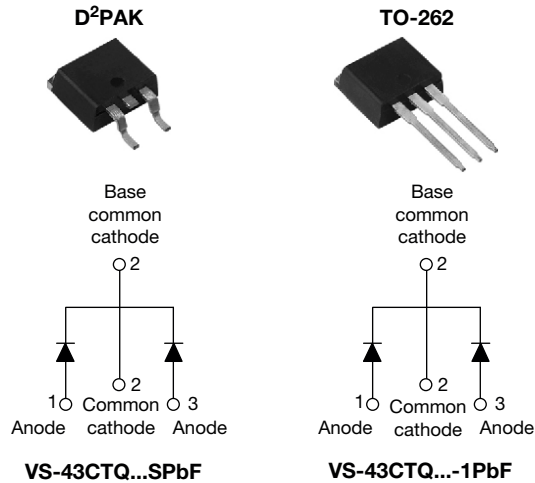


## Schottky Rectifier, 2 x 20 A



### FEATURES

- 175 °C T<sub>J</sub> operation
- Center tap configuration
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- High frequency operation
- 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**

### DESCRIPTION

This center tap Schottky rectifier series 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, freewheeling diodes, and reverse battery protection.

### PRODUCT SUMMARY

|                    |            |
|--------------------|------------|
| I <sub>F(AV)</sub> | 2 x 20 A   |
| V <sub>R</sub>     | 80 V/100 V |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL              | CHARACTERISTICS                           | VALUES      | UNITS |
|---------------------|---|-------------|-------|
| I <sub>F(AV)</sub>  | Rectangular waveform                      | 40          | A     |
| V <sub>R(RRM)</sub> |   | 80/100      | V     |
| I <sub>F(SM)</sub>  | t <sub>p</sub> = 5 μs sine                | 850         | A     |
| V <sub>F</sub>      | 20 Apk, T <sub>J</sub> = 125 °C (per leg) | 0.67        | V     |
| T <sub>J</sub>      | Range                                     | - 55 to 175 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL             | VS-43CTQ080SPbF<br>VS-43CTQ080-1PbF | VS-43CTQ100SPbF<br>VS-43CTQ100-1PbF | UNITS |
|--------------------------------------|--------------------|-------------------------------------|-------------------------------------|-------|
| Maximum DC reverse voltage           | V <sub>R</sub>     | 80                                  | 100                                 | V     |
| Maximum working peak reverse voltage | V <sub>R(WM)</sub> |                                     |                                     |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER   | SYMBOL             | TEST CONDITIONS  | VALUES  | UNITS |
|---|--------------------|--|---|-------|
| Maximum average forward current<br>See fig. 5                             | I <sub>F(AV)</sub> | 50 % duty cycle at T <sub>C</sub> = 135 °C, rectangular waveform   | per leg   | 20    |
|   |                    |  | per device  | 40    |
| Maximum peak one cycle non-repetitive surge current per leg<br>See fig. 7 | I <sub>F(SM)</sub> | 5 μs sine or 3 μs rect. pulse  | Following any rated load condition and with rated V <sub>R(RRM)</sub> applied | 850   |
|   |                    | 10 ms sine or 6 ms rect. pulse   |   | 275   |
| Non-repetitive avalanche energy per leg                                   | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 0.50 A, L = 60 mH  | 7.50  | mJ    |
| Repetitive avalanche current per leg                                      | I <sub>AR</sub>    | Current decaying linearly to zero in 1 μs<br>Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical | 0.50  | A     |



| ELECTRICAL SPECIFICATIONS                             |                |   |                                   |        |            |
|---|----------------|---|-----------------------------------|--------|------------|
| PARAMETER   | SYMBOL         | TEST CONDITIONS   |                                   | VALUES | UNITS      |
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 20 A  | $T_J = 25\text{ }^\circ\text{C}$  | 0.81   | V          |
|   |                | 40 A  |                                   | 0.98   |            |
|   |                | 20 A  | $T_J = 125\text{ }^\circ\text{C}$ | 0.67   |            |
|   |                | 40 A  |                                   | 0.81   |            |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$  | $V_R = \text{Rated } V_R$         | 1      | mA         |
|   |                | $T_J = 125\text{ }^\circ\text{C}$   |                                   | 11     |            |
| Threshold voltage                                     | $V_{F(TO)}$    | $T_J = T_J \text{ maximum}$   |                                   | 0.71   | V          |
| Forward slope resistance                              | $r_t$          |   |                                   | 0.43   | m $\Omega$ |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^\circ\text{C}$ |                                   | 1480   | 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 | V/ $\mu$ s |

