

N-Channel 100-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) |
|--------------|---------------------------|-----------|
| 100 | 0.025 at $V_{GS} = 10$ V | 40 |
| | 0.028 at $V_{GS} = 4.5$ V | 38 |

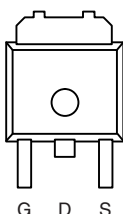
FEATURES

- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- 100 % R_g Tested



Available
RoHS*
COMPLIANT

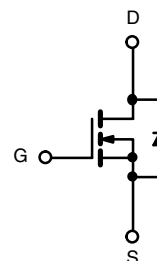
TO-252



Top View

Drain Connected to Tab

Ordering Information: SUD40N10-25
SUD40N10-25-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} | 100 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | |
| Continuous Drain Current ($T_J = 175$ °C) ^b | I_D | 40 | A |
| | | 23 | |
| Pulsed Drain Current | I_{DM} | 70 | |
| Continuous Source Current (Diode Conduction) | I_S | 40 | |
| Avalanche Current | I_{AS} | 40 | mJ |
| Single Pulse Avalanche Energy (Duty Cycle ≤ 1 %) | E_{AS} | 80 | |
| Maximum Power Dissipation | P_D | 136 ^b | W |
| | | 3 ^a | |
| 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} | 15 | 18 | °C/W |
| | | 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.

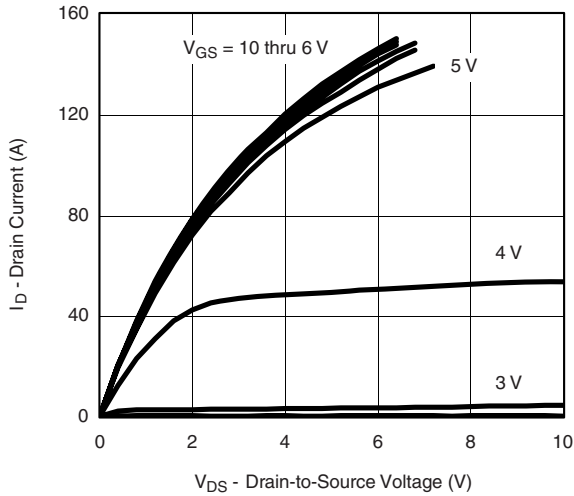
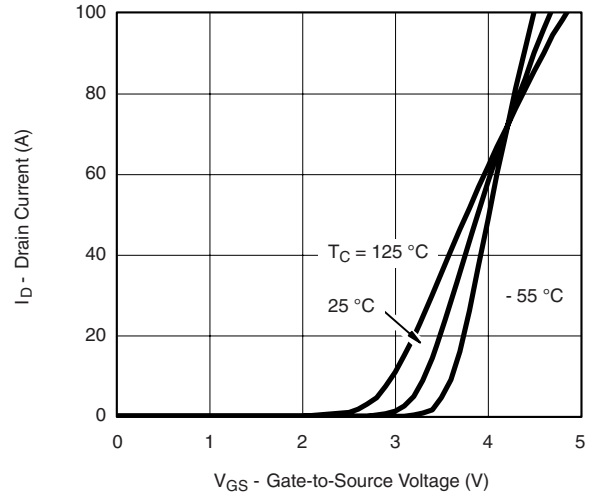
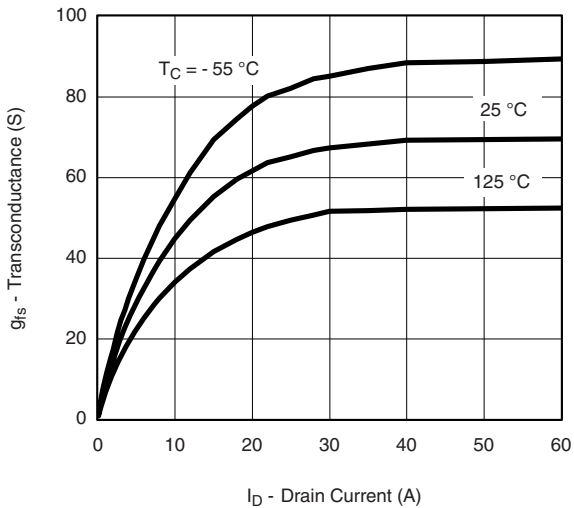
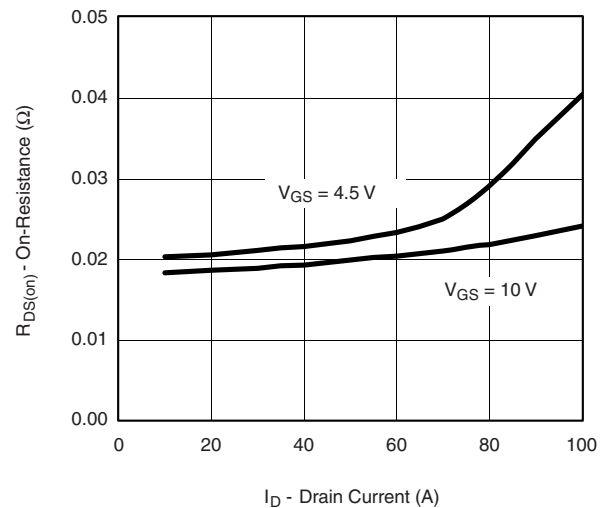
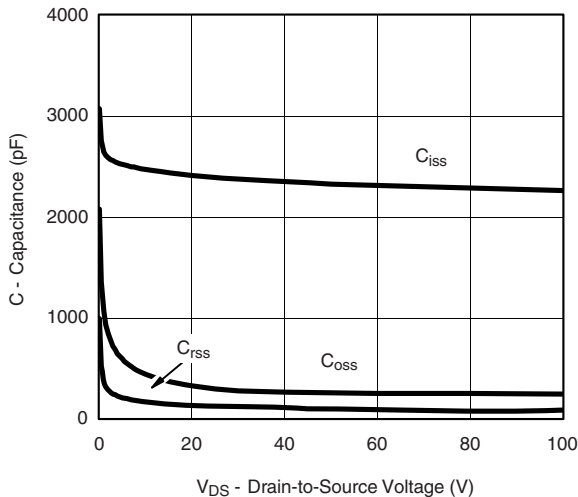
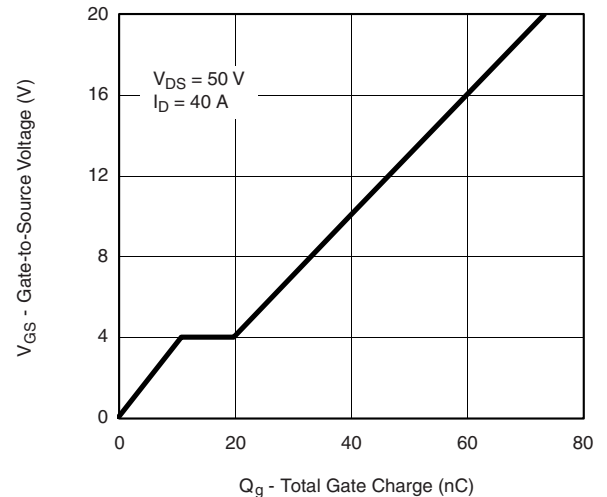
* Pb containing terminations are not RoHS compliant, exemptions may apply.

