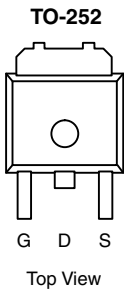


N-Channel 60 V (D-S), 175 °C MOSFET, Logic Level

| PRODUCT SUMMARY | | |
|---------------------|-----------------------------------|---------------------------------|
| V _{DS} (V) | R _{DS(on)} (Ω) | I _D (A) ^a |
| 60 | 0.0093 at V _{GS} = 10 V | 50 |
| | 0.0122 at V _{GS} = 4.5 V | 50 |

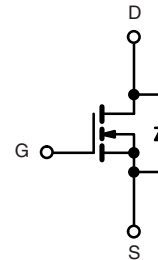
FEATURES

- 175 °C Junction Temperature
- TrenchFET[®] Power MOSFET
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



Drain Connected to Tab

Ordering Information:
SUD50N06-09L-E3 (Lead (Pb)-free)



N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted) | | | | |
|---|-------------------------|-----------------------------------|--------------------------------------|------|
| Parameter | | Symbol | Limit | Unit |
| Gate-Source Voltage | | V _{GS} | ± 20 | V |
| Continuous Drain Current (T _J = 175 °C) ^b | T _C = 25 °C | I _D | 50 | A |
| | T _C = 100 °C | | 50 ^a | |
| Pulsed Drain Current | | I _{DM} | 100 | |
| Continuous Source Current (Diode Conduction) | | I _S | 50 ^a | |
| Avalanche Current | | I _{AS} | 50 | |
| Single Avalanche Energy (Duty Cycle ≤ 1 %) | L = 0.1 mH | E _{AS} | 125 | mJ |
| Maximum Power Dissipation | T _C = 25 °C | P _D | 136 | W |
| | T _A = 25 °C | | 3 ^b , 8.3 ^{b, c} | |
| Operating Junction and Storage Temperature Range | | T _J , T _{stg} | - 55 to 175 | °C |

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

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t ≤ 10 s.

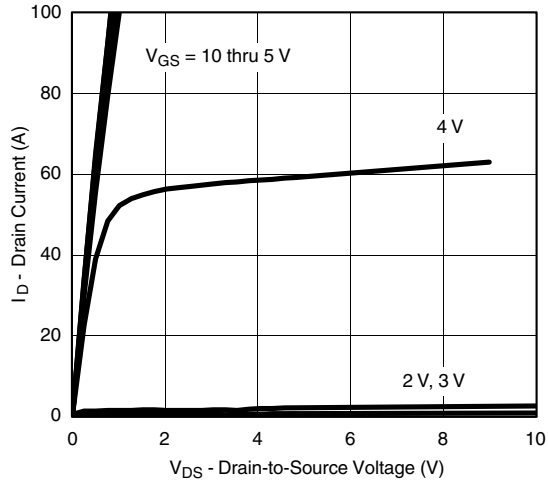
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | |
|--|--------------|--|------|-------------------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. ^a | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 60 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 1 | 2 | 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 | |
| | | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | | | 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 | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | | 0.0074 | 0.0093 | Ω |
| | | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | | | 0.0160 | |
| | | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | | | 0.0200 | |
| | | $V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$ | | | 0.0122 | |
| Forward Transconductance ^b | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 20\text{ A}$ | | 60 | | S |
| Dynamic | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 2650 | | μF |
| Output Capacitance | C_{oss} | | | 470 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 225 | | |
| Total Gate Charge ^c | Q_g | $V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$ | | 47 | 70 | nC |
| Gate-Source Charge ^c | Q_{gs} | | | 10 | | |
| Gate-Drain Charge ^c | Q_{gd} | | | 12 | | |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = 30\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$ | | 10 | 20 | ns |
| Rise Time ^c | t_r | | | 15 | 25 | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | | 35 | 50 | |
| Fall Time ^c | t_f | | | 20 | 30 | |
| Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) | | | | | | |
| Pulsed Current | I_{SM} | | | | 100 | A |
| Diode Forward Voltage | V_{SD} | $I_F = 20\text{ A}, V_{GS} = 0\text{ V}$ | | 1 | 1.5 | V |
| Reverse Recovery Time | t_{rr} | $I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | | 45 | 100 | ns |

Notes:

