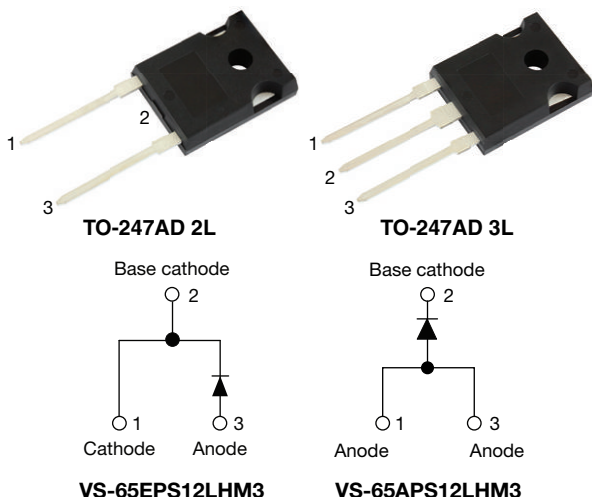


## High Voltage Input Rectifier Diode, 65 A



### FEATURES

- Very low forward voltage drop
- Glass passivated pellet chip junction
- AEC-Q101 qualified meets JESD 201 class 1A whisker test
- Flexible solution for reliable AC power rectification
- High surge, low  $V_F$  rugged blocking diode for DC charging stations
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

### APPLICATIONS

- On-board and off-board EV / HEV battery chargers
- Renewable energy inverters

### 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

|                       |                          |
|-----------------------|--------------------------|
| $I_{F(AV)}$           | 65 A                     |
| $V_R$                 | 1200 V                   |
| $V_F$ at $I_F$        | 1.12 V                   |
| $I_{FSM}$             | 1000 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 | 65          | A     |
| $V_{RRM}$   |                     | 1200        | V     |
| $I_{FSM}$   |                     | 1000        | A     |
| $V_F$       | 30 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<br>NON-REPETITIVE PEAK REVERSE<br>VOLTAGE<br>V | $I_{RRM}$<br>AT 150 °C<br>mA |
|----------------|--------------------------------------------------|--------------------------------------------------------------------|------------------------------|
| VS-65EPS12LHM3 | 1200                                             | 1300                                                               | 1.3                          |
| VS-65APS12LHM3 | 1200                                             | 1300                                                               |                              |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                           | SYMBOL        | TEST CONDITIONS                                | VALUES | UNITS             |
|-----------------------------------------------------|---------------|------------------------------------------------|--------|-------------------|
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 121$ °C, 180° conduction half sine wave | 65     | A                 |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$     | 10 ms sine pulse, rated $V_{RRM}$ applied      | 840    |                   |
|                                                     |               | 10 ms sine pulse, no voltage reapplied         | 1000   | A <sup>2</sup> s  |
| Maximum $I^2t$ for fusing                           | $I^2t$        | 10 ms sine pulse, rated $V_{RRM}$ applied      | 3530   |                   |
|                                                     |               | 10 ms sine pulse, no voltage reapplied         | 5000   | A <sup>2</sup> √s |
| Maximum $I^2\sqrt{t}$ for fusing                    | $I^2\sqrt{t}$ | $t = 0.1$ ms to 10 ms, no voltage reapplied    | 50 000 |                   |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                       | SYMBOL      | TEST CONDITIONS                          | VALUES | UNITS            |
|---------------------------------|-------------|------------------------------------------|--------|------------------|
| Maximum forward voltage drop    | $V_{FM}$    | 65 A, $T_J = 25\text{ }^{\circ}\text{C}$ | 1.12   | V                |
| Forward slope resistance        | $r_t$       | $T_J = 150\text{ }^{\circ}\text{C}$      | 3.98   | $\text{m}\Omega$ |
| Threshold voltage               | $V_{F(TO)}$ |                                          | 0.74   | V                |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25\text{ }^{\circ}\text{C}$       | 0.1    | mA               |
|                                 |             | $T_J = 150\text{ }^{\circ}\text{C}$      | 1.3    |                  |

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                       | SYMBOL                            | TEST CONDITIONS                       | VALUES      | UNITS                  |
|-------------------------------------------------|-----------------------------------|---------------------------------------|-------------|------------------------|
| Maximum junction and storage temperature range  | T <sub>J</sub> , T <sub>Stg</sub> |                                       | -40 to +150 | °C                     |
| Maximum thermal resistance, junction to case    | R <sub>thJC</sub>                 | DC operation                          | 0.25        | °C/W                   |
| Maximum thermal resistance, junction to ambient | R <sub>thJA</sub>                 |                                       | 40          |                        |
| Typical thermal resistance, case to heatsink    | R <sub>thCS</sub>                 | Mounting surface, 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-247AD 2L                | 65EPS12LH   |                        |
|                                                 |                                   | Case style TO-247AD 3L                | 65APS12LH   |                        |

