



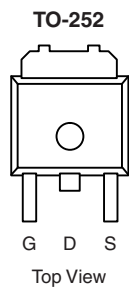
N-Channel 60-V (D-S), 175 °C MOSFET

PRODUCT SUMMARY

| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ (Ω) | I_D (A) ^c |
|-------------------|----------------------------|------------------------|
| 60 | 0.0074 at $V_{GS} = 10$ V | 96 |
| | 0.0088 at $V_{GS} = 4.5$ V | 88 |

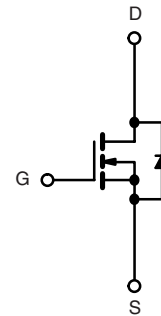
FEATURES

- TrenchFET[®] Power MOSFETS
- 175 °C Junction Temperature

RoHS
COMPLIANT

Drain Connected to Tab

Ordering Information: SUD50N06-07L-E3 (Lead (Pb)-free)



N-Channel MOSFET

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) | I_D | $T_C = 25$ °C | 96 ^c | A |
| | | $T_C = 100$ °C | 67 ^c | |
| Pulsed Drain Current | I_{DM} | 100 | | |
| Single Pulse Avalanche Current | I_{AS} | 45 | | |
| Single Pulse Repetitive Avalanche Energy ^a | E_{AS} | 101 | mJ | |
| Power Dissipation | P_D | 136 | 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 ^b | R_{thJA} | $t \leq 10$ sec | 15 | 18 | °C/W |
| | | Steady State | 40 | 50 | |
| Junction-to-Case | R_{thJC} | 0.85 | 1.1 | | |

Notes:

a. Duty cycle ≤ 1 %.

b. Surface Mounted on 1" FR4 board.

c. Based on maximum allowable Junction Temperature. Package limitation current is 50 A.

| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | |
|---|---------------|---|-----|--------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min | Typ | 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 | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 1 | | 3 | |
| 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 | |
| | | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | | | 150 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$ | 50 | | | A |
| Drain-Source On-State Resistance ^a | $r_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | | 0.0061 | 0.0074 | Ω |
| | | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | | | 0.0122 | |
| | | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | | | 0.0148 | |
| | | $V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$ | | 0.0071 | 0.0088 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 15\text{ A}$ | 20 | 80 | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 5800 | | pF |
| Output Capacitance | C_{oss} | | | 450 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 300 | | |
| Total Gate Charge ^c | Q_g | $V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$ | | 96 | 144 | nC |
| Gate-Source Charge ^c | Q_{gs} | | | 19 | | |
| Gate-Drain Charge ^c | Q_{gd} | | | 20 | | |
| Gate Resistance | R_g | | | 1.5 | | Ω |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = 30\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \equiv 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$ | | 15 | 25 | ns |
| Rise Time ^c | t_r | | | 13 | 20 | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | | 62 | 95 | |
| Fall Time ^c | t_f | | | 14 | 25 | |
| Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) ^b | | | | | | |
| Continuous Current | I_S | | | | 50 | A |
| Pulsed Current | I_{SM} | | | | 100 | |
| Forward Voltage ^a | V_{SD} | $I_F = 30\text{ A}, V_{GS} = 0\text{ V}$ | | 0.90 | 1.50 | V |
| Reverse Recovery Time | t_{rr} | $I_F = 30\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | | 37 | 55 | ns |

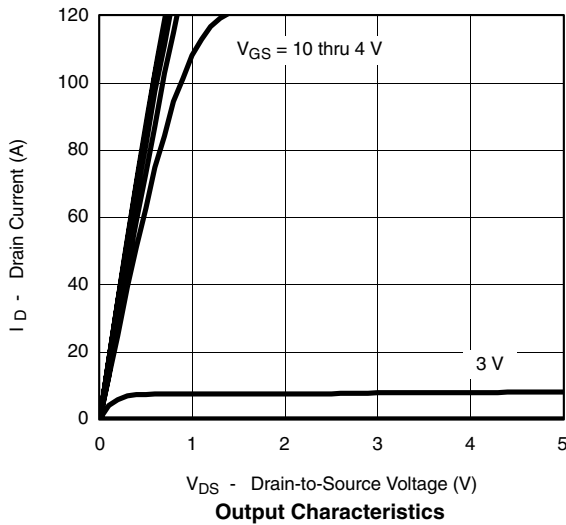
Notes:

