

P-Channel 20 V (D-S) MOSFET

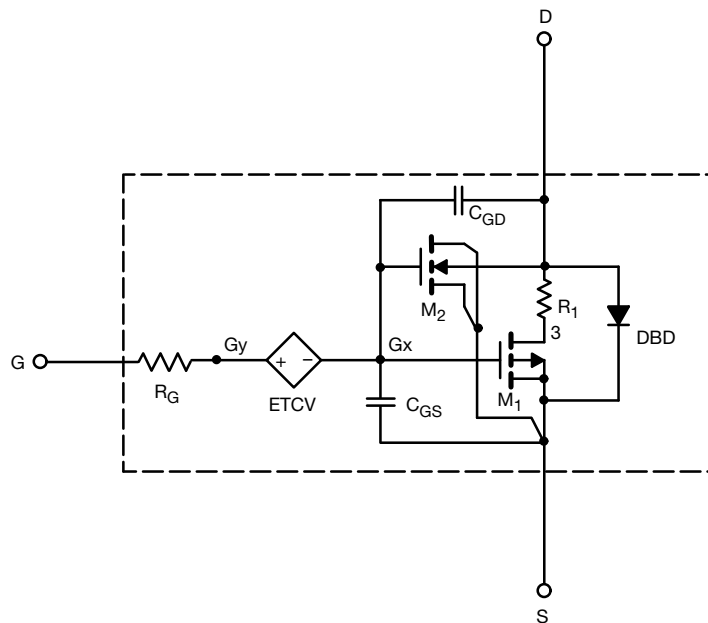
DESCRIPTION

The attached SPICE model describes the typical electrical characteristics of the p-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

- P-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.



