

N-Channel 30 V (D-S) MOSFET

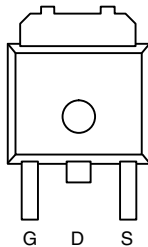
PRODUCT SUMMARY

| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) ^a |
|--------------|----------------------------|------------------------|
| 30 | 0.0120 at $V_{GS} = 10$ V | 17.5 |
| | 0.0175 at $V_{GS} = 4.5$ V | 14.5 |

FEATURES

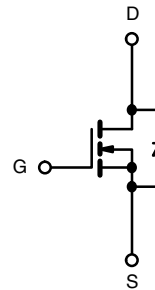
- TrenchFET[®] Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC


RoHS
COMPLIANT

TO-252


Top View

Drain Connected to Tab

Ordering Information: SUD50N03-12P-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} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | |
| Continuous Drain Current ^a | I_D | $T_A = 25$ °C | 17.5 |
| | | $T_A = 100$ °C | 12.4 |
| Pulsed Drain Current | I_{DM} | 40 | A |
| Continuous Source Current (Diode Conduction) ^a | I_S | 5 | |
| Avalanche Current | I_{AS} | 30 | |
| Single Pulse Avalanche Energy | E_{AS} | 45 | mJ |
| Maximum Power Dissipation | P_D | $T_C = 25$ °C | 46.8 |
| | | $T_A = 25$ °C | 6.5 ^a |
| 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 | R_{thJA} | $t \leq 10$ s | 18 | °C/W |
| | | Steady State | 40 | |
| Maximum Junction-to-Case | R_{thJC} | 2.6 | 3.2 | |

Note:

 a. Surface mounted on FR4 board, $t \leq 10$ s.

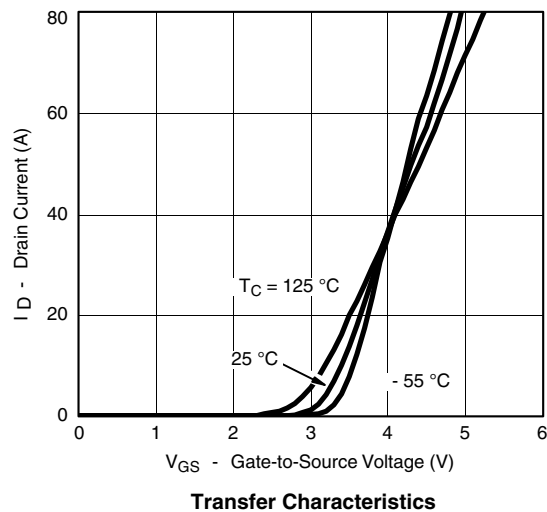
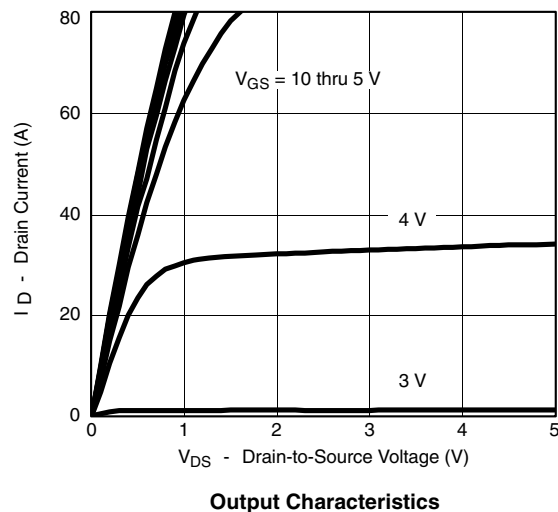
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | |
|---|--------------|--|------|-------------------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. ^a | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 30 | | | 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} | $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$ | | | 1 | μA |
| | | $V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | | | 50 | |
| On-State Drain Current ^b | $I_{D(on)}$ | $V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$ | 40 | | | A |
| Drain-Source On-State Resistance ^b | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | | 0.0100 | 0.0120 | Ω |
| | | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | | | 0.0170 | |
| | | $V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$ | | 0.0138 | 0.0175 | |
| Forward Transconductance ^b | g_{fs} | $V_{DS} = 15\text{ V}, I_D = 20\text{ A}$ | 15 | | | S |
| Dynamic^a | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | | 1600 | | μF |
| Output Capacitance | C_{oss} | | | 285 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 140 | | |
| Total Gate Charge ^c | Q_g | $V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$ | | 28 | 42 | nC |
| Gate-Source Charge ^c | Q_{gs} | | | 6 | | |
| Gate-Drain Charge ^c | Q_{gd} | | | 5 | | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | 0.3 | 1.5 | 3.0 | Ω |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = 15\text{ V}, R_L = 0.3\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\text{ }\Omega$ | | 9 | 15 | ns |
| Rise Time ^c | t_r | | | 15 | 25 | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | | 20 | 30 | |
| Fall Time ^c | t_f | | | 12 | 20 | |
| 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} | $I_F = 40\text{ A}, V_{GS} = 0\text{ V}$ | | 1.2 | 1.5 | V |
| Source-Drain Reverse Recovery Time | t_{rr} | $I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | | 25 | 70 | ns |

