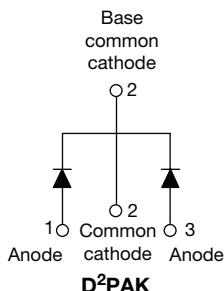
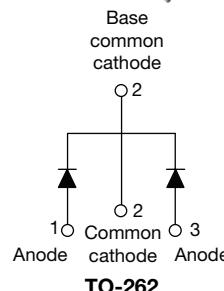


Schottky Rectifier, 2 x 5 A

VS-10CTQ150SPbF



VS-10CTQ150-1PbF



FEATURES

- 175 °C T_J operation
- Center tap configuration
- Low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- AEC-Q101 qualified



RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY

| | |
|-------------|---------|
| $I_{F(AV)}$ | 2 x 5 A |
| V_R | 150 V |

DESCRIPTION

This center tap Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|-------------|---------------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform | 10 | A |
| V_{RRM} | | 150 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 620 | A |
| V_F | 5 Apk, $T_J = 125$ °C (per leg) | 0.73 | V |
| T_J | Range | - 55 to 175 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-10CTQ150SPbF VS-10CTQ150-1PbF | UNITS |
|--------------------------------------|-----------|-------------------------------------|-------|
| Maximum DC reverse voltage | V_R | 150 | V |
| Maximum working peak reverse voltage | V_{RWM} | | |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|-------------|---|--------|-------|
| Maximum average forward current per leg See fig. 5 | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 155$ °C, rectangular waveform | 5 | A |
| per device | | | 10 | |
| Maximum peak one cycle non-repetitive surge current per leg See fig. 7 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | 620 | A |
| | | 10 ms sine or 6 ms rect. pulse | 115 | |
| Non-repetitive avalanche energy per leg | E_{AS} | $T_J = 25$ °C, $I_{AS} = 1$ A, $L = 10$ mH | 5 | mJ |
| Repetitive avalanche current per leg | I_{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | 1 | A |

ELECTRICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS | |
|---|----------------|---|------------------------------------|--------|------------------------|--|
| Maximum forward voltage drop per leg See fig. 1 | $V_{FM}^{(1)}$ | 5 A | $T_J = 25 \text{ }^\circ\text{C}$ | 0.93 | V | |
| | | 10 A | | 1.10 | | |
| | | 5 A | $T_J = 125 \text{ }^\circ\text{C}$ | 0.73 | | |
| | | 10 A | | 0.86 | | |
| Maximum reverse leakage current per leg See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25 \text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 0.05 | mA | |
| | | $T_J = 125 \text{ }^\circ\text{C}$ | | 7 | | |
| Threshold voltage | $V_{F(TO)}$ | $T_J = T_J \text{ maximum}$ | | 0.468 | V | |
| Forward slope resistance | r_t | | | 28 | $\text{m}\Omega$ | |
| Maximum junction capacitance per leg | C_T | $V_R = 5 \text{ V}_{\text{DC}}$ (test signal range 100 kHz to 1 MHz), $25 \text{ }^\circ\text{C}$ | | 200 | pF | |
| Typical series inductance per leg | L_S | Measured lead to lead 5 mm from package body | | 8.0 | nH | |
| Maximum voltage rate of change | dV/dt | Rated V_R | | 10 000 | $\text{V}/\mu\text{s}$ | |

Note(1) Pulse width < 300 μs , duty cycle < 2 %
THERMAL - MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS | |
|--|----------------|--------------------------------------|--|-------------|--|--|
| Maximum junction and storage temperature range | T_J, T_{Stg} | | | - 55 to 175 | $^\circ\text{C}$ | |
| Maximum thermal resistance, junction to case per leg | R_{thJC} | DC operation | | 3.50 | $^\circ\text{C}/\text{W}$ | |
| | | | | 1.75 | | |
| Typical thermal resistance, case to heatsink (only for TO-220) | R_{thCS} | Mounting surface, smooth and greased | | 0.50 | | |
| Approximate weight | | | | 2 | g | |
| | | | | 0.07 | oz. | |
| Mounting torque | minimum | | | 6 (5) | $\text{kgf} \cdot \text{cm}$ (lbf · in) | |
| | maximum | | | 12 (10) | | |
| Marking device | | Case style D ² PAK | | 10CTQ150S | | |
| | | Case style TO-262 | | 10CTQ150-1 | | |

