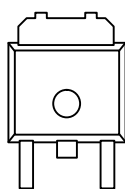


P-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY

| V_{DS} (V) | $R_{DS(on)}$ (Ω) Max. | I_D (A) | Q_g (Typ.) |
|--------------|--------------------------------|-----------|--------------|
| - 40 | 0.0162 at $V_{GS} = - 10$ V | - 36 | 67 |
| | 0.0230 at $V_{GS} = - 4.5$ V | - 24 | |

TO-252



G D S

Top View

Drain Connected to Tab

Ordering Information:

SUD45P04-16P-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

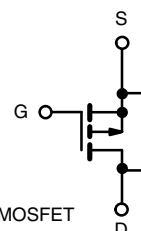
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Power Switch
- Load Switch in High Current Applications
- DC/DC Converters



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

| Parameter | | Symbol | Limit | Unit |
|--|-------------------------------------|-----------------------------------|-------------------|------|
| Drain-Source Voltage | | V _{DS} | - 40 | V |
| Gate-Source Voltage | | V _{GS} | ± 20 | |
| Continuous Drain Current (T _J = 150 °C) | T _C = 25 °C | I _D | - 36 | A |
| | T _C = 70 °C | | - 29 | |
| Pulsed Drain Current (t = 300 μs) | | I _{DM} | - 100 | |
| Avalanche Current | | I _{AS} | - 32 | |
| Single Avalanche Energy ^a | L = 0.1 mH | E _{AS} | 51 | mJ |
| Maximum Power Dissipation ^a | T _C = 25 °C | P _D | 41.7 ^b | W |
| | T _A = 25 °C ^c | | 2.1 | |
| Operating Junction and Storage Temperature Range | | T _J , T _{stg} | - 55 to 150 | °C |

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Limit | Unit |
|--|------------|-------|------|
| Junction-to-Ambient (PCB Mount) ^c | R_{thJA} | 60 | °C/W |
| Junction-to-Case (Drain) | R_{thJC} | 3 | |

Notes:

