

P-Channel 20 V (D-S) MOSFET

DESCRIPTION

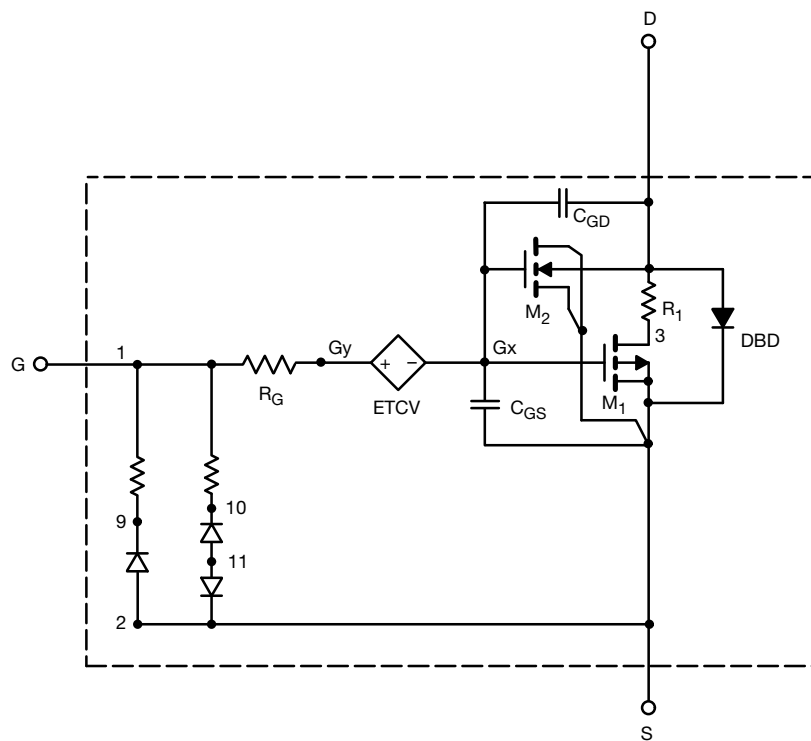
The attached SPICE model describes the typical electrical characteristics of the p-channel vertical DMOS. The sub-circuit model is extracted and optimized over the $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ temperature ranges under the pulsed 0 V to 5 V gate drive. The saturated 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 $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ 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



