

N-Channel 150 V (D-S) MOSFET

DESCRIPTION

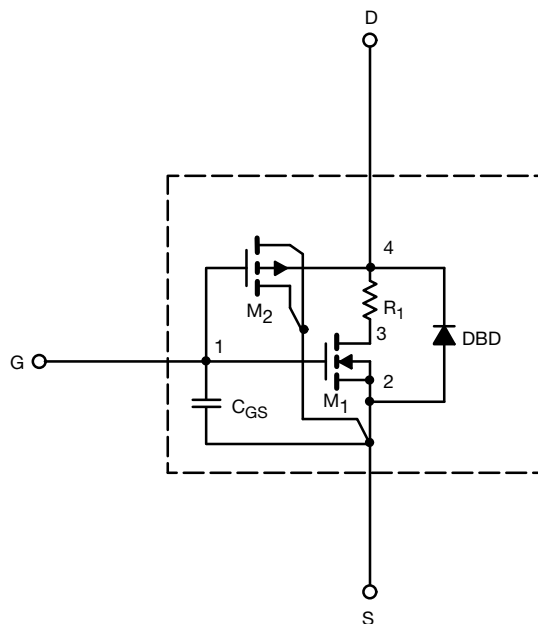
The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over the -55 °C to 125 °C temperature ranges under the pulsed 0 V to 10 V gate drive. The saturated output impedance is best fit at the gate bias near 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.



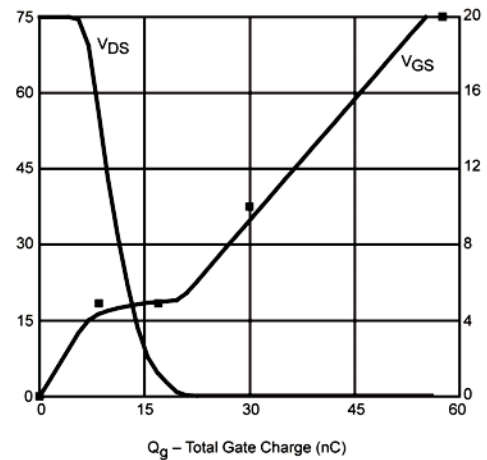
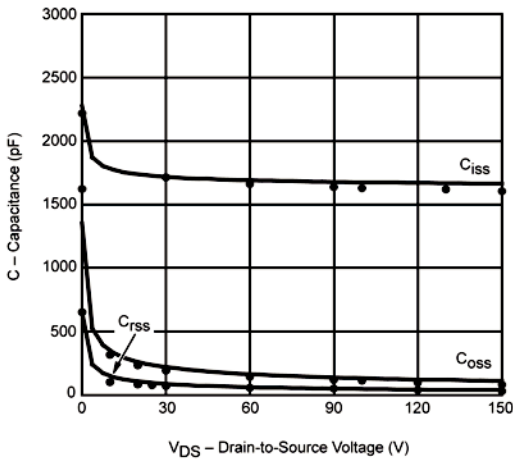
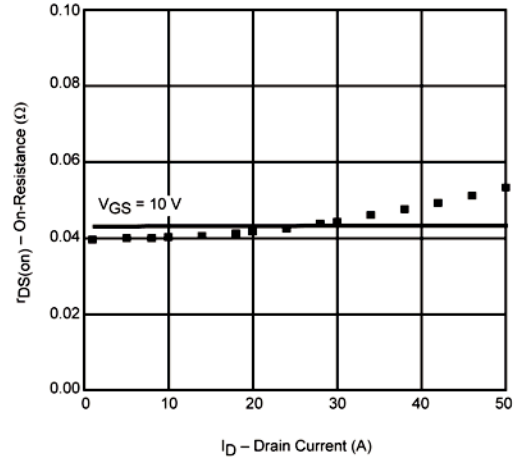
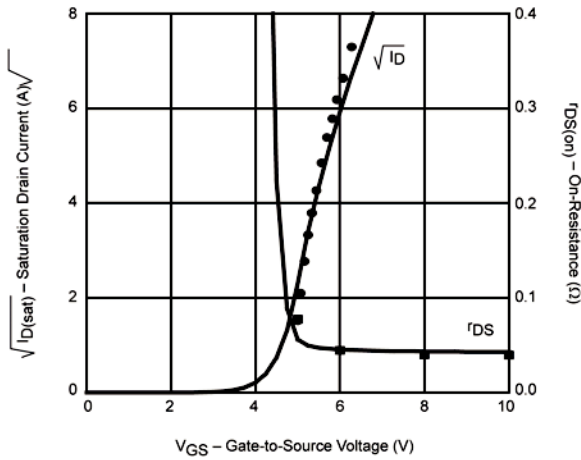
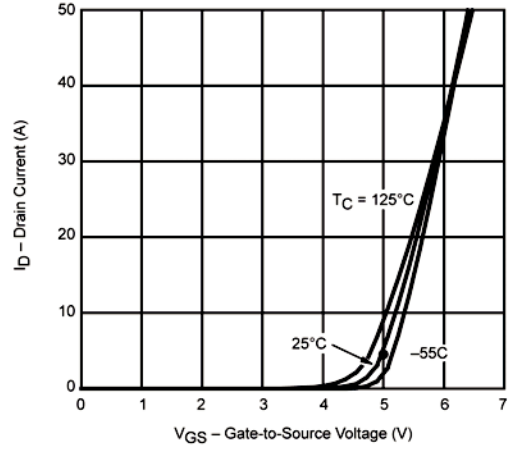
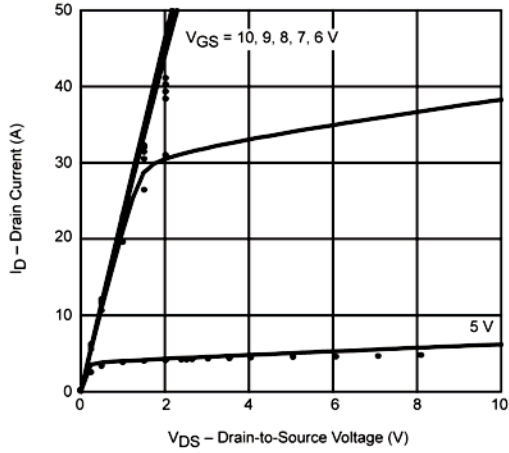
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | |
|--|--------------|--|----------------|---------------|----------|
| PARAMETER | SYMBOL | TEST CONDITIONS | SIMULATED DATA | MEASURED DATA | UNIT |
| Static | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 3.1 | - | V |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$ | 114 | - | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 5\text{ A}$ | 0.043 | 0.041 | Ω |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 5\text{ A}$ | 24 | 18 | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 2.8\text{ A}, V_{GS} = 0\text{ V}$ | 0.76 | 0.75 | V |
| Dynamic^b | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 75\text{ V}, V_{GS} = 10\text{ V}, I_D = 5\text{ A}$ | 31 | 30 | nC |
| Gate-Source Charge | Q_{gs} | | 8.5 | 8.5 | |
| Gate-Drain Charge | Q_{gd} | | 8.5 | 8.5 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 75\text{ V}, R_L = 15\text{ }\Omega$ $I_D = 5\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$ | 11 | 12 | ns |
| Rise Time | t_r | | 21 | 7 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | 39 | 22 | |
| Fall Time | t_f | | 41 | 10 | |
| Source-Drain Reverse Recovery Time | t_{rr} | $I_F = 2.8\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | 37 | 40 | |

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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