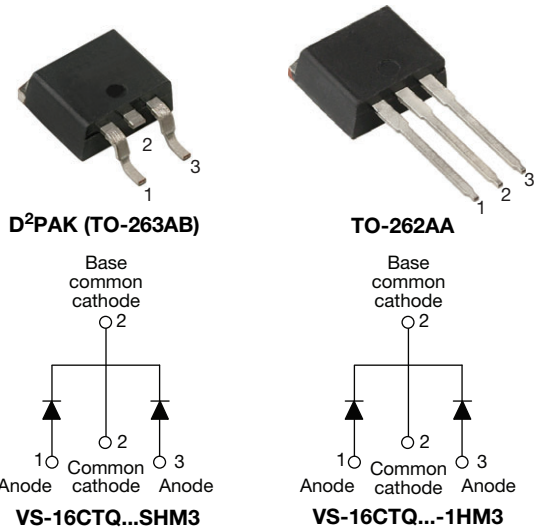


## High Performance Schottky Rectifier, 2 x 8 A



### 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
- AEC-Q101 qualified, meets JESD 201 class 1 whisker test
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**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, converters, freewheeling diodes, and reverse battery protection.

### PRIMARY CHARACTERISTICS

|                                  |   |
|----------------------------------|---|
| I <sub>F(AV)</sub>               | 2 x 8 A                                 |
| V <sub>R</sub>                   | 60 V to 100 V                           |
| V <sub>F</sub> at I <sub>F</sub> | 0.58 V                                  |
| I <sub>RM</sub>                  | 7.0 mA at 125 °C                        |
| T <sub>J</sub> max.              | 175 °C                                  |
| E <sub>AS</sub>                  | 7.5 mJ                                  |
| Package                          | D <sup>2</sup> PAK (TO-263AB), TO-262AA |
| Circuit configuration            | Common cathode                          |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL             | CHARACTERISTICS                                       | VALUES      | UNITS |
|--------------------|---|-------------|-------|
| I <sub>F(AV)</sub> | Rectangular waveform                                  | 16          | A     |
| V <sub>R</sub>     |   | 60 to 100   | V     |
| I <sub>FSM</sub>   | t <sub>p</sub> = 5 μs sine                            | 850         | A     |
| V <sub>F</sub>     | 8 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg) | 0.58        | V     |
| T <sub>J</sub>     | Range   | -55 to +175 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL           | VS-16CTQ060SHM3<br>VS-16CTQ060-1HM3 | VS-16CTQ080SHM3<br>VS-16CTQ080-1HM3 | VS-16CTQ100SHM3<br>VS-16CTQ100-1HM3 | UNITS |
|--------------------------------------|------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------|
| Maximum DC reverse voltage           | V <sub>R</sub>   | 60                                  | 80                                  | 100                                 | V     |
| Maximum working peak reverse voltage | V <sub>RWM</sub> |                                     |                                     |                                     |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER  | SYMBOL             | TEST CONDITIONS  | VALUES     | UNITS |
|--|--------------------|--|------------|-------|
| Maximum average forward current _____ per leg<br>See fig. 5 _____ per device | I <sub>F(AV)</sub> | 50 % duty cycle at T <sub>C</sub> = 148 °C, rectangular waveform   | 8<br>16    | A     |
| Maximum peak one cycle non-repetitive surge current per leg<br>See fig. 7    | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse<br>10 ms sine or 6 ms rect. pulse  | 850<br>275 | A     |
| 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     |



| <b>ELECTRICAL SPECIFICATIONS</b>                      |                |   |                                   |                  |    |
|---|----------------|---|-----------------------------------|------------------|----|
| PARAMETER   | SYMBOL         | TEST CONDITIONS   | VALUES                            | UNITS            |    |
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 8 A   | $T_J = 25\text{ }^\circ\text{C}$  | 0.72             | V  |
|   |                | 16 A  |                                   | 0.88             |    |
|   |                | 8 A   | $T_J = 125\text{ }^\circ\text{C}$ | 0.58             |    |
|   |                | 16 A  |                                   | 0.69             |    |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$  | $V_R = \text{rated } V_R$         | 0.55             | mA |
|   |                | $T_J = 125\text{ }^\circ\text{C}$   |                                   | 7.0              |    |
| Threshold voltage                                     | $V_{F(TO)}$    | $T_J = T_J \text{ maximum}$   | 0.415                             | V                |    |
| Forward slope resistance                              | $r_t$          |   | 11.07                             | $m\Omega$        |    |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^\circ\text{C}$ | 500                               | 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/ $\mu\text{s}$ |    |

