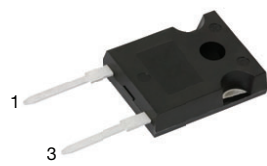
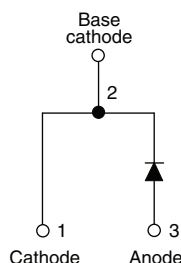
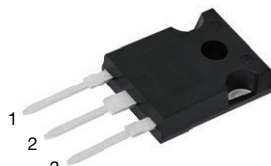
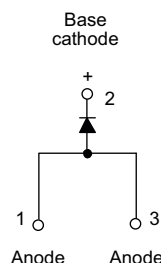


## High Voltage, Input Rectifier Diode, 40 A


**TO-247AC 2L**

**VS-40EPS16-M3**

**TO-247AC 3L**

**VS-40APS16-M3**

### FEATURES

- Very low forward voltage drop
- 150 °C max. operating junction temperature
- Glass passivated pellet chip junction
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### APPLICATIONS

- Input rectification
- Vishay Semiconductors switches and output rectifiers which are available in identical package outlines

### DESCRIPTION

High voltage rectifiers optimized for very low forward voltage drop with moderate leakage.

These devices are intended for use in main rectification (single or three phase bridge).

### MECHANICAL DATA

**Case:** TO-247AC 2L, TO-247AC 3L

Molding compound meets UL 94 V-0 flammability rating

**Terminal:** matte tin plated leads, solderable per J-STD-002

### PRIMARY CHARACTERISTICS

|                       |                          |
|-----------------------|--------------------------|
| $I_{F(AV)}$           | 40 A                     |
| $V_R$                 | 1600 V                   |
| $V_F$ at $I_F$        | 1.14 V                   |
| $I_{FSM}$             | 475 A                    |
| $T_J$ max.            | 150 °C                   |
| Package               | TO-247AC 2L, TO-247AC 3L |
| Circuit configuration | Single                   |

### LINKS TO ADDITIONAL RESOURCES



### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS     | VALUES      | UNITS |
|-------------|---------------------|-------------|-------|
| $I_{F(AV)}$ | Sinusoidal waveform | 40          | A     |
| $V_{RRM}$   |                     | 1600        | V     |
| $I_{FSM}$   |                     | 475         | A     |
| $V_F$       | 20 A, $T_J = 25$ °C | 1.0         | V     |
| $T_J$       |                     | -40 to +150 | °C    |

### VOLTAGE RATINGS

| PART NUMBER   | $V_{RRM}$ , MAXIMUM<br>PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE<br>PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$<br>AT 150 °C<br>mA |
|---------------|--------------------------------------------------|-----------------------------------------------------------------|------------------------------|
| VS-40EPS16-M3 | 1600                                             | 1700                                                            | 1                            |
| VS-40APS16-M3 |                                                  |                                                                 |                              |



## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                           | SYMBOL        | TEST CONDITIONS                                             | VALUES | UNITS                       |
|-----------------------------------------------------|---------------|-------------------------------------------------------------|--------|-----------------------------|
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 105^\circ\text{C}$ , 180° conduction half sine wave  | 40     | A                           |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$     | 10 ms sine pulse, rated $V_{RRM}$ applied                   | 400    |                             |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                      | 475    |                             |
| Maximum $I^2t$ for fusing                           | $I^2t$        | 10 ms sine pulse, rated $V_{RRM}$ applied                   | 800    | $\text{A}^2\text{s}$        |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                      | 1131   |                             |
| Maximum $I^2\sqrt{t}$ for fusing                    | $I^2\sqrt{t}$ | $t = 0.1\text{ ms to } 10\text{ ms}$ , no voltage reapplied | 11 310 | $\text{A}^2\sqrt{\text{s}}$ |

