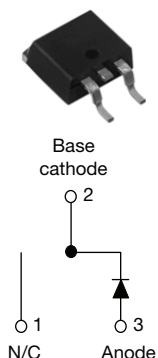


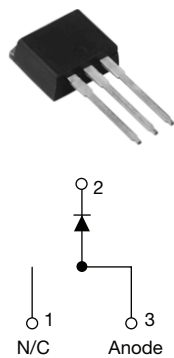
Ultrafast Rectifier, 8 A FRED Pt®

VS-MURB1520PbF



D²PAK

VS-MURB1520-1PbF



TO-262

FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- 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

DESCRIPTION/APPLICATIONS

MUR.. series are the state of the art ultrafast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultrafast recovery time.

The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in the output rectification stage of SMPS, UPS, dc-to-dc converters as well as freewheeling diode in low voltage inverters and chopper motor drives.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRODUCT SUMMARY

| | |
|-------------|-------|
| t_{rr} | 35 ns |
| $I_{F(AV)}$ | 15 A |
| V_R | 200 V |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
|---|----------------|--|-------------|-------|
| Peak repetitive reverse voltage | V_{RRM} | | 200 | V |
| Average rectified forward current | $I_{F(AV)}$ | Total device, rated V_R , $T_C = 150\text{ °C}$ | 15 | A |
| Non-repetitive peak surge current | I_{FSM} | | 200 | |
| Peak repetitive forward current | I_{FM} | Rated V_R , square wave, 20 kHz, $T_C = 150\text{ °C}$ | 30 | |
| Operating junction and storage temperatures | T_J, T_{Stg} | | - 65 to 175 | °C |

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|-------------------------------------|---------------|---|------|------|------|---------------|
| Breakdown voltage, blocking voltage | V_{BR}, V_R | $I_R = 100\text{ }\mu\text{A}$ | 200 | - | - | V |
| Forward voltage | V_F | $I_F = 15\text{ A}$ | - | - | 1.05 | |
| | | $I_F = 15\text{ A}, T_J = 150\text{ °C}$ | - | - | 0.85 | |
| Reverse leakage current | I_R | $V_R = V_R\text{ rated}$ | - | - | 10 | μA |
| | | $T_J = 150\text{ °C}, V_R = V_R\text{ rated}$ | - | - | 500 | |
| Junction capacitance | C_T | $V_R = 200\text{ V}$ | - | 55 | - | pF |
| Series inductance | L_S | Measured lead to lead 5 mm from package body | - | 8.0 | - | nH |

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| DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified) | | | | | | | |
|--|------------------|--|---|------|------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time | t _{rr} | I _F = 1.0 A, dI _F /dt = 50 A/μs, V _R = 30 V | | - | - | 35 | ns |
| | | T _J = 25 °C | I _F = 15 A dI _F /dt = 200 A/μs V _R = 160 V | - | 22 | - | |
| | | T _J = 125 °C | | - | 39 | - | |
| Peak recovery current | I _{RRM} | T _J = 25 °C | | - | 1.6 | - | A |
| | | T _J = 125 °C | | - | 4.1 | - | |
| Reverse recovery charge | Q _{rr} | T _J = 25 °C | | - | 19 | - | nC |
| | | T _J = 125 °C | | - | 90 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|--|-----------------------------------|--|--------------|------|------------|------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Maximum junction and storage temperature range | T _J , T _{Stg} | | - 65 | - | 175 | °C |
| Thermal resistance, junction to case | R _{thJC} | | - | - | 1.5 | °C/W |
| Thermal resistance, junction to ambient | R _{thJA} | | - | - | 50 | |
| Thermal resistance, case to heatsink | R _{thCS} | Mounting surface, flat, smooth and greased | - | 0.5 | - | |
| Weight | | | - | 2.0 | - | g |
| | | | - | 0.07 | - | oz. |
| Mounting torque | | | 6.0 (5.0) | - | 12 (10) | kgf · cm (lbf · in) |
| Marking device | | Case style D ² PAK | MURB1520 | | | |
| | | Case style TO-262 | MURB1520-1 | | | |

