VISHAY

SPICE Device Model Si7943DP
Vishay Siliconix
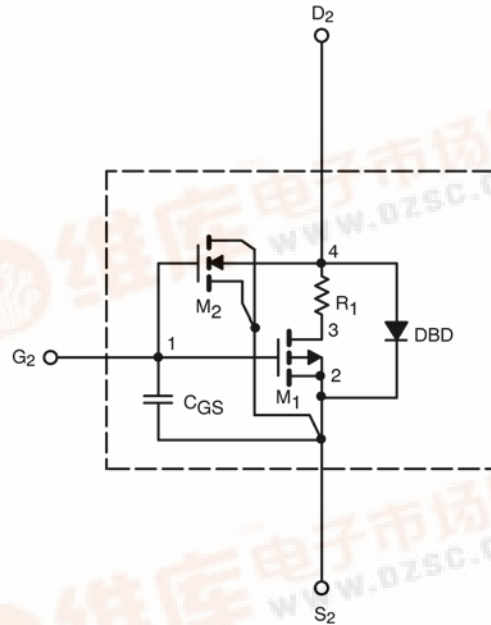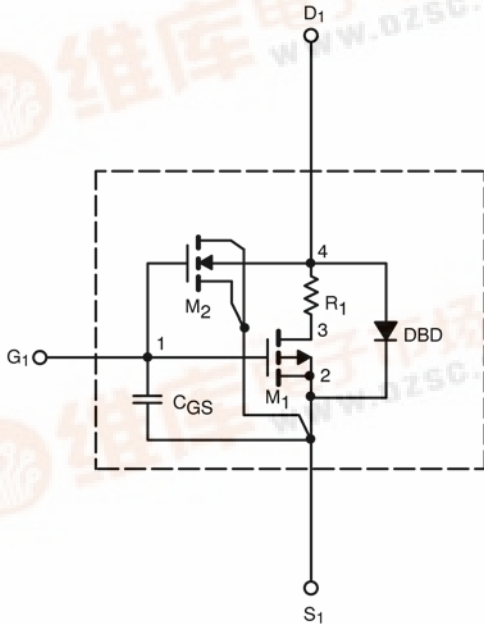
Dual P-Channel 30-V (D-S) MOSFET

CHARACTERISTICS

- 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 p-channel vertical DMOS. The subcircuit model is extracted and optimized over the −55 to 125°C temperature ranges under the pulsed 0 to 10V 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

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| Parameter	Symbol	Test Conditions	Simulated Data	Measured Data	Unit
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)					
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250$ μA	1.1		V
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} = -5$ V, $V_{GS} = -10$ V	235		A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	$V_{GS} = -10$ V, $I_D = -9.4$ A	0.020	0.020	Ω
		$V_{GS} = -4.5$ V, $I_D = -8.6$ A	0.024	0.024	
		$V_{GS} = -2.5$ V, $I_D = -3$ A	0.036	0.037	
Forward Transconductance[a]	g_{fs}	$V_{DS} = -15$ V, $I_D = -9.4$ A	23	15	S
Diode Forward Voltage[a]	V_{SD}	$I_S = -2.9$ A, $V_{GS} = 0$ V	−0.81	−0.80	V
Dynamic[b]					
Total Gate Charge	Q_g	$V_{DS} = -15$ V, $V_{GS} = -4.5$ V, $I_D = -9.4$ A	25	23.5	nC
Gate-Source Charge	Q_{gs}		8.5	8.5	
Gate-Drain Charge	Q_{gd}		5	5	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15$ V, $R_L = 15$ Ω $I_D \cong -1$ A, $V_{GEN} = -10$ V, $R_G = 6$ Ω	17	18	ns
Rise Time	t_r		22	40	
Turn-Off Delay Time	$t_{d(off)}$		53	100	
Fall Time	t_f		73	60	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -2.9$ A, di/dt = 100 A/μs	47	50	

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

COMPARISON OF MODEL WITH MEASURED DATA (T$_J$=25°C UNLESS OTHERWISE NOTED)
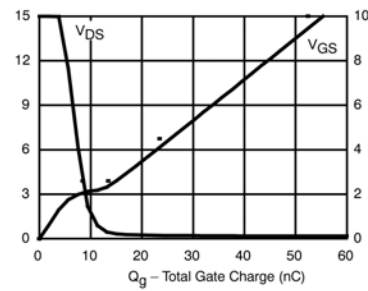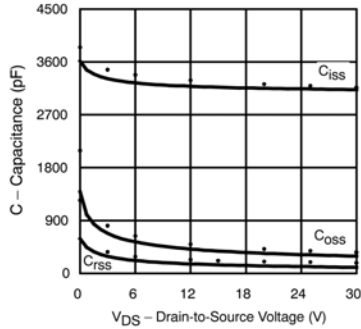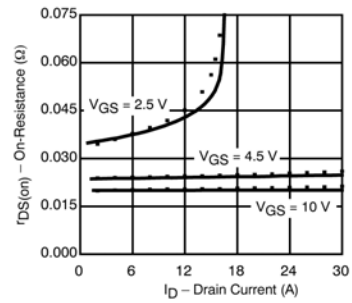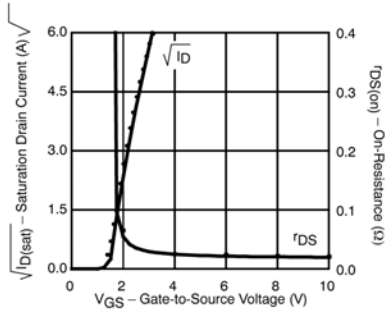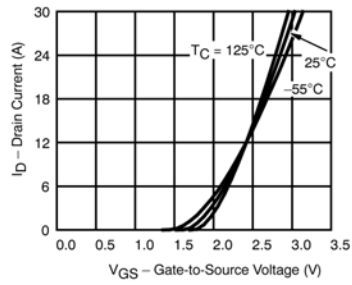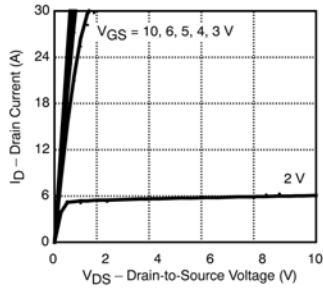
Note: Dots and squares represent measured data.