

N-Channel 40 V (D-S) MOSFET

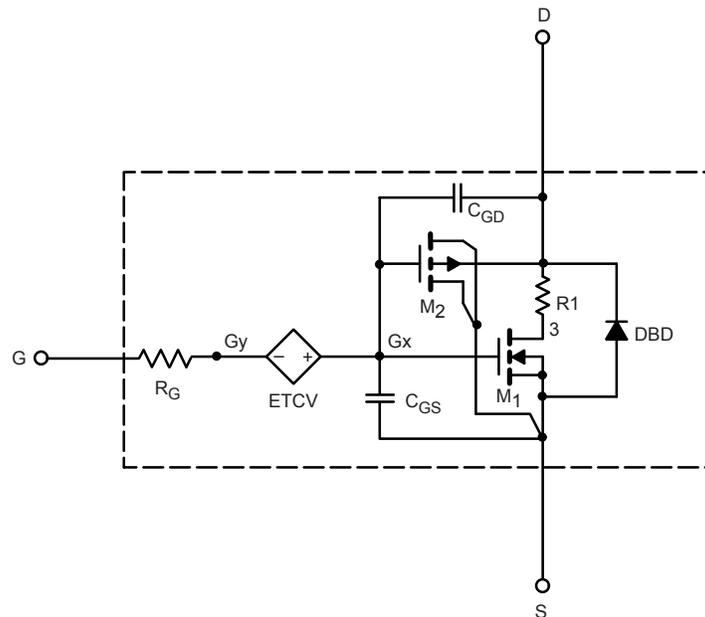
DESCRIPTION

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 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

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.



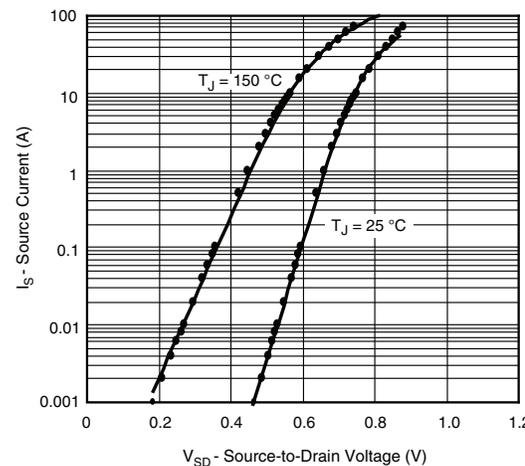
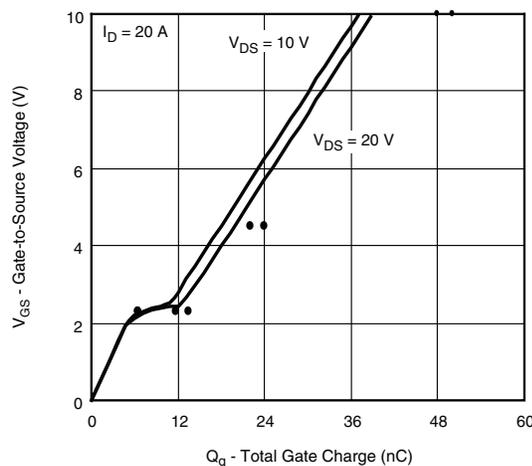
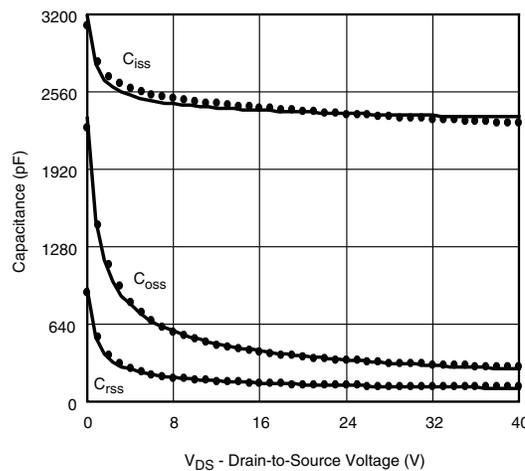
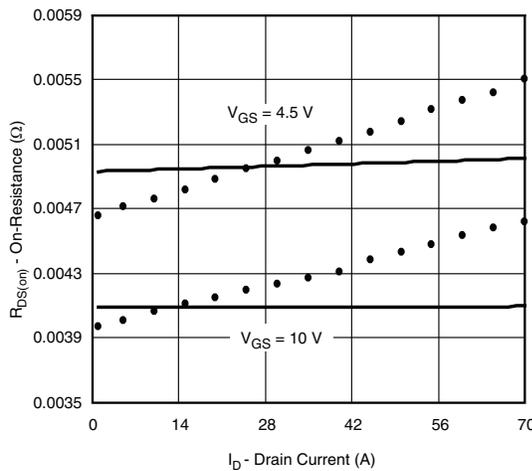
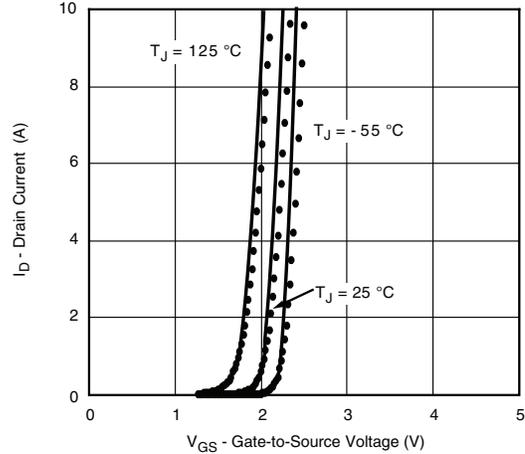
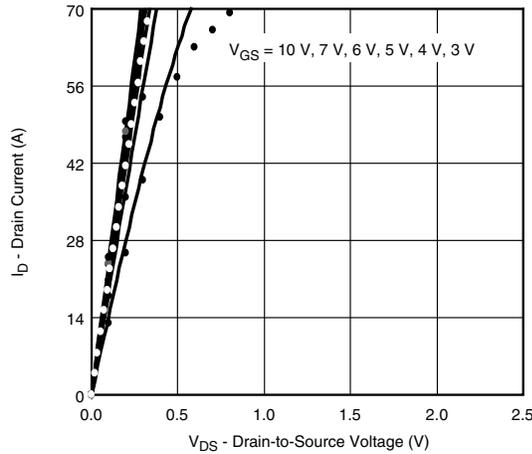
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | |
|--|--------------|--|----------------|---------------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | SIMULATED DATA | MEASURED DATA | UNIT |
| Static | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 1.3 | - | V |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | 0.0041 | 0.0041 | Ω |
| | | $V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$ | 0.0049 | 0.0048 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 20\text{ A}$ | 76 | 95 | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 4\text{ A}$ | 0.71 | 0.71 | V |
| Dynamic^b | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | 2390 | 2410 | μF |
| Output Capacitance | C_{oss} | | 376 | 371 | |
| Reverse Transfer Capacitance | C_{rss} | | 142 | 141 | |
| Total Gate Charge | Q_g | $V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | 37 | 50 | nC |
| Gate-Source Charge | Q_{gs} | $V_{DS} = 20\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$ | 18 | 24 | |
| Gate-Source Charge | Q_{gs} | | 6.5 | 6.5 | |
| Gate-Drain Charge | Q_{gd} | | 7 | 7 | |

