

EF Series Power MOSFET with Fast Body Diode

DESCRIPTION

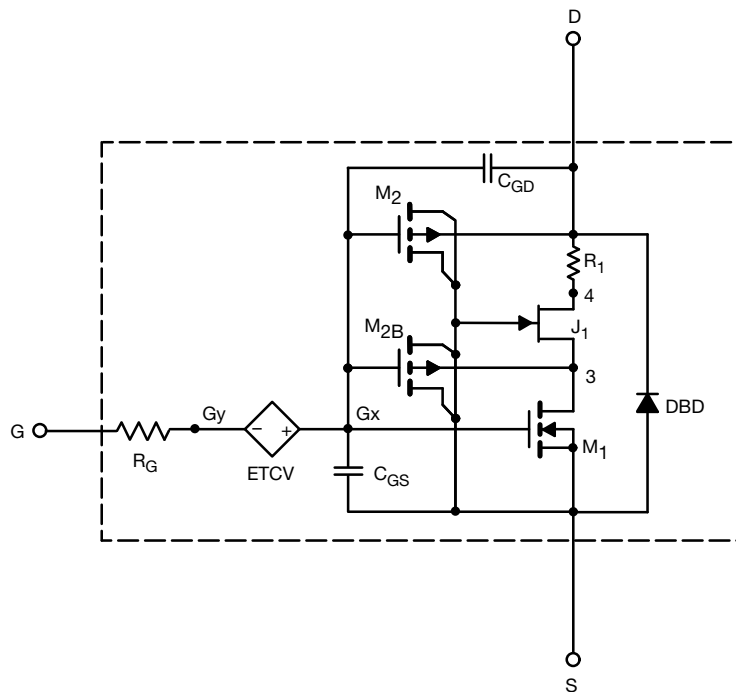
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over 25 °C to 150 °C temperature ranges under the pulsed 0 V to 15 V gate drive. The saturated output impedance is best fit at the gate bias near the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

