

## N-Channel 60 V (D-S) 175 °C MOSFET

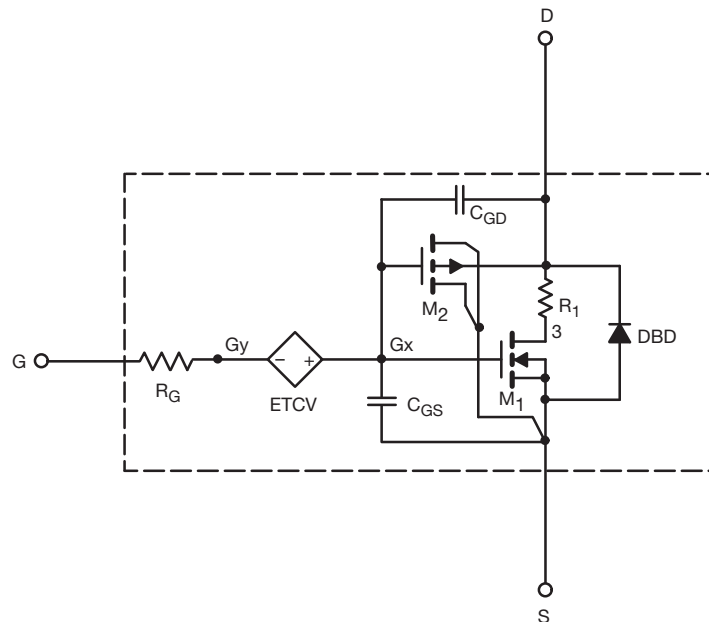
### DESCRIPTION

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 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 the - 55 °C to + 125 °C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