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

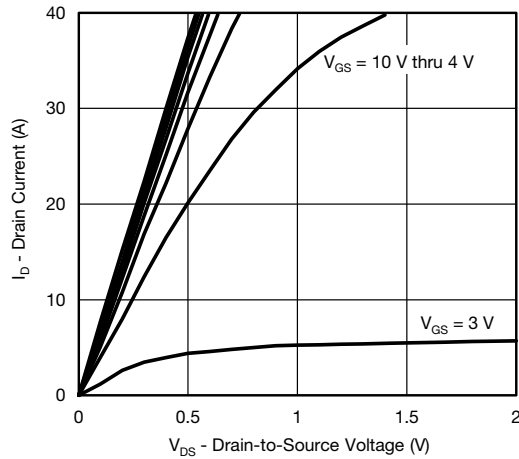
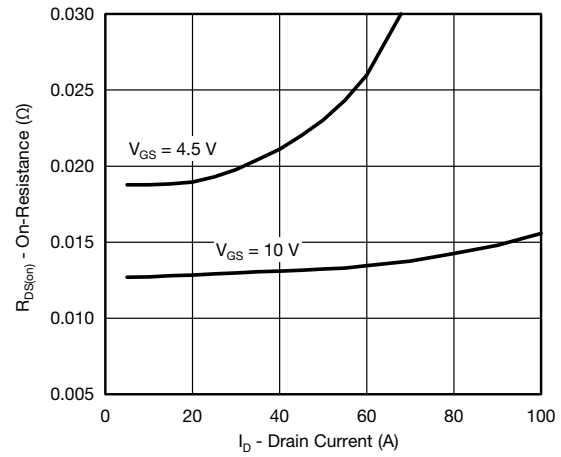
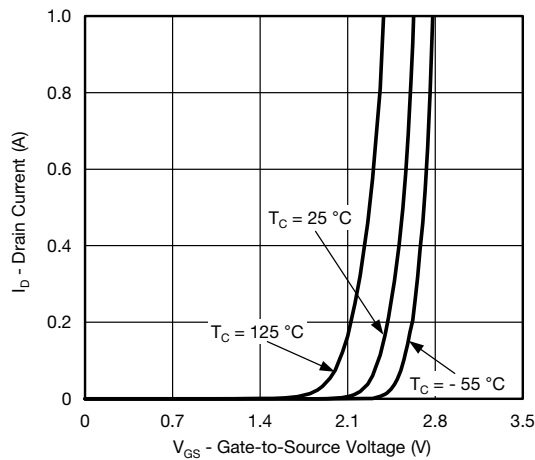
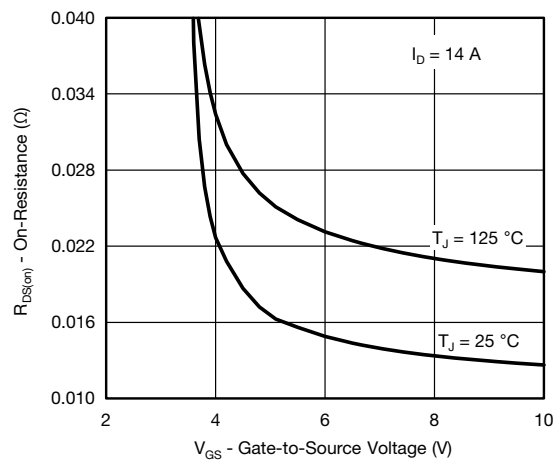
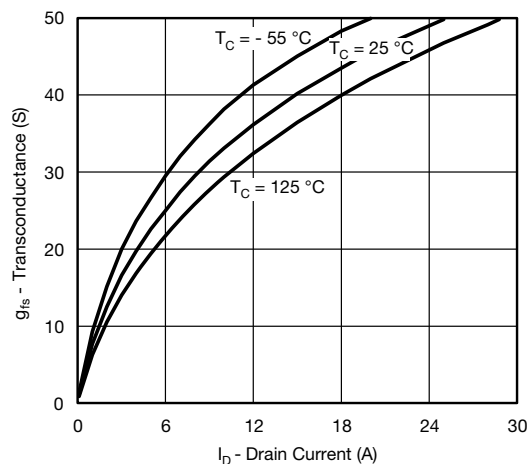
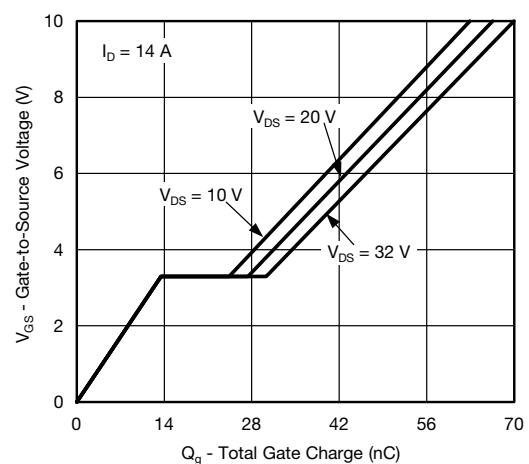
c. When mounted on 1" square PCB (FR-4 material).

| SPECIFICATIONS (T _J = 25 °C, unless otherwise noted) | | | | | | |
|---|----------------------|--|------|--------|--------|------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{DS} | V _{DS} = 0 V, I _D = - 250 μA | - 40 | | | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = - 250 μA | - 1 | | - 2.5 | |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 20 V | | | ± 250 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = - 40 V, V _{GS} = 0 V | | | - 1 | μA |
| | | V _{DS} = - 40 V, V _{GS} = 0 V, T _J = 125 °C | | | - 50 | |
| | | V _{DS} = - 40 V, V _{GS} = 0 V, T _J = 150 °C | | | - 250 | |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} ≤ - 10 V, V _{GS} = - 10 V | - 50 | | | A |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | V _{GS} = - 10 V, I _D = - 14 A | | 0.0135 | 0.0162 | Ω |
| | | V _{GS} = - 4.5 V, I _D = - 12 A | | 0.0190 | 0.0230 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = - 20 V, I _D = - 14 A | | 40 | | S |
| Dynamic ^b | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = - 20 V, f = 1 MHz | | 2765 | | pF |
| Output Capacitance | C _{oss} | | | 330 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 280 | | |
| Total Gate Charge ^c | Q _g | V _{DS} = - 20 V, V _{GS} = - 10 V, I _D = - 14 A | | 67 | 100 | nC |
| Gate-Source Charge ^c | Q _{gs} | | | 13.5 | | |
| Gate-Drain Charge ^c | Q _{gd} | | | 14 | | |
| Gate Resistance | R _g | f = 1 MHz | 0.5 | 2.5 | 5 | Ω |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = - 20 V, R _L = 2 Ω I _D ≅ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω | | 10 | 20 | ns |
| Rise Time ^c | t _r | | | 11 | 20 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | | 42 | 63 | |
| Fall Time ^c | t _f | | | 12 | 20 | |
| Drain-Source Body Diode Ratings and Characteristics T _C = 25 °C ^b | | | | | | |
| Continuous Current | I _S | | | | - 36 | A |
| Pulsed Current | I _{SM} | | | | - 100 | |
| Forward Voltage ^a | V _{SD} | I _F = - 10 A, V _{GS} = 0 V | | - 0.8 | - 1.5 | V |
| Reverse Recovery Time | t _{rr} | I _F = - 10 A, dI/dt = 100 A/μs | | 38 | 57 | ns |
| Peak Reverse Recovery Current | I _{RM(REC)} | | | 2.3 | 3.5 | A |
| Reverse Recovery Charge | Q _{rr} | | | 40 | 60 | nC |

