

## D Series Power MOSFET

### DESCRIPTION

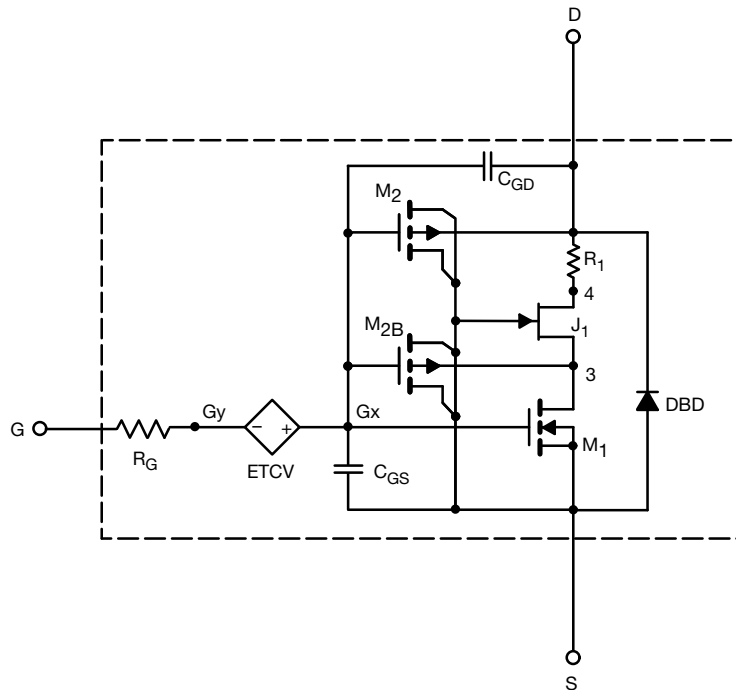
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over 25 °C to 150 °C temperature ranges under the pulsed 0 V to 15 V gate drive. The saturated output impedance is best fit at the gate bias near the 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 25 °C to 150 °C temperature range
- Model the gate charge