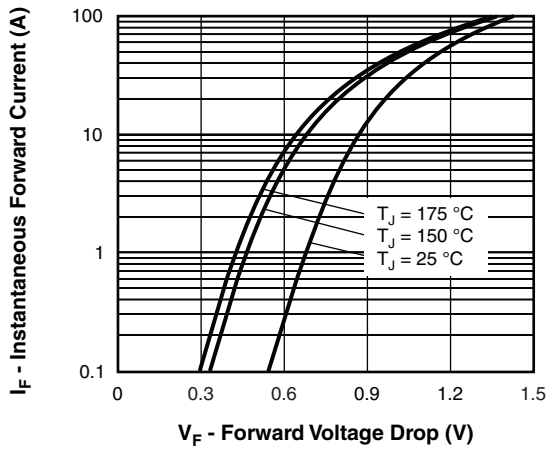


Fig. 1 - Typical Forward Voltage Drop Characteristics

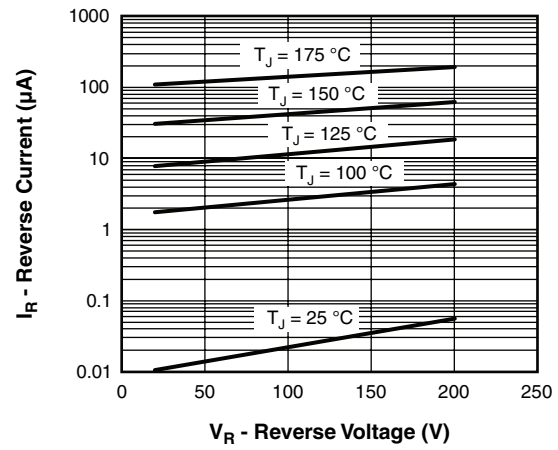


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

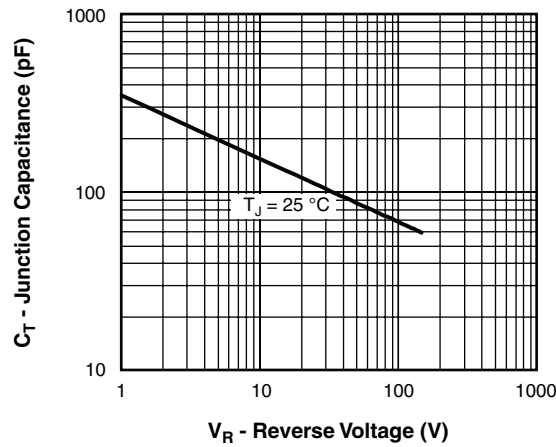


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

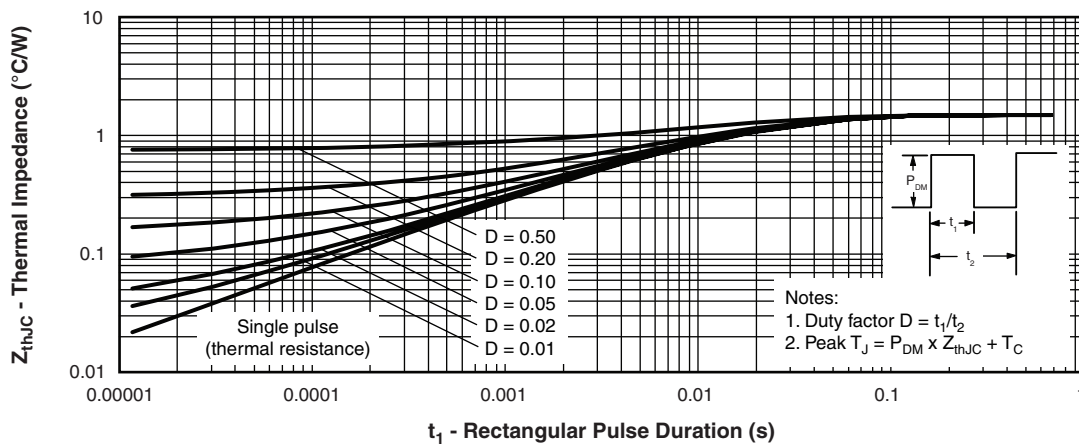


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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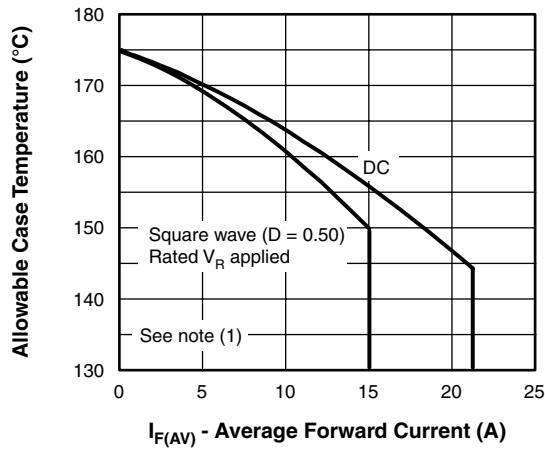


