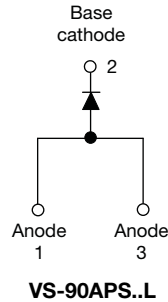
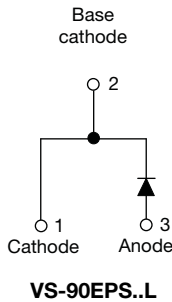
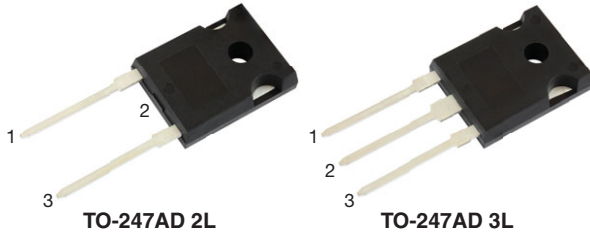


## High Voltage, Input Rectifier Diode, 90 A



### FEATURES

- Very low forward voltage drop
- 150 °C max. operating junction temperature
- Glass passivated pallet 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**

### APPLICATIONS

- Input rectification for single and three phase bridge configurations
- Off-board EV/HEV battery chargers
- Renewable energy inverters
- Input rectification for single and three phase bridge configurations
- 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).

| PRIMARY CHARACTERISTICS |                          |
|-------------------------|--------------------------|
| $I_{F(AV)}$             | 90 A                     |
| $V_R$                   | 800 V to 1200 V          |
| $V_F$ at $I_F$          | 1.20 V                   |
| $I_{FSM}$               | 1100 A                   |
| $T_J$ max.              | 150 °C                   |
| Package                 | TO-247AD 2L, TO-247AD 3L |
| Circuit configuration   | Single                   |

| MAJOR RATINGS AND CHARACTERISTICS |                     |             |       |
|-----------------------------------|---------------------|-------------|-------|
| SYMBOL                            | CHARACTERISTICS     | VALUES      | UNITS |
| $I_{F(AV)}$                       | Sinusoidal waveform | 90          | A     |
| $V_{RRM}$                         | Range               | 800 to 1200 | V     |
| $I_{FSM}$                         |                     | 1100        | A     |
| $V_F$                             | 90 A, $T_J = 25$ °C | 1.20        | V     |
| $T_J$                             |                     | -40 to +150 | °C    |

| VOLTAGE RATINGS                |   |  |                           |
|--------------------------------|---|--|---------------------------|
| PART NUMBER                    | $V_{RRM}$ , MAXIMUM PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ AT 150 °C<br>mA |
| VS-90EPS08L-M3, VS-90APS08L-M3 | 800   | 900  | 1.5                       |
| VS-90EPS12L-M3, VS-90APS12L-M3 | 1200  | 1300   |                           |



| ABSOLUTE MAXIMUM RATINGS                            |               |  |        |               |
|---|---------------|--|--------|---------------|
| PARAMETER   | SYMBOL        | TEST CONDITIONS  | VALUES | UNITS         |
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 112\text{ }^\circ\text{C}$ , 180° conduction half sine wave | 90     | A             |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$     | 10 ms sine pulse, rated $V_{RRM}$ applied                          | 915    |               |
|   |               | 10 ms sine pulse, no voltage reapplied                             | 1100   |               |
| Maximum $I^2t$ for fusing                           | $I^2t$        | 10 ms sine pulse, rated $V_{RRM}$ applied                          | 4185   | $A^2s$        |
|   |               | 10 ms sine pulse, no voltage reapplied                             | 6050   |               |
| Maximum $I^2\sqrt{t}$ for fusing                    | $I^2\sqrt{t}$ | $t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied         | 60 500 | $A^2\sqrt{s}$ |

| ELECTRICAL SPECIFICATIONS       |             |  |        |           |
|---------------------------------|-------------|--|--------|-----------|
| PARAMETER                       | SYMBOL      | TEST CONDITIONS                        | VALUES | UNITS     |
| Maximum forward voltage drop    | $V_{FM}$    | 90 A, $T_J = 25\text{ }^\circ\text{C}$ | 1.20   | V         |
| Forward slope resistance        | $r_t$       | $T_J = 150\text{ }^\circ\text{C}$      | 3.17   | $m\Omega$ |
| Threshold voltage               | $V_{F(TO)}$ |  | 0.73   | V         |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25\text{ }^\circ\text{C}$       | 0.1    | mA        |
|                                 |             | $T_J = 150\text{ }^\circ\text{C}$      |        |           |

