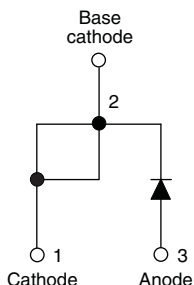




## High Voltage, Input Rectifier Diode, 40 A



TO-247AC modified



## FEATURES

- Very low forward voltage drop
- 150 °C max. operating junction temperature
- Designed and qualified according to JEDEC®-JESD47
- 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).

## PRODUCT SUMMARY

|                 |                            |
|-----------------|----------------------------|
| Package         | TO-247AC modified (2 pins) |
| $I_{F(AV)}$     | 40 A                       |
| $V_R$           | 800 V to 1200 V            |
| $V_F$ at $I_F$  | 1.1 V                      |
| $I_{FSM}$       | 475 A                      |
| $T_J$ max.      | 150 °C                     |
| Diode variation | Single die                 |

## MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS            | VALUES     | UNITS |
|-------------|----------------------------|------------|-------|
| $I_{F(AV)}$ | Sinusoidal waveform        | 40         | A     |
| $V_{RRM}$   | Range                      | 800/1200   | V     |
| $I_{FSM}$   |                            | 475        | A     |
| $V_F$       | 40 A, $T_J = 25\text{ °C}$ | 1.1        | 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-40EPS08PbF, VS-40EPS08-M3 | 800                                              | 900                                                             | 1                            |
| VS-40EPS12PbF, VS-40EPS12-M3 | 1200                                             | 1300                                                            |                              |

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                           | SYMBOL        | TEST CONDITIONS                                            | VALUES | UNITS             |
|-----------------------------------------------------|---------------|------------------------------------------------------------|--------|-------------------|
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 105\text{ °C}$ , 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    | A <sup>2</sup> 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 | A <sup>2</sup> √s |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                       | SYMBOL      | TEST CONDITIONS                |                               | VALUES | UNITS      |
|---------------------------------|-------------|--------------------------------|-------------------------------|--------|------------|
| Maximum forward voltage drop    | $V_{FM}$    | 20 A, $T_J = 25^\circ\text{C}$ |                               | 1.0    | V          |
|                                 |             | 40 A, $T_J = 25^\circ\text{C}$ |                               | 1.1    |            |
| Forward slope resistance        | $r_t$       | $T_J = 150^\circ\text{C}$      |                               | 7.16   | m $\Omega$ |
| Threshold voltage               | $V_{F(TO)}$ |                                |                               | 0.74   | V          |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25^\circ\text{C}$       | $V_R = \text{Rated } V_{RRM}$ | 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                      |
|                                                 |                |                                            | 0.21       | oz.                    |
| Mounting torque                                 | minimum        |                                            | 6 (5)      | kgf · cm<br>(lbf · in) |
|                                                 | maximum        |                                            | 12 (10)    |                        |
| Marking device                                  |                | Case style TO-247AC modified (JEDEC)       | 40EPS08    |                        |
|                                                 |                |                                            | 40EPS12    |                        |

