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**SUD50N03-11**

Vishay Siliconix

**N-Channel 30-V (D-S) 175 °C MOSFET**

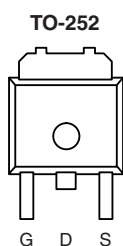
| PRODUCT SUMMARY     |                                  |                                 |
|---------------------|----------------------------------|---------------------------------|
| V <sub>DS</sub> (V) | R <sub>DS(on)</sub> (Ω)          | I <sub>D</sub> (A) <sup>a</sup> |
| 30                  | 0.011 at V <sub>GS</sub> = 10 V  | 50                              |
|                     | 0.017 at V <sub>GS</sub> = 4.5 V | 43                              |

**FEATURES**

- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- 100 % R<sub>g</sub> Tested

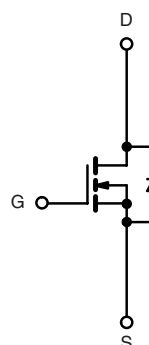


**RoHS**  
COMPLIANT



Top View

Drain Connected to Tab



N-Channel MOSFET

Ordering Information: SUD50N03-11-E3 (Lead (Pb)-free)

| ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted |                                   |                         |                   |
|---|-----------------------------------|-------------------------|-------------------|
| Parameter   | Symbol                            | Limit                   | Unit              |
| Drain-Source Voltage  | V <sub>DS</sub>                   | 30                      | V                 |
| Gate-Source Voltage   | V <sub>GS</sub>                   | ± 20                    |                   |
| Continuous Drain Current (T <sub>J</sub> = 175 °C) <sup>b</sup>         | I <sub>D</sub>                    | T <sub>C</sub> = 25 °C  | 50                |
|   |                                   | T <sub>C</sub> = 100 °C | 37                |
| Pulsed Drain Current  | I <sub>DM</sub>                   | 100                     | A                 |
| Continuous Source Current (Diode Conduction) <sup>a</sup>               | I <sub>S</sub>                    | 50                      |                   |
| Maximum Power Dissipation   | P <sub>D</sub>                    | T <sub>C</sub> = 25 °C  | 62.5 <sup>c</sup> |
|   |                                   | T <sub>A</sub> = 25 °C  | 7.5 <sup>b</sup>  |
| Operating Junction and Storage Temperature Range                        | T <sub>J</sub> , T <sub>stg</sub> | - 55 to 175             | °C                |

| THERMAL RESISTANCE RATINGS       |                   |              |         |      |      |
|----------------------------------|-------------------|--------------|---------|------|------|
| Parameter                        | Symbol            | Typical      | Maximum | Unit |      |
| Junction-to-Ambient <sup>b</sup> | R <sub>thJA</sub> | t ≤ 10 s     | 17      | 20   | °C/W |
|                                  |                   | Steady State | 50      | 60   |      |
| Junction-to-Case                 | R <sub>thJC</sub> | 2            | 2.4     |      |      |
| Junction-to-Lead                 | R <sub>thJL</sub> | 4            | 4.8     |      |      |

Notes:

- a. Package limited.
- b. Surface Mounted on 1" x 1" FR4 board, t ≤ 10 s.
- c. See SOA curve for voltage derating.

\* Pb containing terminations are not RoHS compliant, exemptions may apply.