## ELECTRICAL SPECIFICATIONS

| PARAMETER                       | SYMBOL      | TEST CONDITIONS                | VALUES | UNITS            |
|---------------------------------|-------------|--------------------------------|--------|------------------|
| Maximum forward voltage drop    | $V_{FM}$    | 40 A, $T_J = 25^\circ\text{C}$ | 1.14   | V                |
| Forward slope resistance        | $r_t$       | $T_J = 150^\circ\text{C}$      | 7.6    | $\text{m}\Omega$ |
| Threshold voltage               | $V_{F(TO)}$ |                                | 0.72   | V                |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25^\circ\text{C}$       | 0.1    | mA               |
|                                 |             | $T_J = 150^\circ\text{C}$      | 1.0    |                  |

## THERMAL - MECHANICAL SPECIFICATIONS

| PARAMETER                                       | SYMBOL         | TEST CONDITIONS                             | VALUES             | UNITS                                                            |
|-------------------------------------------------|----------------|---------------------------------------------|--------------------|------------------------------------------------------------------|
| Maximum junction and storage temperature range  | $T_J, T_{Stg}$ |                                             | -40 to +150        | $^\circ\text{C}$                                                 |
| Maximum thermal resistance, junction to case    | $R_{thJC}$     | DC operation                                | 0.6                | $^\circ\text{C/W}$                                               |
| Maximum thermal resistance, junction to ambient | $R_{thJA}$     |                                             | 40                 |                                                                  |
| Typical thermal resistance, case to heatsink    | $R_{thCS}$     | Mounting surface, flat, smooth, and greased | 0.2                |                                                                  |
| Approximate weight                              |                |                                             | 6                  | g                                                                |
| Mounting torque                                 | minimum        |                                             | 6 (5)              | $\text{kgf} \cdot \text{cm}$<br>( $\text{lbf} \cdot \text{in}$ ) |
|                                                 | maximum        |                                             | 12 (10)            |                                                                  |
| Marking device                                  |                | Case style TO-247AC 2L, TO-247AC 3L         | 40EPS16<br>40APS16 |                                                                  |