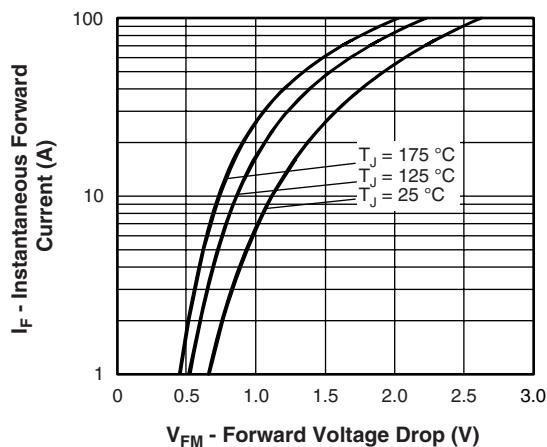


Fig. 1 - Maximum Forward Voltage Drop Characteristics
(Per Leg)

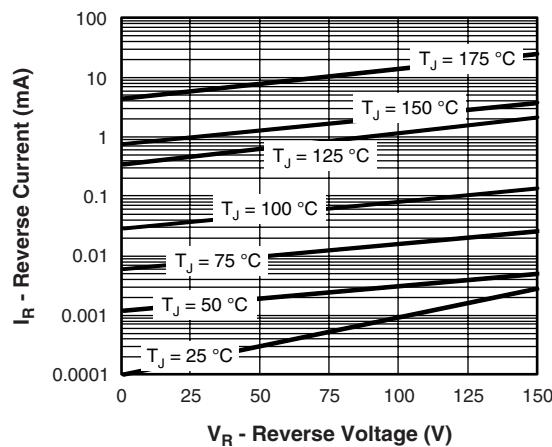


Fig. 2 - Typical Values of Reverse Current vs.
Reverse Voltage (Per Leg)