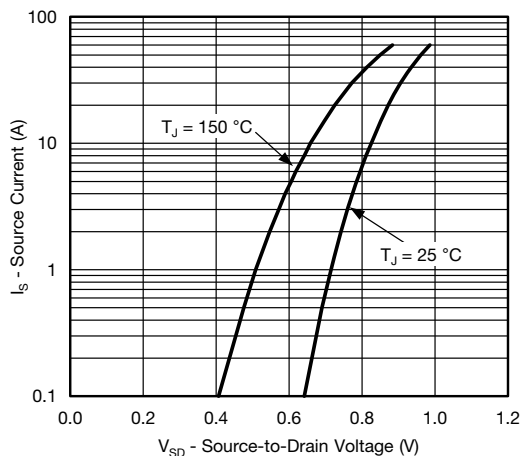
Notes:

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

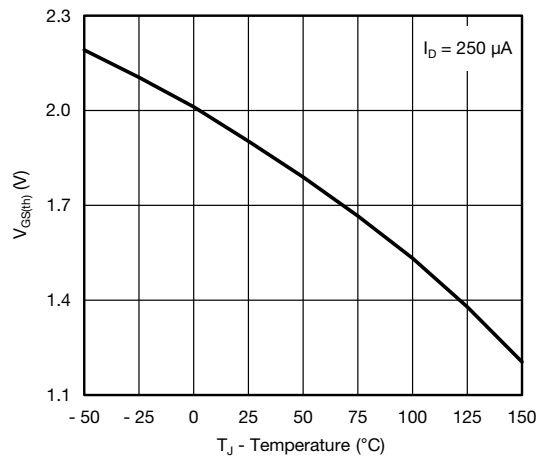
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

On-Resistance vs. Drain Current

Transfer Characteristics

On-Resistance vs. Gate-to-Source Voltage

Transconductance

Gate Charge

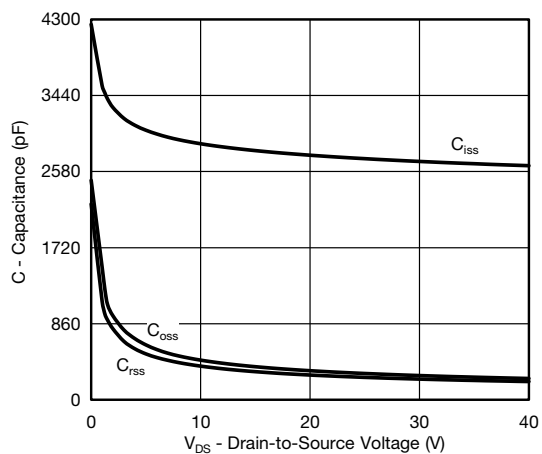
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