**Note**(1) Pulse width < 300  $\mu$ s, 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                         |  | 2.0         | $^\circ\text{C/W}$ |
| Maximum thermal resistance, junction to case per package |                |                                      |  | 1.0         |                    |
| Typical thermal resistance, case to heatsink             | $R_{thCS}$     | Mounting surface, smooth and greased |  | 0.50        |                    |
| Approximate weight                                       |                |                                      |  | 2           | g                  |
|  |                |                                      |  | 0.07        | oz.                |
| Mounting torque  | minimum        |                                      |  | 6 (5)       | kgf · cm           |
|  | maximum        |                                      |  | 12 (10)     | (lb · in)          |
| Marking device   |                | Case style D <sup>2</sup> PAK        |  | 43CTQ080S   |                    |
|  |                |                                      |  | 43CTQ100S   |                    |
|  |                | Case style TO-262                    |  | 43CTQ080-1  |                    |
|  |                |                                      |  | 43CTQ100-1  |                    |

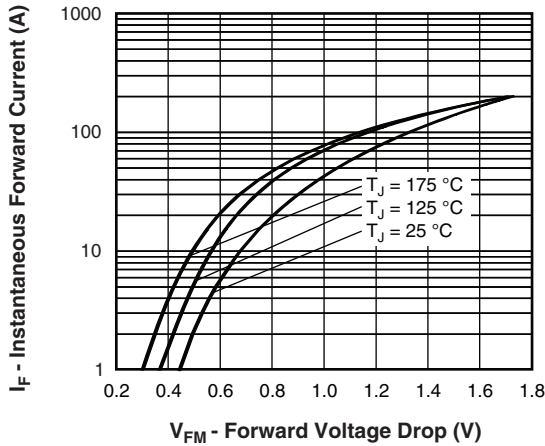


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

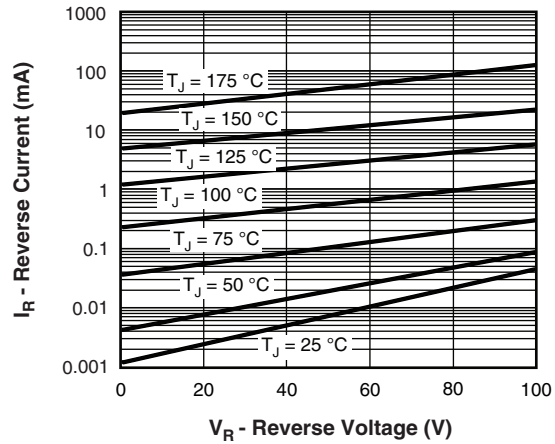


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

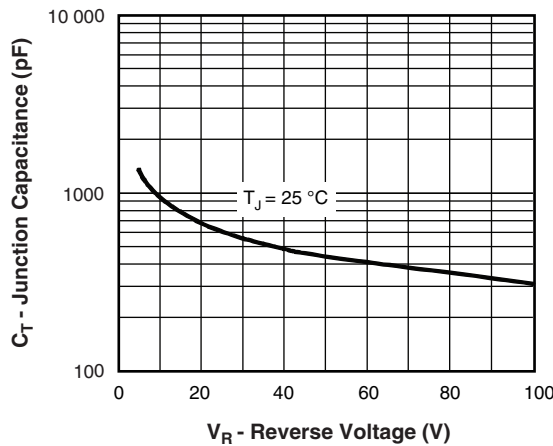


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

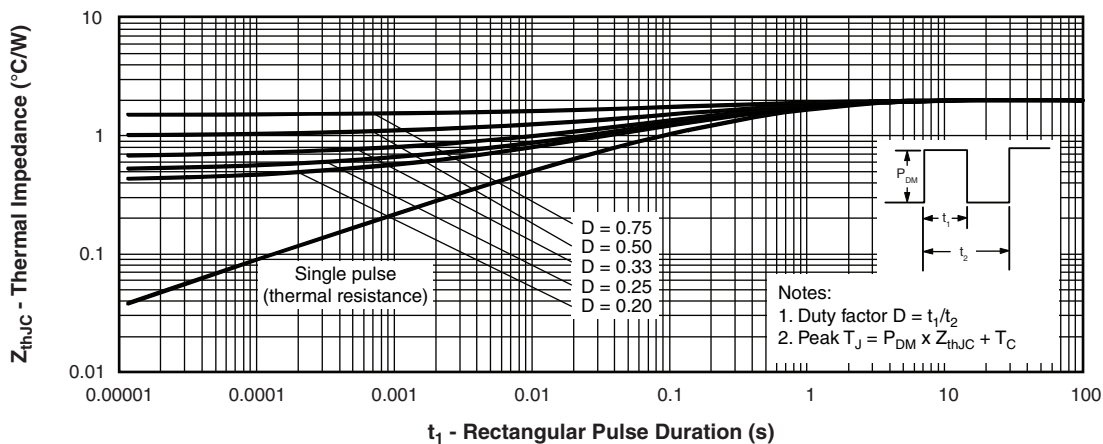


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

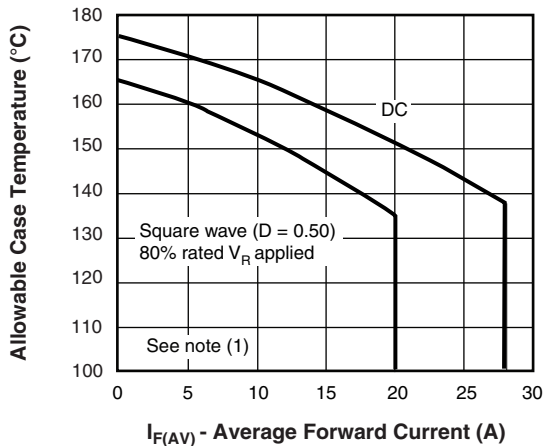


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

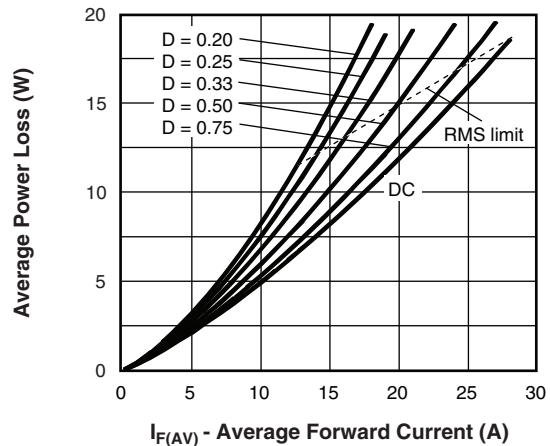


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

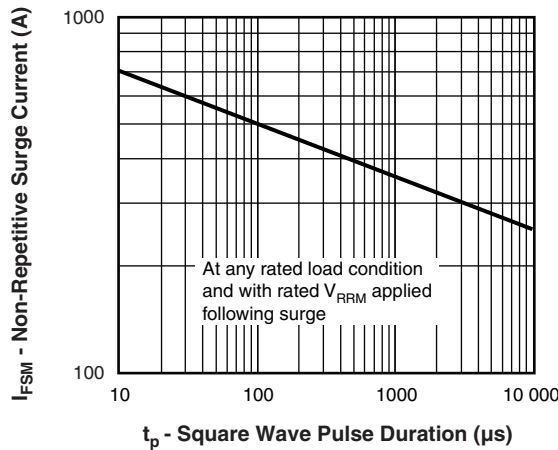


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

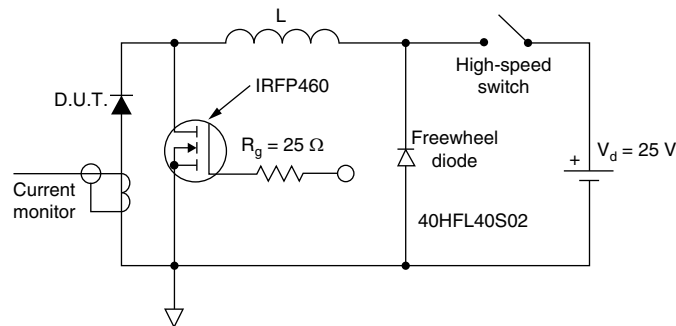


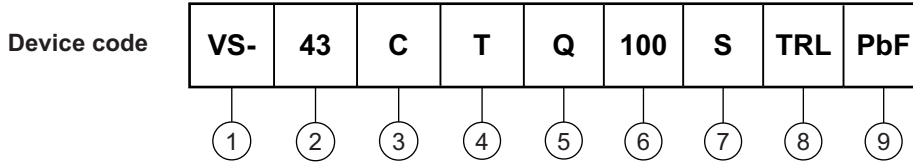