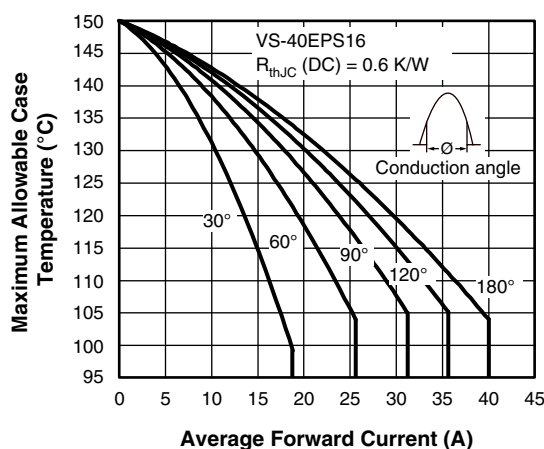


Fig. 1 - Current Rating Characteristics

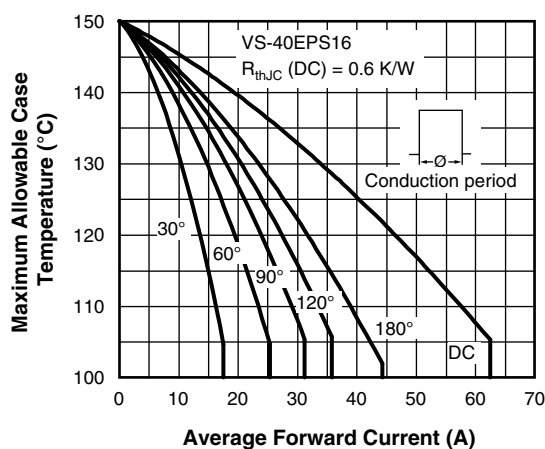


Fig. 2 - Current Rating Characteristics

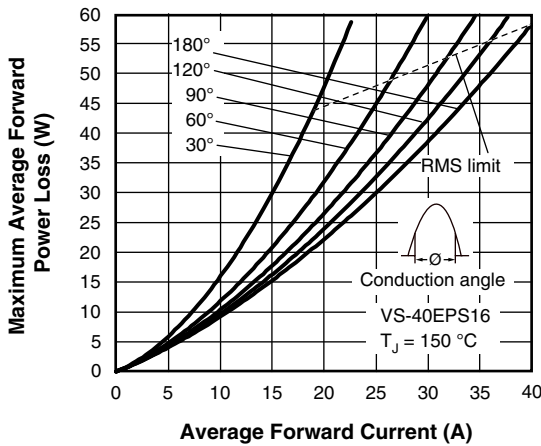


Fig. 3 - Forward Power Loss Characteristics

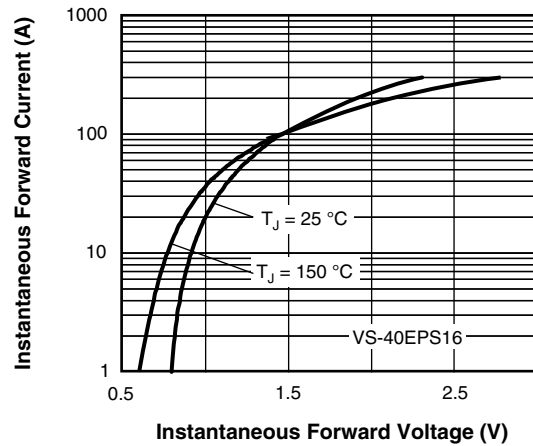


Fig. 5 - Forward Voltage Drop Characteristics

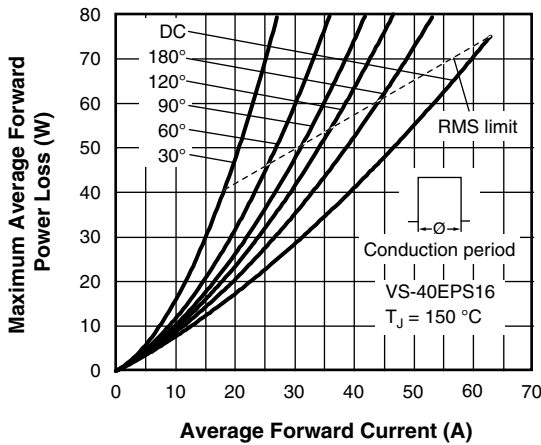


Fig. 4 - Forward Power Loss Characteristics

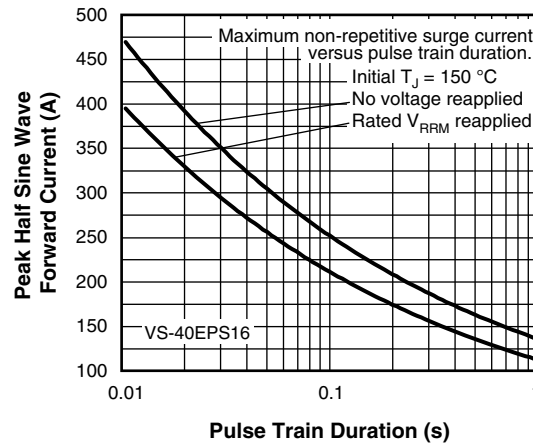
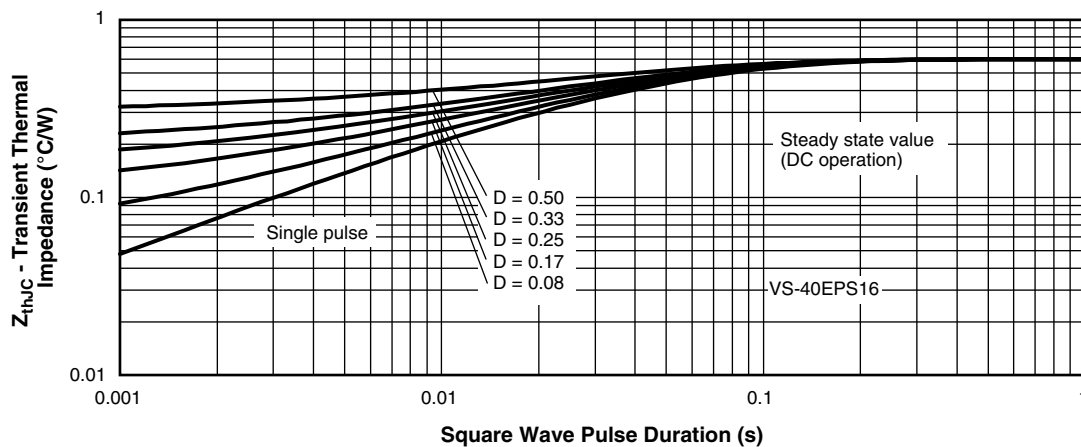


