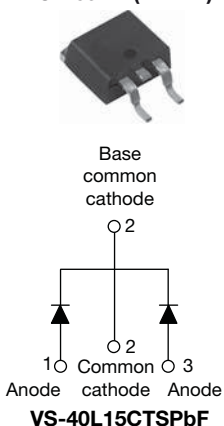
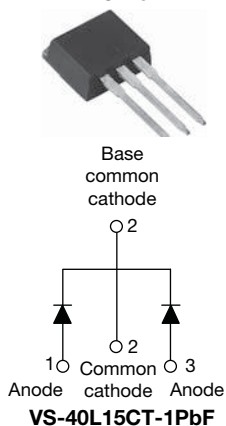


## High Performance Schottky Rectifier, 2 x 20 A

TO-263AB (D<sup>2</sup>PAK)


TO-262AA



### FEATURES

- 125 °C T<sub>J</sub> operation (V<sub>R</sub> < 5 V)
- Center tap module
- Optimized for OR-ing applications
- Ultralow 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
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**

### PRODUCT SUMMARY

|                                  |                                         |
|----------------------------------|-----------------------------------------|
| I <sub>F(AV)</sub>               | 2 x 20 A                                |
| V <sub>R</sub>                   | 15 V                                    |
| V <sub>F</sub> at I <sub>F</sub> | see datasheet                           |
| I <sub>RM</sub> max.             | 600 mA at 100 °C                        |
| T <sub>J</sub> max.              | 125 °C                                  |
| E <sub>AS</sub>                  | 10 mJ                                   |
| Package                          | TO-263AB (D <sup>2</sup> PAK), TO-262AA |
| Diode variation                  | Common cathode                          |

### DESCRIPTION

The center tap Schottky rectifier module has been optimized for ultralow forward voltage drop specifically for the OR-ing of parallel power supplies. The proprietary barrier technology allows for reliable operation up to 125 °C junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL             | CHARACTERISTICS                                                 | VALUES      | UNITS |
|--------------------|-----------------------------------------------------------------|-------------|-------|
| I <sub>F(AV)</sub> | Rectangular waveform                                            | 40          | A     |
| V <sub>RRM</sub>   |                                                                 | 15          | V     |
| I <sub>FSM</sub>   | t <sub>p</sub> = 5 μs sine                                      | 700         | A     |
| V <sub>F</sub>     | 19 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg, typical) | 0.25        | V     |
| T <sub>J</sub>     |                                                                 | -55 to +125 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL           | TEST CONDITIONS         | VS-40L15CTSPbF<br>VS-40L15CT-1PbF | UNITS |
|--------------------------------------|------------------|-------------------------|-----------------------------------|-------|
| Maximum DC reverse voltage           | V <sub>R</sub>   | T <sub>J</sub> = 100 °C | 15                                | V     |
| Maximum working peak reverse voltage | V <sub>RWM</sub> |                         |                                   |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                               | SYMBOL             | TEST CONDITIONS                                                                                                                        | VALUES | UNITS |
|-------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------|-------|
| Maximum average forward current, see fig. 5                             | I <sub>F(AV)</sub> | 50 % duty cycle at T <sub>C</sub> = 85 °C, rectangular waveform                                                                        | 20     | A     |
|                                                                         |                    |                                                                                                                                        | 40     |       |
| Maximum peak one cycle non-repetitive surge current per leg, see fig. 7 | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse                                                                                                          | 700    |       |
|                                                                         |                    | 10 ms sine or 6 ms rect. pulse                                                                                                         | 330    |       |
| Non-repetitive avalanche energy per leg                                 | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 2 A, L = 6 mH                                                                                | 10     | 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 | 2      | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                                          | SYMBOL         | TEST CONDITIONS                                                                            | TYP.   | MAX. | UNITS      |
|----------------------------------------------------|----------------|--------------------------------------------------------------------------------------------|--------|------|------------|
| Maximum forward voltage drop per leg<br>See fig. 1 | $V_{FM}^{(1)}$ | 19 A                                                                                       | -      | 0.41 | V          |
|                                                    |                | 40 A                                                                                       |        | 0.52 |            |
|                                                    |                | 19 A                                                                                       | 0.25   | 0.33 |            |
|                                                    |                | 40 A                                                                                       |        | 0.50 |            |
| Reverse leakage current per leg<br>See fig. 2      | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^{\circ}\text{C}$                                                         | -      | 10   | mA         |
|                                                    |                | $T_J = 100\text{ }^{\circ}\text{C}$                                                        |        | 600  |            |
| Threshold voltage                                  | $V_{F(TO)}$    | $T_J = T_J \text{ maximum}$                                                                | 0.182  |      | V          |
| Forward slope resistance                           | $r_t$          |                                                                                            | 7.6    |      | m $\Omega$ |
| Maximum junction capacitance per leg               | $C_T$          | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$ | -      | 2000 | pF         |
| Typical series inductance per leg                  | $L_S$          | Measured lead to lead 5 mm from package body                                               | 8      | -    | nH         |
| Maximum voltage rate of change                     | dV/dt          | Rated $V_R$                                                                                | 10 000 |      | V/ $\mu$ s |

