



N-Channel Reduced Q_g , Fast Switching MOSFET

DESCRIPTION

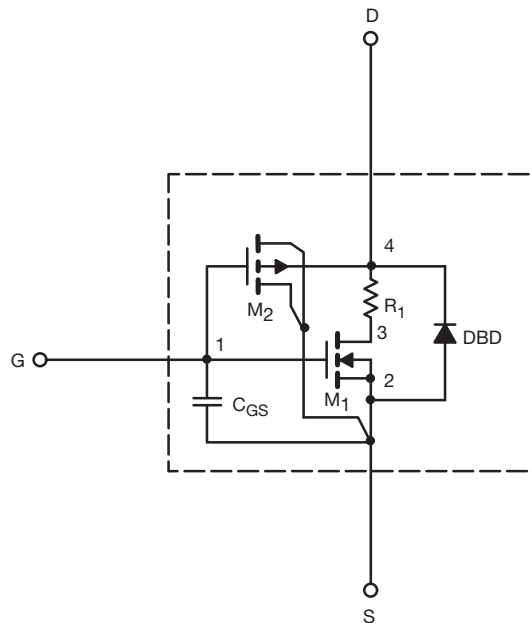
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over the - 55 °C to 125 °C temperature ranges under the pulsed 0 V to 5 V gate drive. The saturated output impedance is best fit at the gate bias near 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.

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.



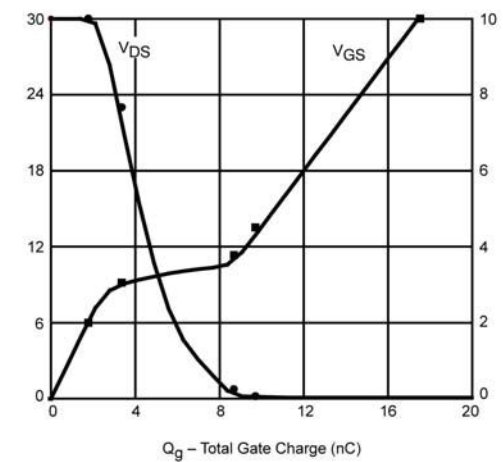
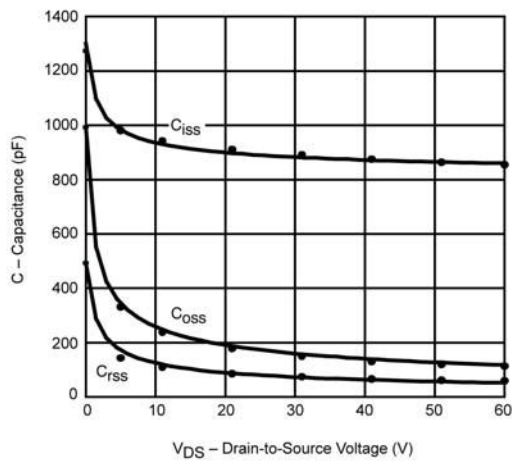
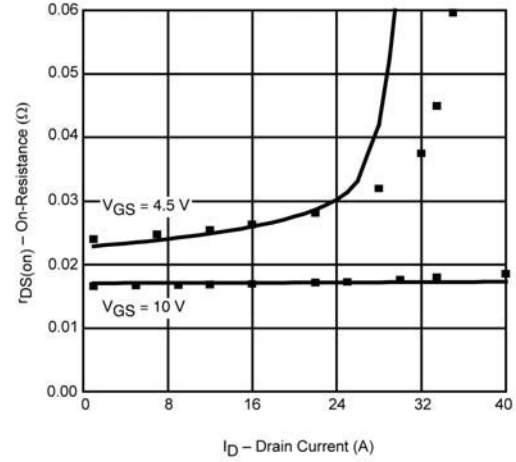
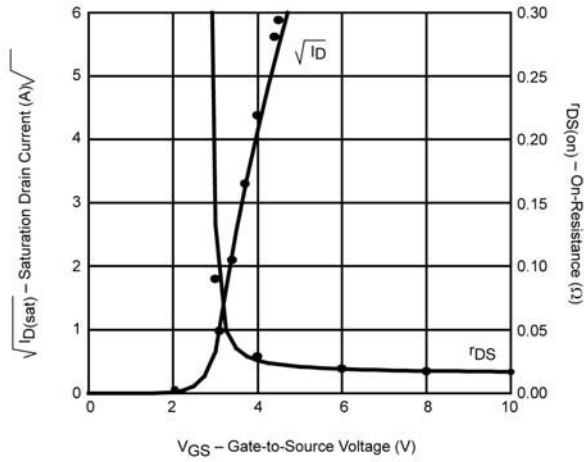
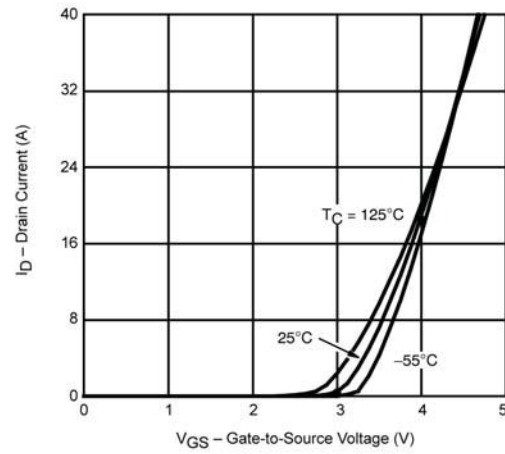
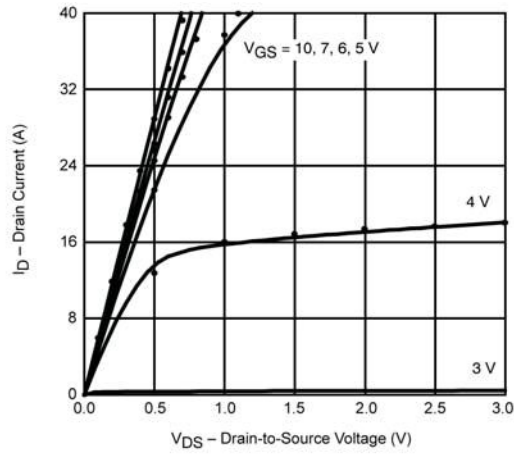
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
Static					
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1.95	-	V
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	248	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 6\text{ A}$	0.017	-	Ω
		$V_{GS} = 10\text{ V}$, $I_D = 6\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$	0.026	-	
		$V_{GS} = 10\text{ V}$, $I_D = 6\text{ A}$, $T_J = 175\text{ }^\circ\text{C}$	0.032	-	
		$V_{GS} = 4.5\text{ V}$, $I_D = 5.1\text{ A}$	0.023	-	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 6\text{ A}$	22	-	S
Diode Forward Voltage ^a	V_{SD}	$I_S = 1.7\text{ A}$, $V_{GS} = 0\text{ V}$	0.8	-	V
Dynamic^b					
Total Gate Charge	Q_g	$V_{DS} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 6\text{ A}$	17.5	-	nC
Gate-Source Charge	Q_{gs}		3.4	-	
Gate-Drain Charge	Q_{gd}		5.3	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 30\text{ }\Omega$ $I_D = 1\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 6\text{ }\Omega$	22	-	ns
Rise Time	t_r		25	-	
Turn-Off Delay Time	$t_{d(off)}$		42	-	
Fall Time	t_f		48	-	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 1.7\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	39	-	

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 ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Note

- Dots and squares represent measured data.



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