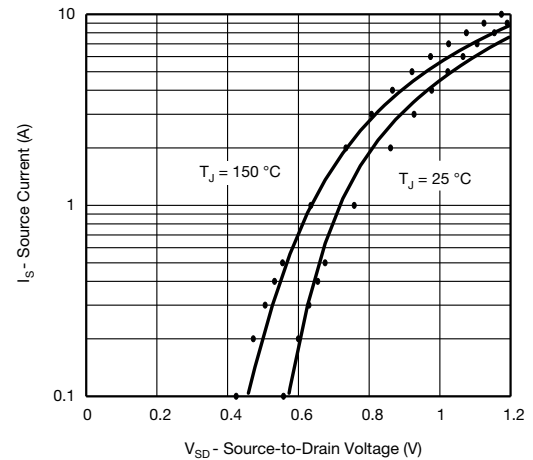
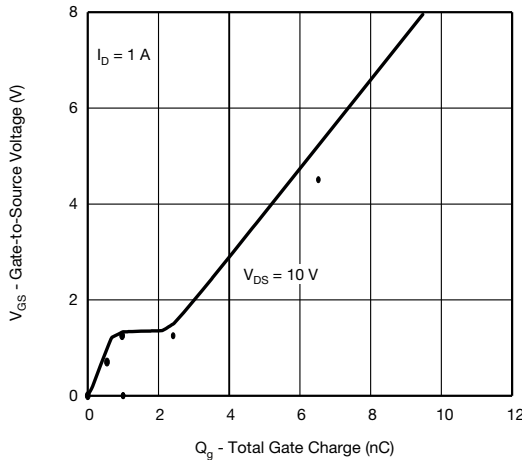
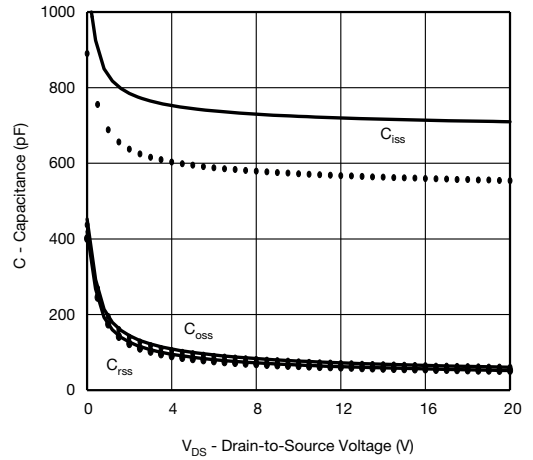
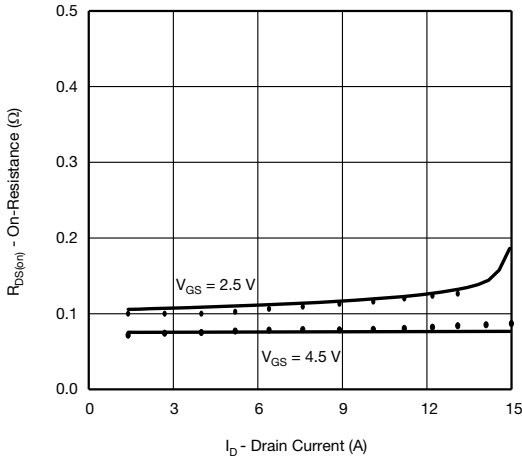
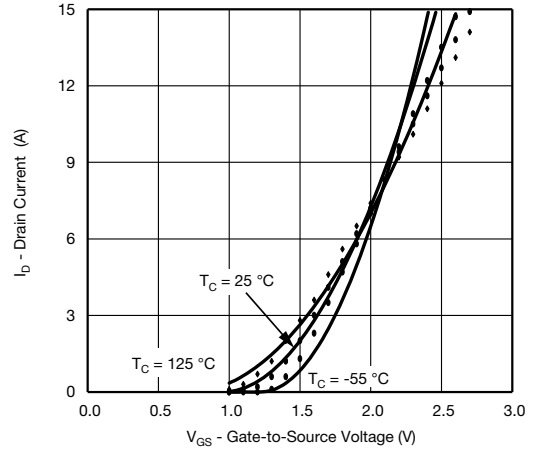
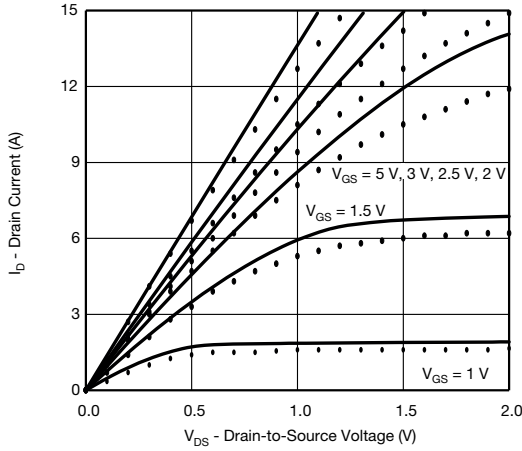
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | |
|--|--------------|--|----------------|---------------|----------|
| PARAMETER | SYMBOL | TEST CONDITIONS | SIMULATED DATA | MEASURED DATA | UNIT |
| Static | | | | | |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | 0.74 | - | V |
| Drain-source on-state resistance ^a | $R_{DS(on)}$ | $V_{GS} = -4.5\text{ V}, I_D = -1\text{ A}$ | 0.076 | 0.077 | Ω |
| | | $V_{GS} = -2.5\text{ V}, I_D = -1\text{ A}$ | 0.105 | 0.100 | |
| Forward transconductance ^a | g_{fs} | $V_{DS} = -5\text{ V}, I_D = -1\text{ A}$ | 5.2 | 6 | S |
| Diode forward voltage | V_{SD} | $I_S = -1\text{ A}$ | -0.73 | -0.80 | V |
| Dynamic ^b | | | | | |
| Input capacitance | C_{iss} | $V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | 724 | 580 | pF |
| Output capacitance | C_{oss} | | 77 | 75 | |
| Reverse transfer capacitance | C_{rss} | | 66 | 65 | |
| Total gate charge | Q_g | $V_{DS} = -10\text{ V}, V_{GS} = -8\text{ V}, I_D = -1\text{ A}$ | 10 | 11 | nC |
| | | $V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -1\text{ A}$ | 5.8 | 6.6 | |
| Q_{gs} | 1 | | 1 | | |
| Q_{gd} | 1.5 | | 1.5 | | |

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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