Fig. 6 - Maximum Non-Repetitive Surge Current


Fig. 7 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

|             |            |           |          |          |          |           |            |
|-------------|------------|-----------|----------|----------|----------|-----------|------------|
| Device code | <b>VS-</b> | <b>40</b> | <b>E</b> | <b>P</b> | <b>S</b> | <b>16</b> | <b>-M3</b> |
|             | 1          | 2         | 3        | 4        | 5        | 6         | 7          |

- 1** - Vishay Semiconductors product
- 2** - Current rating (40 = 40 A)
- 3** - Circuit configuration:  
A = single diode, 3 pins  
E = single diode, 2 pins
- 4** - Package:  
P = TO-247AC 2L / TO-247AC 3L
- 5** - Type of silicon:  
S = standard recovery rectifier
- 6** - Voltage rating (16 = 1600 V)
- 7** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

**ORDERING INFORMATION** (Example)

| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION    |
|---------------|------------------|------------------------|--------------------------|
| VS-40EPS16-M3 | 25               | 500                    | Antistatic plastic tubes |
| VS-40APS16-M3 | 25               | 500                    | Antistatic plastic tubes |

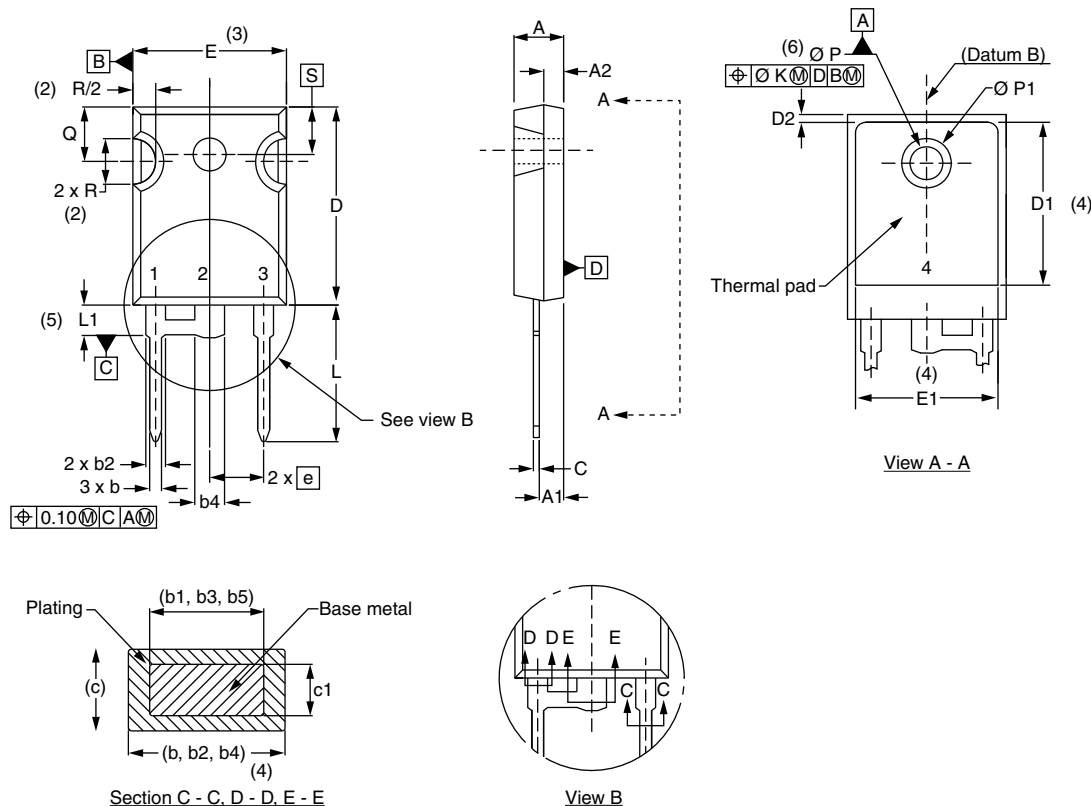
**LINKS TO RELATED DOCUMENTS**

|                          |             |                                                                        |
|--------------------------|-------------|------------------------------------------------------------------------|
| Dimensions               | TO-247AC 2L | <a href="http://www.vishay.com/doc?96144">www.vishay.com/doc?96144</a> |
|                          | TO-247AC 3L | <a href="http://www.vishay.com/doc?96138">www.vishay.com/doc?96138</a> |
| Part marking information | TO-247AC 2L | <a href="http://www.vishay.com/doc?95648">www.vishay.com/doc?95648</a> |
|                          | TO-247AC 3L | <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a> |
| SPICE model              |             | <a href="http://www.vishay.com/doc?96047">www.vishay.com/doc?96047</a> |



## TO-247AC modified - 50 mils L/F

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES |
|--------|-------------|-------|--------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |
| A      | 4.65        | 5.31  | 0.183  | 0.209 |       |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       |
| A2     | 1.17        | 1.37  | 0.046  | 0.054 |       |
| b      | 0.99        | 1.40  | 0.039  | 0.055 |       |
| b1     | 0.99        | 1.35  | 0.039  | 0.053 |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       |
