

P-Channel 20 V (D-S) MOSFET

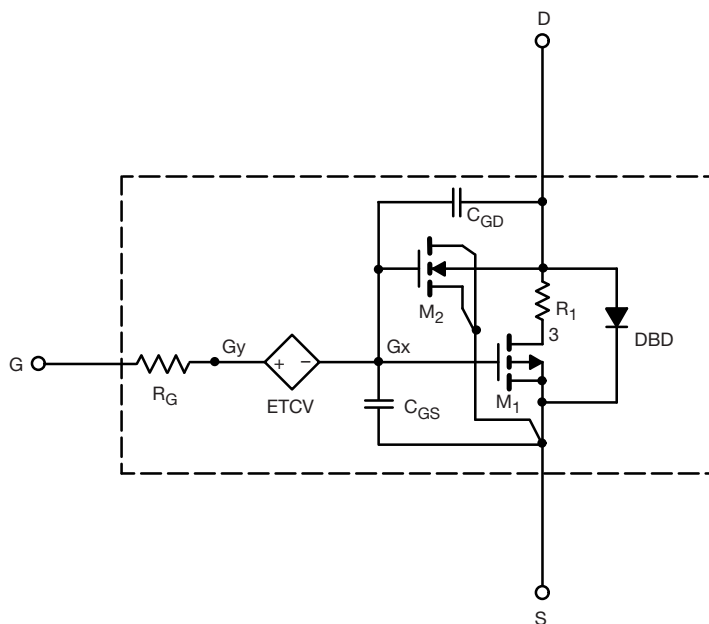
DESCRIPTION

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 5 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.