| 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                               | 0.2                | $^\circ\text{C/W}$   |
| Maximum thermal resistance, junction to ambient | $R_{thJA}$     |  | 40                 |  |
| Typical thermal resistance, case to heatsink    | $R_{thCS}$     | Mounting surface, flat, smooth and greased | 0.25               |  |
| Approximate weight                              |                |  | 6                  | g  |
|   |                |  | 0.21               | oz.  |
| Mounting torque                                 | minimum        |  | 6 (5)              | $\text{kgf} \cdot \text{cm}$<br>$(\text{lbf} \cdot \text{in})$ |
|   | maximum        |  | 12 (10)            |  |
| Marking device                                  |                | Case style TO-247AD 2L                     | 90EPS08L, 90EPS12L |  |
|   |                | Case style TO-247AD 3L                     | 90APS08L, 90APS12L |  |

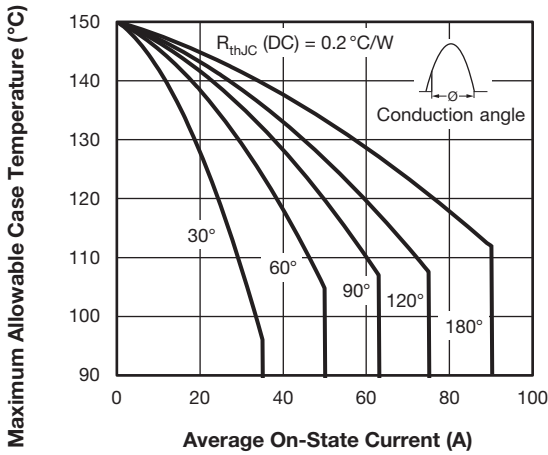


Fig. 1 - Current Rating Characteristics

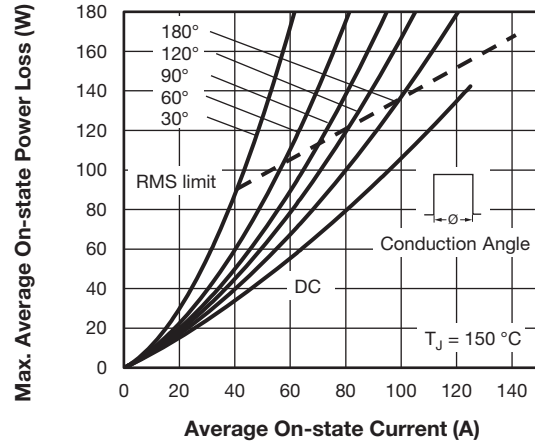


Fig. 4 - Forward Power Loss Characteristics

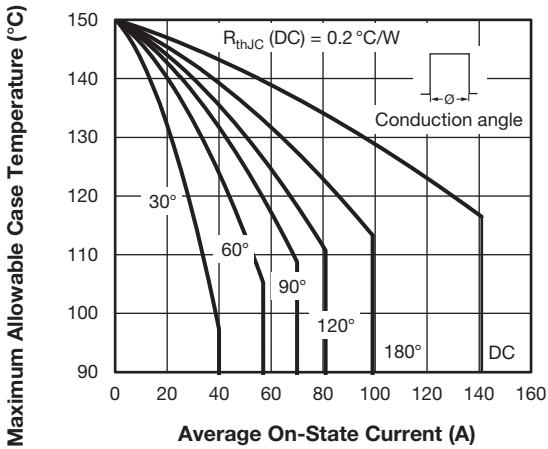


Fig. 2 - Current Rating Characteristics

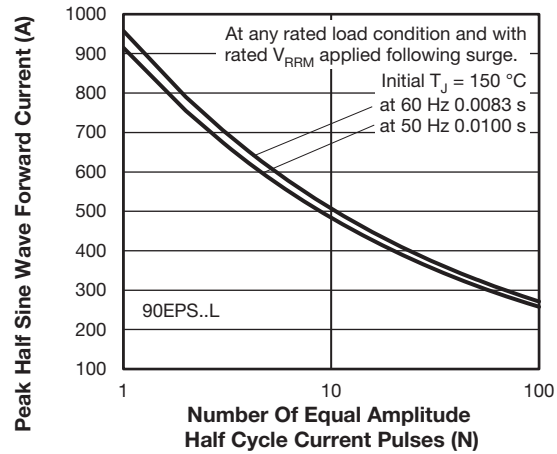


Fig. 5 - Maximum Non-Repetitive Surge Current

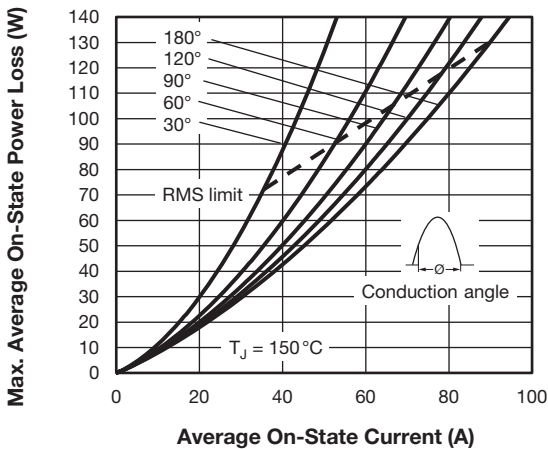


Fig. 3 - Forward Power Loss Characteristics

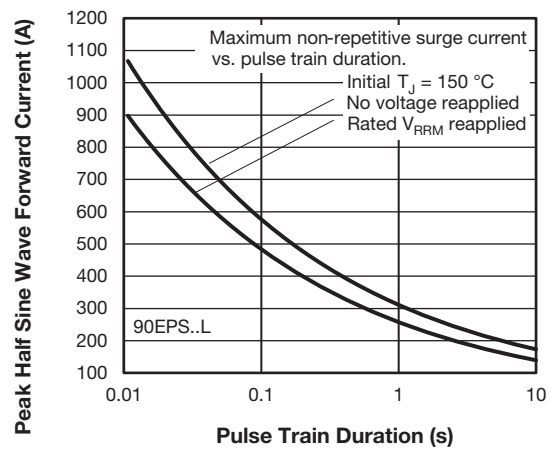


Fig. 6 - Maximum Non-Repetitive Surge Current

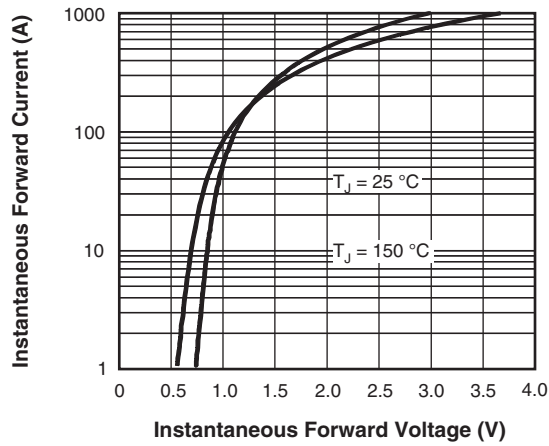


Fig. 7 - Forward Voltage Drop Characteristics

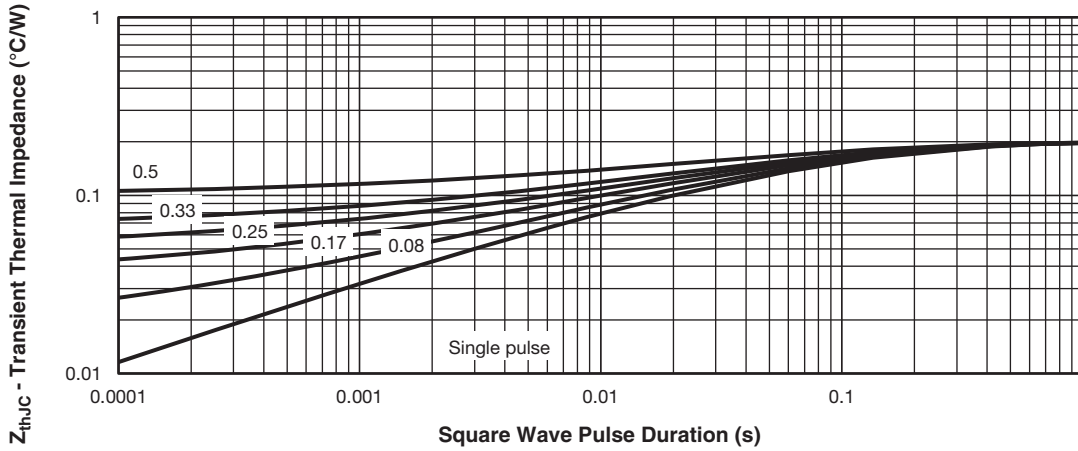
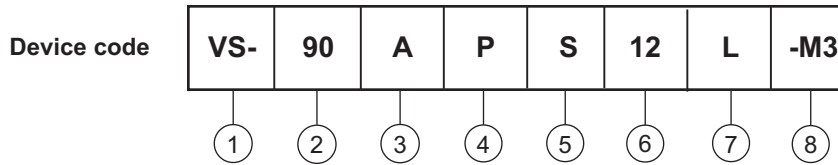


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (90 = 90 A)
- 3** - Circuit configuration:  
E = single diode, 2 pins  
A = single diode, 3 pins
- 4** - Package:  
P = TO-247AD
- 5** - Type of silicon:  
S = standard recovery rectifier
- 6** - Voltage ratings 08 = 800 V  
12 = 1200 V
- 7** - L = long leads
- 8** - 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-90EPS08L-M3                 | 25               | 500                    | Antistatic plastic tubes |
| VS-90APS08L-M3                 | 25               | 500                    | Antistatic plastic tubes |
| VS-90EPS12L-M3                 | 25               | 500                    | Antistatic plastic tubes |
| VS-90APS12L-M3                 | 25               | 500                    | Antistatic plastic tubes |

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | TO-247AD 2L <a href="http://www.vishay.com/doc?95536">www.vishay.com/doc?95536</a> |
|                            | TO-247AD 3L <a href="http://www.vishay.com/doc?95626">www.vishay.com/doc?95626</a> |
| Part marking information   | TO-247AD 2L <a href="http://www.vishay.com/doc?95648">www.vishay.com/doc?95648</a> |
|                            | TO-247AD 3L <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a> |