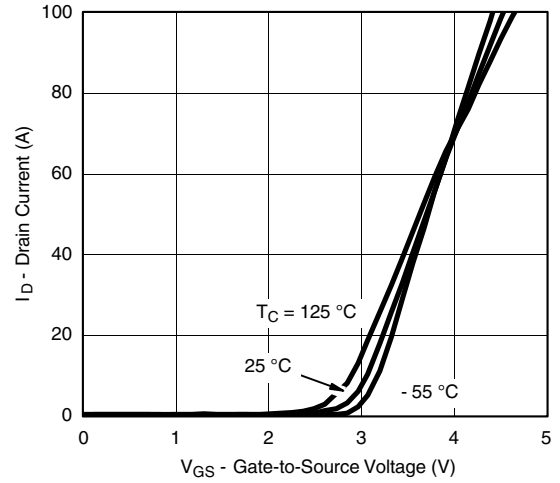
- For design aid only; not subject to production testing.
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Independent of operating temperature.

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.

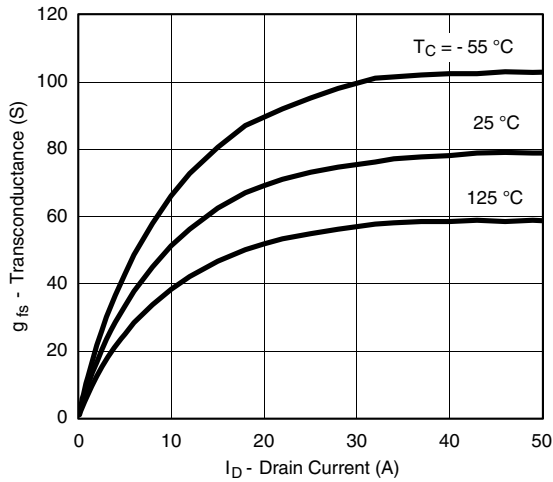
TYPICAL CHARACTERISTICS (25 °C unless noted)