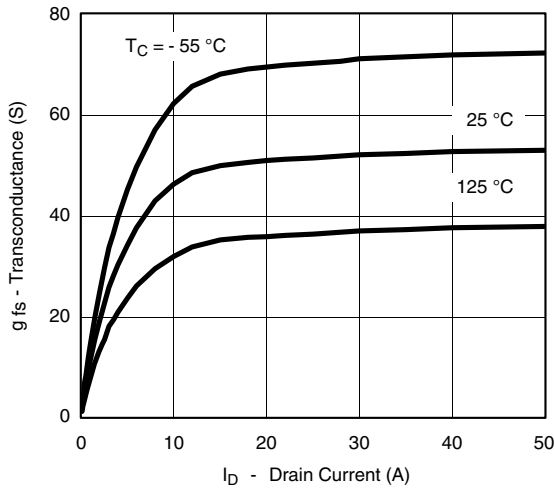
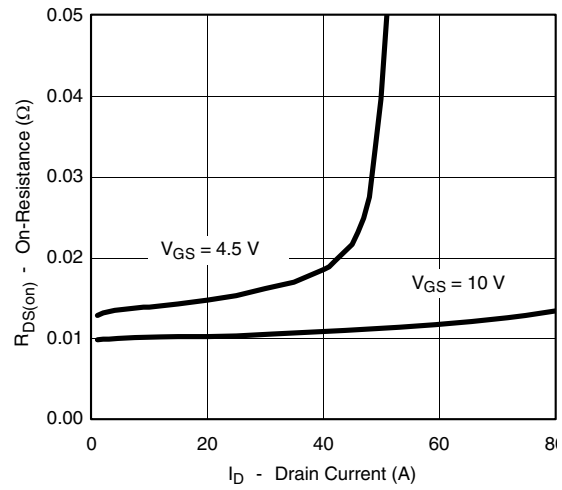
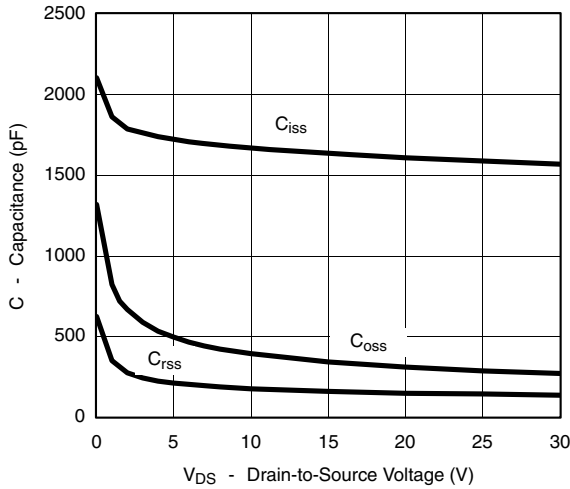
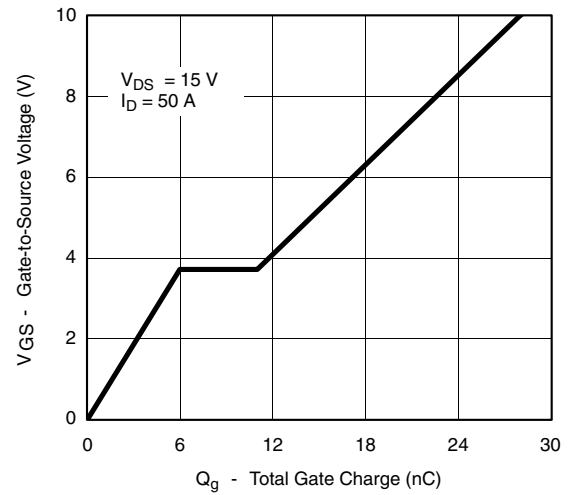
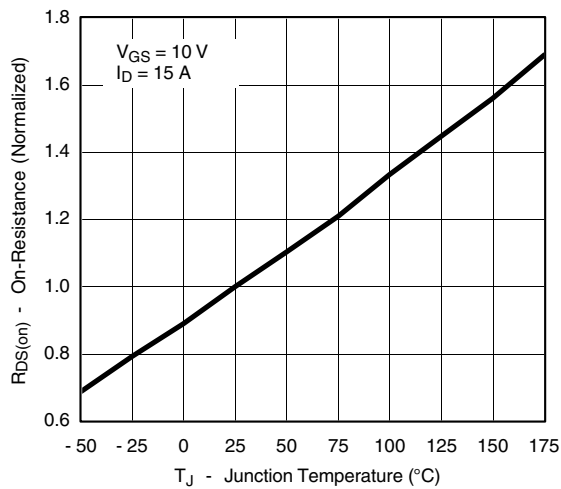
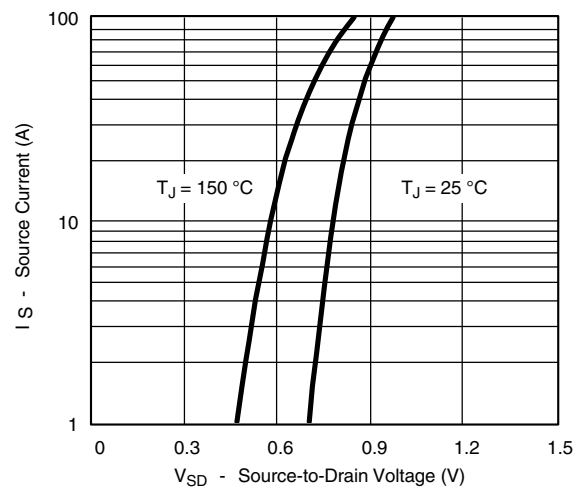
Notes:

- 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.

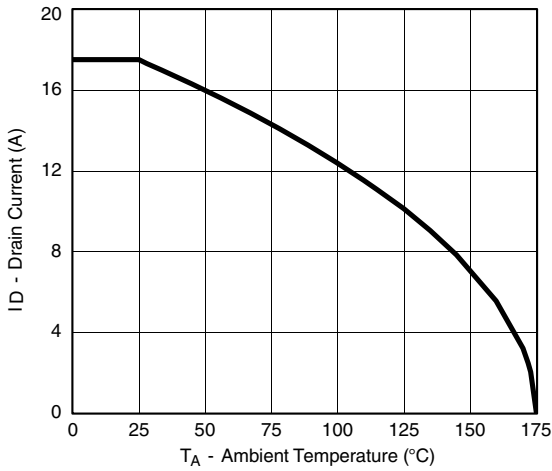
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS ($25\text{ }^\circ\text{C}$ unless noted)

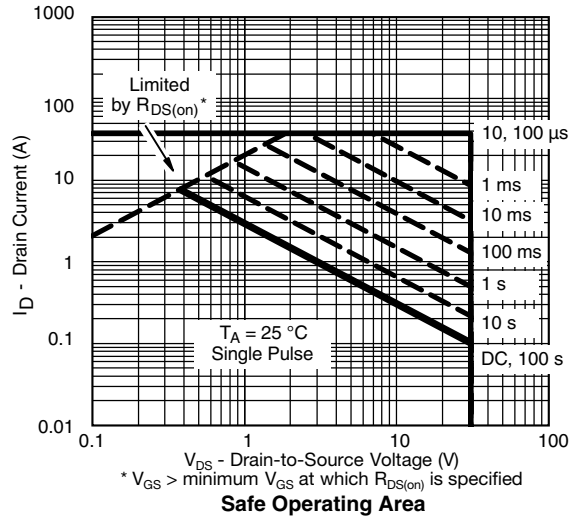


TYPICAL CHARACTERISTICS (25 °C unless noted)