### SUBCIRCUIT MODEL SCHEMATIC



### Note

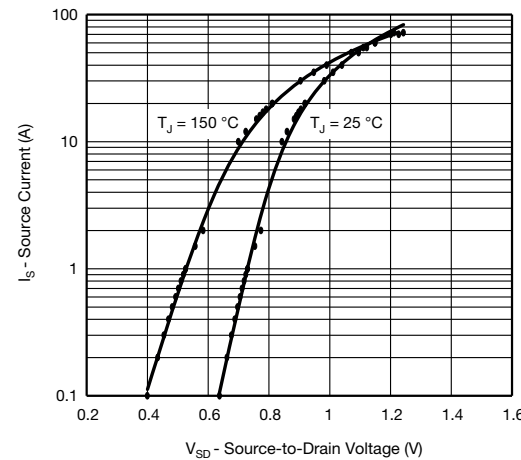
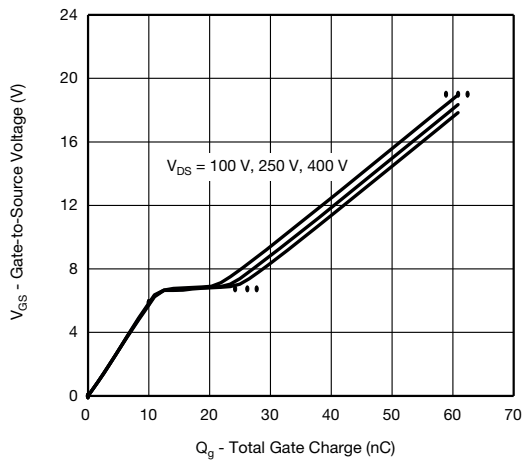
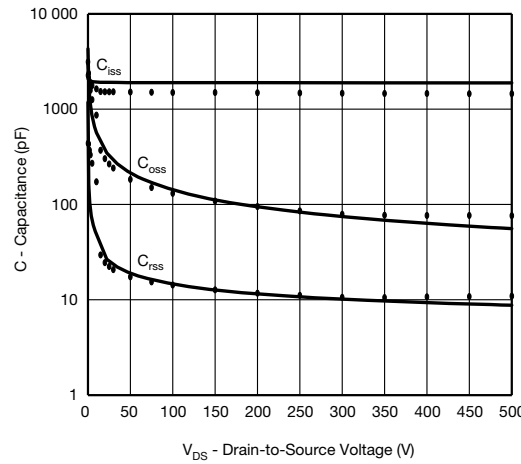
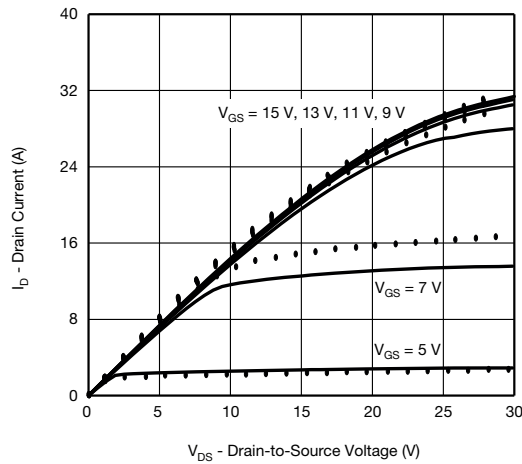
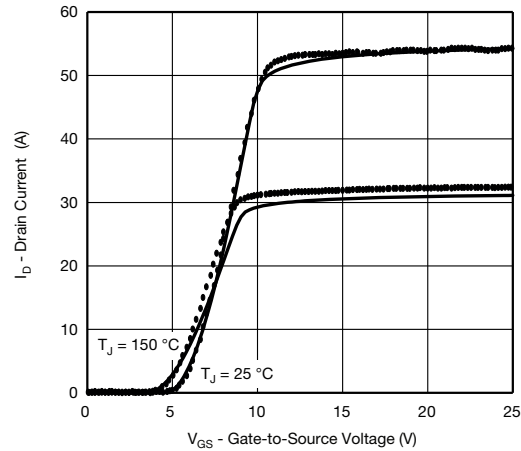
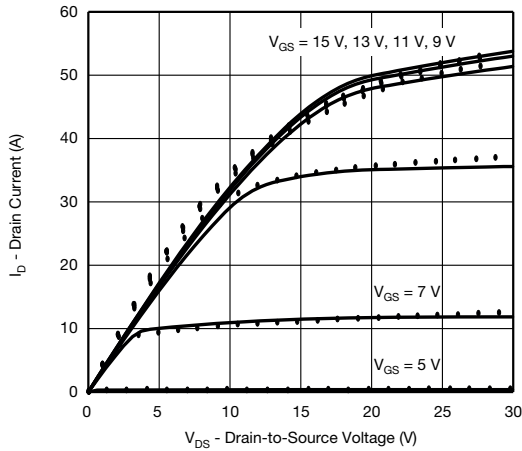
- This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits



| <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  | $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$  | 4              | -             | V             |
| Drain-Source On-State Resistance   | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$ , $I_D = 9\text{ A}$   | 0.28           | 0.23          | $\Omega$      |
| Forward Transconductance   | $g_{fs}$     | $V_{DS} = 50\text{ V}$ , $I_D = 9\text{ A}$   | 8.2            | 6.4           | S             |
| <b>Dynamic</b>   |              |   |                |               |               |
| Input Capacitance  | $C_{iss}$    | $V_{DS} = 100\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$  | 1900           | 1500          | pF            |
| Output Capacitance   | $C_{oss}$    |   | 140            | 131           |               |
| Reverse Transfer Capacitance   | $C_{rss}$    |   | 12             | 14            |               |
| Total Gate Charge  | $Q_g$        | $V_{DS} = 400\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 9\text{ A}$   | 36             | 38            | nC            |
| Gate-Source Charge   | $Q_{gs}$     |   | 12             | 11            |               |
| Gate-Drain Charge  | $Q_{gd}$     |   | 14             | 17            |               |
| <b>Drain-Source Body Diode Characteristics</b>                                     |              |   |                |               |               |
| Diode Forward Voltage  | $V_{SD}$     | $T_J = 25\text{ }^\circ\text{C}$ , $I_S = 9\text{ A}$ , $V_{GS} = 0\text{ V}$   | 0.9            | -             | V             |
| Reverse Recovery Time  | $t_{rr}$     | $T_J = 25\text{ }^\circ\text{C}$ , $I_F = I_S = 9\text{ A}$ ,<br>$di/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 20\text{ V}$ | 350            | 354           | ns            |
| Reverse Recovery Charge  | $Q_{rr}$     |   | 3.5            | 3.9           | $\mu\text{C}$ |



## 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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