**Note**

(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

| <b>THERMAL - MECHANICAL SPECIFICATIONS</b>               |                |  |             |                    |
|--|----------------|--|-------------|--------------------|
| 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                             | 3.25        | $^\circ\text{C/W}$ |
| Maximum thermal resistance, junction to case per package |                |  | 1.63        |                    |
| 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)     | (lbf · in)         |
| Marking device   |                | Case style D <sup>2</sup> PAK (TO-263AB) | 16CTQ...SH  |                    |
|  |                | Case style TO-262AA                      | 16CTQ...-1H |                    |

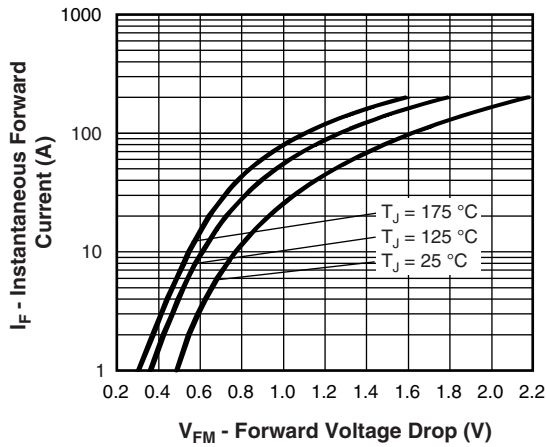


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

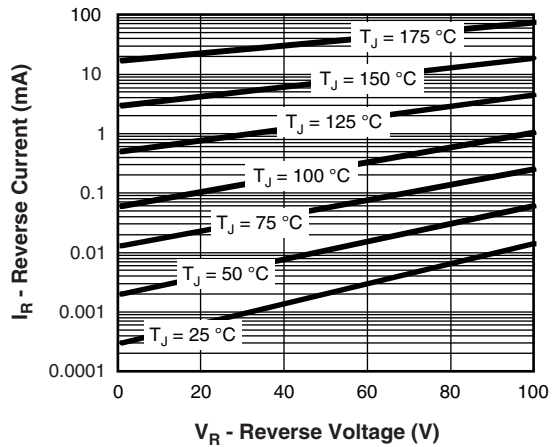


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

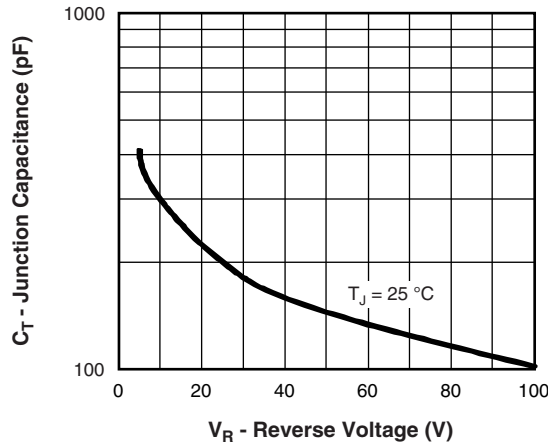


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

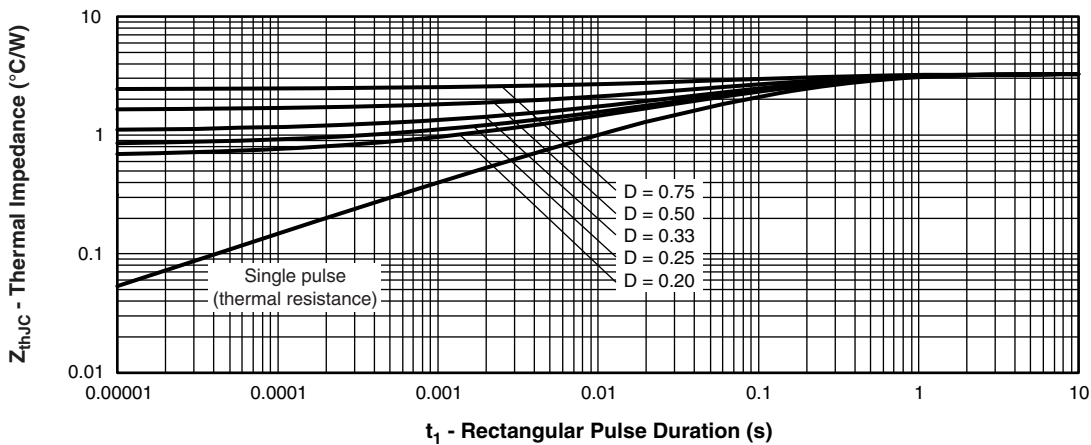


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

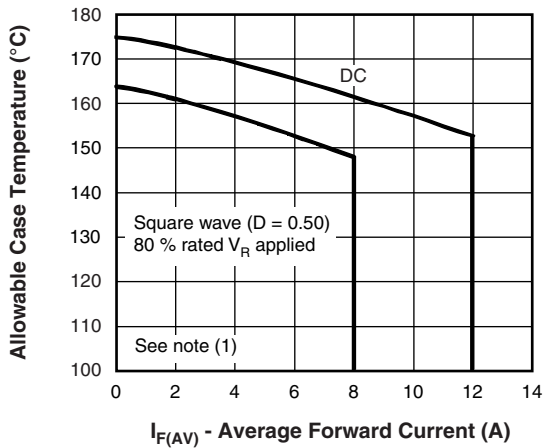


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

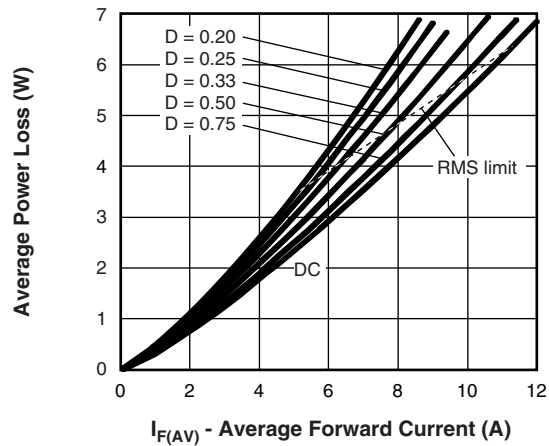


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

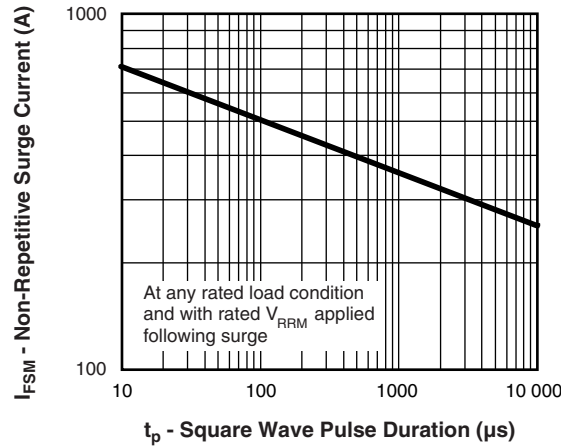


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

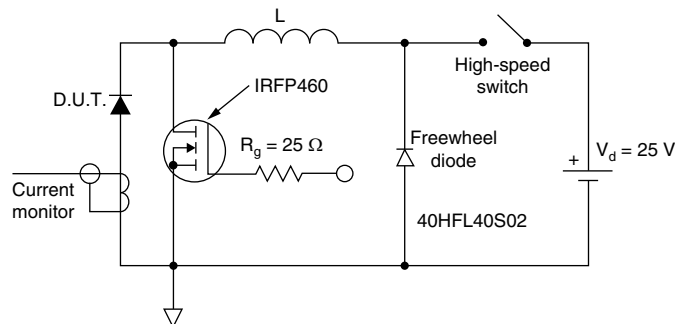


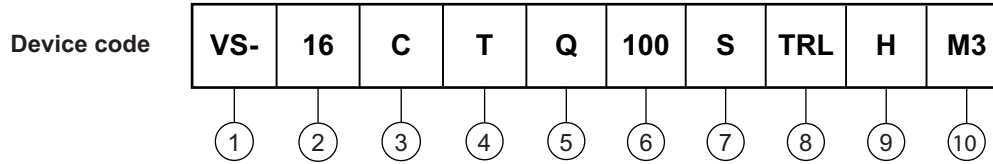
Fig. 8 - Unclamped Inductive Test Circuit