| SPECIFICATIONS T _J = 25 °C, unless otherwise noted | | | | | | |
|---|---------------------|---|------|-------------------|-------|------|
| Parameter | Symbol | Test Conditions | Min. | Typ. ^a | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{DS} | V _{GS} = 0 V, I _D = 250 μA | 100 | | | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | 1.0 | | 3.0 | |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 20 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 100 V, V _{GS} = 0 V | | | 1 | μA |
| | | V _{DS} = 100 V, V _{GS} = 0 V, T _J = 125 °C | | | 50 | |
| | | V _{DS} = 100 V, V _{GS} = 0 V, T _J = 175 °C | | | 250 | |
| On-State Drain Current ^b | I _{D(on)} | V _{DS} = 5 V, V _{GS} = 10 V | 70 | | | A |
| Drain-Source On-State Resistance ^b | R _{DS(on)} | V _{GS} = 10 V, I _D = 40 A | | 0.02 | 0.025 | Ω |
| | | V _{GS} = 10 V, I _D = 40 A, T _J = 125 °C | | | 0.05 | |
| | | V _{GS} = 10 V, I _D = 40 A, T _J = 175 °C | | | 0.063 | |
| | | V _{GS} = 4.5 V, I _D = 20 A | | 0.022 | 0.028 | |
| Forward Transconductance ^b | g _{fs} | V _{DS} = 15 V, I _D = 40 A | | 70 | | S |
| Dynamic ^a | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 25 V, F = 1 MHz | | 2400 | | pF |
| Output Capacitance | C _{oss} | | | 290 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 120 | | |
| Total Gate Charge ^c | Q _g | V _{DS} = 50 V, V _{GS} = 10 V, I _D = 40 A | | 40 | 60 | nC |
| Gate-Source Charge ^c | Q _{gs} | | | 11 | | |
| Gate-Drain Charge ^c | Q _{gd} | | | 9 | | |
| Gate Resistance | R _g | | 1 | | 3.5 | Ω |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = 50 V, R _L = 1.25 Ω I _D ≅ 40 A, V _{GEN} = 10 V, R _g = 2.5 Ω | | 8 | 13 | ns |
| Rise Time ^c | t _r | | | 40 | 60 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | | 15 | 25 | |
| Fall Time ^c | t _f | | | 80 | 120 | |
| Source-Drain Diode Ratings and Characteristics T _C = 25 °C | | | | | | |
| Pulsed Current | I _{SM} | | | | 70 | A |
| Diode Forward Voltage ^b | V _{SD} | I _F = 40 A, V _{GS} = 0 V | | 1.0 | 1.5 | V |
| Source-Drain Reverse Recovery Time | t _{rr} | I _F = 40 A, dI/dt = 100 A/μs | | 75 | 120 | ns |