| b4     | 2.59        | 3.43  | 0.102  | 0.135 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       |
| c1     | 0.38        | 0.84  | 0.015  | 0.033 |       |
| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     |
| D1     | 13.08       | -     | 0.515  | -     | 4     |

| SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| D2     | 0.51        | 1.35  | 0.020     | 0.053 |       |
| E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| E1     | 13.46       | -     | 0.53      | -     |       |
| e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| Ø K    | 0.254       |       | 0.010     |       |       |
| L      | 14.20       | 16.10 | 0.559     | 0.634 |       |
| L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| Ø P1   | -           | 7.39  | -         | 0.291 |       |
| Q      | 5.31        | 5.69  | 0.209     | 0.224 |       |
| R      | 4.52        | 5.49  | 0.178     | 0.216 |       |
| S      | 5.51 BSC    |       | 0.217 BSC |       |       |

## Notes

- Dimensioning and tolerance per ASME Y14.5M-1994
- Contour of slot optional
- 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 outermost extremes of the plastic body
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- Outline conforms to JEDEC® outline TO-247 with exception of dimension c and Q



## TO-247AC 3L

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES |
|--------|-------------|-------|--------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |
| A      | 4.65        | 5.31  | 0.183  | 0.209 |       |
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| b1     | 0.99        | 1.35  | 0.039  | 0.053 |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       |
| b4     | 2.59        | 3.43  | 0.102  | 0.135 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       |
| c1     | 0.38        | 0.84  | 0.015  | 0.033 |       |
| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     |
| D1     | 13.08       | -     | 0.515  | -     | 4     |

| SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| D2     | 0.51        | 1.35  | 0.020     | 0.053 |       |
| E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| E1     | 13.46       | -     | 0.53      | -     |       |
| e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| Ø K    | 0.254       |       | 0.010     |       |       |
| L      | 14.20       | 16.10 | 0.559     | 0.634 |       |
| L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| Ø P1   | -           | 7.39  | -         | 0.291 |       |
| Q      | 5.31        | 5.69  | 0.209     | 0.224 |       |
| R      | 4.52        | 5.49  | 0.178     | 0.216 |       |
| S      | 5.51 BSC    |       | 0.217 BSC |       |       |