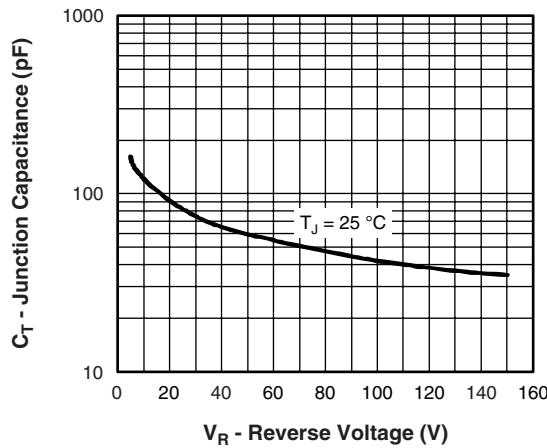


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

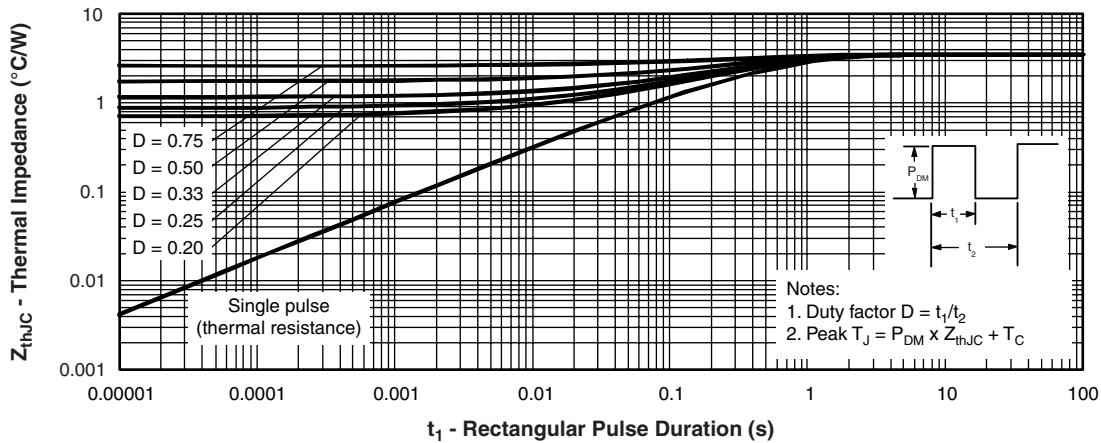


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

VS-10CTQ150SPbF, VS-10CTQ150-1PbF

Vishay High Power Products Schottky Rectifier, 2 x 5 A

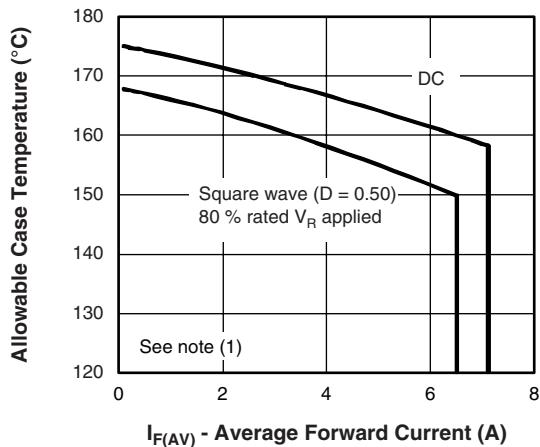


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current (Per Leg)

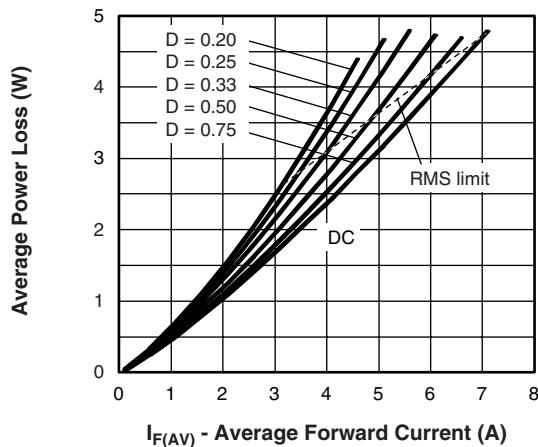


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

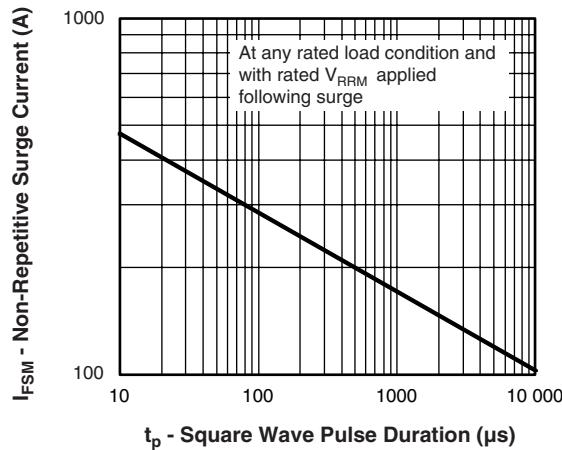


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

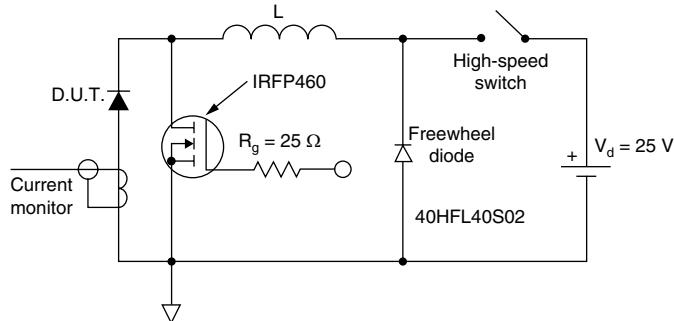


Fig. 8 - Unclamped Inductive Test Circuit

Note

- ⁽¹⁾ Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 $P_d = \text{Forward power loss} = I_{F(AV)} \times V_{FM} \text{ at } (I_{F(AV)}/D) \text{ (see fig. 6)}$;
 $P_{dREV} = \text{Inverse power loss} = V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 10 \text{ V}$