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

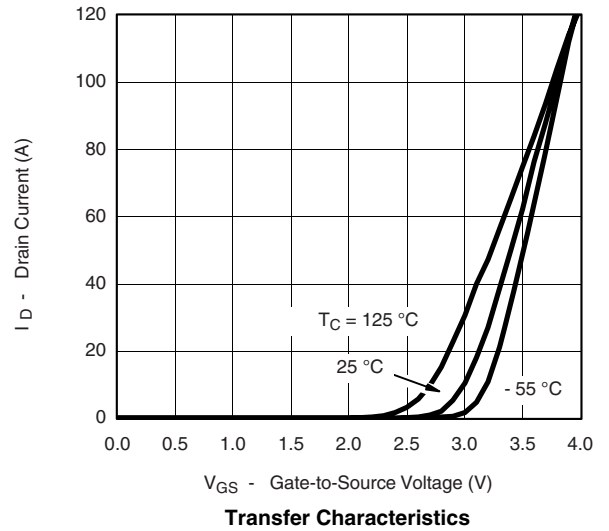
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



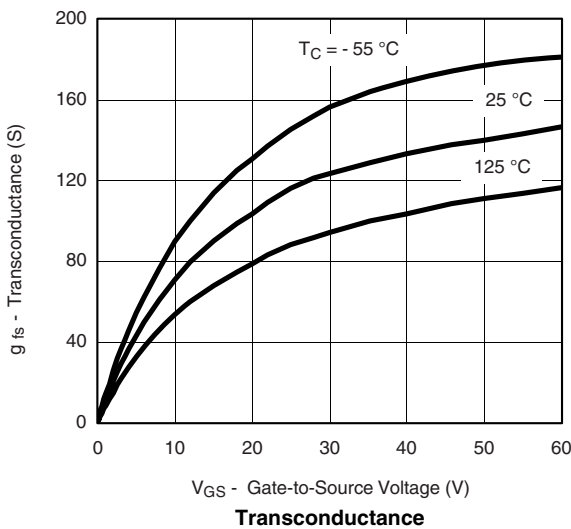
TYPICAL CHARACTERISTICS 25 °C unless noted



