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

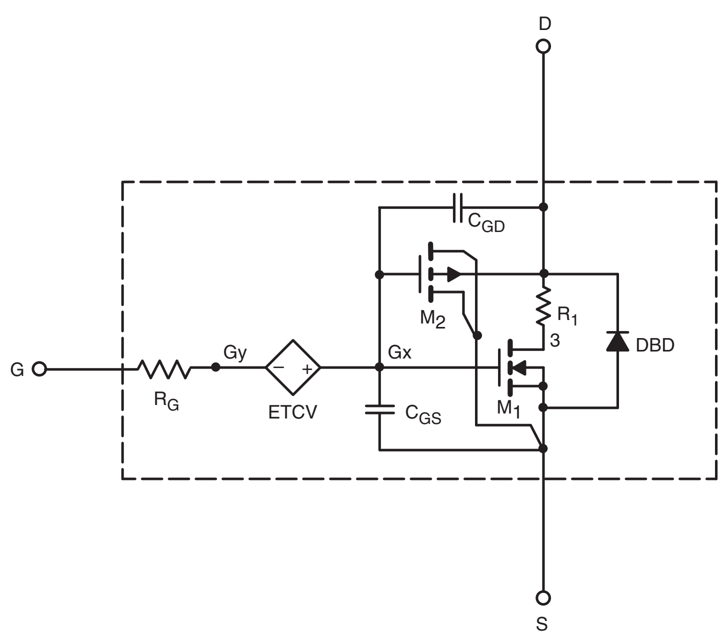
## DESCRIPTION

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, Transient, and Diode Reverse Recovery Characteristics

## 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.

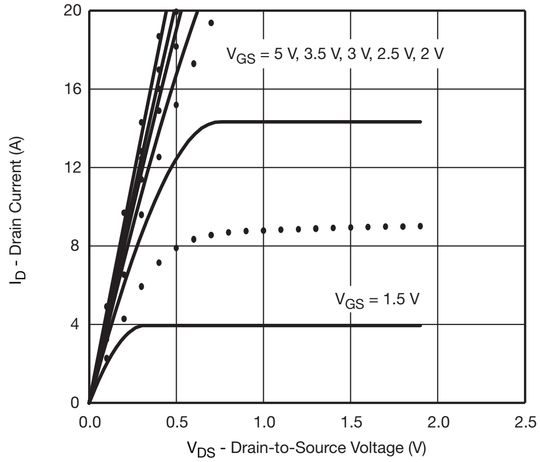
| **SPECIFICATIONS** $T_J$ = 25 °C, unless otherwise noted | | | | | |
|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **SIMULATED DATA** | **MEASURED DATA** | **UNIT** |
| **Static** | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 250 µA | 0.71 | - | V |
| Drain-Source On-State Resistance[a] | $R_{DS(on)}$ | $V_{GS}$ = 4.5 V, $I_D$ = 8 A | 0.022 | 0.021 | Ω |
| | | $V_{GS}$ = 2.5 V, $I_D$ = 5 A | 0.027 | 0.025 | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = 10 V, $I_D$ = 8 A | 21 | 28 | S |
| Body Diode Voltage | $V_{SD}$ | $I_S$ = 5.4 A | 0.79 | 0.78 | V |
| **Dynamic**[b] | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1 MHz | 822 | 830 | pF |
| Output Capacitance | $C_{oss}$ | | 107 | 115 | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 53 | 63 | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 10 V, $V_{GS}$ = 8 V, $I_D$ = 8 A | 14.5 | 14.5 | nC |
| | | $V_{DS}$ = 10 V, $V_{GS}$ = 4.5 V, $I_D$ = 8 A | 8.5 | 8.3 | |
| Gate-Source Charge | $Q_{gs}$ | | 1.1 | 1.1 | |
| Gate-Drain Charge | $Q_{gd}$ | | 1.1 | 1.1 | |

