



N-Channel 60-V (D-S) 175 °C MOSFET

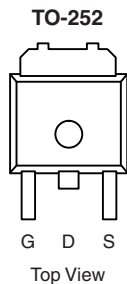
| PRODUCT SUMMARY | | | |
|---------------------|----------------------------------|---------------------------------|----------------------|
| V _{DS} (V) | r _{DS(on)} (Ω) | I _D (A) ^c | Q _g (Typ) |
| 60 | 0.0078 at V _{GS} = 10 V | 93 | 94 |

FEATURES

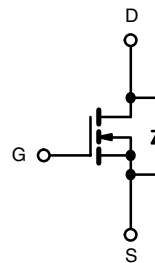
- TrenchFET[®] Power MOSFET
- 175 °C Junction Temperature
- 100 % R_g Tested
- High Threshold at High Temperature



RoHS COMPLIANT



Drain Connected to Tab



N-Channel MOSFET

Ordering Information: SUD50N06-08H0-E3 (Lead (Pb)-free)

| ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted | | | | |
|---|-----------------------------------|-------------------------|------------------|----|
| Parameter | Symbol | Limit | Unit | |
| Drain-Source Voltage | V _{DS} | 60 | V | |
| Gate-Source Voltage | V _{GS} | ± 20 | | |
| Continuous Drain Current (T _J = 175 °C) ^b | I _D | T _C = 25 °C | 93 ^c | |
| | | T _C = 125 °C | 54 ^c | |
| Pulsed Drain Current | I _{DM} | 100 | A | |
| Continuous Source Current (Diode Conduction) | I _S | 91 ^c | | |
| Avalanche Current, Single Pulse | I _{AS} | 50 | | |
| Avalanche Energy | E _{AS} | L = 0.1 mH | 125 | mJ |
| Maximum Power Dissipation | | T _C = 25 °C | 136 ^b | |
| | | T _A = 25 °C | 3 ^a | W |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | - 55 to 175 | °C | |

| THERMAL RESISTANCE RATINGS | | | | | |
|----------------------------------|-------------------|--------------|---------|------|------|
| Parameter | Symbol | Typical | Maximum | Unit | |
| Junction-to-Ambient ^a | R _{thJA} | t ≤ 10 sec | 15 | 18 | °C/W |
| | | Steady State | 40 | 50 | |
| Junction-to-Case | R _{thJC} | 0.85 | 1.1 | | |

Notes:

a. Surface Mounted on 1" x 1" FR4 Board.

b. See SOA curve for voltage derating.

c. Calculate continuous current based on maximum allowable junction temperature when using infinite heat sink. Package limitation current is 50 A.

| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | |
|--|---------------|---|------|------------------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min | Typ ^a | Max | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 60 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 3.4 | | 4.5 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ | | | 1 | μA |
| | | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | | | 50 | |
| | | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | | | 250 | |
| On-State Drain Current ^b | $I_{D(on)}$ | $V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$ | 50 | | | A |
| Drain-Source On-State Resistance ^b | $r_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | | 0.0065 | 0.0078 | Ω |
| | | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | | | 0.013 | |
| | | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | | | 0.0156 | |
| Forward Transconductance ^b | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 20\text{ A}$ | | 25 | | S |
| Dynamic^a | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, F = 1\text{ MHz}$ | | 7000 | | μF |
| Output Capacitance | C_{oss} | | | 450 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 240 | | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | 0.75 | 1.5 | 2.3 | Ω |
| Total Gate Charge ^c | Q_g | $V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$ | | 94 | 145 | nC |
| Gate-Source Charge ^c | Q_{gs} | | | 35 | | |
| Gate-Drain Charge ^c | Q_{gd} | | | 20 | | |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = 30\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \equiv 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$ | | 28 | 45 | ns |
| Rise Time ^c | t_r | | | 13 | 20 | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | | 50 | 75 | |
| Fall Time ^c | t_f | | | 10 | 15 | |
| Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) | | | | | | |
| Pulsed Current | I_{SM} | | | | 100 | A |
| Diode Forward Voltage ^b | V_{SD} | $I_F = 50\text{ A}, V_{GS} = 0\text{ V}$ | | 1.0 | 1.5 | V |
| Source-Drain Reverse Recovery Time | t_{rr} | $I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | | 45 | 70 | ns |