Fig. 8 - Unclamped Inductive Test Circuit

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = 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  $V_{R1} = 10\text{ V}$



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (40 A)
- 3** - Circuit configuration: C = Common cathode
- 4** - T = TO-220
- 5** - Schottky "Q" series
- 6** - Voltage ratings
 

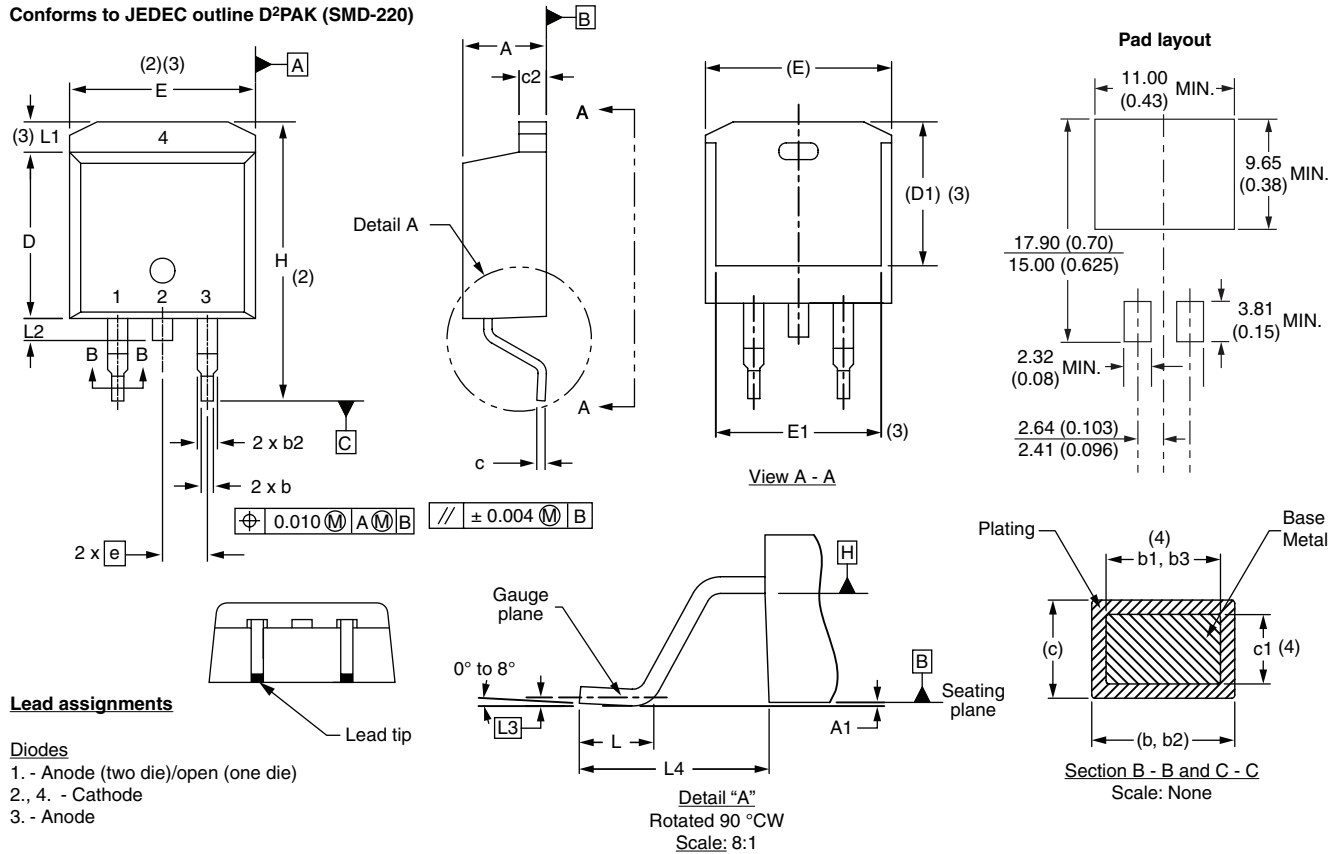
|             |
|-------------|
| 080 = 80 V  |
| 100 = 100 V |
- 7** -
  - S = D<sup>2</sup>PAK
  - -1 = TO-262
- 8** -
  - None = Tube (50 pieces)
  - TRL = Tape and reel (left oriented - for D<sup>2</sup>PAK only)
  - TRR = Tape and reel (right oriented - for D<sup>2</sup>PAK only)
- 9** - PbF = Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?95014">www.vishay.com/doc?95014</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95008">www.vishay.com/doc?95008</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</a> |
| SPIICE model               | <a href="http://www.vishay.com/doc?95065">www.vishay.com/doc?95065</a> |