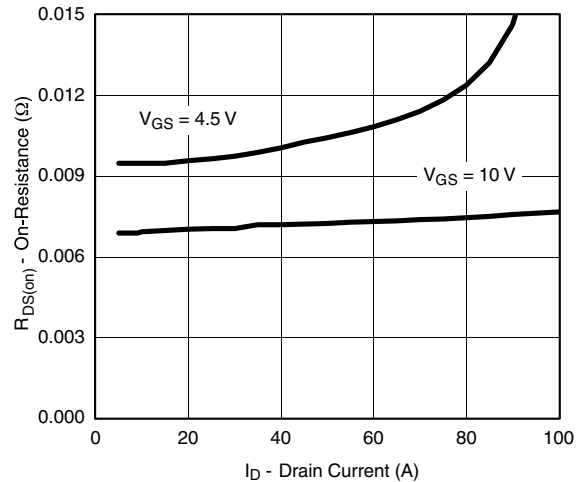
Output Characteristics



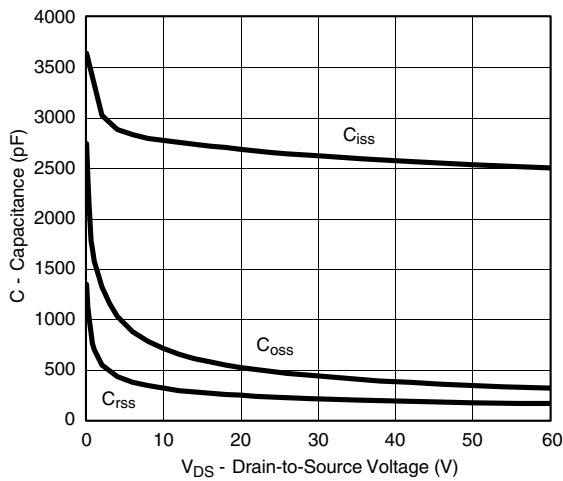
Transfer Characteristics



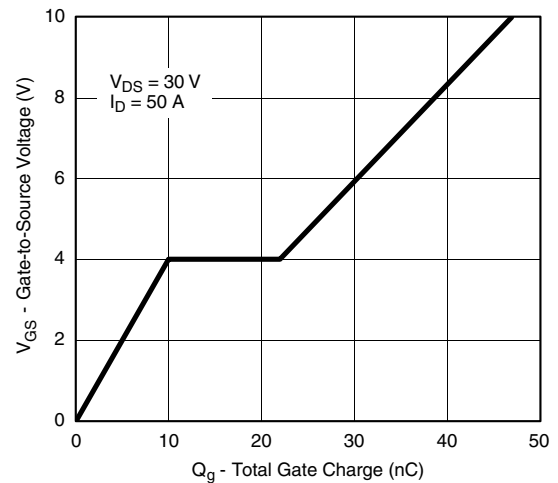
Transconductance



On-Resistance vs. Drain Current

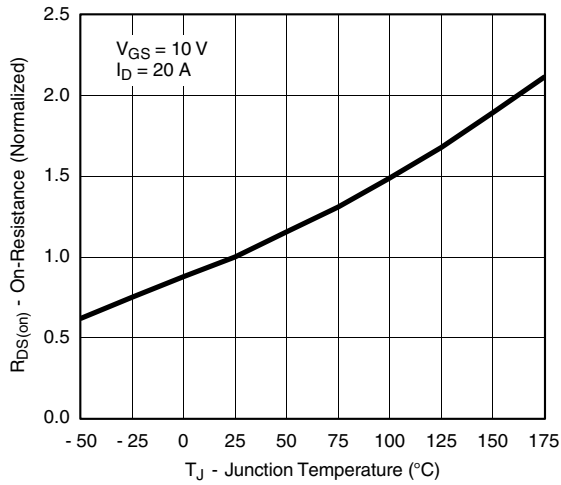


Capacitance

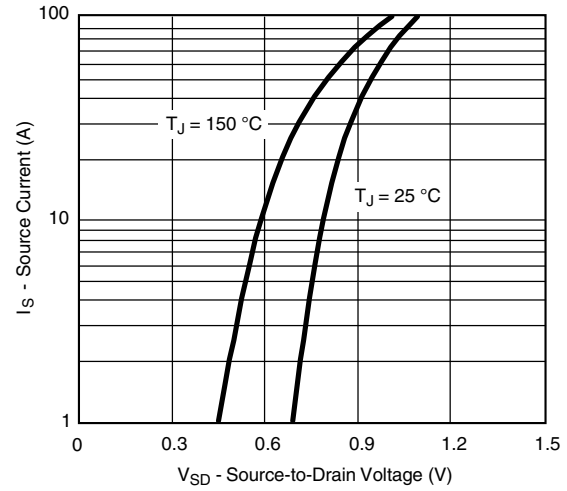


Gate Charge

TYPICAL CHARACTERISTICS (25 °C unless noted)