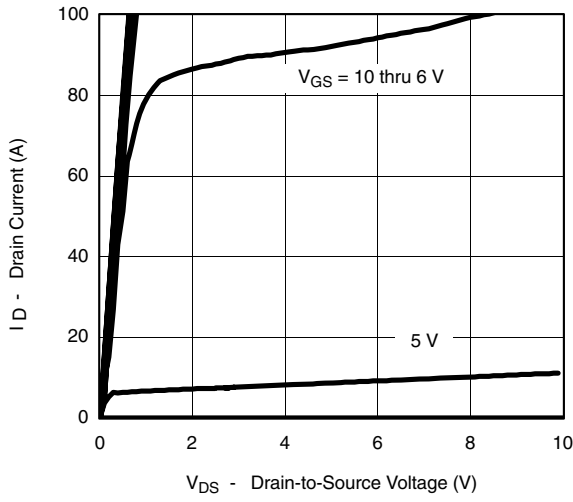
Notes:

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

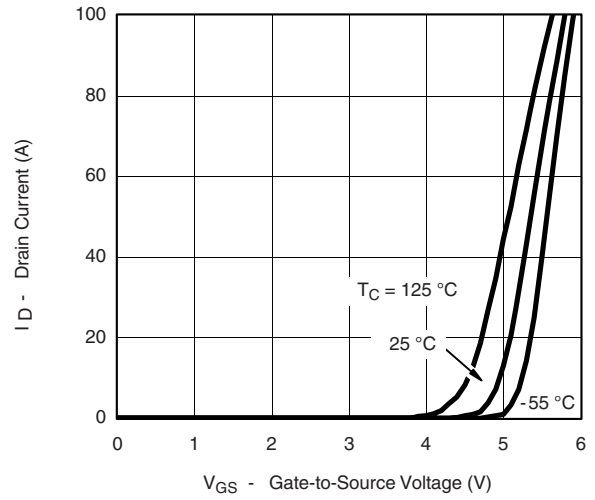
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



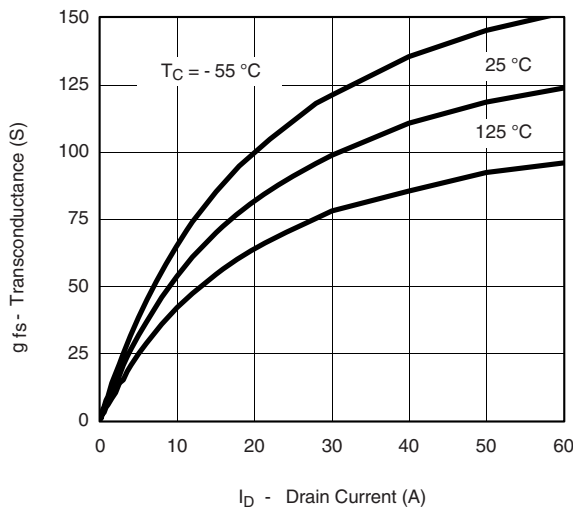
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