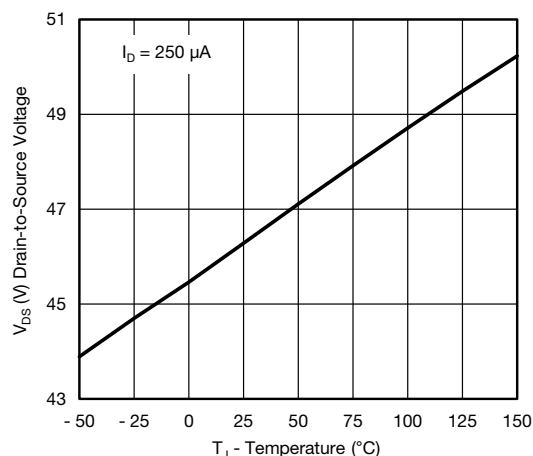
Source-Drain Diode Forward Voltage



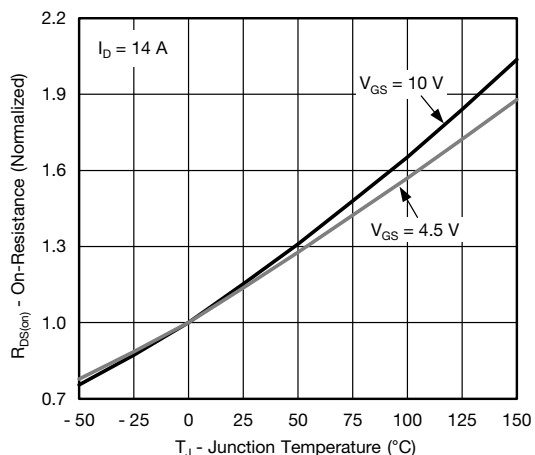
Threshold Voltage



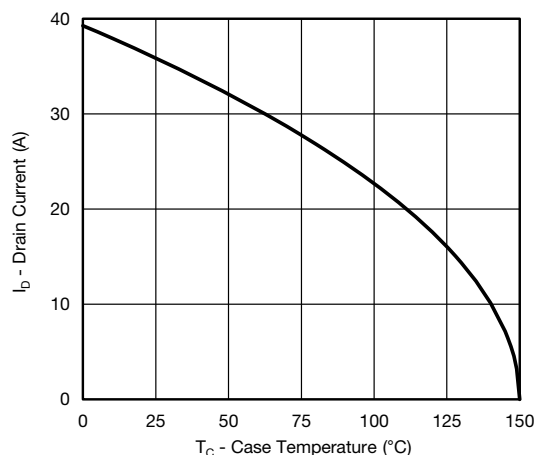
Capacitance



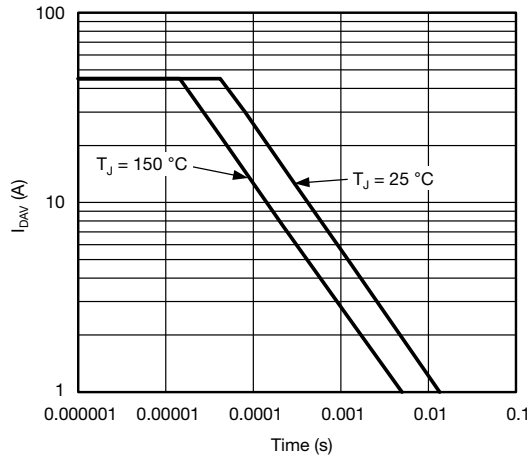
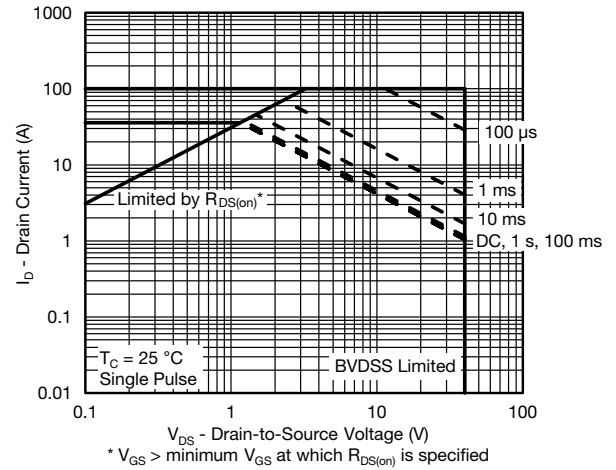
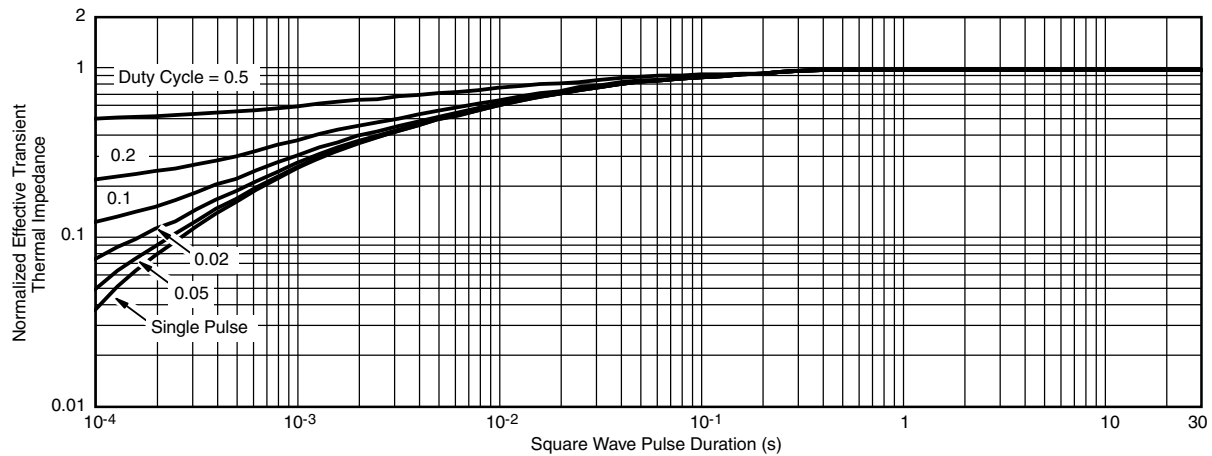
Drain Source Breakdown vs. Junction Temperature