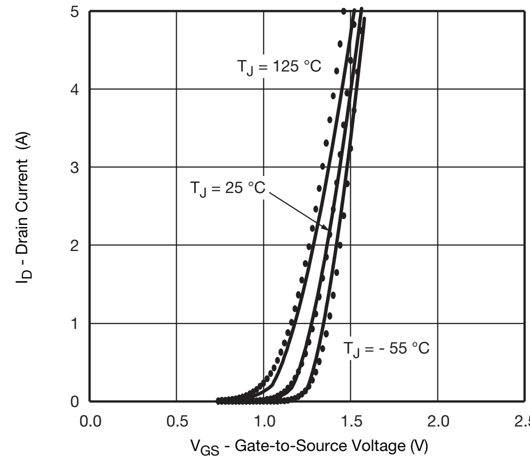
**Notes**

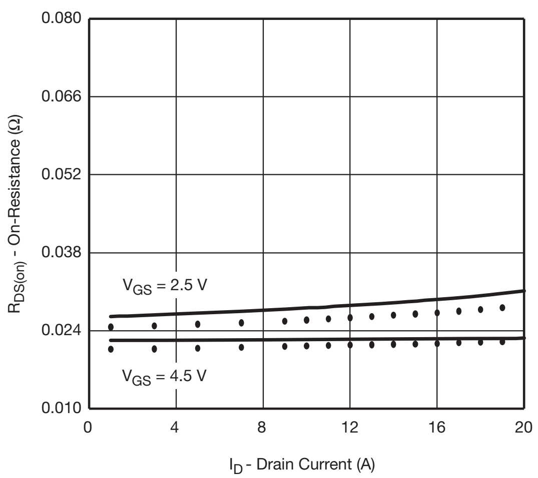
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

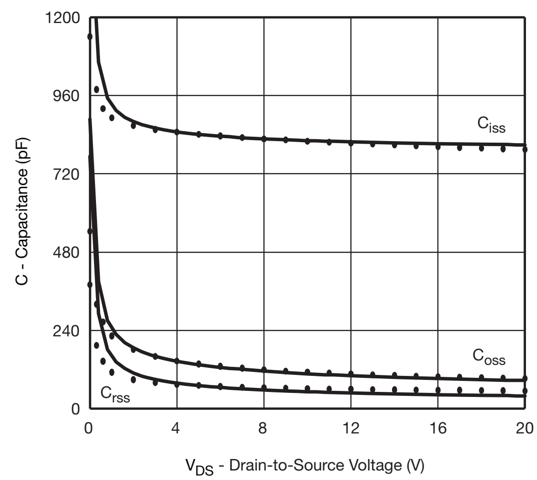
b. Guaranteed by design, not subject to production testing.

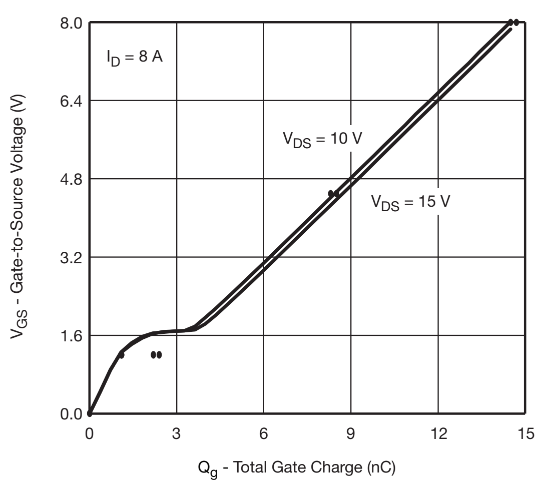
**COMPARISON OF MODEL WITH MEASURED DATA** $T_J$ = 25 °C, unless otherwise noted

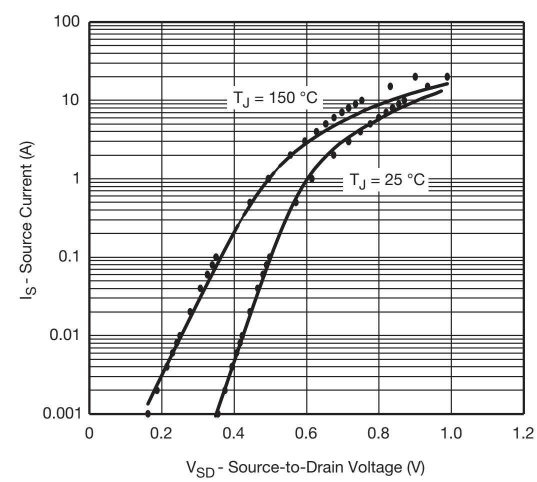



**Note**

Dots and squares represent measured data.

# Disclaimer

All product specifications and data are subject to change without notice.

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