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;  
 $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{d_{REV}}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$  applied



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (16 A)
- 3** - Circuit configuration: C = Common cathode
- 4** - T = TO-220
- 5** - Schottky "Q" series
- 6** - Voltage ratings
 

|             |
|-------------|
| 060 = 60 V  |
| 080 = 80 V  |
| 100 = 100 V |
- 7** -
  - S = D<sup>2</sup>PAK
  - -1 = TO-262
- 8** -
  - None = tube
  - 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** - H = AEC-Q101 qualified
- 10** - M3 = halogen-free, RoHS-compliant and termination lead (Pb)-free

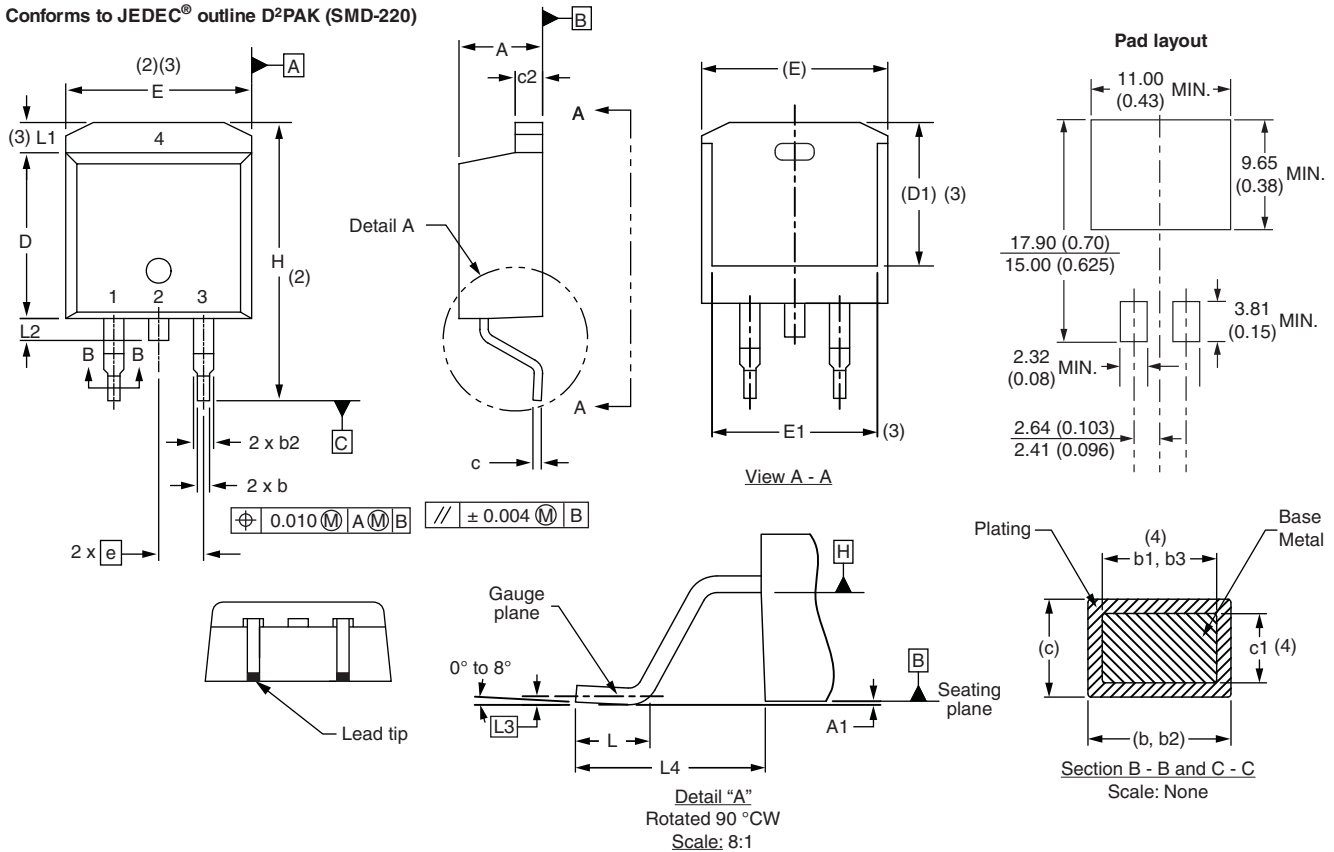
| ORDERING INFORMATION |                  |                        |                          |
|----------------------|------------------|------------------------|--------------------------|
| PREFERRED P/N        | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION    |
| VS-16CTQ060SHM3      | 50               | 1000                   | Antistatic plastic tubes |
| VS-16CTQ060STRRHM3   | 800              | 800                    | 13" diameter reel        |
| VS-16CTQ060STRLHM3   | 800              | 800                    | 13" diameter reel        |
| VS-16CTQ060-1HM3     | 50               | 1000                   | Antistatic plastic tubes |
| VS-16CTQ080SHM3      | 50               | 1000                   | Antistatic plastic tubes |
| VS-16CTQ080STRRHM3   | 800              | 800                    | 13" diameter reel        |
| VS-16CTQ080STRLHM3   | 800              | 800                    | 13" diameter reel        |
| VS-16CTQ080-1HM3     | 50               | 1000                   | Antistatic plastic tubes |
| VS-16CTQ100SHM3      | 50               | 1000                   | Antistatic plastic tubes |
| VS-16CTQ100STRRHM3   | 800              | 800                    | 13" diameter reel        |
| VS-16CTQ100STRLHM3   | 800              | 800                    | 13" diameter reel        |
| VS-16CTQ100-1HM3     | 50               | 1000                   | Antistatic plastic tubes |

