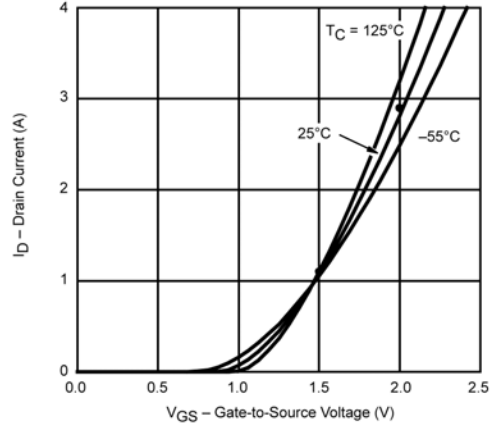
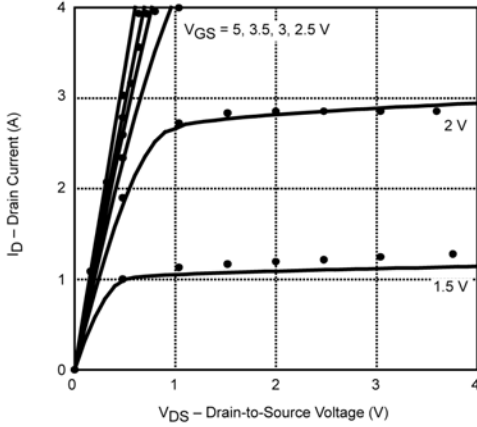


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COMPARISON OF MODEL WITH MEASURED DATA ($T_J=25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

N-Channel MOSFET



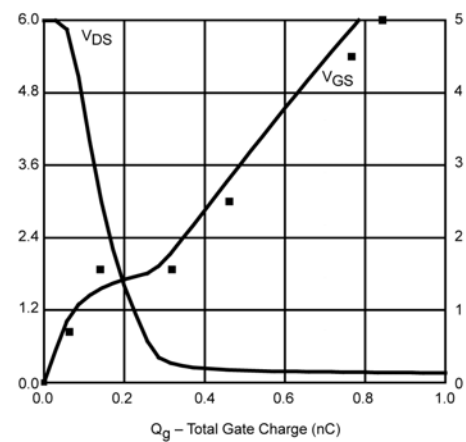
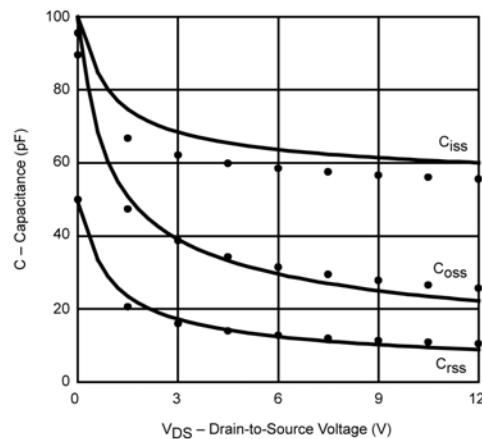
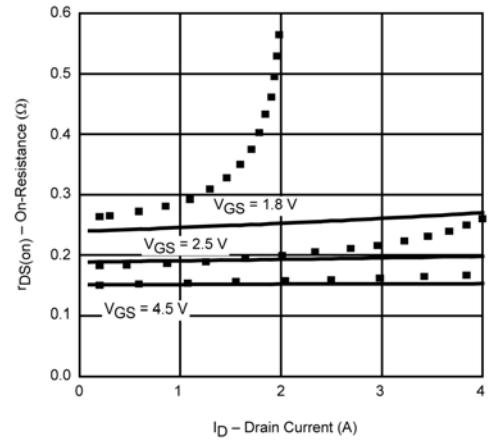
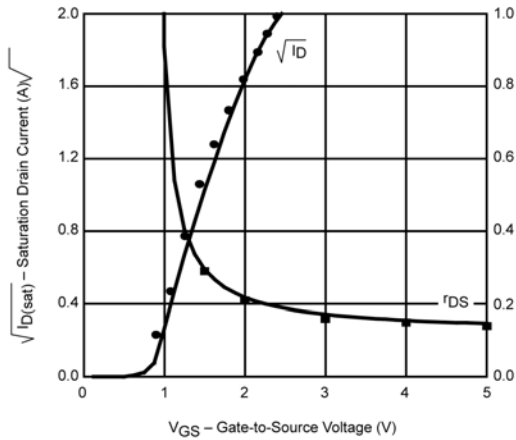
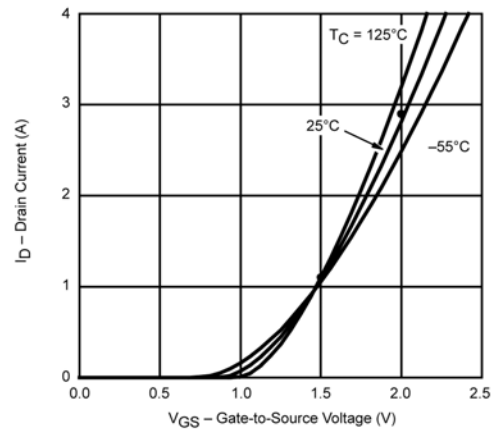
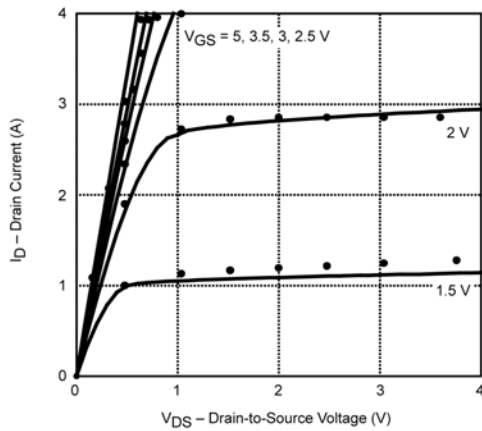
Note: Dots and squares represent measured data.

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P-Channel MOSFET



Note: Dots and squares represent measured data.



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