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage

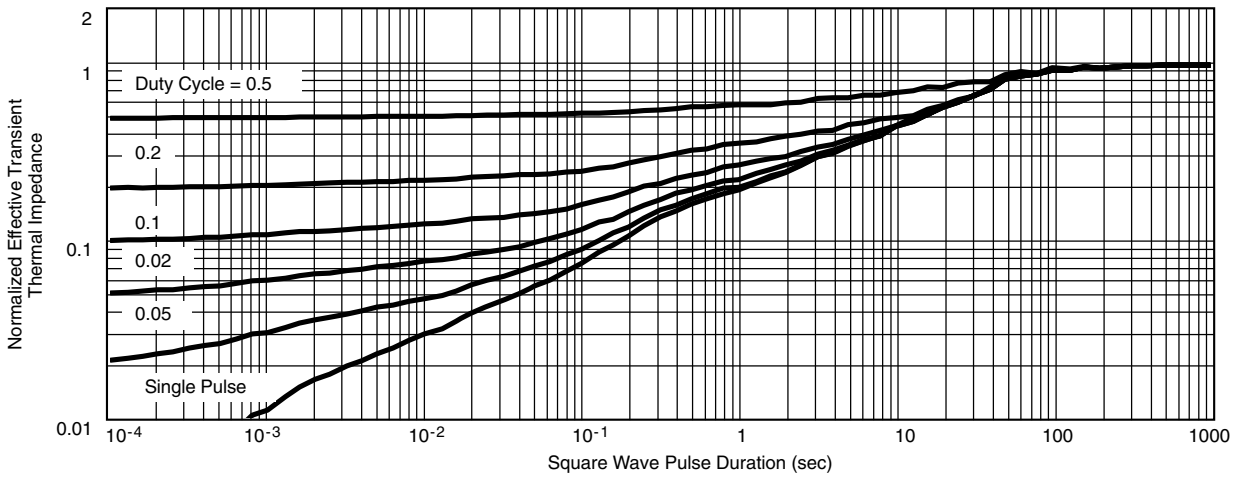
THERMAL RATINGS



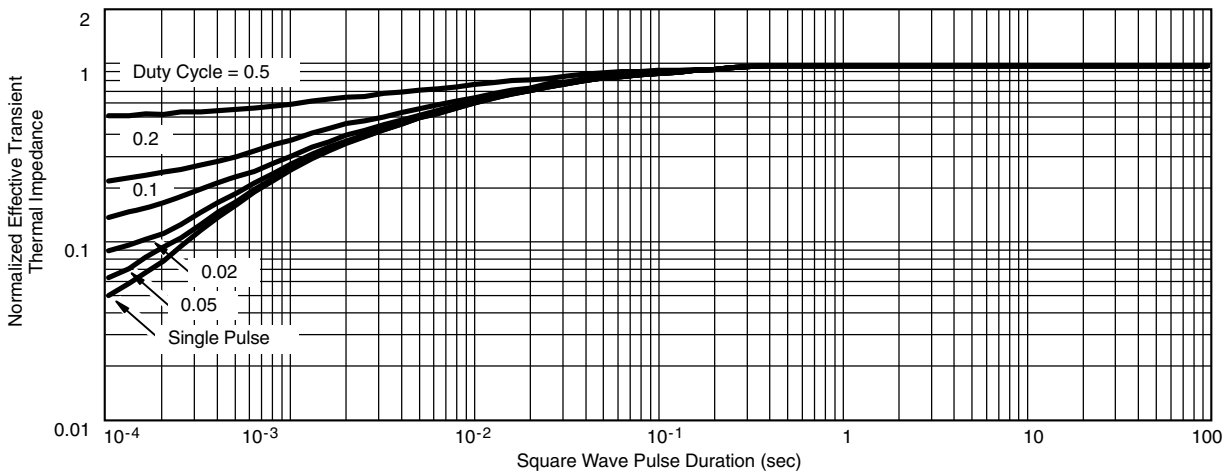
Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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TO-252AA Case Outline

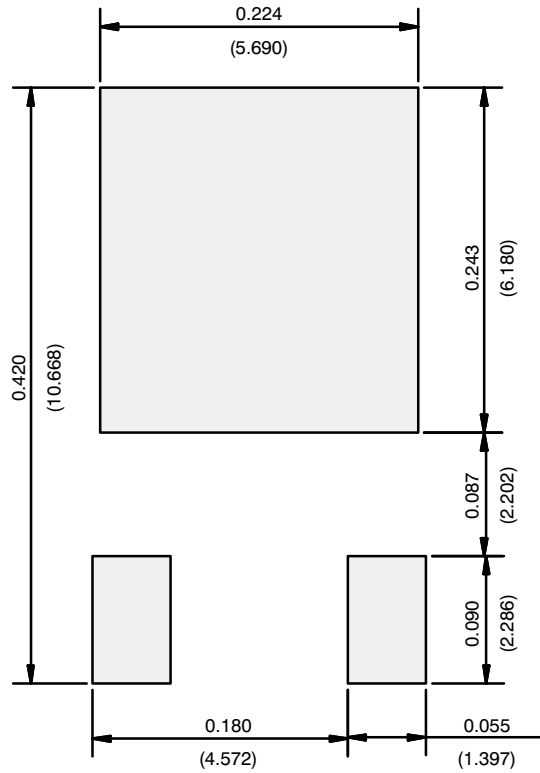


| DIM. | MILLIMETERS | | INCHES | |
|--|-------------|-------|-----------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 2.18 | 2.38 | 0.086 | 0.094 |
| A1 | - | 0.127 | - | 0.005 |
| b | 0.64 | 0.88 | 0.025 | 0.035 |
| b2 | 0.76 | 1.14 | 0.030 | 0.045 |
| b3 | 4.95 | 5.46 | 0.195 | 0.215 |
| C | 0.46 | 0.61 | 0.018 | 0.024 |
| C2 | 0.46 | 0.89 | 0.018 | 0.035 |
| D | 5.97 | 6.22 | 0.235 | 0.245 |
| D1 | 4.10 | - | 0.161 | - |
| E | 6.35 | 6.73 | 0.250 | 0.265 |
| E1 | 4.32 | - | 0.170 | - |
| H | 9.40 | 10.41 | 0.370 | 0.410 |
| e | 2.28 BSC | | 0.090 BSC | |
| e1 | 4.56 BSC | | 0.180 BSC | |
| L | 1.40 | 1.78 | 0.055 | 0.070 |
| L3 | 0.89 | 1.27 | 0.035 | 0.050 |
| L4 | - | 1.02 | - | 0.040 |
| L5 | 1.01 | 1.52 | 0.040 | 0.060 |
| ECN: T16-0236-Rev. P, 16-May-16 DWG: 5347 | | | | |

Notes

- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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