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)

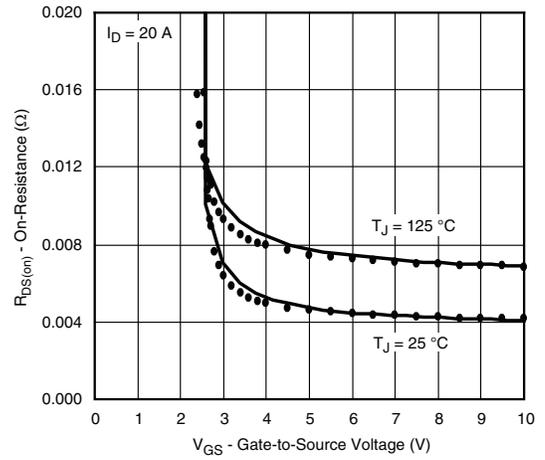
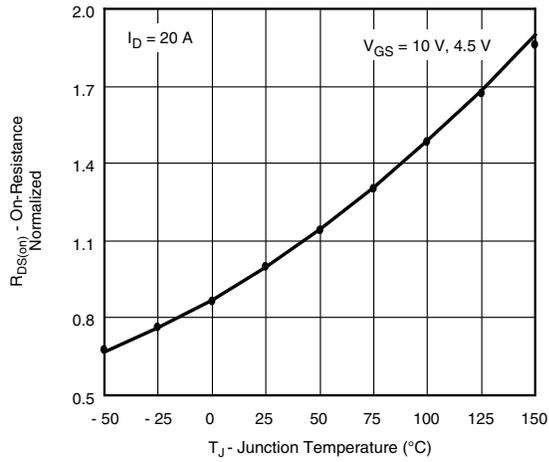


Note

- Dots and squares represent measured data.



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- Dots and squares represent measured data.