### SUBCIRCUIT MODEL SCHEMATIC



### Note

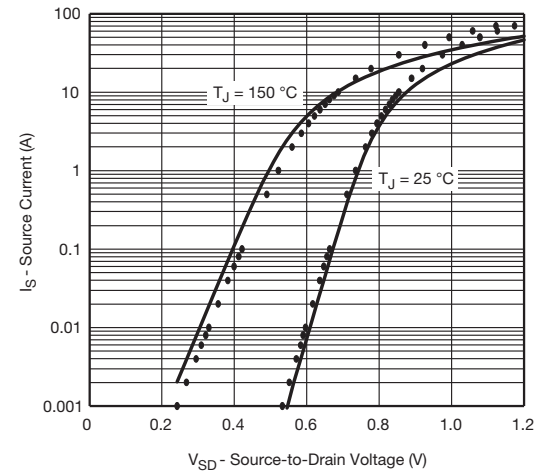
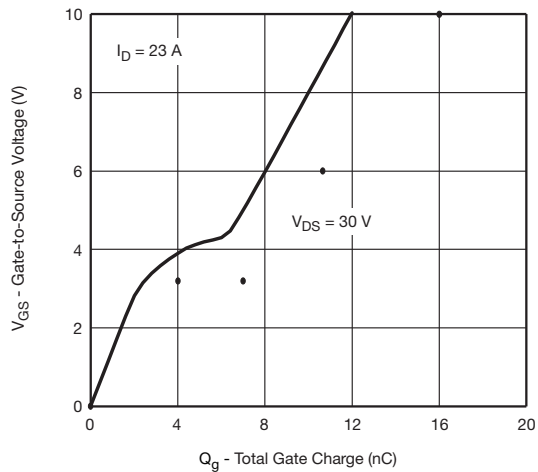
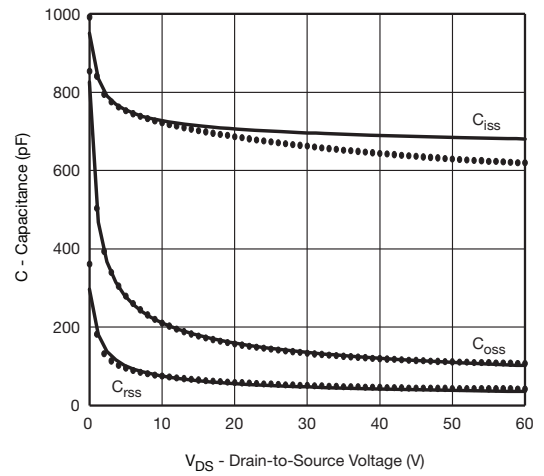
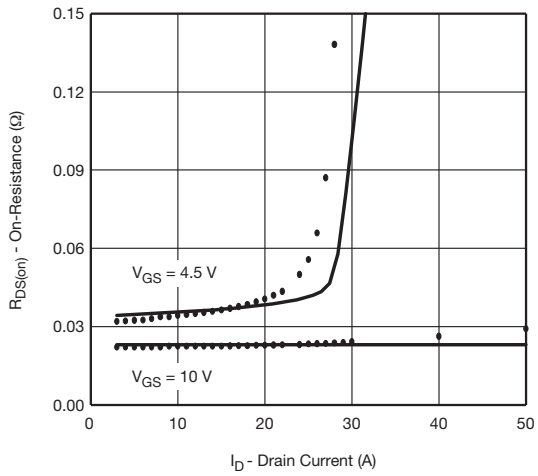
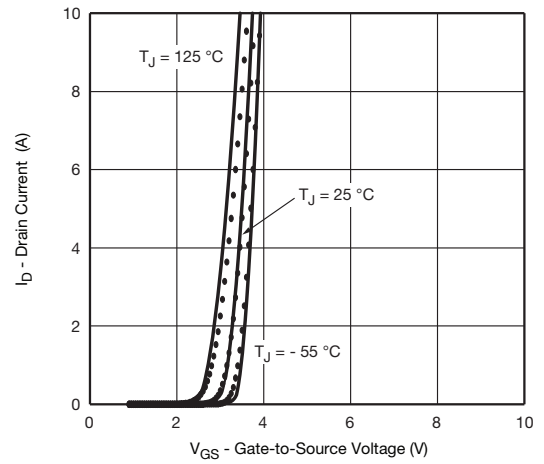
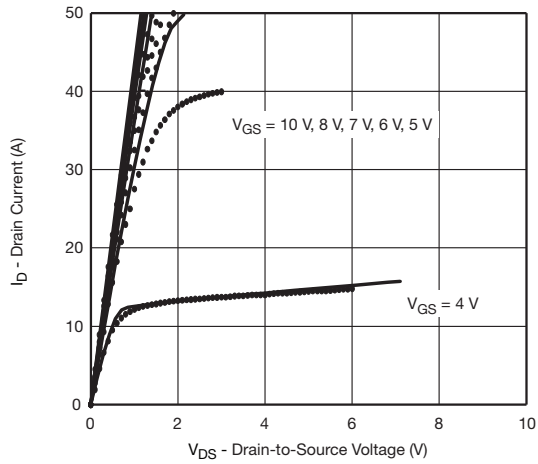
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

| <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  | $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$                    | 2.1            | -             | V        |
| Drain-Source On-State Resistance <sup>a</sup>  | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$ , $I_D = 15\text{ A}$                          | 0.023          | 0.024         | $\Omega$ |
|  |              | $V_{GS} = 4.5\text{ V}$ , $I_D = 10\text{ A}$                         | 0.035          | -             |          |
| Forward Transconductance <sup>a</sup>  | $g_{fs}$     | $V_{DS} = 15\text{ V}$ , $I_D = 15\text{ A}$                          | 28             | 25            | S        |
| Body Diode Voltage   | $V_{SD}$     | $I_S = 15\text{ A}$   | 0.92           | 0.90          | V        |
| <b>Dynamic<sup>b</sup></b>   |              |   |                |               |          |
| Input Capacitance  | $C_{iss}$    | $V_{DS} = 30\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$   | 700            | 674           | pF       |
| Output Capacitance   | $C_{oss}$    |   | 145            | 144           |          |
| Reverse Transfer Capacitance   | $C_{rss}$    |   | 51             | 55            |          |
| Total Gate Charge  | $Q_g$        | $V_{DS} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 23\text{ A}$ | 12             | 16            | nC       |
| Gate-Source Charge   | $Q_{gs}$     |   | 4              | 4             |          |
| Gate-Drain Charge  | $Q_{gd}$     |   | 3              | 3             |          |

## Notes

- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

## COMPARISON OF MODEL WITH MEASURED DATA ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)



### Note

Dots and squares represent measured data.