### TO-247AD 2L

**DIMENSIONS** in millimeters and inches



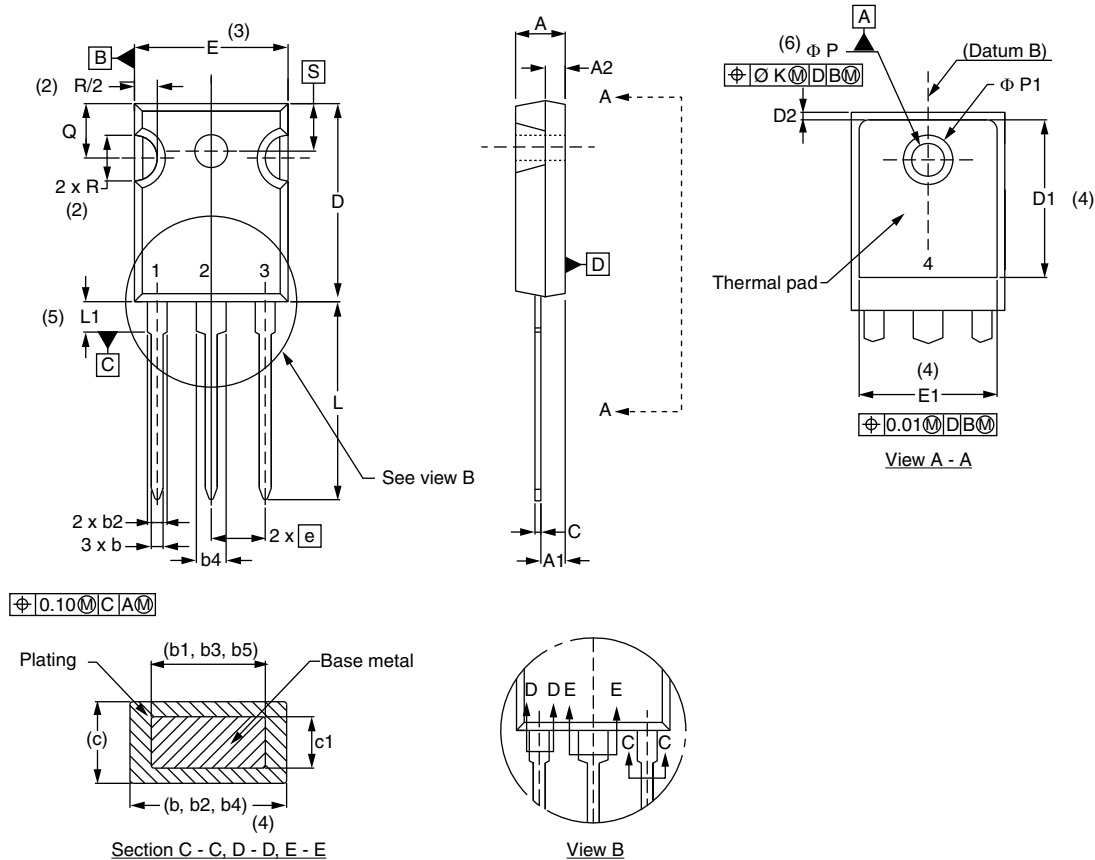
| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES | SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| A      | 4.65        | 5.31  | 0.183  | 0.209 |       | E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       | E1     | 13.46       | -     | 0.53      | -     |       |
| A2     | 1.50        | 2.49  | 0.059  | 0.098 |       | e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| b      | 0.99        | 1.40  | 0.039  | 0.055 |       | Ø K    | 0.254       |       | 0.010     |       |       |
| b1     | 0.99        | 1.35  | 0.039  | 0.053 |       | L      | 19.81       | 20.32 | 0.780     | 0.800 |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       | L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       | Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       | Ø P1   | -           | 6.98  | -         | 0.275 |       |
| c1     | 0.38        | 0.84  | 0.015  | 0.033 |       | Q      | 5.31        | 5.69  | 0.209     | 0.224 |       |
| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     | R      | 4.52        | 5.49  | 0.178     | 0.216 |       |
| D1     | 13.08       | -     | 0.515  | -     | 4     | S      | 5.51 BSC    |       | 0.217 BSC |       |       |
| D2     | 0.51        | 1.35  | 0.020  | 0.053 |       |        |             |       |           |       |       |

**Notes**

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. 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 A min., D, E min., Q min., S, and note 4

## TO-247AD 3L

**DIMENSIONS** in millimeters and inches



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES | SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| A      | 4.65        | 5.31  | 0.183  | 0.209 |       | D2     | 0.51        | 1.30  | 0.020     | 0.051 |       |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       | E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| A2     | 1.50        | 2.49  | 0.059  | 0.098 |       | E1     | 13.46       | -     | 0.53      | -     |       |
| b      | 0.99        | 1.40  | 0.039  | 0.055 |       | e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| b1     | 0.99        | 1.35  | 0.039  | 0.053 |       | Ø K    | 0.254       |       | 0.010     |       |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       | L      | 19.81       | 20.32 | 0.780     | 0.800 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       | L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| b4     | 2.59        | 3.43  | 0.102  | 0.135 |       | Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       | Ø P1   | -           | 6.98  | -         | 0.275 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       | Q      | 5.31        | 5.69  | 0.209     | 0.224 |       |
| c1     | 0.38        | 0.84  | 0.015  | 0.033 |       | R      | 4.52        | 5.49  | 0.178     | 0.216 |       |
| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     | S      | 5.51 BSC    |       | 0.217 BSC |       |       |
| D1     | 13.08       | -     | 0.515  | -     | 4     |        |             |       |           |       |       |

**Notes**

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. 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
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- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4



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