ORDERING INFORMATION TABLE

| Device code | VS- | 10 | C | T | Q | 150 | S | TRL | PbF |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |

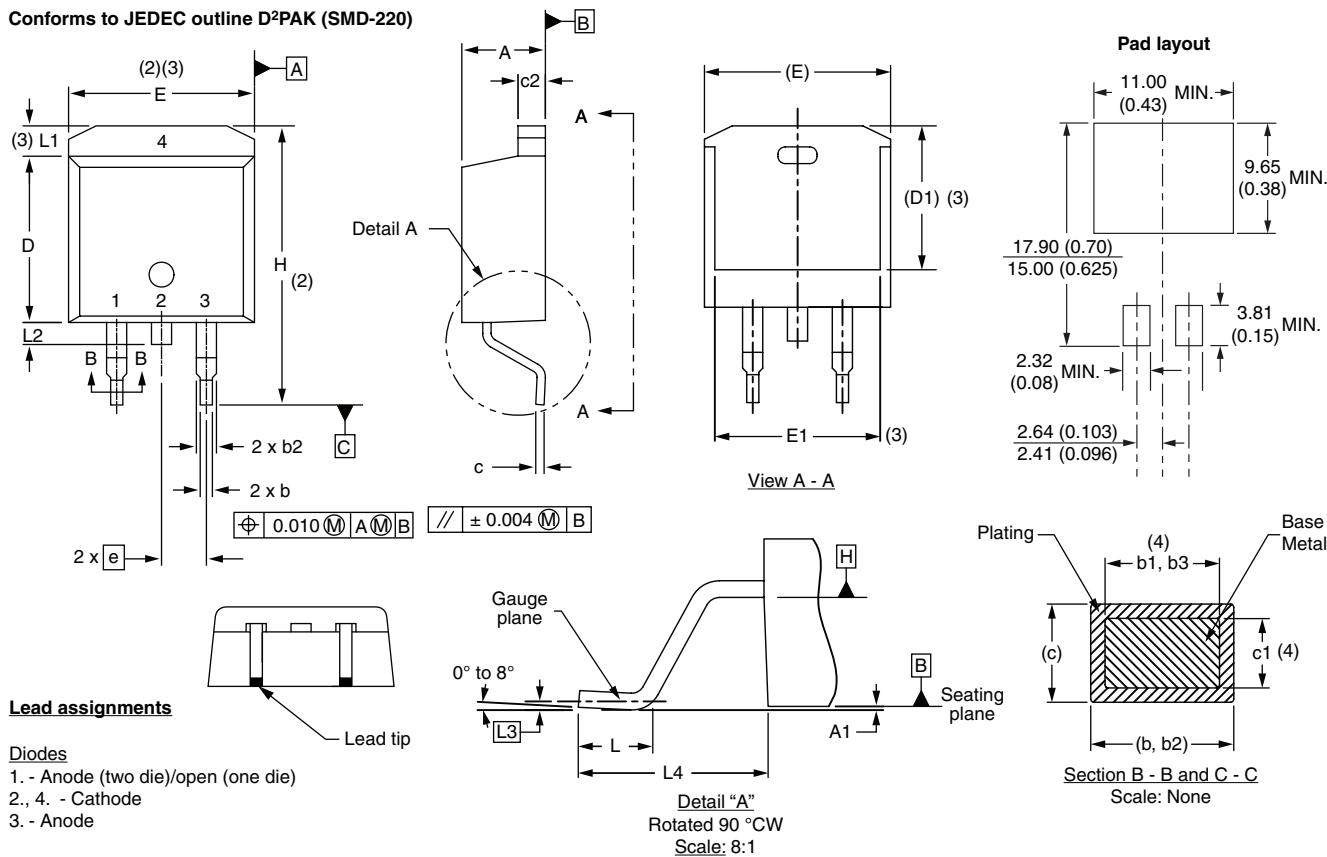
- 1** - HPP product suffix
- 2** - Current rating (10 A)
- 3** - Circuit configuration: C = Common cathode
- 4** - T = TO-220
- 5** - Schottky "Q" series
- 6** - Voltage rating (150 = 150 V)
- 7** - • S = D²PAK
 - -1 = TO-262
- 8** - • None = Tube (50 pieces)
 - TRL = Tape and reel (left oriented - for D²PAK only)
 - TRR = Tape and reel (right oriented - for D²PAK only)
- 9** - PbF = Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95014 |
| Part marking information | www.vishay.com/doc?95008 |
| Packaging information | www.vishay.com/doc?95032 |