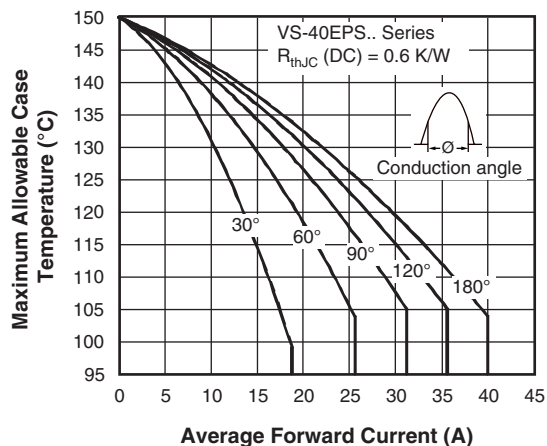


Fig. 1 - Current Rating Characteristics

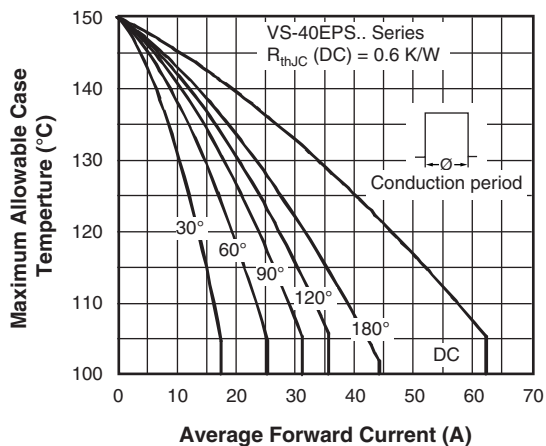


Fig. 2 - Current Rating Characteristics

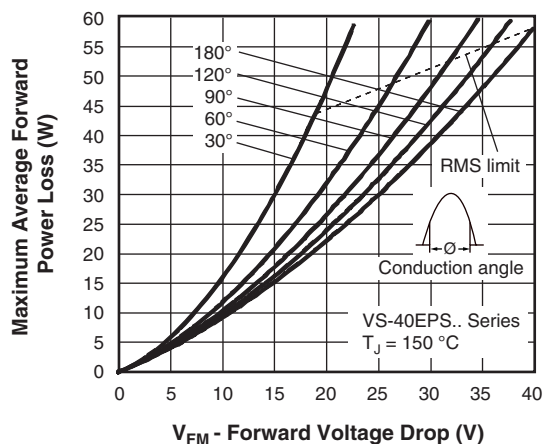


Fig. 3 - Forward Power Loss Characteristics

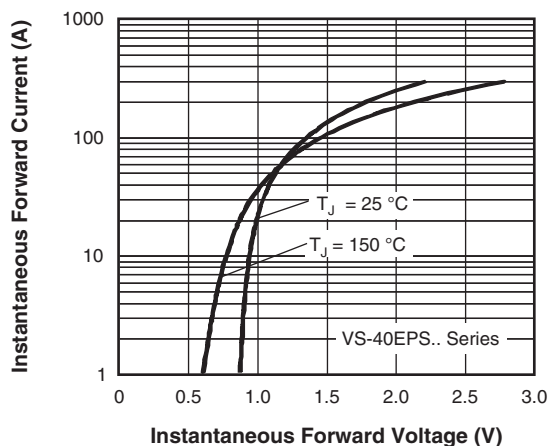


Fig. 5 - Forward Voltage Drop Characteristics

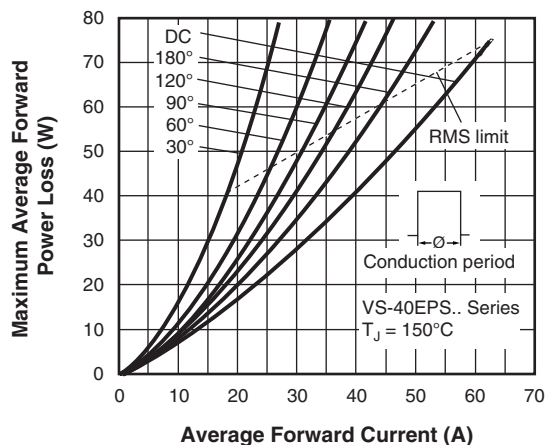


Fig. 4 - Forward Power Loss Characteristics

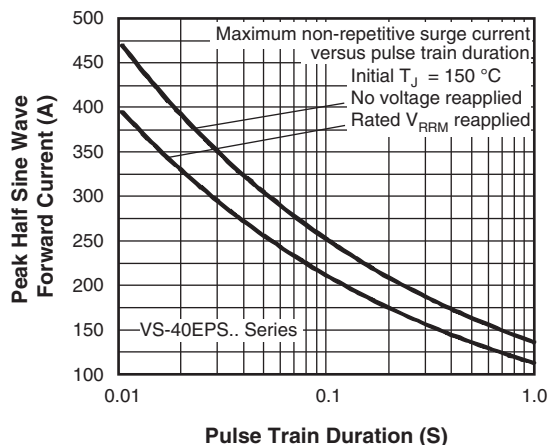


Fig. 6 - Maximum Non-Repetitive Surge Current

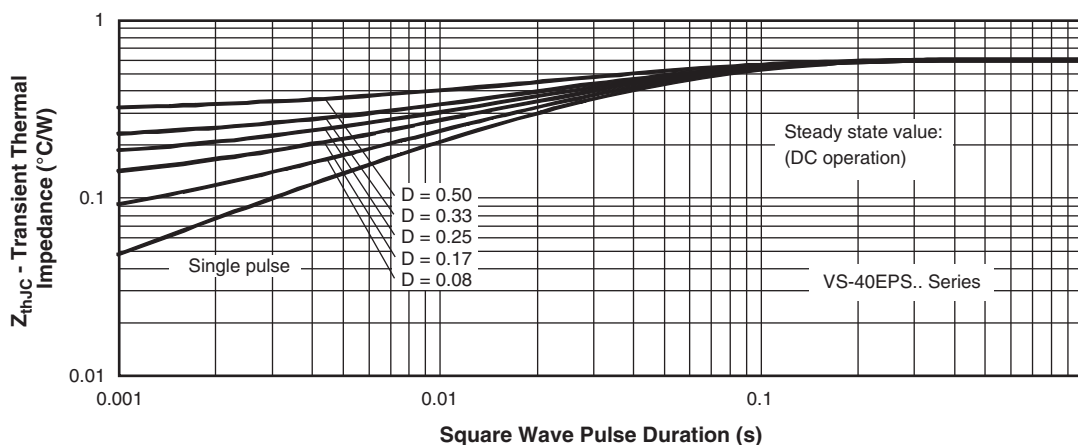


Fig. 7 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

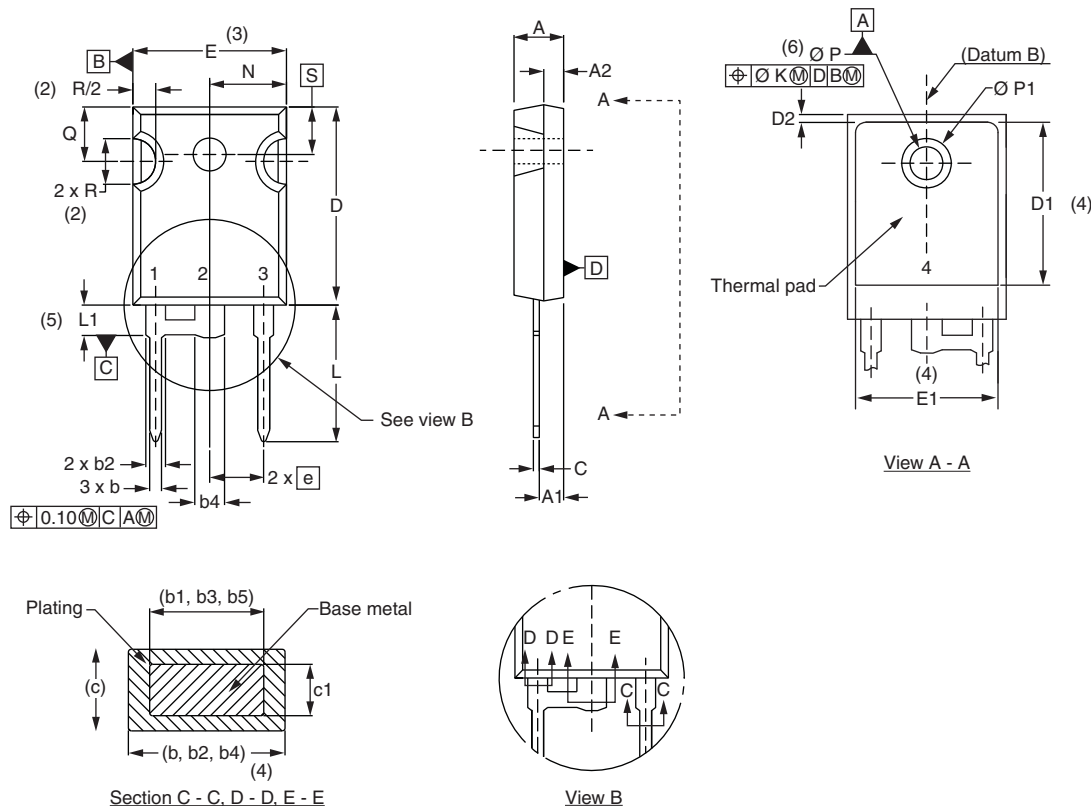
|             |            |                                                                                                                                         |          |          |          |           |                           |
|-------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|-----------|---------------------------|
| Device code | <b>VS-</b> | <b>40</b>                                                                                                                               | <b>E</b> | <b>P</b> | <b>S</b> | <b>12</b> | <b>PbF</b>                |
|             | 1          | 2                                                                                                                                       | 3        | 4        | 5        | 6         | 7                         |
|             | 1          | - Vishay Semiconductors product                                                                                                         |          |          |          |           |                           |
|             | 2          | - Current rating (40 = 40 A)                                                                                                            |          |          |          |           |                           |
|             | 3          | - Circuit configuration:<br>E = Single diode                                                                                            |          |          |          |           |                           |
|             | 4          | - Package:<br>P = TO-247AC modified                                                                                                     |          |          |          |           |                           |
|             | 5          | - Type of silicon:<br>S = Standard recovery rectifier                                                                                   |          |          |          |           |                           |
|             | 6          | - Voltage rating                                                                                                                        |          |          |          |           | 08 = 800 V<br>12 = 1200 V |
|             | 7          | - Environmental digit:<br>PbF = Lead (Pb)-free and RoHS compliant<br>-M3 = Halogen-free, RoHS compliant and terminations lead (Pb)-free |          |          |          |           |                           |