# SUD50N03-11

Vishay Siliconix



| <b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted        |               |  |      |                   |           |               |
|--|---------------|--|------|-------------------|-----------|---------------|
| Parameter  | Symbol        | Test Conditions  | Min. | Typ. <sup>a</sup> | Max.      | Unit          |
| <b>Static</b>  |               |  |      |                   |           |               |
| Drain-Source Breakdown Voltage   | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$  | 30   |                   |           | V             |
| Gate Threshold Voltage   | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$  | 0.8  |                   |           |               |
| Gate-Body Leakage  | $I_{GSS}$     | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$  |      |                   | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current  | $I_{DSS}$     | $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$  |      |                   | 1         | $\mu\text{A}$ |
|  |               | $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$   |      |                   | 50        |               |
| On-State Drain Current <sup>b</sup>  | $I_{D(on)}$   | $V_{DS} = 5\text{ V}, V_{GS} = 5\text{ V}$   | 50   |                   |           | A             |
| Drain-Source On-State Resistance <sup>b</sup>  | $R_{DS(on)}$  | $V_{GS} = 10\text{ V}, I_D = 25\text{ A}$  |      | 0.009             | 0.011     | $\Omega$      |
|  |               | $V_{GS} = 5\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$  |      |                   | 0.018     |               |
|  |               | $V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$   |      | 0.014             | 0.017     |               |
| Forward Transconductance <sup>b</sup>  | $g_{fs}$      | $V_{DS} = 15\text{ V}, I_D = 20\text{ A}$  | 10   |                   |           | S             |
| <b>Dynamic<sup>a</sup></b>   |               |  |      |                   |           |               |
| Input Capacitance  | $C_{iss}$     | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$  |      | 1130              |           | pF            |
| Output Capacitance   | $C_{oss}$     |  |      | 400               |           |               |
| Reverse Transfer Capacitance   | $C_{rss}$     |  |      | 175               |           |               |
| Total Gate Charge <sup>c</sup>   | $Q_g$         | $V_{DS} = 15\text{ V}, V_{GS} = 5\text{ V}, I_D = 50\text{ A}$   |      | 12                | 20        | nC            |
| Gate-Source Charge <sup>c</sup>  | $Q_{gs}$      |  |      | 4                 |           |               |
| Gate-Drain Charge <sup>c</sup>   | $Q_{gd}$      |  |      | 4.5               |           |               |
| Gate Resistance  | $R_g$         |  | 0.5  |                   | 3.4       | $\Omega$      |
| Turn-On Delay Time <sup>c</sup>  | $t_{d(on)}$   | $V_{DD} = 15\text{ V}, R_L = 0.3\text{ }\Omega$<br>$I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\text{ }\Omega$ |      | 8                 | 12        | ns            |
| Rise Time <sup>c</sup>   | $t_r$         |  |      | 10                | 15        |               |
| Turn-Off Delay Time <sup>c</sup>   | $t_{d(off)}$  |  |      | 18                | 30        |               |
| Fall Time <sup>c</sup>   | $t_f$         |  |      | 6                 | 9         |               |
| <b>Source-Drain Diode Ratings and Characteristics</b> $T_C = 25\text{ }^\circ\text{C}$ |               |  |      |                   |           |               |
| Continuous Current   | $I_S$         |  |      |                   | 50        | A             |
| Pulsed Current   | $I_{SM}$      |  |      |                   | 80        |               |
| Diode Forward Voltage <sup>b</sup>   | $V_{SD}$      | $I_F = 100\text{ A}, V_{GS} = 0\text{ V}$  |      |                   | 1.5       | V             |
| Source-Drain Reverse Recovery Time   | $t_{rr}$      | $I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$  |      | 30                | 50        | ns            |

**Notes:**

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

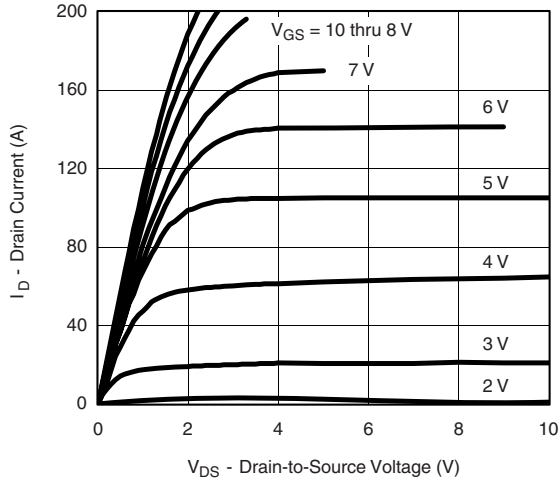
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



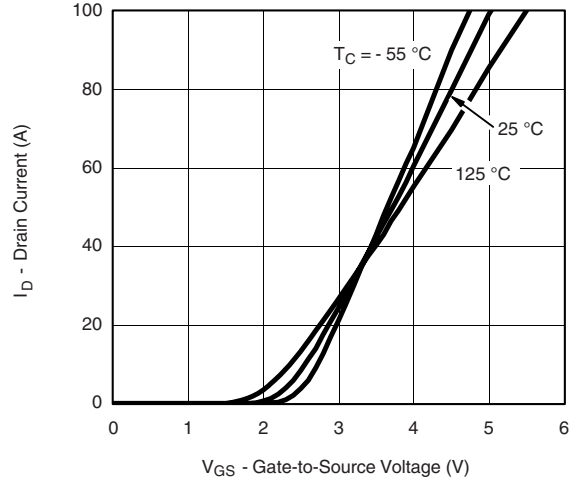
**SUD50N03-11**

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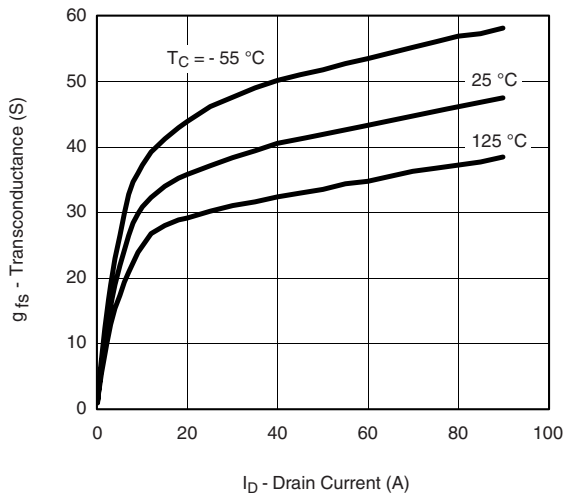
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