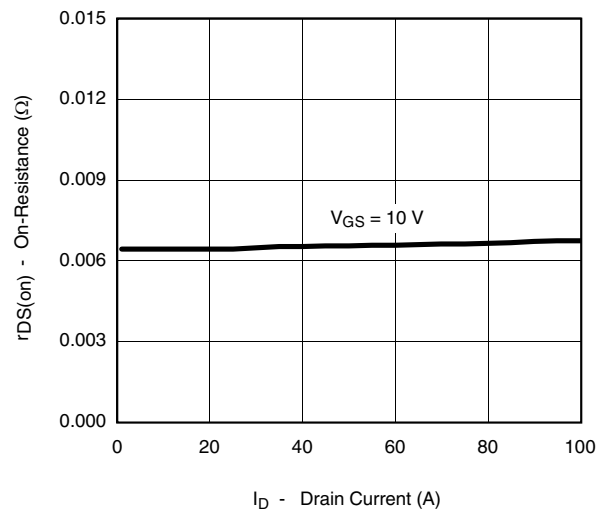
Output Characteristics



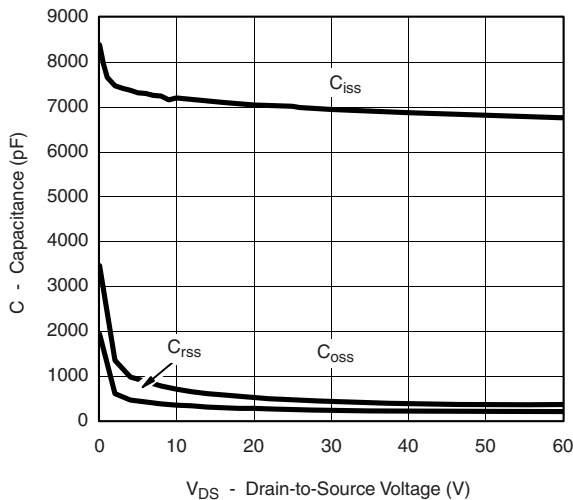
Transfer Characteristics



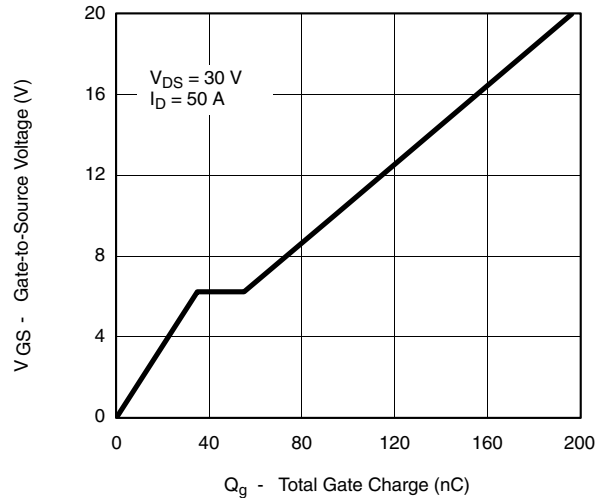
Transconductance



On-Resistance vs. Drain Current



Capacitance



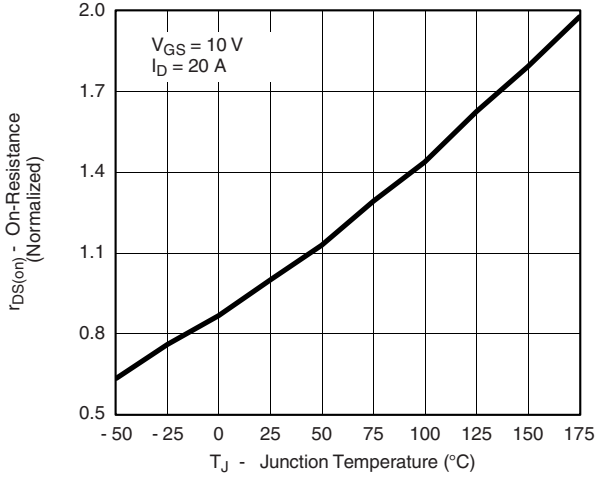
Gate Charge

SUD50N06-08H

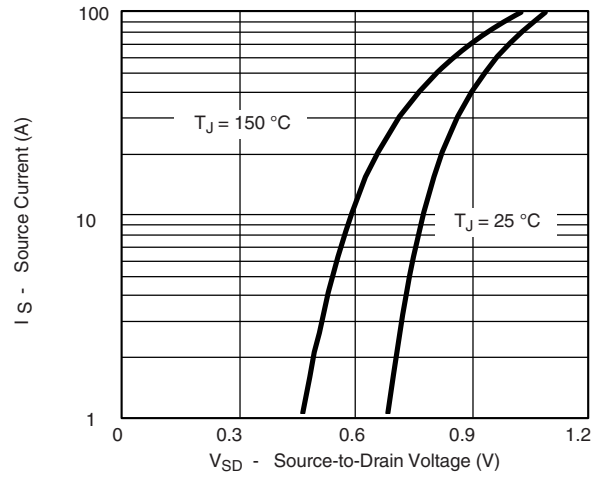


Vishay Siliconix