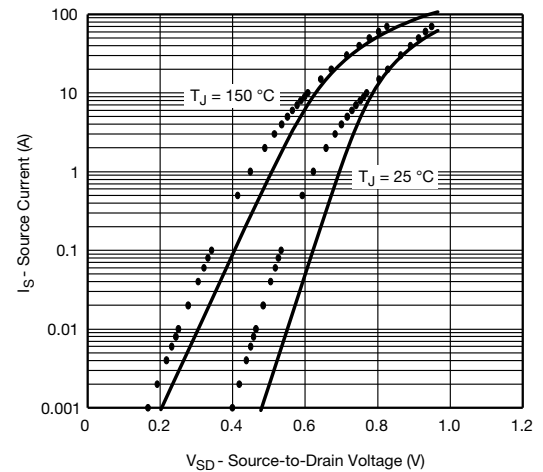
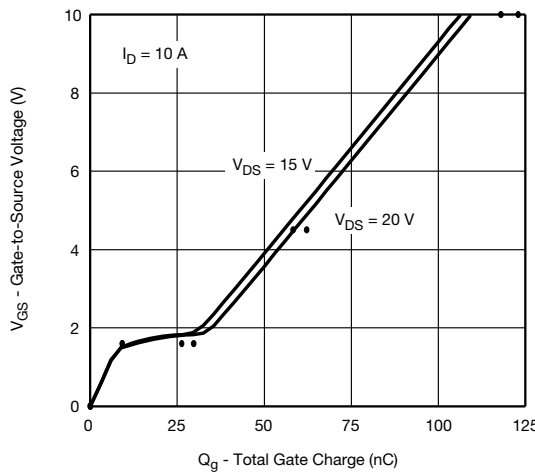
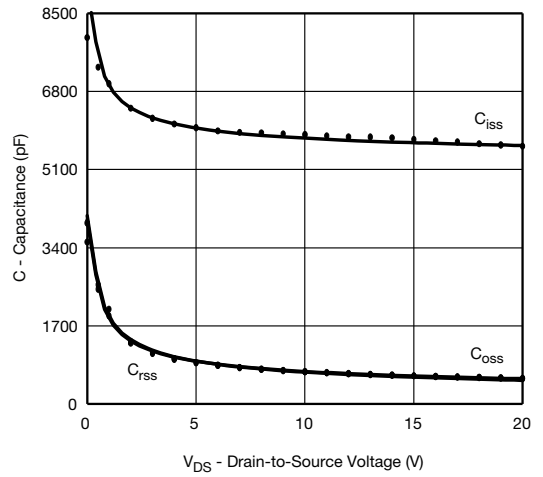
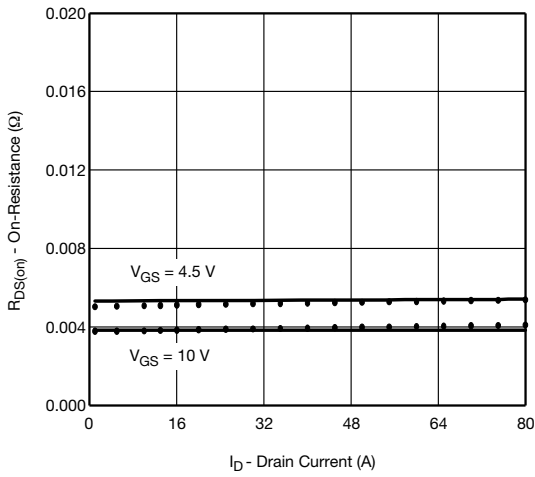
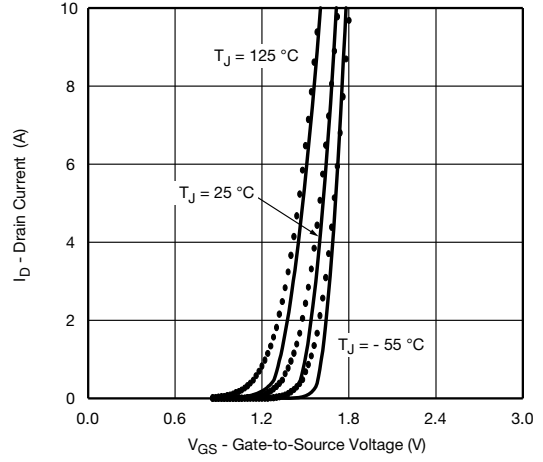
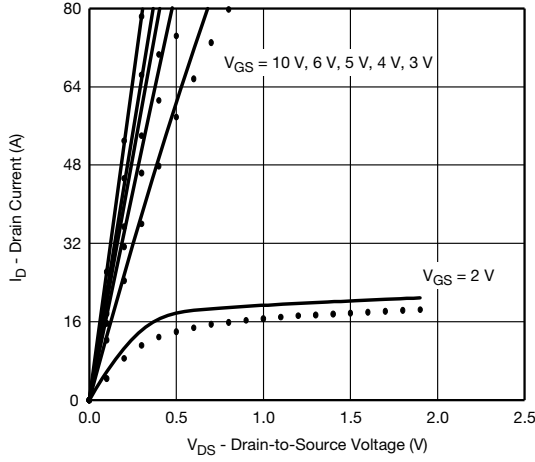
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | |
|--|--------------|---|----------------|---------------|----------|
| PARAMETER | SYMBOL | TEST CONDITIONS | SIMULATED DATA | MEASURED DATA | UNIT |
| Static | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | 0.44 | - | V |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -20\text{ A}$ | 0.0038 | 0.0038 | Ω |
| | | $V_{GS} = -4.5\text{ V}, I_D = -15\text{ A}$ | 0.0053 | 0.0051 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = -10\text{ V}, I_D = -20\text{ A}$ | 60 | 64 | S |
| Diode Forward Voltage | V_{SD} | $I_S = -4\text{ A}$ | -0.73 | -0.7 | V |
| Dynamic^b | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | 5780 | 5790 | pF |
| Output Capacitance | C_{oss} | | 695 | 700 | |
| Reverse Transfer Capacitance | C_{rss} | | 711 | 705 | |
| Total Gate Charge | Q_g | $V_{DS} = -10\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$ | 110 | 118 | nC |
| | | | 56 | 59 | |
| Gate-Source Charge | Q_{gs} | $V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$ | 9.2 | 9.2 | |
| Gate-Drain Charge | Q_{gd} | | 17.1 | 17.1 | |

Notes

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