

SPICE Device Model Si4434DY

Vishay Siliconix

N-Channel 250-V (D-S) MOSFET

CHARACTERISTICS

- N-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS

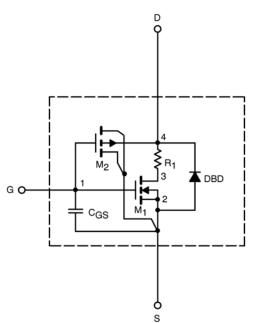
- Apply for both Linear and Switching Application
- Accurate over the -55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

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 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.

SUBCIRCUIT MODEL SCHEMATIC

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.



This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.



| SPECIFICATIONS (T _J = 25°C UN | NLESS OTHERV | VISE NOTED) | | | |
|-----------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|------|
| Parameter | Symbol | Test Condition | Simulated Data | Measured Data | Unit |
| Static | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V_{DS} = V_{GS} , I_D = 250 μ A | 1.6 | | V |
| On-State Drain Current ^a | I _{D(on)} | $V_{\text{DS}}~\geq 5$ V, V_{GS} = 10 V | 38 | | А |
| Drain-Source On-State Resistance ^a | r _{DS(on)} | V_{GS} = 10 V, I _D = 3 A | 0.131 | 0.129 | Ω |
| | | V_{GS} = 6 V, I _D = 2.9 A | 0.133 | 0.131 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = 15 V, I _D = 3 A | 7 | 14 | S |
| Forward Voltage ^a | V _{SD} | $I_{\rm S}$ = 2.8 A, $V_{\rm GS}$ = 0 V | 0.82 | 0.75 | V |
| Dynamic ^b | | | | | |
| Total Gate Charge | Qg | V_{DS} = 100 V, V_{GS} = 10 V, I_{D} = 3 A | 35.5 | 34 | nC |
| Gate-Source Charge | Q _{gs} | | 6.8 | 6.8 | |
| Gate-Drain Charge | Q _{gd} | | 10.5 | 10.5 | |
| Turn-On Delay Time | t _{d(on)} | $\label{eq:V_DD} \begin{array}{l} \text{V}_{\text{DD}} = 100 \text{ V}, \text{ R}_{\text{L}} = 25 \ \Omega \\ \text{I}_{\text{D}} \cong \ \text{4 A}, \ \text{V}_{\text{GEN}} = 10 \text{ V}, \ \text{R}_{\text{G}} = 6 \ \Omega \end{array}$ | 11 | 16 | ns |
| Rise Time | t _r | | 19 | 23 | |
| Turn-Off Delay Time | t _{d(off)} | | 30 | 47 | |
| Fall Time | t _f | | 43 | 19 | |

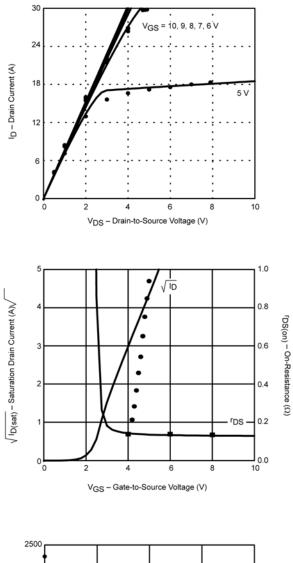
Notes a. Pulse test; pulse width \leq 300 $\mu s,$ duty cycle \leq 2%. b. Guaranteed by design, not subject to production testing.

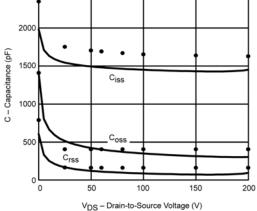


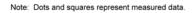
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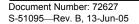
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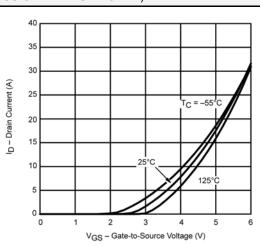
COMPARISON OF MODEL WITH MEASURED DATA (TJ=25°C UNLESS OTHERWISE NOTED)

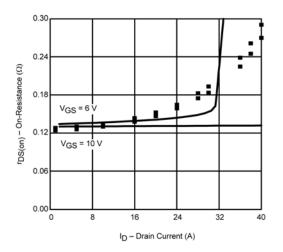


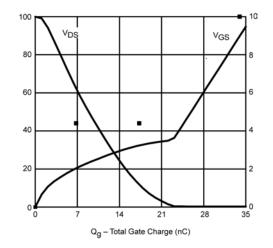














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