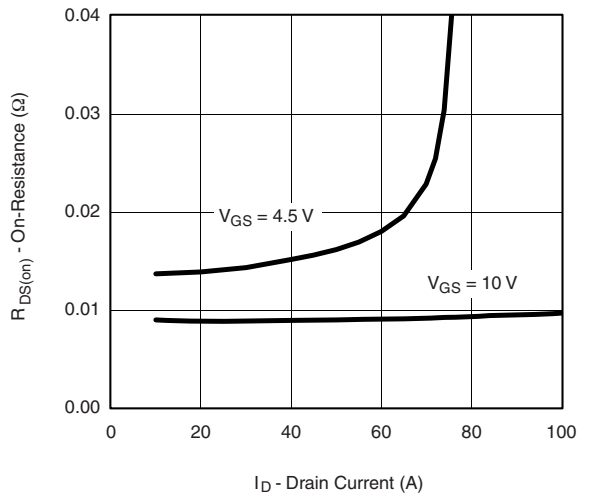
**Output Characteristics**



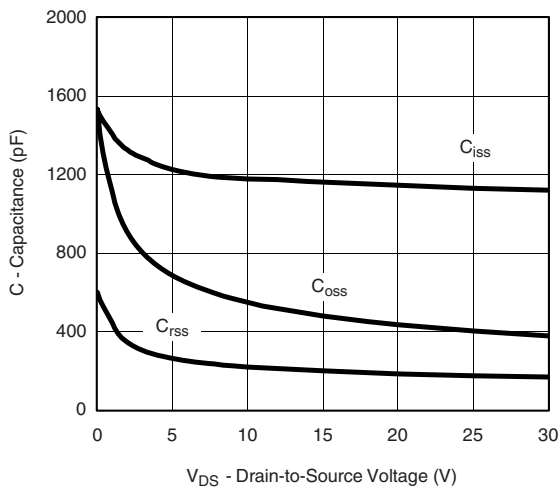
**Transfer Characteristics**



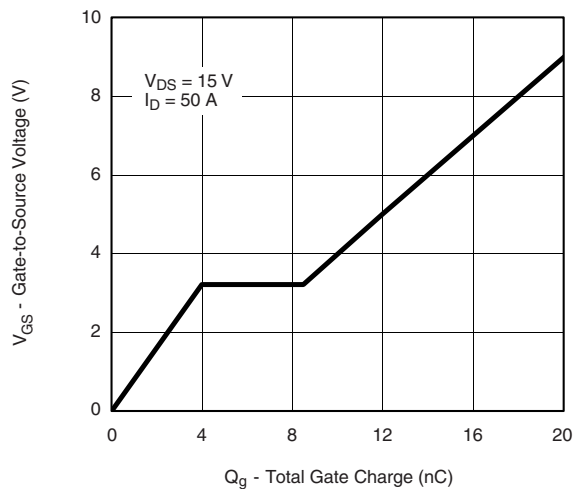
**Transconductance**



**On-Resistance vs. Drain Current**



**Capacitance**



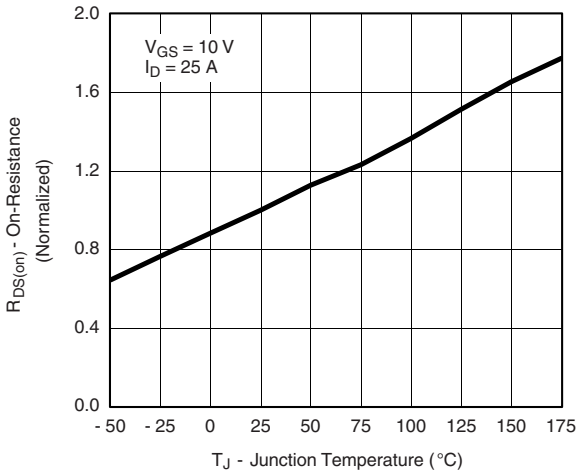
**Gate Charge**

# SUD50N03-11

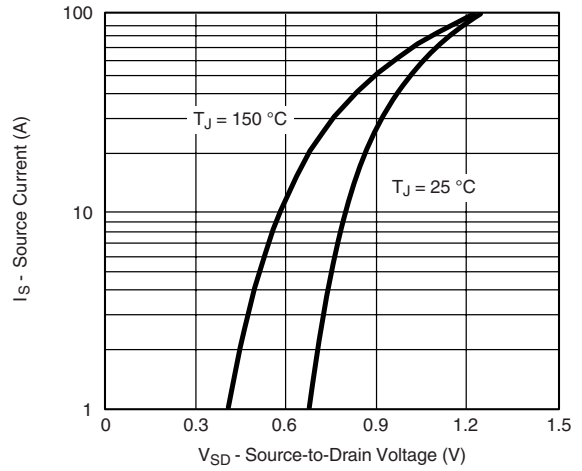
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## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