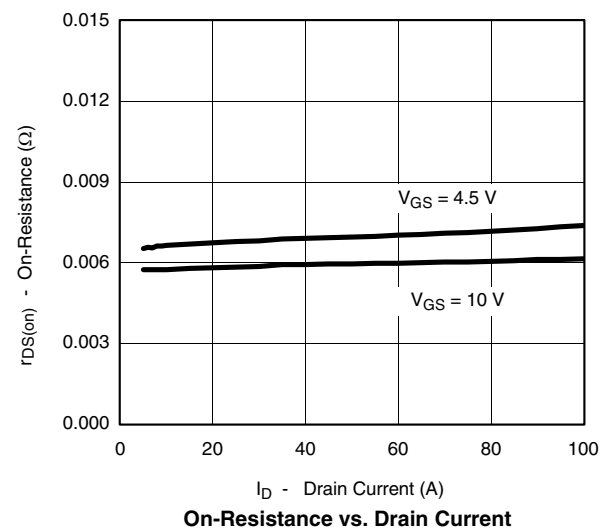
Output Characteristics



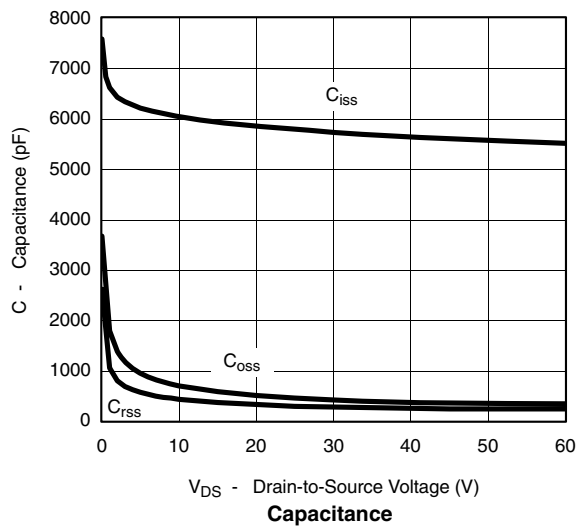
Transfer Characteristics



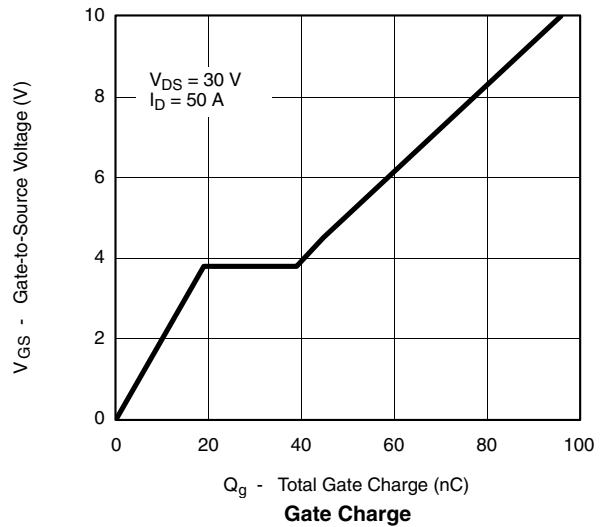
Transconductance



On-Resistance vs. Drain Current



Capacitance



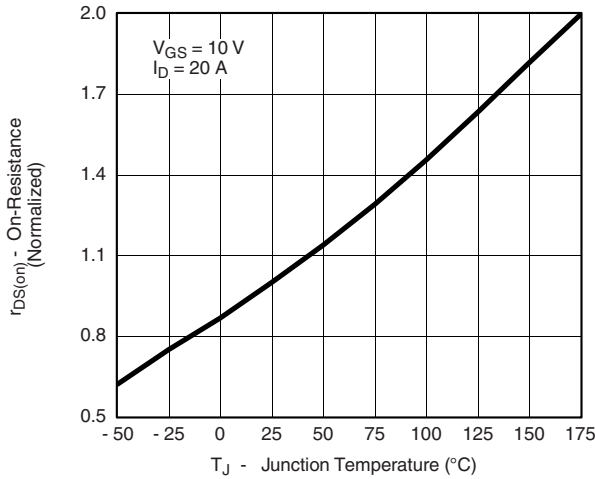
Gate Charge

SUD50N06-07L

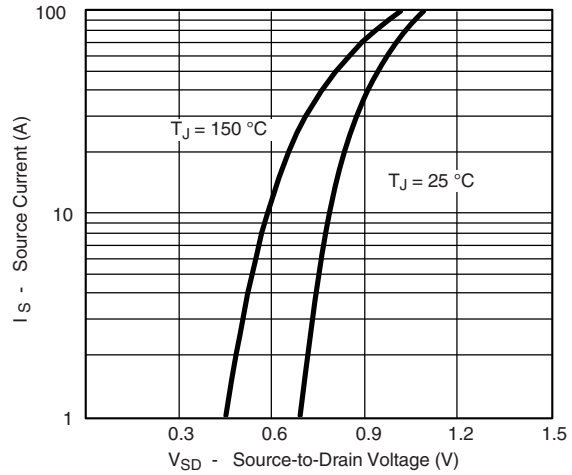