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

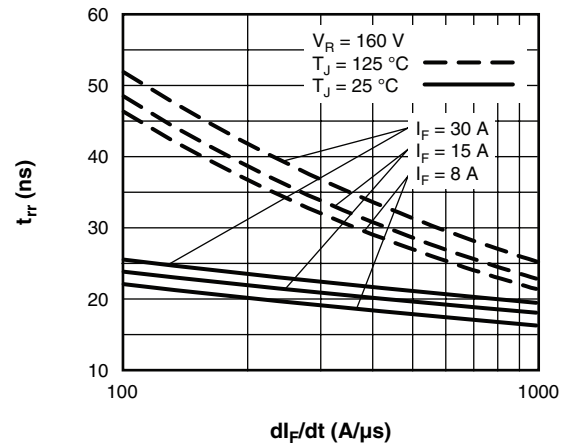


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

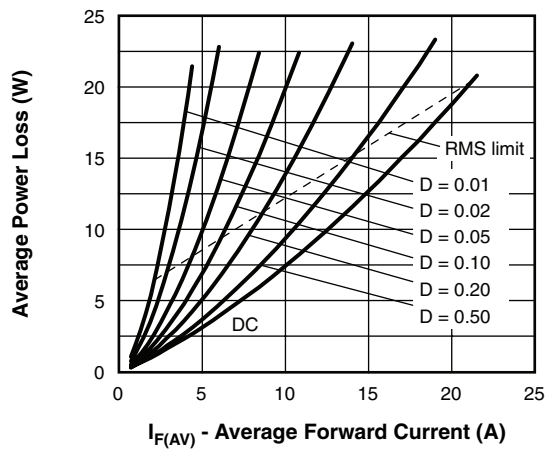


Fig. 6 - Forward Power Loss Characteristics

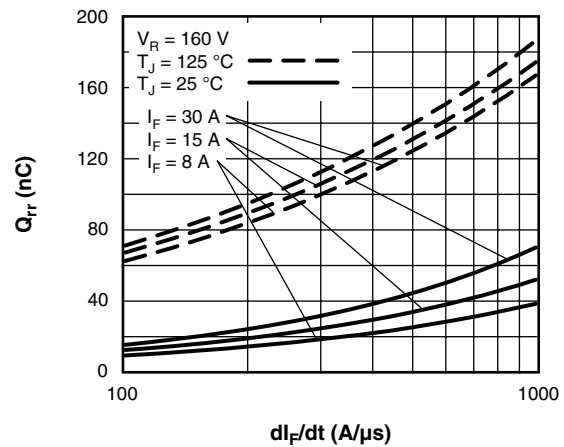


Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

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

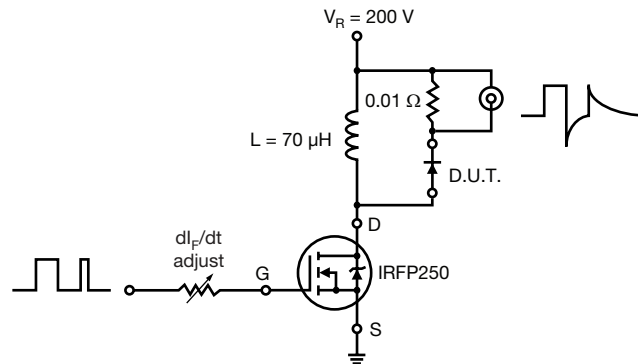


Fig. 9 - Reverse Recovery Parameter Test Circuit

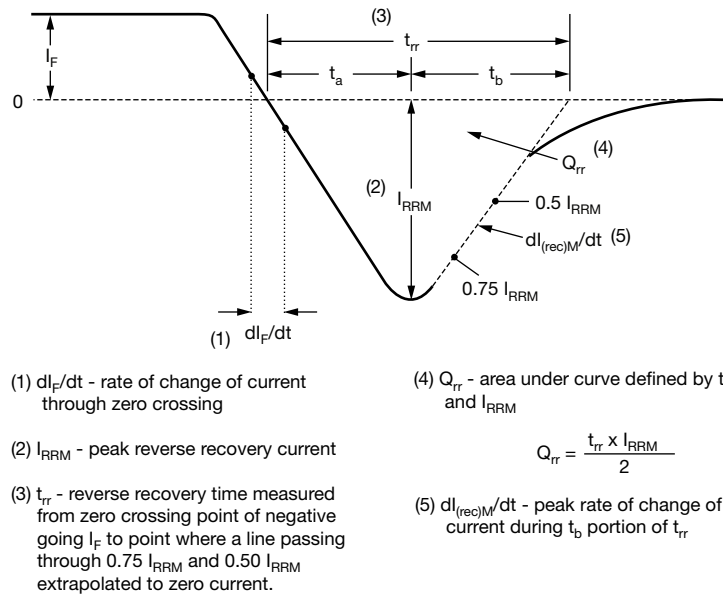


Fig. 10 - Reverse Recovery Waveform and Definitions

VS-MURB1520PbF, VS-MURB1520-1PbF

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ORDERING INFORMATION TABLE

| | | | | | | | | |
|-------------|-----|-----|---|----|----|----|-----|-----|