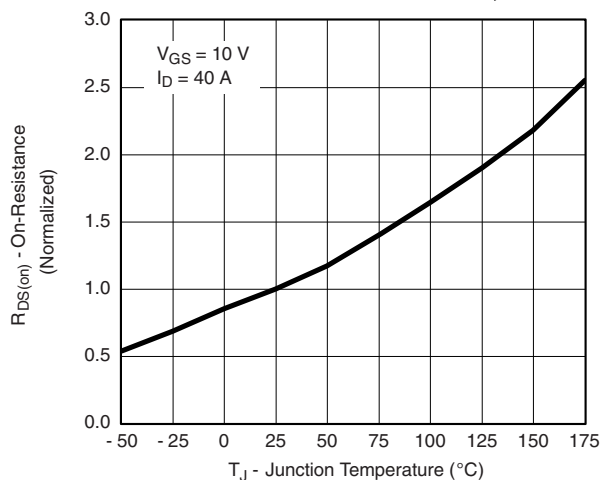
Notes:

- 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.

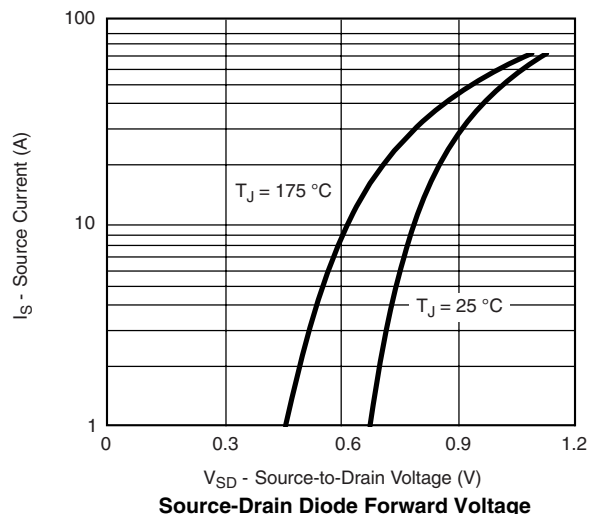
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