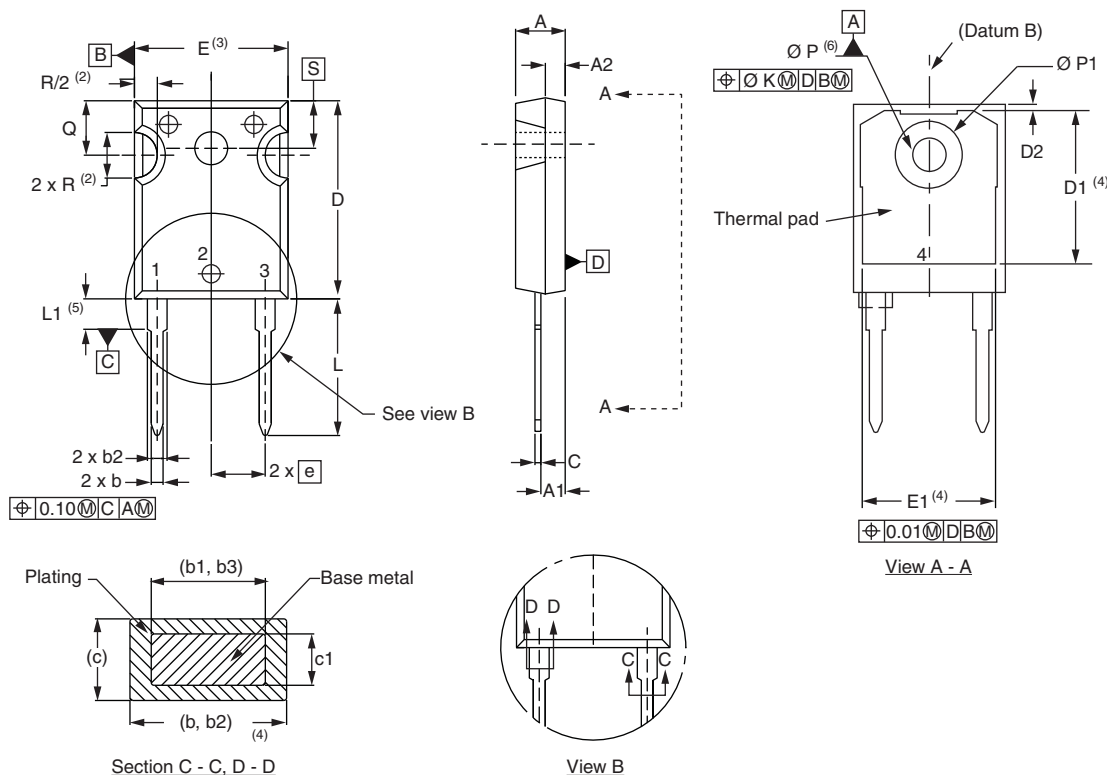
## Notes

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- (2) Contour of slot optional
- (3) 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 outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension Q



## TO-247AC 2L

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES |
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|        | MIN.        | MAX.  | MIN.   | MAX.  |       |
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| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       |
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| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     |
| D1     | 13.08       | -     | 0.515  | -     | 4     |
| D2     | 0.51        | 1.35  | 0.020  | 0.053 |       |

| SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| E1     | 13.46       | -     | 0.53      | -     |       |
| e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| Ø K    | 0.254       |       | 0.010     |       |       |
| L      | 14.20       | 16.10 | 0.559     | 0.634 |       |
| L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
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| Q      | 5.31        | 5.69  | 0.209     | 0.224 |       |
| R      | 4.52        | 5.49  | 0.178     | 0.216 |       |
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## Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
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- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension Q



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