## D<sup>2</sup>PAK, TO-262

### DIMENSIONS FOR D<sup>2</sup>PAK in millimeters and inches

Conforms to JEDEC outline D<sup>2</sup>PAK (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     |

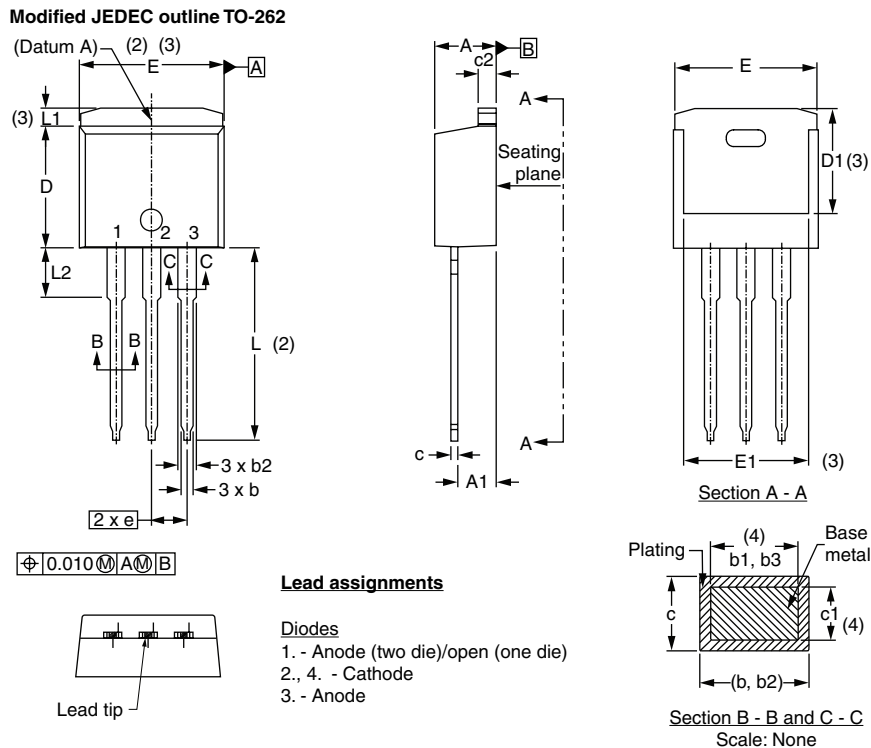
| SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| D1     | 6.86        | 8.00  | 0.270     | 0.315 | 3     |
| E      | 9.65        | 10.67 | 0.380     | 0.420 | 2, 3  |
| 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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