Vishay Siliconix

TYPICAL CHARACTERISTICS 25 °C unless noted

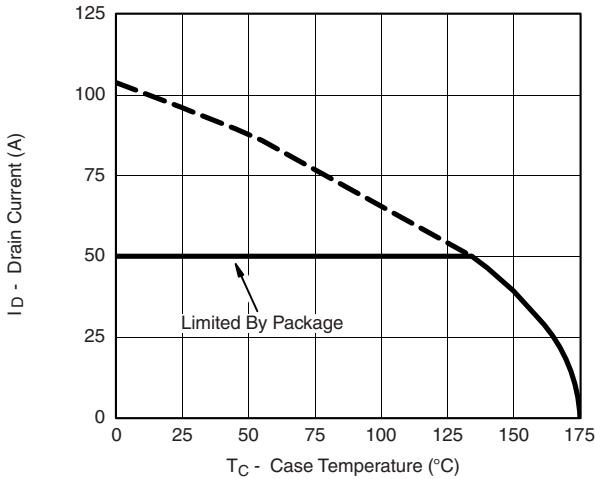


On-Resistance vs. Junction Temperature

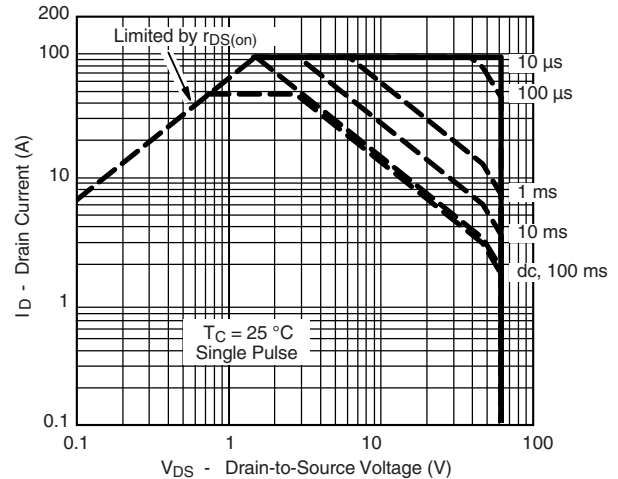


Source-Drain Diode Forward Voltage

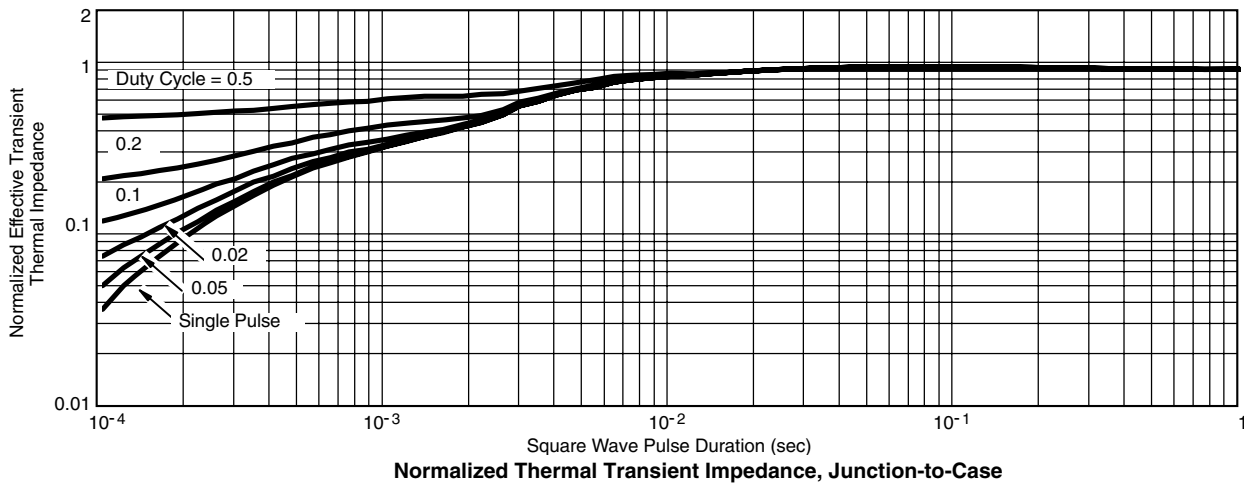
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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