

N-Channel 30 V (D-S) MOSFET with Schottky Diode

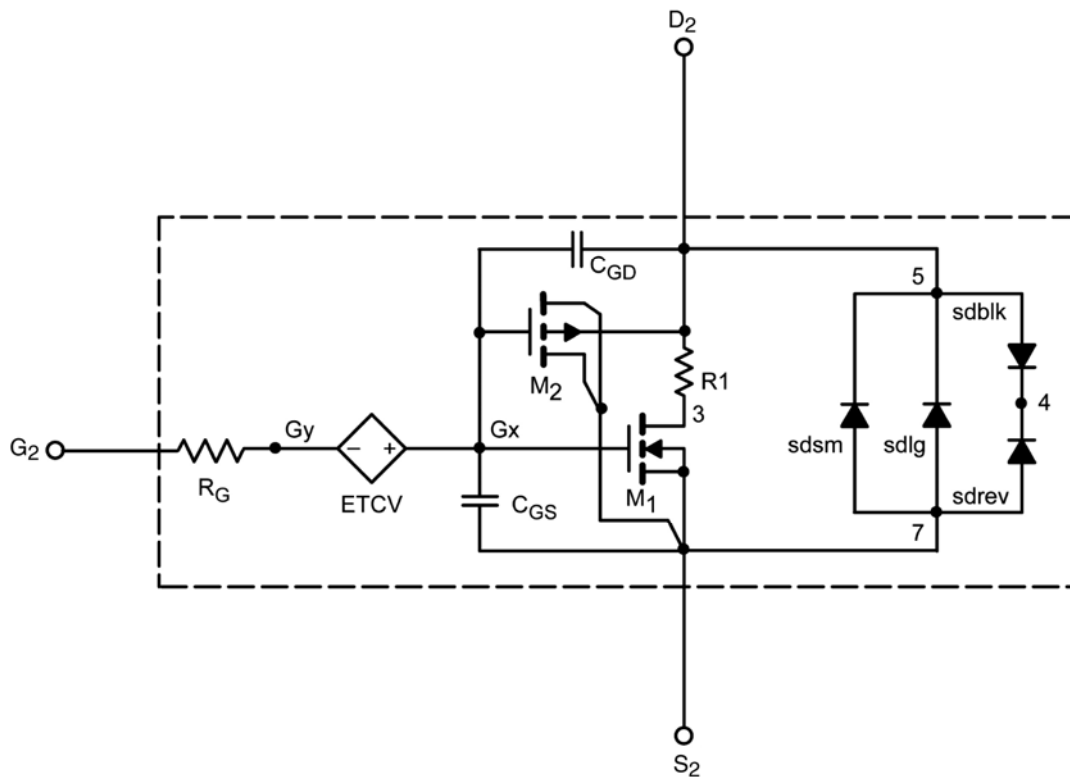
DESCRIPTION

The attached SPICE model describes the typical electrical characteristics of the n-channel vertical DMOS. The subcircuit model is extracted and optimized over 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, 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 Si4712DY