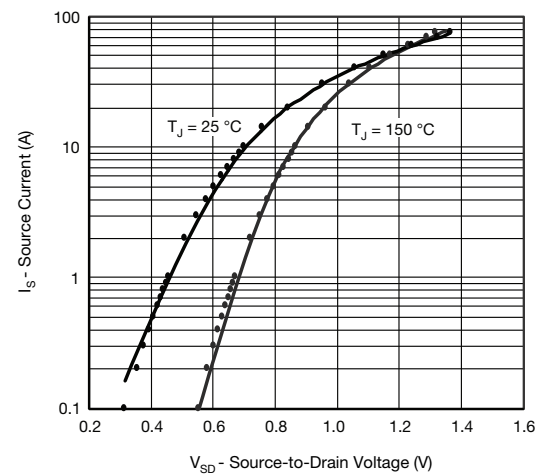
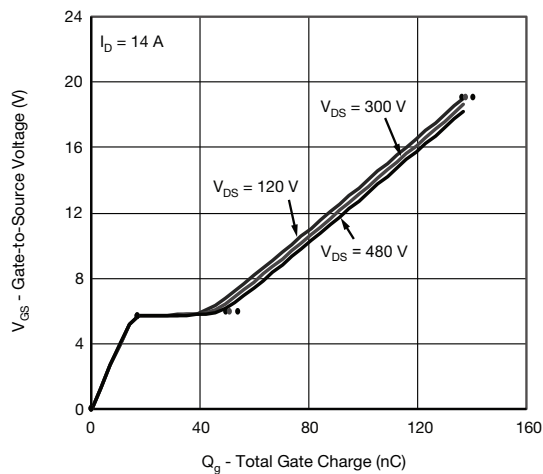
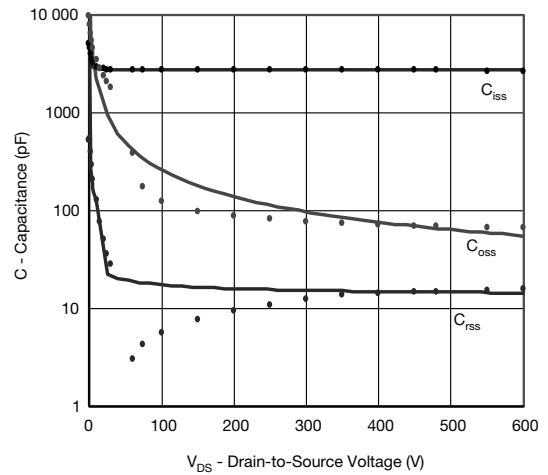
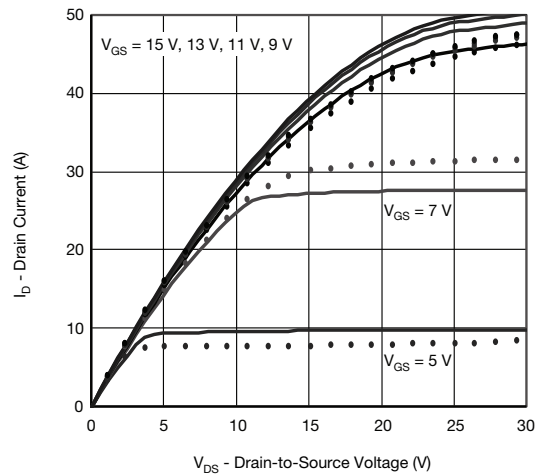
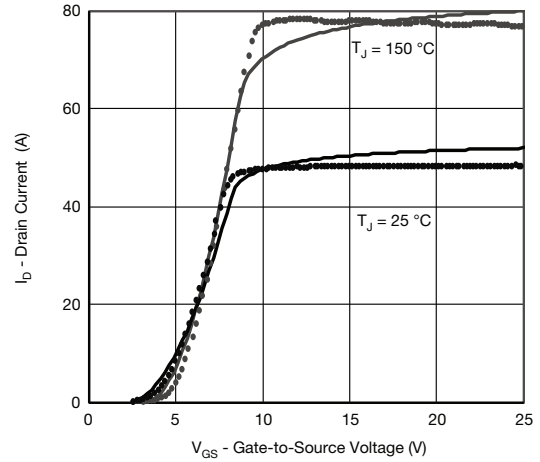
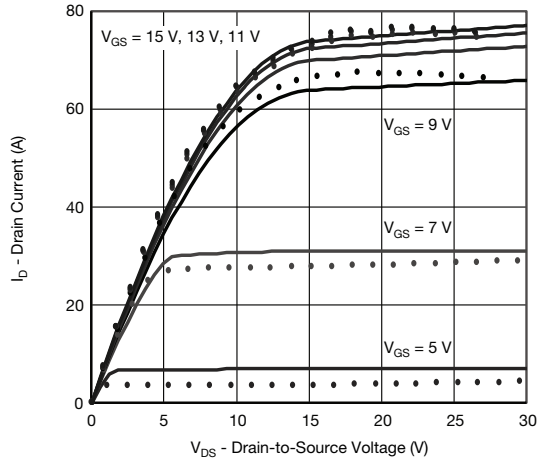
- This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.



| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | |
|--|--------------|---|----------------|---------------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | SIMULATED DATA | MEASURED DATA | UNIT |
| Static | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 2.2 | - | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 14\text{ A}$ | 0.127 | 0.107 | Ω |
| Forward Transconductance | g_{fs} | $V_{DS} = 30\text{ V}, I_D = 14\text{ A}$ | 10 | 9.7 | S |
| Dynamic | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | 2660 | 2714 | pF |
| Output Capacitance | C_{oss} | | 250 | 123 | |
| Reverse Transfer Capacitance | C_{rss} | | 17 | 6 | |
| Total Gate Charge | Q_g | $V_{DS} = 480\text{ V}, V_{GS} = 10\text{ V}, I_D = 14\text{ A}$ | 79 | 80 | nC |
| Gate-Source Charge | Q_{gs} | | 17 | 17 | |
| Gate-Drain Charge | Q_{gd} | | 33 | 33 | |
| Drain-Source Body Diode Characteristics | | | | | |
| Diode Forward Voltage | V_{SD} | $T_J = 25\text{ }^\circ\text{C}, I_S = 11\text{ A}, V_{GS} = 0\text{ V}$ | 0.90 | 0.90 | V |
| Reverse Recovery Time | t_{rr} | $T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 14\text{ A},$ $di/dt = 100\text{ A}/\mu\text{s}, V_R = 25\text{ V}$ | 140 | 142 | ns |
| Reverse Recovery Charge | Q_{rr} | | 0.90 | 0.97 | μC |



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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