

## N-Channel 30 V (D-S) Fast Switching MOSFET

### DESCRIPTION

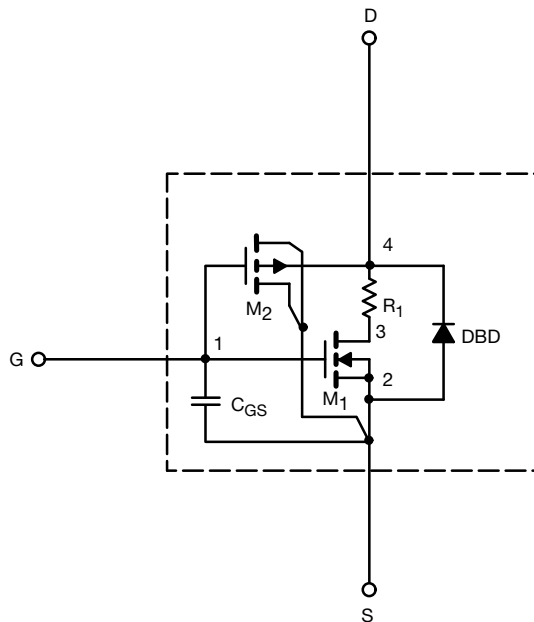
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over -55 °C to +125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias near 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.

### CHARACTERISTICS

- N-channel vertical DMOS
- Macro model (subcircuit model)
- Level 3 MOS
- Apply for both linear and switching application
- Accurate over -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



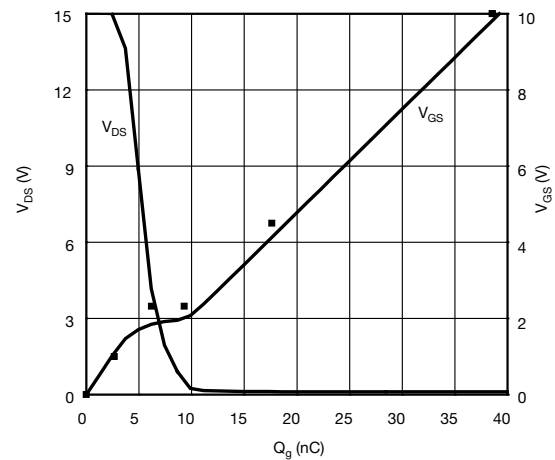
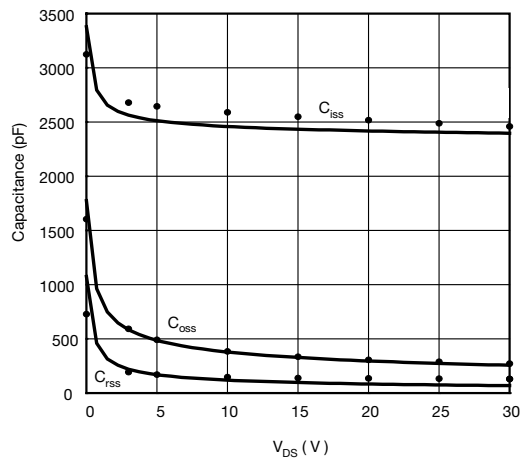
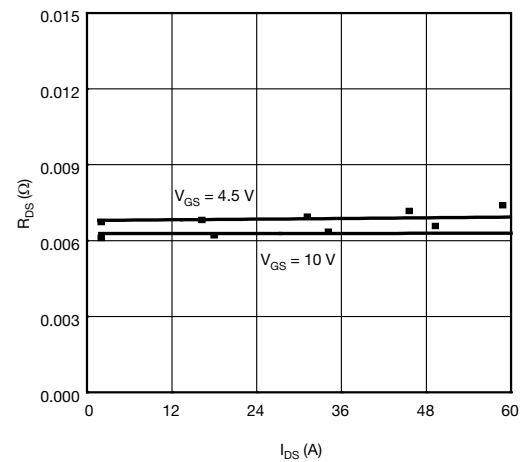
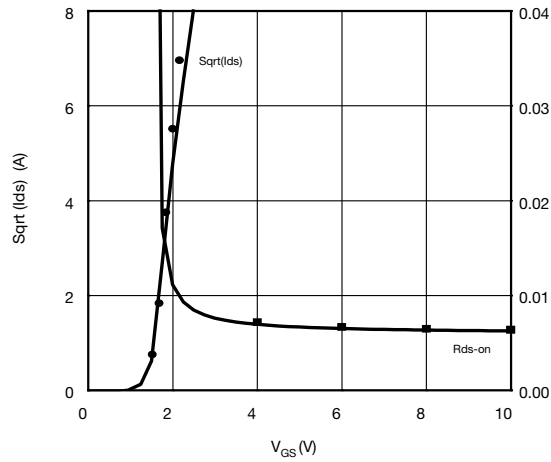
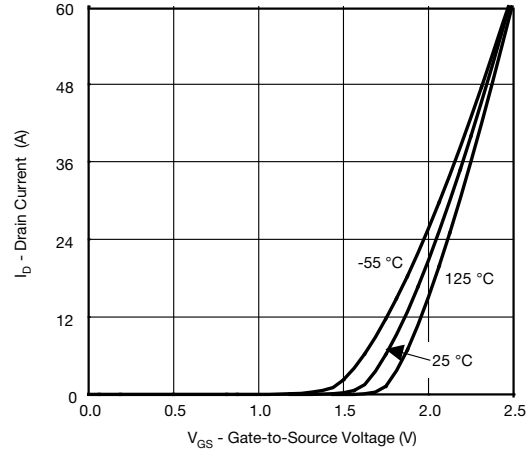
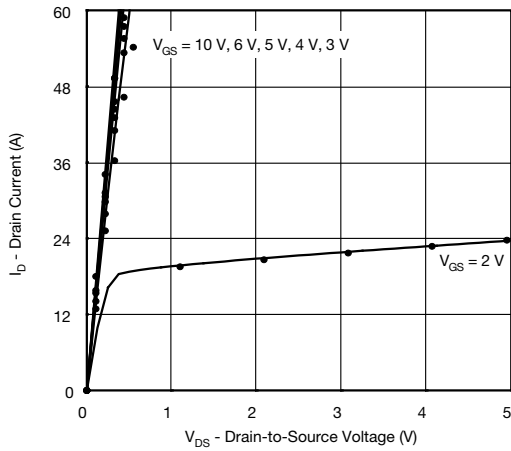
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	SIMULATED DATA	MEASURED DATA	UNIT
<b>Static</b>					
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	-	V
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 17.8\text{ A}$	0.0063	0.0060	$\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 17\text{ A}$	0.0068	0.0065	
Forward transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 17.8\text{ A}$	78	97	S
Diode forward voltage	$V_{SD}$	$I_S = 3.2\text{ A}, V_{GS} = 0\text{ V}$	0.83	0.70	V
<b>Dynamic <sup>b</sup></b>					
Total gate charge	$Q_g$	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 17.8\text{ A}$	39	39	nC
Gate-source charge	$Q_{gs}$		6.2	6.2	
Gate-drain charge	$Q_{gd}$		3.1	3.1	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D = 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$	11	10	ns
Rise time	$t_r$		7	10	
Turn-off delay time	$t_{d(off)}$		52	65	
Fall time	$t_f$		21	10	

**Notes**

- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\text{ }\%$
- 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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