**Note**

<sup>(1)</sup> Pulse width < 300  $\mu$ s, duty cycle < 2 %

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                            |         | SYMBOL            | TEST CONDITIONS                          | VALUES      | UNITS                  |
|------------------------------------------------------|---------|-------------------|------------------------------------------|-------------|------------------------|
| Maximum junction temperature range                   |         | T <sub>J</sub>    |                                          | -55 to +125 | °C                     |
| Maximum storage temperature range                    |         | T <sub>Stg</sub>  |                                          | -55 to +150 |                        |
| Maximum thermal resistance, junction to case per leg |         | R <sub>thJC</sub> | DC operation<br>See fig. 4               | 1.5         | °C/W                   |
| Typical thermal resistance, case to heatsink         |         | R <sub>thCS</sub> | Mounting surface, smooth and greased     | 0.50        |                        |
| Maximum thermal resistance, junction to ambient      |         | R <sub>thJA</sub> | DC operation                             | 40          |                        |
| Approximate weight                                   |         |                   |                                          | 2           | g                      |
|                                                      |         |                   |                                          | 0.07        | oz.                    |
| Mounting torque                                      | minimum |                   | Non-lubricated threads                   | 6 (5)       | kgf · cm<br>(lbf · in) |
|                                                      | maximum |                   |                                          | 12 (10)     |                        |
| Marking device                                       |         |                   | Case style TO-263AB (D <sup>2</sup> PAK) | 40L15CTS    |                        |
|                                                      |         |                   | Case style TO-262AA                      | 40L15CT-1   |                        |