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

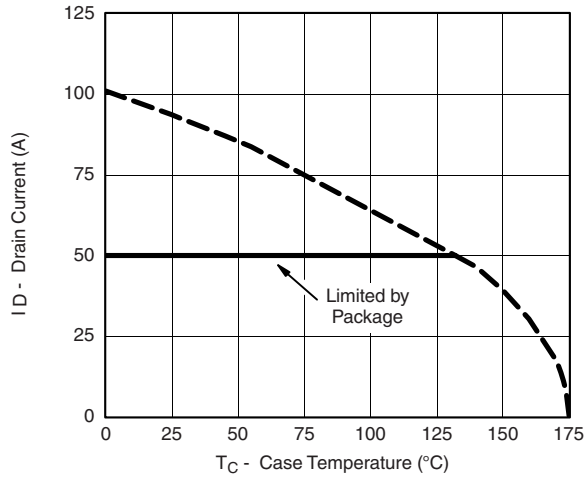


On-Resistance vs. Junction Temperature

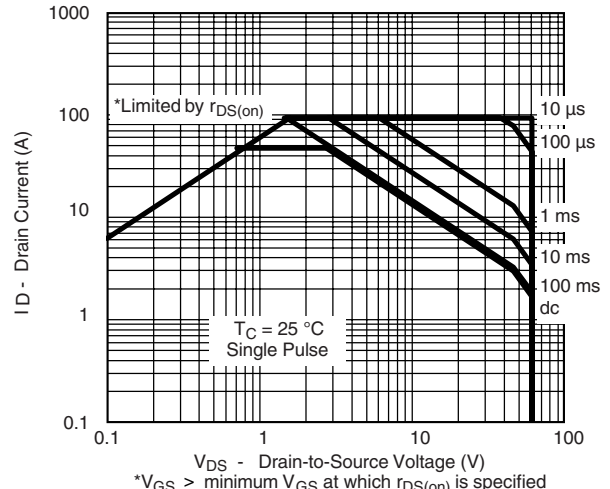


Source-Drain Diode Forward Voltage

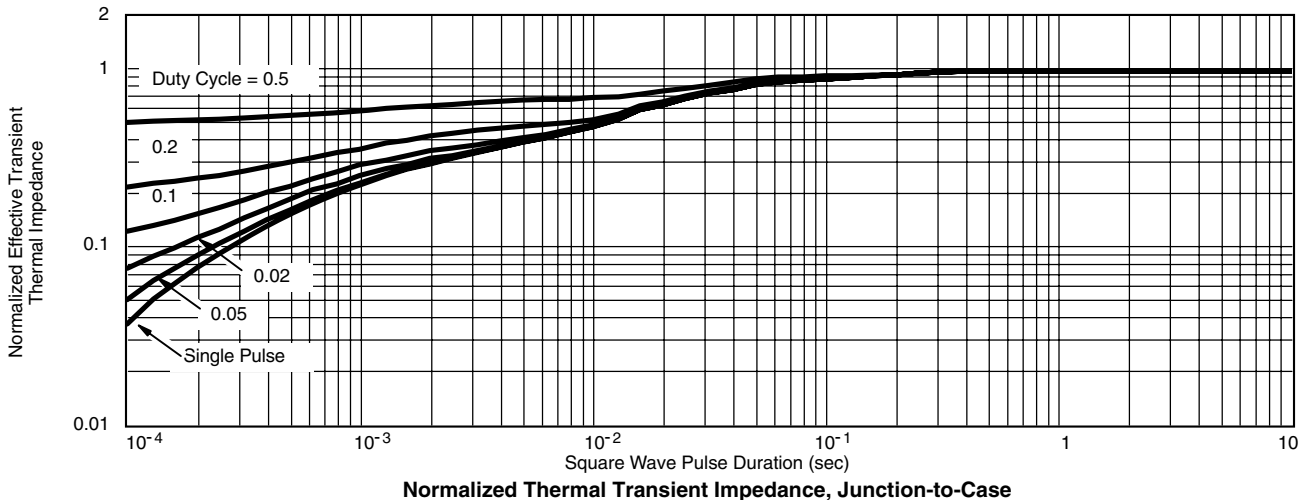
THERMAL RATINGS



Maximum Avalanche Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Impedance, Junction-to-Case

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