| LINKS TO RELATED DOCUMENTS |                               |  |
|----------------------------|-------------------------------|--|
| Dimensions                 | TO-263AB (D <sup>2</sup> PAK) | <a href="http://www.vishay.com/doc?95046">www.vishay.com/doc?95046</a> |
|                            | TO-262AA                      | <a href="http://www.vishay.com/doc?95419">www.vishay.com/doc?95419</a> |
| Part marking information   | TO-263AB (D <sup>2</sup> PAK) | <a href="http://www.vishay.com/doc?95444">www.vishay.com/doc?95444</a> |
|                            | TO-262AA                      | <a href="http://www.vishay.com/doc?95443">www.vishay.com/doc?95443</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?95279">www.vishay.com/doc?95279</a> |

### D<sup>2</sup>PAK

#### DIMENSIONS in millimeters and inches

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

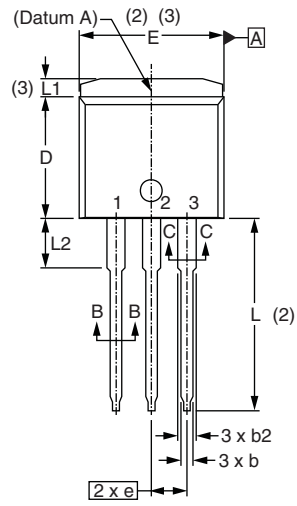
#### Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- 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
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC<sup>®</sup> outline TO-263AB

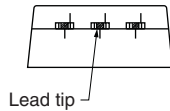
## TO-262

**DIMENSIONS** in millimeters and inches

Modified JEDEC® outline TO-262

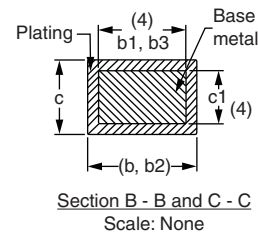
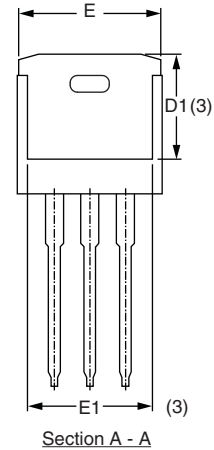
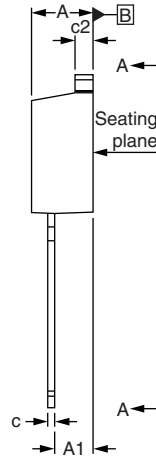


$\oplus 0.010 \text{ M A M B}$



**Lead assignments**

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



| 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     | 3.36        | 3.71  | 0.132     | 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), D1 (minimum) and L2 where dimensions derived the actual package outline



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