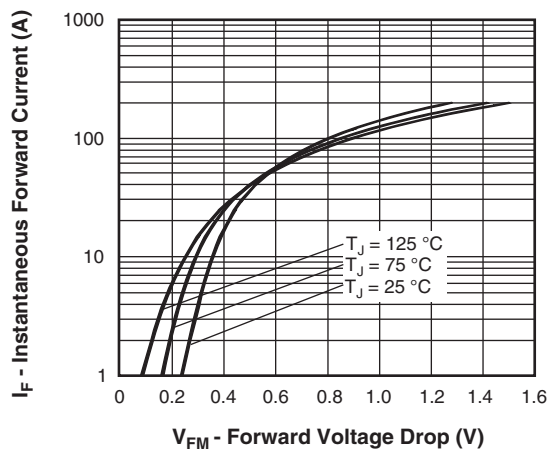


Fig. 1 - Maximum Forward Voltage Drop Characteristics

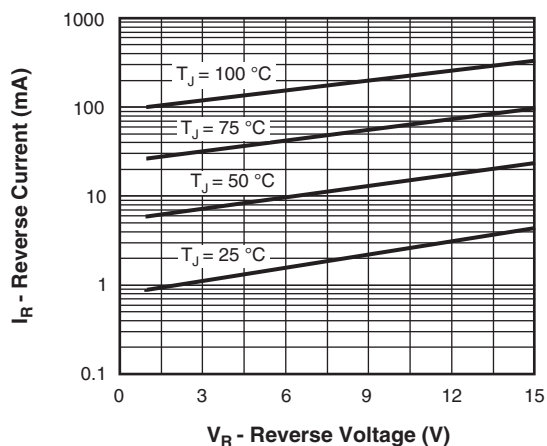


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

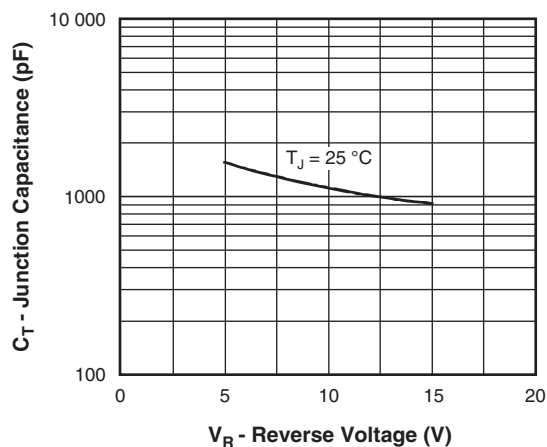
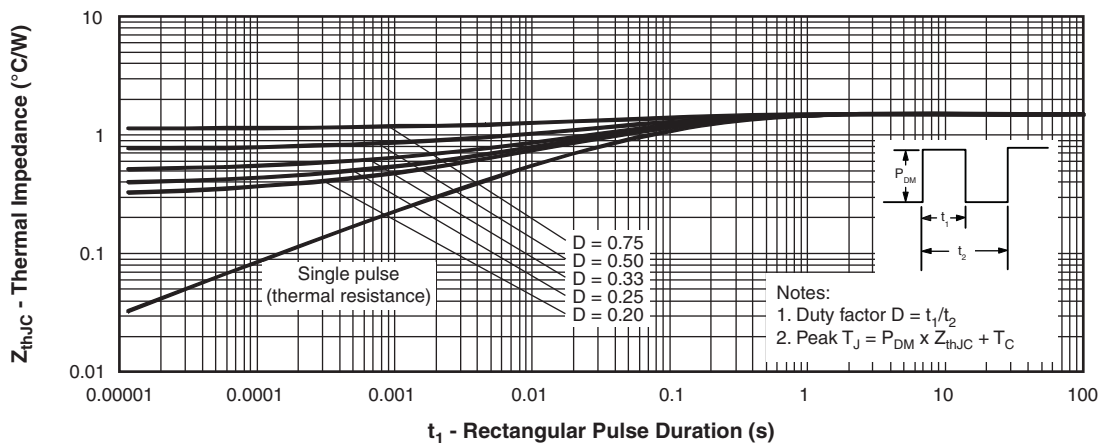