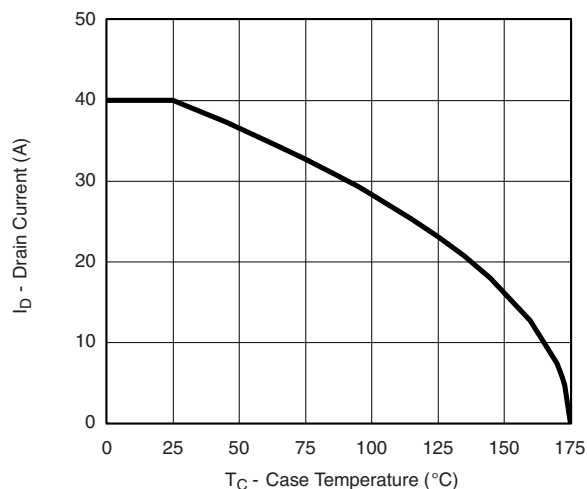


On-Resistance vs. Junction Temperature

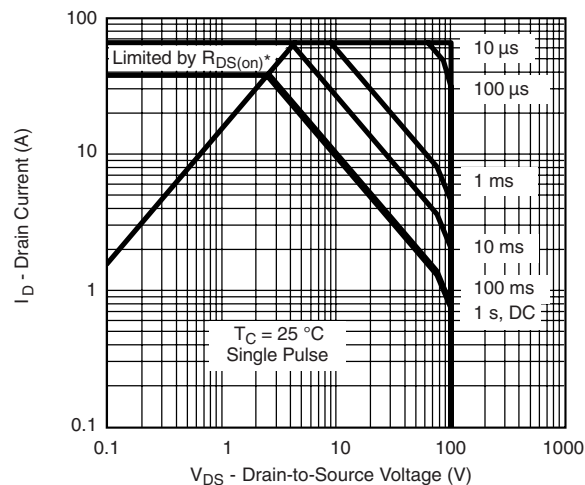


Source-Drain Diode Forward Voltage

THERMAL RATINGS

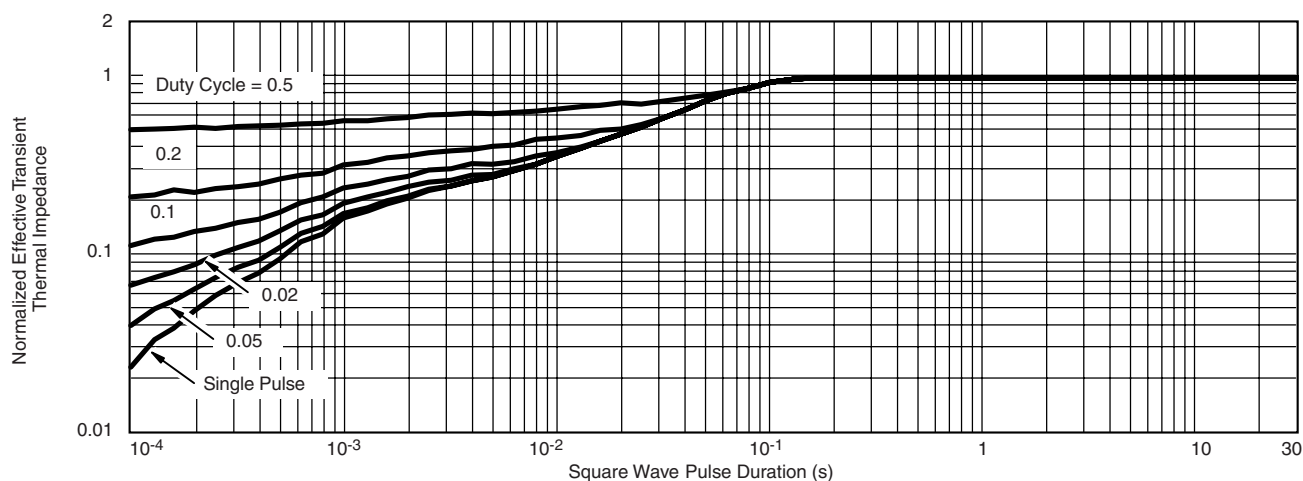


Maximum Avalanche Drain Current vs. Case Temperature



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

Safe Operating Area

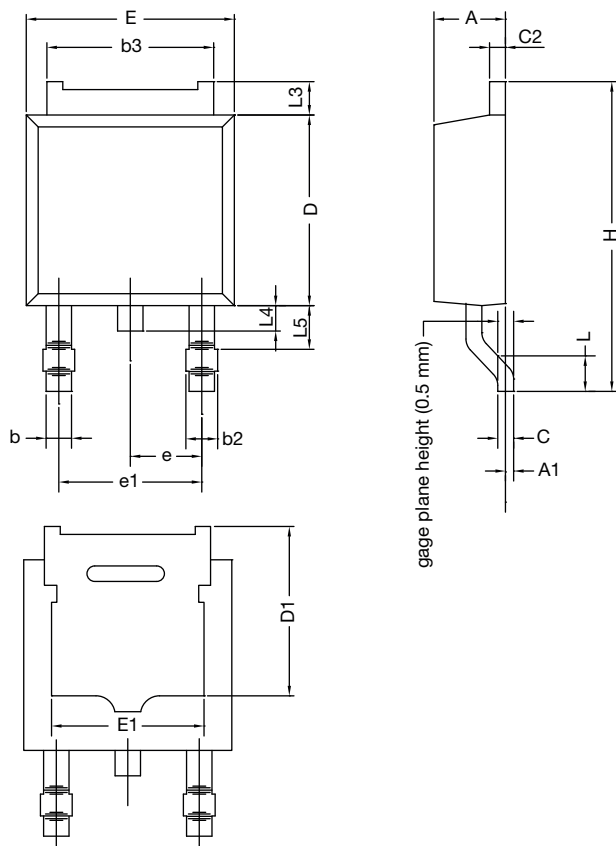


Normalized Thermal Transient Impedance, Junction-to-Case

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 <http://www.vishay.com/ppg71140>.



TO-252AA Case Outline

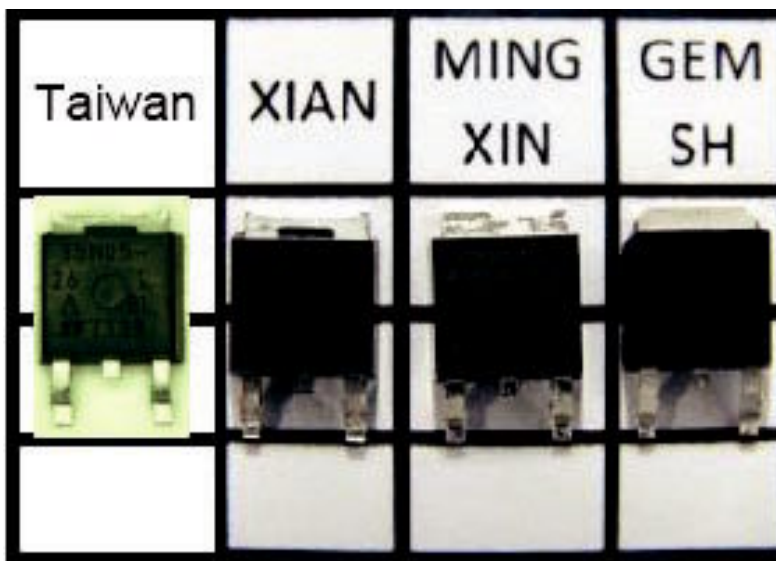


| DIM. | MILLIMETERS | | INCHES | |