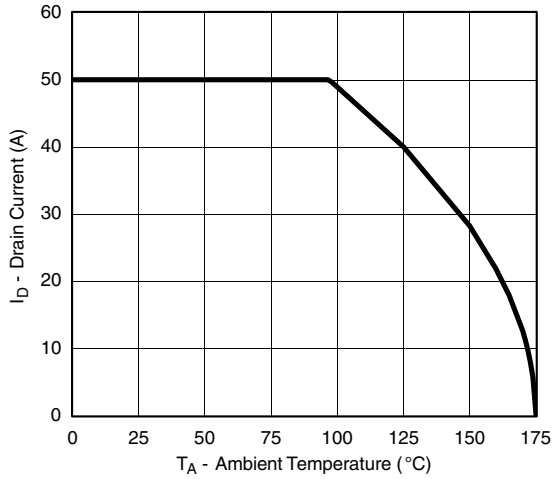


On-Resistance vs. Junction Temperature

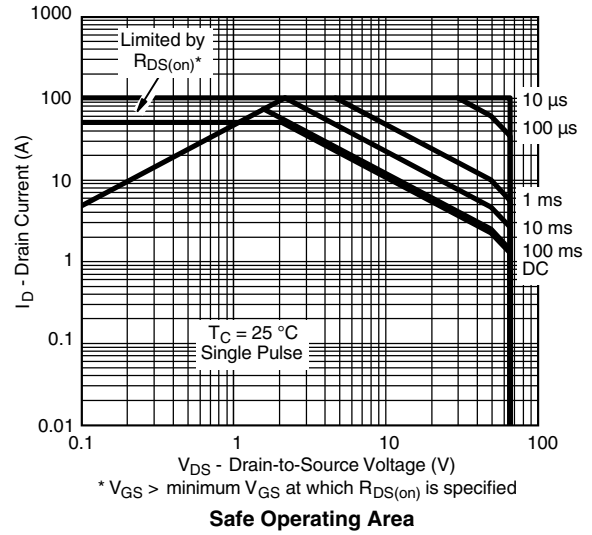


Source-Drain Diode Forward Voltage

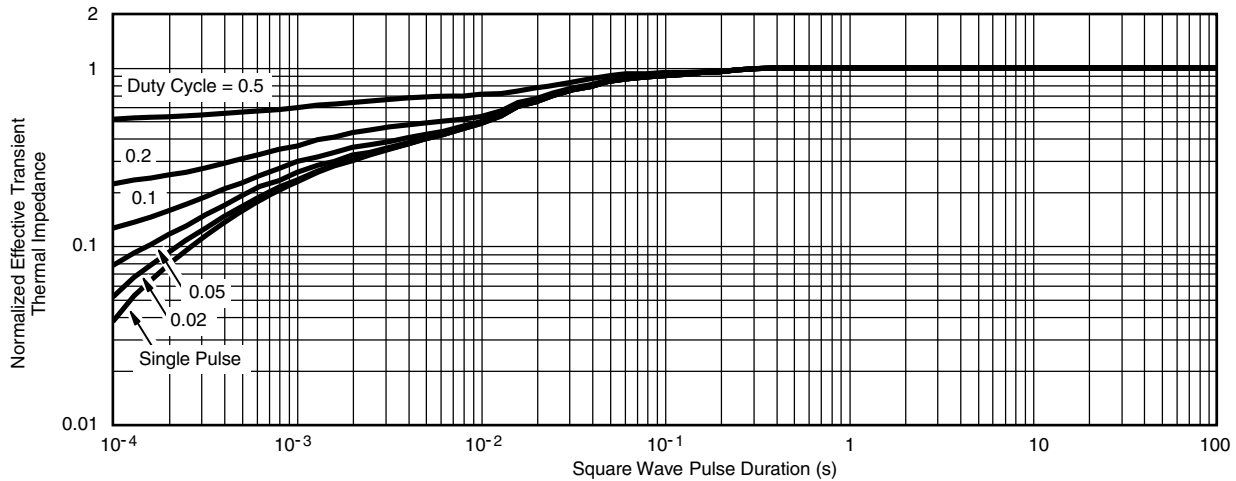
THERMAL RATINGS



Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



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 www.vishay.com/ppg?72004.



TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y



| DIM. | MILLIMETERS | |
|------|-------------|-------|
| | MIN. | MAX. |
| A | 2.18 | 2.38 |
| A1 | - | 0.127 |
| b | 0.64 | 0.88 |
| b2 | 0.76 | 1.14 |
| b3 | 4.95 | 5.46 |
| C | 0.46 | 0.61 |
| C2 | 0.46 | 0.89 |
| D | 5.97 | 6.22 |
| D1 | 4.10 | - |
| E | 6.35 | 6.73 |
| E1 | 4.32 | - |
| H | 9.40 | 10.41 |
| e | 2.28 BSC | |
| e1 | 4.56 BSC | |
| L | 1.40 | 1.78 |
| L3 | 0.89 | 1.27 |
| L4 | - | 1.02 |
| L5 | 1.01 | 1.52 |

Note

- Dimension L3 is for reference only



VERSION 2: FACILITY CODE = N



| MILLIMETERS | | |
|-------------|----------|-------|
| DIM. | MIN. | MAX. |
| A | 2.18 | 2.39 |
| A1 | - | 0.13 |
| b | 0.65 | 0.89 |
| b1 | 0.64 | 0.79 |
| b2 | 0.76 | 1.13 |
| b3 | 4.95 | 5.46 |
| c | 0.46 | 0.61 |
| c1 | 0.41 | 0.56 |
| c2 | 0.46 | 0.60 |
| D | 5.97 | 6.22 |
| D1 | 5.21 | - |
| E | 6.35 | 6.73 |
| E1 | 4.32 | - |
| e | 2.29 BSC | |
| H | 9.94 | 10.34 |

| MILLIMETERS | | |
|-------------|-----------|------|
| DIM. | MIN. | MAX. |
| L | 1.50 | 1.78 |
| L1 | 2.74 ref. | |
| L2 | 0.51 BSC | |
| L3 | 0.89 | 1.27 |
| L4 | - | 1.02 |
| L5 | 1.14 | 1.49 |
| L6 | 0.65 | 0.85 |
| θ | 0° | 10° |
| θ1 | 0° | 15° |
| θ2 | 25° | 35° |

Notes

- Dimensioning and tolerance confirm to ASME Y14.5M-1994
- All dimensions are in millimeters. Angles are in degrees
- Heat sink side flash is max. 0.8 mm
- Radius on terminal is optional

ECN: E19-0649-Rev. Q, 16-Dec-2019
 DWG: 5347

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



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