| Device code | VS- | MUR | B | 15 | 20 | -1 | TRL | PbF |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

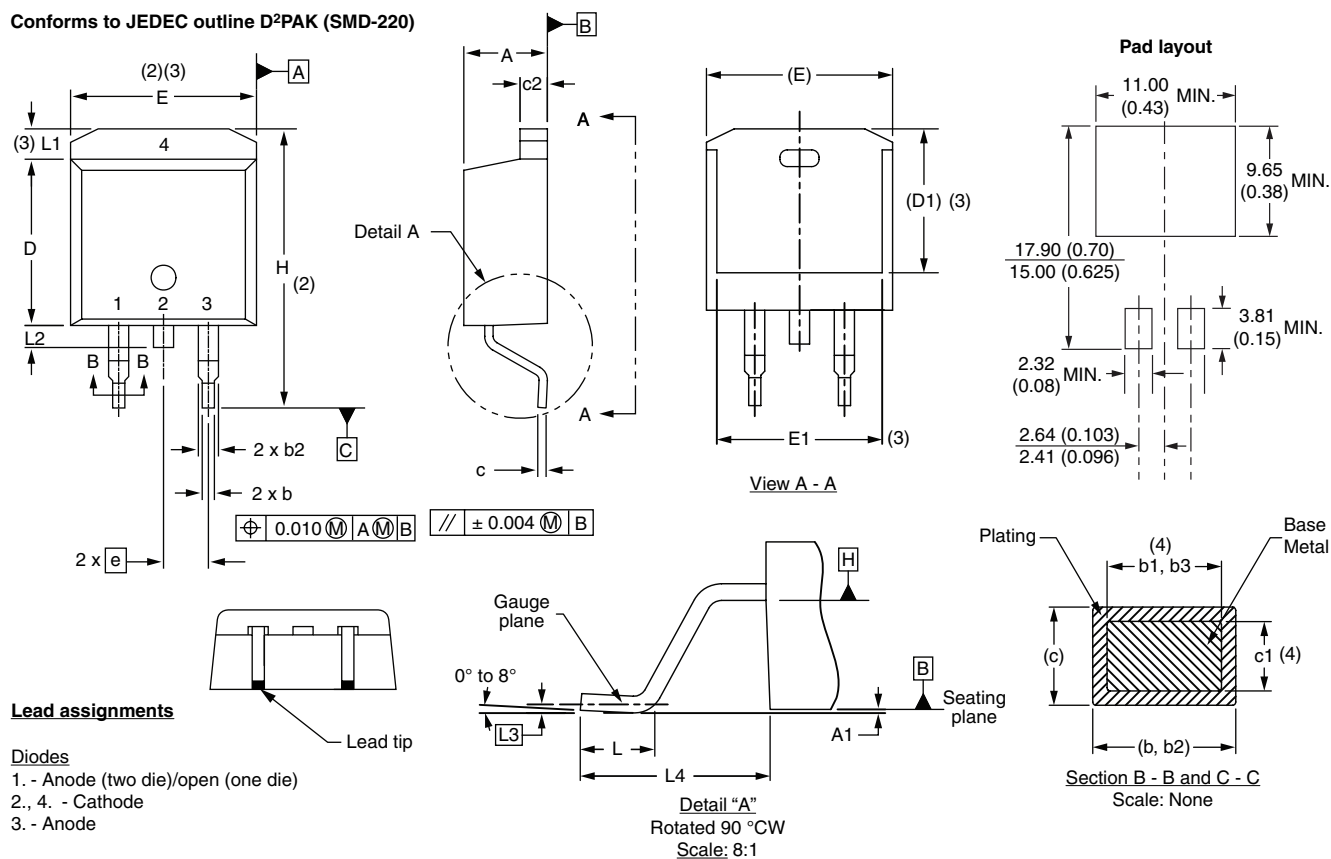
- | | | |
|---|---|--|
| 1 | - | HPP product suffix |
| 2 | - | Ultrafast MUR series |
| 3 | - | B = D ² PAK/TO-262 |
| 4 | - | Current rating (15 = 15 A) |
| 5 | - | Voltage rating (20 = 200 V) |
| 6 | - | <ul style="list-style-type: none">• None = D²PAK• -1 = TO-262 |
| 7 | - | <ul style="list-style-type: none">• None = Tube (50 pieces)• TRL = Tape and reel (left oriented, for D²PAK package)• TRR = Tape and reel (right oriented, for D²PAK package) |
| 8 | - | 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 |
| SPIICE model | www.vishay.com/doc?95271 |