D²PAK, TO-262

DIMENSIONS FOR D²PAK in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



| SYMBOL | MILLIMETERS | | INCHES | | NOTES | | SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|--|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | | | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | | | D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| A1 | 0.00 | 0.254 | 0.000 | 0.010 | | | E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| b | 0.51 | 0.99 | 0.020 | 0.039 | | | E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 | 4 | | e | 2.54 BSC | | 0.100 BSC | | |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 | | | H | 14.61 | 15.88 | 0.575 | 0.625 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 | | L | 1.78 | 2.79 | 0.070 | 0.110 | |
| c | 0.38 | 0.74 | 0.015 | 0.029 | | | L1 | - | 1.65 | - | 0.066 | 3 |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 | 4 | | L2 | 1.27 | 1.78 | 0.050 | 0.070 | |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 | | | L3 | 0.25 BSC | | 0.010 BSC | | |
| D | 8.51 | 9.65 | 0.335 | 0.380 | 2 | | L4 | 4.78 | 5.28 | 0.188 | 0.208 | |

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch

(7) Outline conforms to JEDEC outline TO-263AB

Outline Dimensions

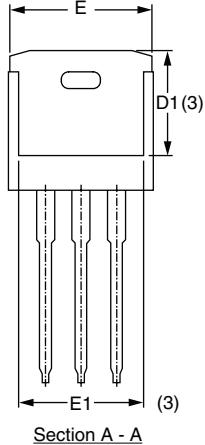
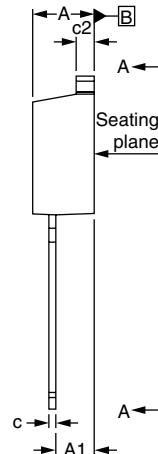
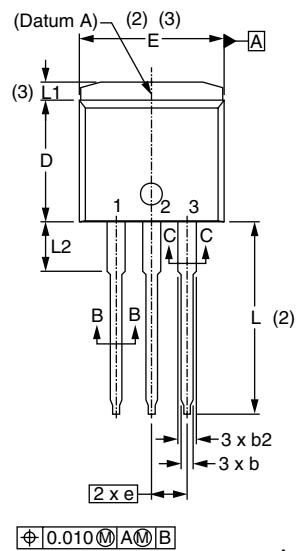
Vishay High Power Products

D²PAK, TO-262



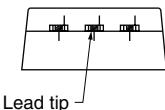
DIMENSIONS FOR TO-262 in millimeters and inches

Modified JEDEC outline TO-262



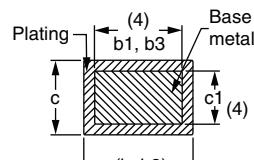
$\pm 0.010 \text{ mm}$

Lead assignments



Diodes

1. - Anode (two die)/open (one die)
- 2., 4. - Cathode
3. - Anode



Section B - B and C - C

Scale: None

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | |
| A1 | 2.03 | 3.02 | 0.080 | 0.119 | |
| b | 0.51 | 0.99 | 0.020 | 0.039 | |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 | 4 |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 |
| c | 0.38 | 0.74 | 0.015 | 0.029 | |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 | 4 |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 | |
| D | 8.51 | 9.65 | 0.335 | 0.380 | 2 |
| D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| e | 2.54 BSC | | 0.100 BSC | | |
| L | 13.46 | 14.10 | 0.530 | 0.555 | |
| L1 | - | 1.65 | - | 0.065 | 3 |
| L2 | 3.56 | 3.71 | 0.140 | 0.146 | |

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Controlling dimension: inches

- (6) Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum) and D1 (minimum) where dimensions derived the actual package outline

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