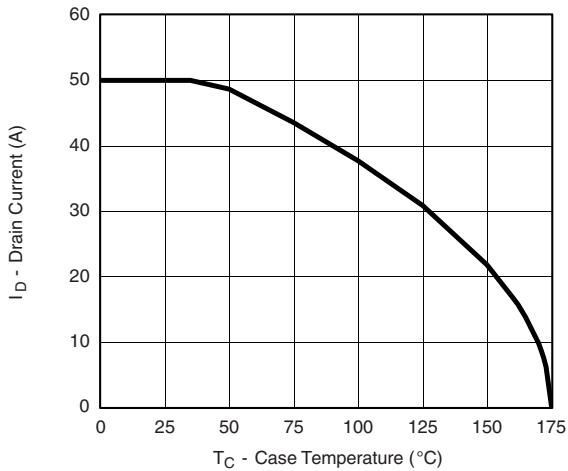


**On-Resistance vs. Junction Temperature**

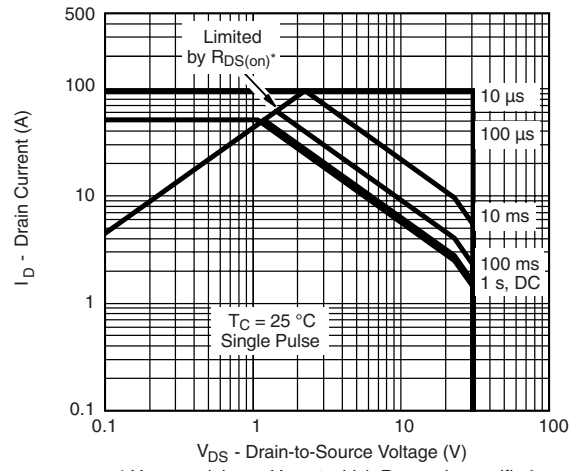


**Source-Drain Diode Forward Voltage**

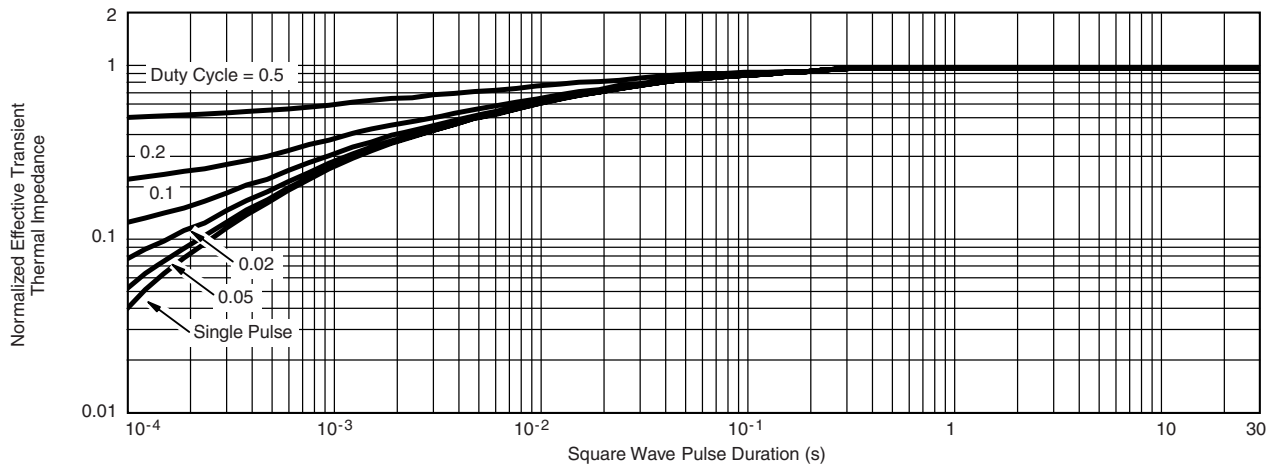
## THERMAL RATINGS



**Maximum Avalanche Drain Current vs. Case Temperature**



**Safe Operating Area**  
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified



**Normalized Thermal Transient Impedance, Junction-to-Case**

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?71187>.



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