SPICE Device Model Si2399DS

Vishay Siliconix

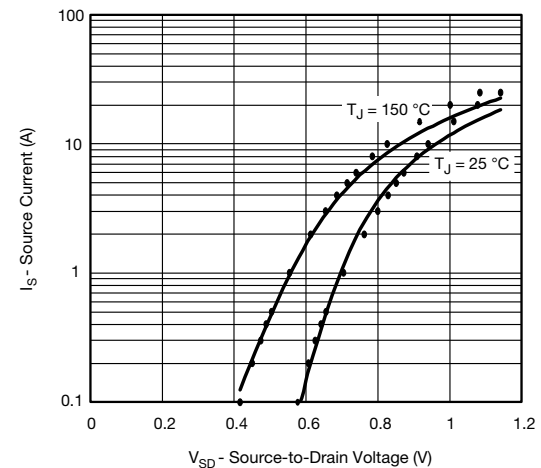
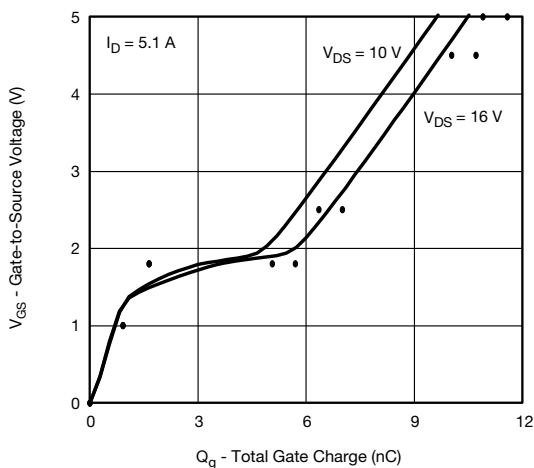
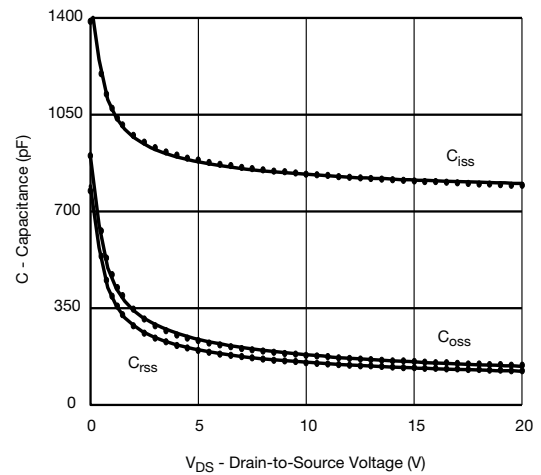
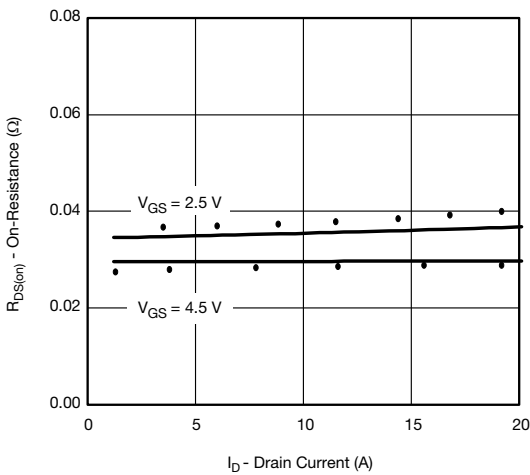
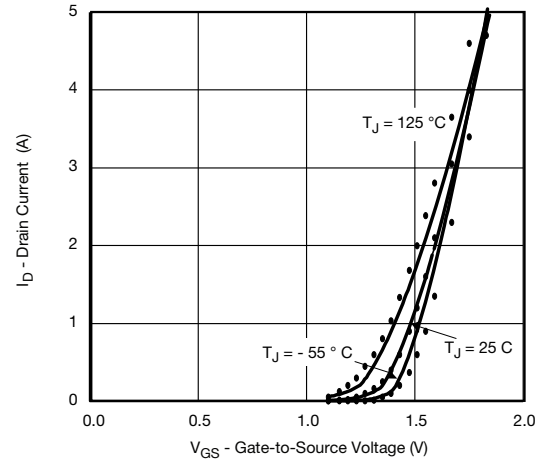
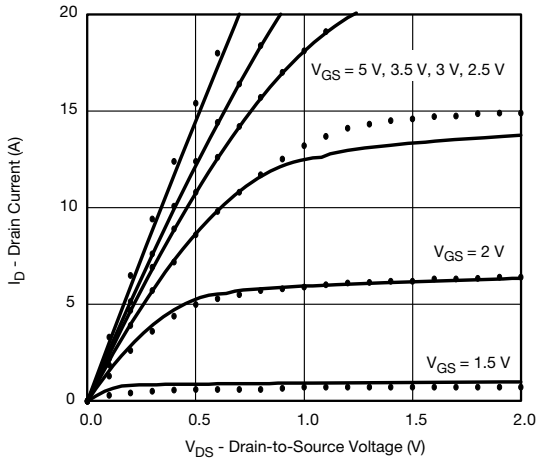


| SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted) | | | | | |
|---|--------------|--|----------------|---------------|----------|
| PARAMETER | SYMBOL | TEST CONDITIONS | SIMULATED DATA | MEASURED DATA | UNIT |
| Static | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$ | 0.83 | - | V |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}$, $I_D = -5.1\text{ A}$ | 0.029 | 0.028 | Ω |
| | | $V_{GS} = -4.5\text{ V}$, $I_D = -4.5\text{ A}$ | 0.035 | 0.037 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = -5\text{ V}$, $I_D = -4.6\text{ A}$ | 13 | 15 | S |
| Diode Forward Voltage | V_{SD} | $I_S = -4.1\text{ A}$ | -0.81 | -0.80 | V |
| Dynamic^b | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$ | 834 | 835 | pF |
| Output Capacitance | C_{oss} | | 181 | 180 | |
| Reverse Transfer Capacitance | C_{rss} | | 154 | 155 | |
| Total Gate Charge | Q_g | $V_{DS} = -10\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -5.1\text{ A}$ | 9 | 10 | nC |
| | | | 6 | 6.4 | |
| Gate-Source Charge | Q_{gs} | $V_{DS} = -10\text{ V}$, $V_{GS} = -2.5\text{ V}$, $I_D = -5.1\text{ A}$ | 1.7 | 1.7 | |
| Gate-Drain Charge | Q_{gd} | | 3.4 | 3.4 | |

Notes

- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

COMPARISON OF MODEL WITH MEASURED DATA ($T_J = 25^\circ\text{C}$, unless otherwise noted)



Note

Dots and squares represent measured data.



Disclaimer

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