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

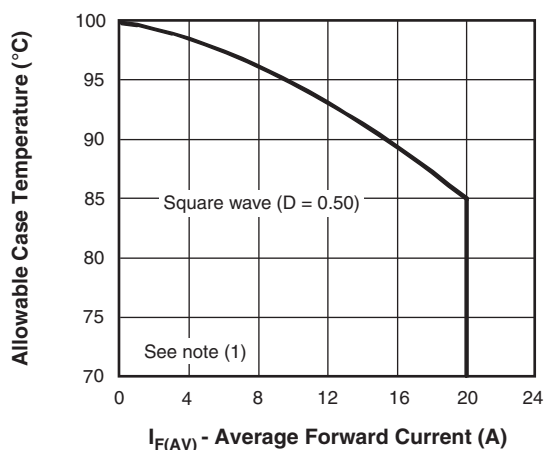


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

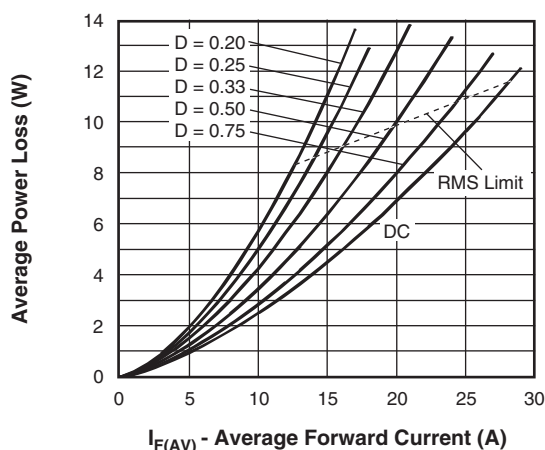


Fig. 6 - Forward Power Loss Characteristics

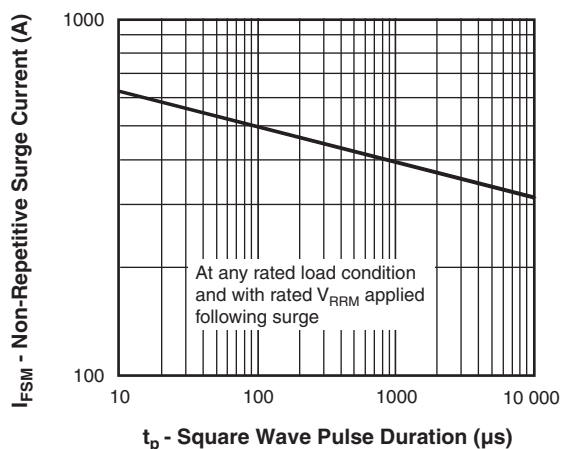


Fig. 7 - Maximum Non-Repetitive Surge Current

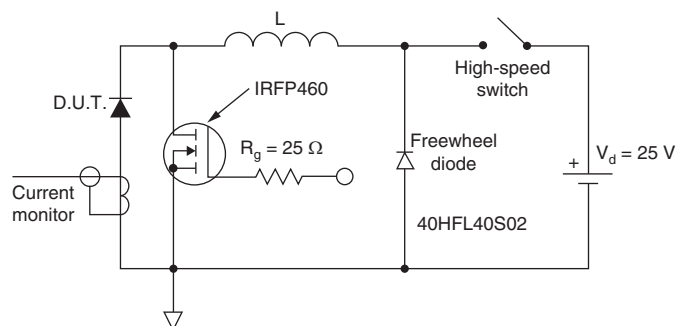


Fig. 8 - Unclamped Inductive Test Circuit

#### 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  $V_{R1} = 80\%$  rated  $V_R$

**ORDERING INFORMATION TABLE**

|             |            |           |          |           |          |          |          |            |            |
|-------------|------------|-----------|----------|-----------|----------|----------|----------|------------|------------|
| Device code | <b>VS-</b> | <b>40</b> | <b>L</b> | <b>15</b> | <b>C</b> | <b>T</b> | <b>S</b> | <b>TRL</b> | <b>PbF</b> |
|             | 1          | 2         | 3        | 4         | 5        | 6        | 7        | 8          | 9          |

- |          |   |                                                                                                                                                              |
|----------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | - | Vishay Semiconductors product                                                                                                                                |
| <b>2</b> | - | Current rating (40 A)                                                                                                                                        |
| <b>3</b> | - | L = Schottky "L" series                                                                                                                                      |
| <b>4</b> | - | Voltage rating (15 V)                                                                                                                                        |
| <b>5</b> | - | C = common cathode                                                                                                                                           |
| <b>6</b> | - | T = TO-220                                                                                                                                                   |
| <b>7</b> | - | • S = D <sup>2</sup> PAK<br>• -1 = TO-262                                                                                                                    |
| <b>8</b> | - | • None = tube<br>• TRL = tape and reel (left oriented - for D <sup>2</sup> PAK only)<br>• TRR = tape and reel (right oriented - for D <sup>2</sup> PAK only) |
| <b>9</b> | - | PbF = lead (Pb)-free                                                                                                                                         |

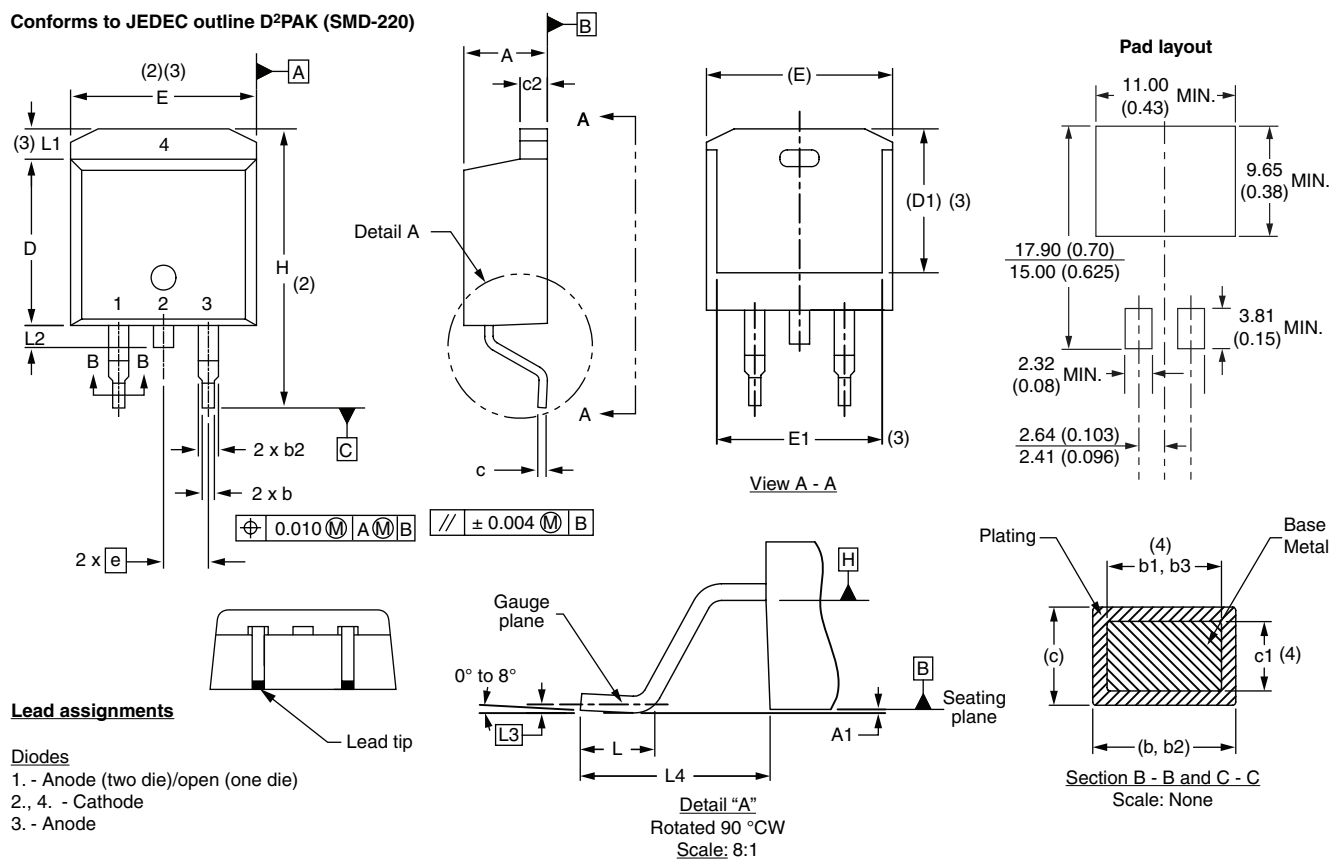
| <b>ORDERING INFORMATION</b> (Example) |                         |                               |                                    |
|---------------------------------------|-------------------------|-------------------------------|------------------------------------|
| <b>PREFERRED P/N</b>                  | <b>QUANTITY PER T/R</b> | <b>MINIMUM ORDER QUANTITY</b> | <b>PACKAGING DESCRIPTION</b>       |
| VS-40L15CTSPbF                        | 50                      | 1000                          | Antistatic plastic tubes           |
| VS-40L15CTSTRPbF                      | 800                     | 800                           | 13" diameter plastic tape and reel |
| VS-40L15CTSTRLPbF                     | 800                     | 800                           | 13" diameter plastic tape and reel |
| VS-40L15CT-1PbF                       | 50                      | 1000                          | Antistatic plastic tubes           |