|------|-------------|-------|-----------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 2.18 | 2.38 | 0.086 | 0.094 |
| A1 | - | 0.127 | - | 0.005 |
| b | 0.64 | 0.88 | 0.025 | 0.035 |
| b2 | 0.76 | 1.14 | 0.030 | 0.045 |
| b3 | 4.95 | 5.46 | 0.195 | 0.215 |
| C | 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 |

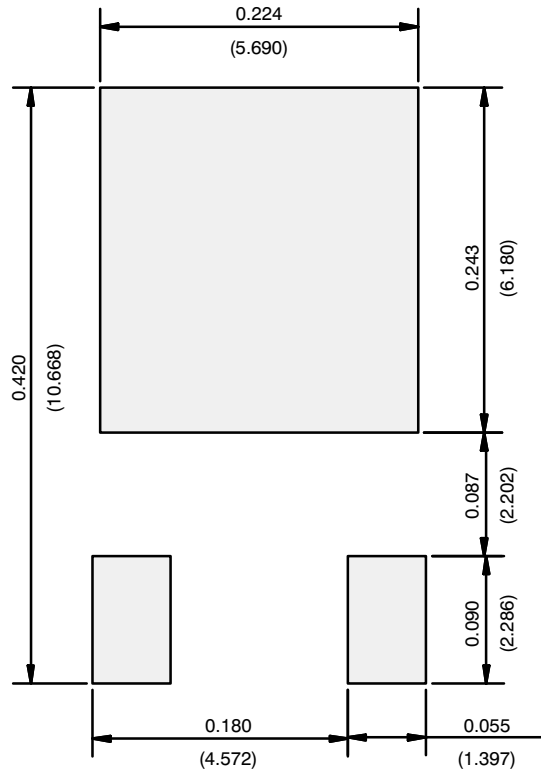
ECN: T13-0359-Rev. O, 03-Jun-13
DWG: 5347

Notes

- Dimension L3 is for reference only.
- Xi'an, Mingxin, and GEM SH actual photo.



RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



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