Vishay Siliconix

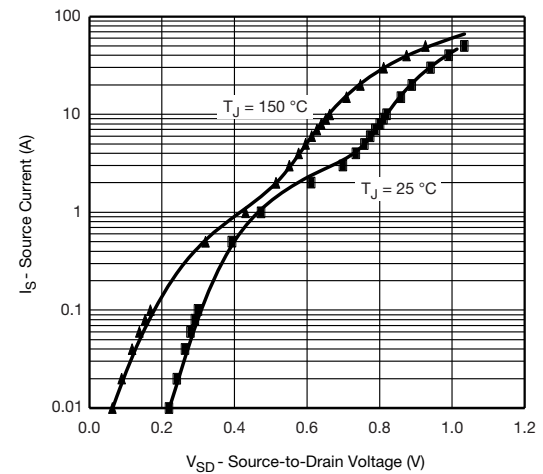
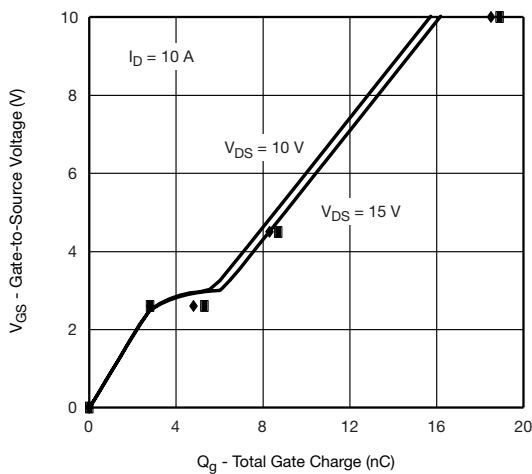
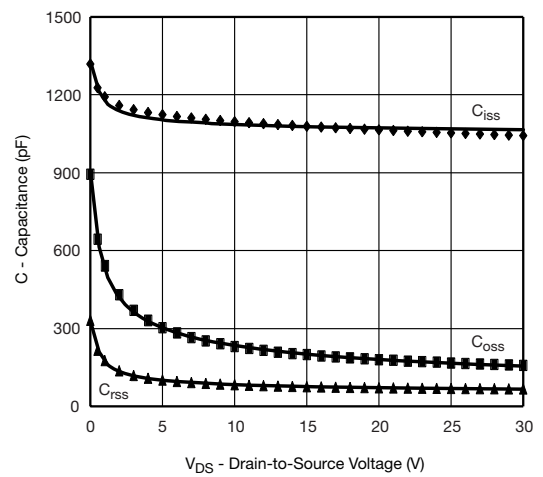
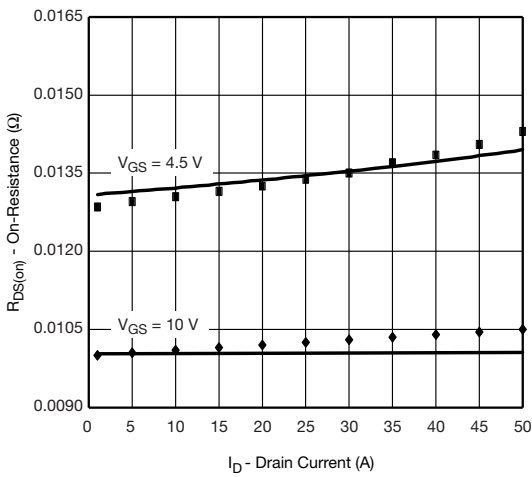
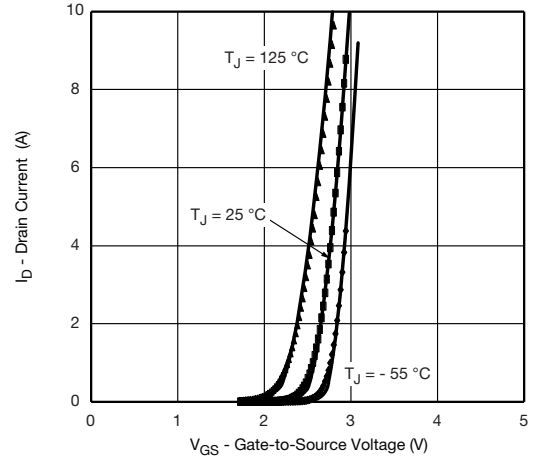
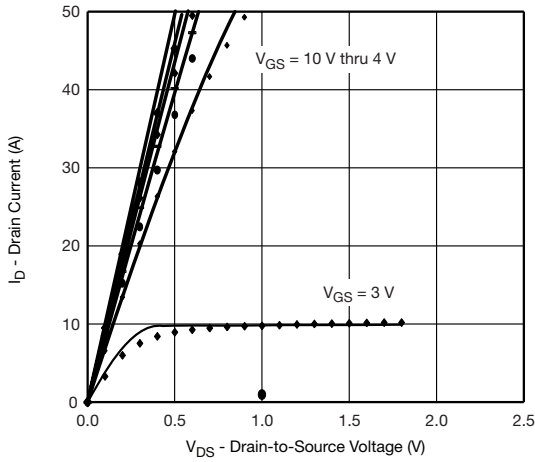


| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | |
|--|--------------|--|----------------|---------------|----------|
| PARAMETER | SYMBOL | TEST CONDITIONS | SIMULATED DATA | MEASURED DATA | UNIT |
| Static | | | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 1.7 | - | V |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 15\text{ A}$ | 0.010 | 0.0105 | Ω |
| | | $V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$ | 0.013 | 0.013 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 15\text{ A}$ | 39 | 37 | S |
| Body Diode Voltage | V_{SD} | $I_S = 1\text{ A}$ | 0.47 | 0.48 | V |
| Dynamic^b | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | 1080 | 1084 | pF |
| Output Capacitance | C_{oss} | | 201 | 200 | |
| Reverse Transfer Capacitance | C_{rss} | | 76 | 77 | |
| Total Gate Charge | Q_g | $V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$ | 16 | 18.5 | nC |
| | | $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$ | 8 | 8.3 | |
| Gate-Source Charge | Q_{gs} | $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$ | 2.8 | 2.8 | |
| Gate-Drain Charge | Q_{gd} | | 2 | 2 | |

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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