D²PAK, TO-262

DIMENSIONS FOR D²PAK in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | |
| A1 | 0.00 | 0.254 | 0.000 | 0.010 | |
| 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 |

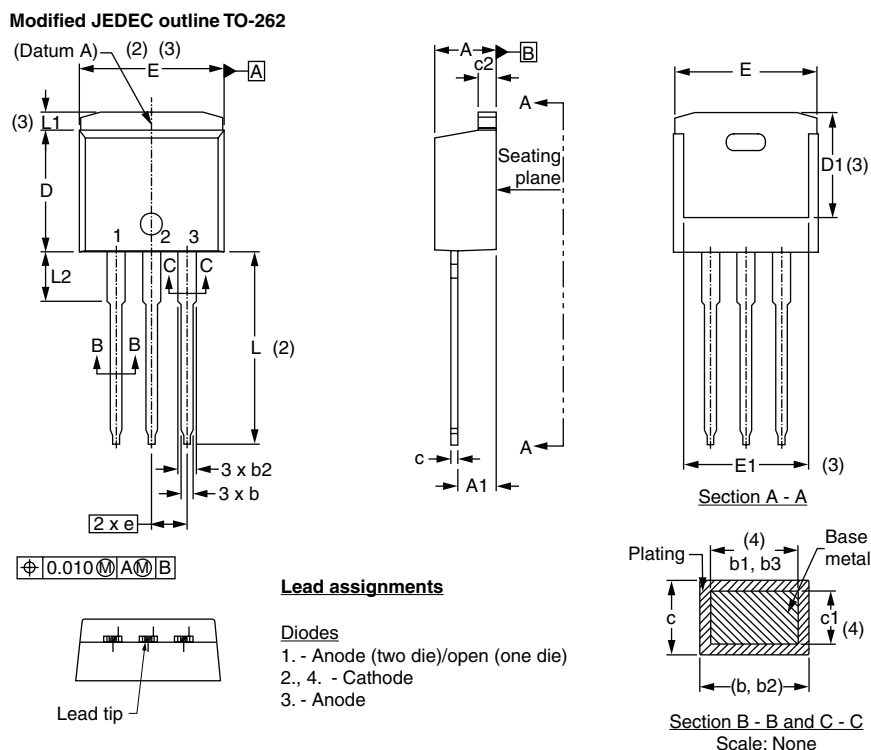
| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| e | 2.54 BSC | | 0.100 BSC | | |
| H | 14.61 | 15.88 | 0.575 | 0.625 | |
| L | 1.78 | 2.79 | 0.070 | 0.110 | |
| L1 | - | 1.65 | - | 0.066 | 3 |
| L2 | 1.27 | 1.78 | 0.050 | 0.070 | |
| L3 | 0.25 BSC | | 0.010 BSC | | |
| 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

DIMENSIONS FOR TO-262 in millimeters and inches



| 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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