On-Resistance vs. Junction Temperature



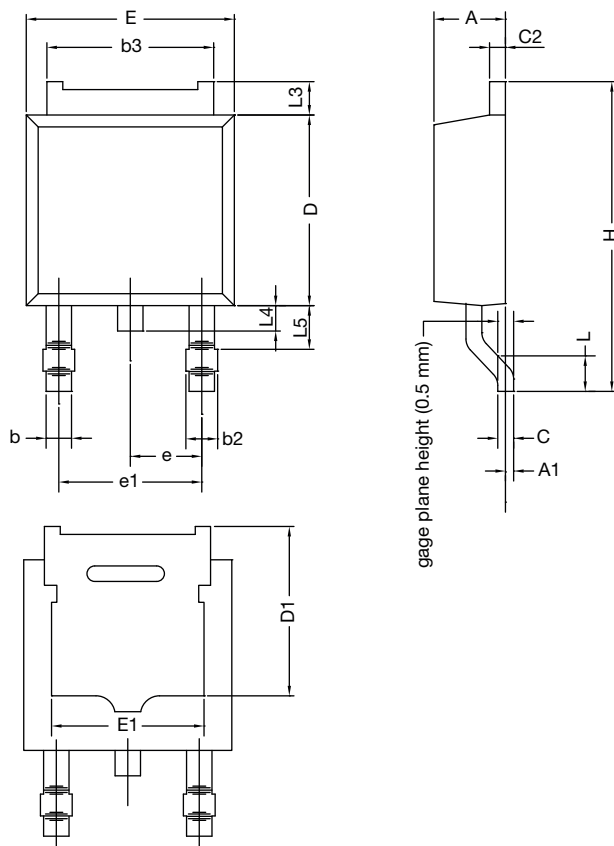
Current Derating

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Single Pulse Avalanche Current Capability vs. Time

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?63372.



TO-252AA Case Outline

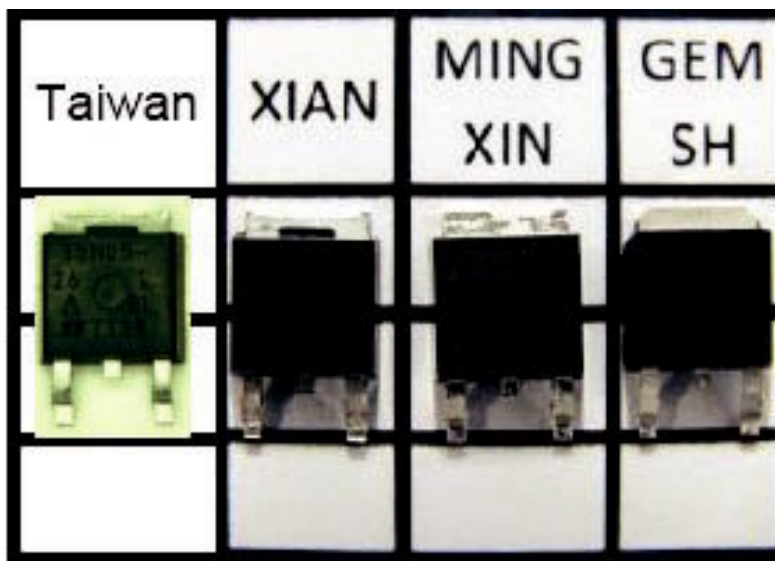


| DIM. | MILLIMETERS | | INCHES | |
|------|-------------|-------|-----------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 2.18 | 2.38 | 0.086 | 0.094 |
| A1 | - | 0.127 | - | 0.005 |
| b | 0.64 | 0.88 | 0.025 | 0.035 |
| b2 | 0.76 | 1.14 | 0.030 | 0.045 |
| b3 | 4.95 | 5.46 | 0.195 | 0.215 |
| C |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