| <b>ORDERING INFORMATION (Example)</b> |                  |                        |                          |
|---------------------------------------|------------------|------------------------|--------------------------|
| PREFERRED P/N                         | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION    |
| VS-40EPS08PbF                         | 25               | 500                    | Antistatic plastic tubes |
| VS-40EPS08-M3                         | 25               | 500                    | Antistatic plastic tubes |
| VS-40EPS12PbF                         | 25               | 500                    | Antistatic plastic tubes |
| VS-40EPS12-M3                         | 25               | 500                    | Antistatic plastic tubes |

| <b>LINKS TO RELATED DOCUMENTS</b> |                       |                                                                        |
|-----------------------------------|-----------------------|------------------------------------------------------------------------|
| Dimensions                        |                       | <a href="http://www.vishay.com/doc?95541">www.vishay.com/doc?95541</a> |
| Part marking information          | TO-247AC modified PbF | <a href="http://www.vishay.com/doc?95255">www.vishay.com/doc?95255</a> |
|                                   | TO-247AC modified -M3 | <a href="http://www.vishay.com/doc?95442">www.vishay.com/doc?95442</a> |



## TO-247 modified

**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     | 1.50        | 2.49  | 0.059  | 0.098 |       |
| 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        | 1.30  | 0.020     | 0.051 |       |
| E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| E1     | 13.72       | -     | 0.540     | -     |       |
| e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| Ø K    | 2.54        |       | 0.010     |       |       |
| L      | 14.20       | 16.10 | 0.559     | 0.634 |       |
| L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| N      | 7.62 BSC    |       | 0.3       |       |       |
| Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| Ø P1   | -           | 6.98  | -         | 0.275 |       |
| 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 |       |       |

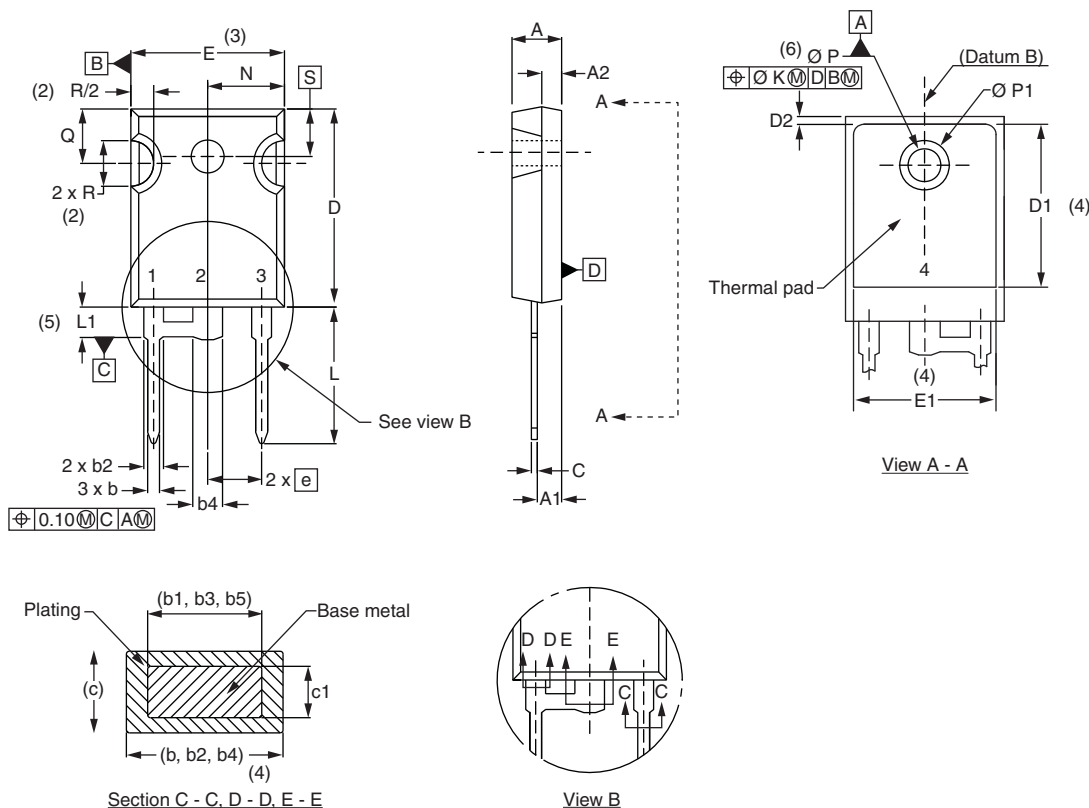
**Notes**

- (1) Dimensioning and tolerance per ASME Y14.5M-1994
- (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 c



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

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 |       |
| N      | 7.62 BSC    |       | 0.3       |       |       |
| 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



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