| <b>LINKS TO RELATED DOCUMENTS</b> |                               |                                                                        |
|-----------------------------------|-------------------------------|------------------------------------------------------------------------|
| 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          |                               | <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> |

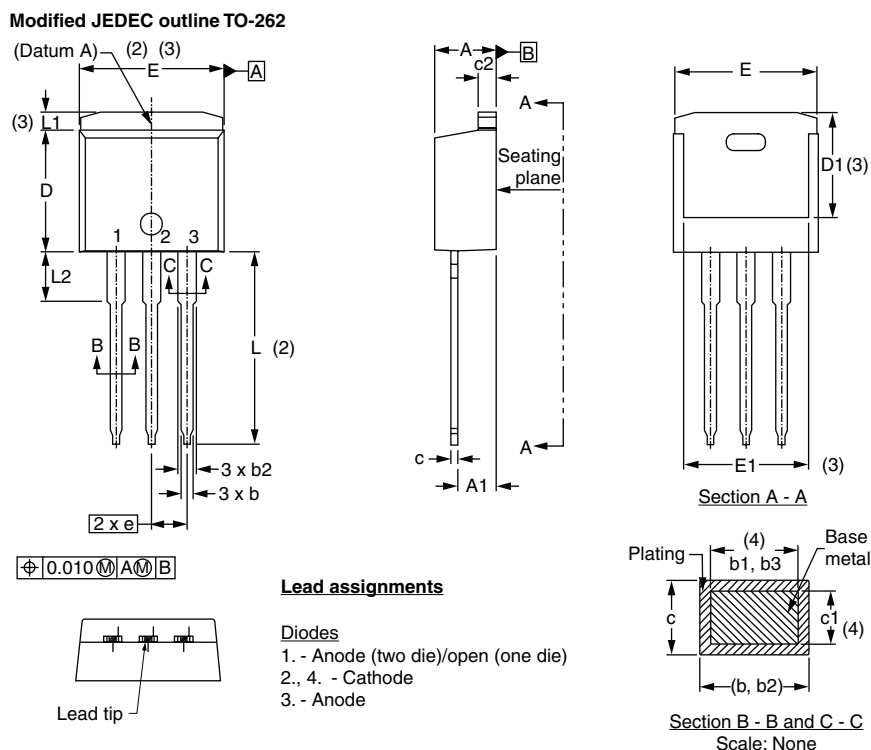
## D<sup>2</sup>PAK, TO-262

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

Conforms to JEDEC outline D<sup>2</sup>PAK (SMD-220)



## 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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