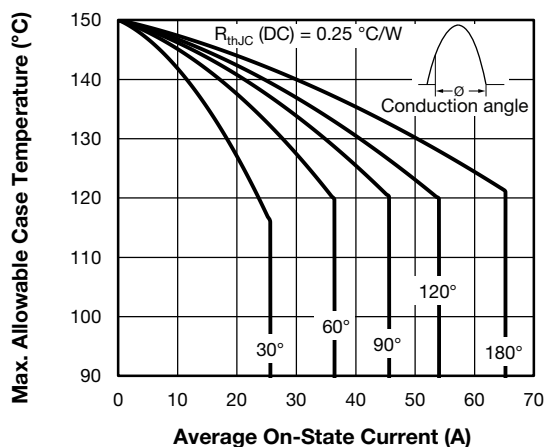


Fig. 1 - Current Rating Characteristics

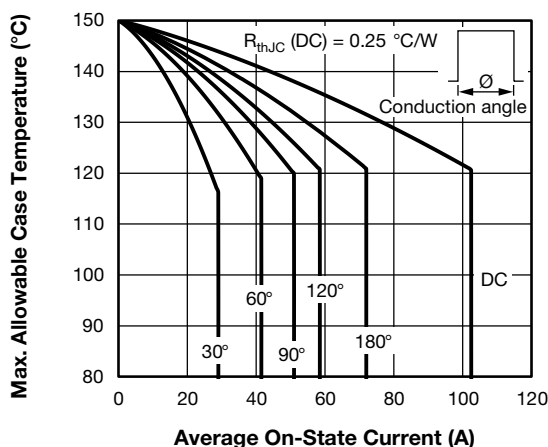


Fig. 2 - Current Rating Characteristics

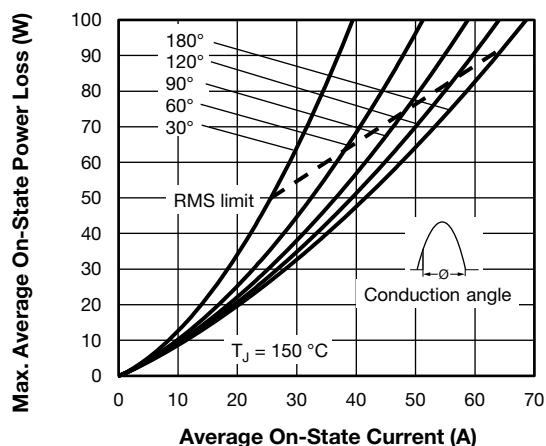


Fig. 3 - Forward Power Loss Characteristics

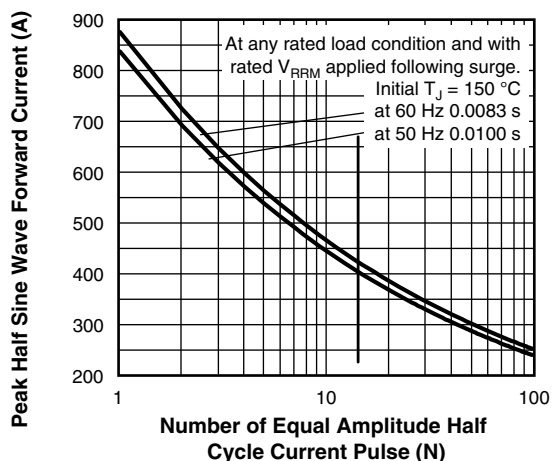


Fig. 5 - Maximum Non-Repetitive Surge Current

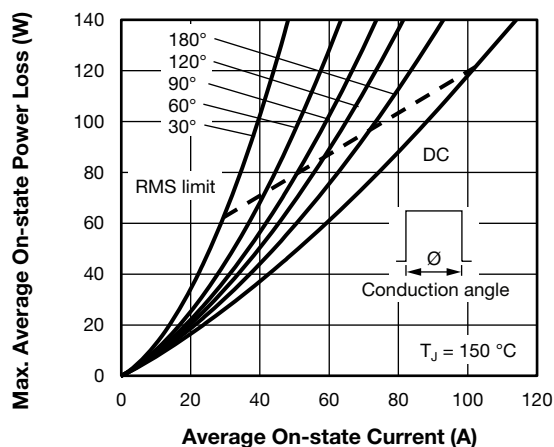


Fig. 4 - Forward Power Loss Characteristics

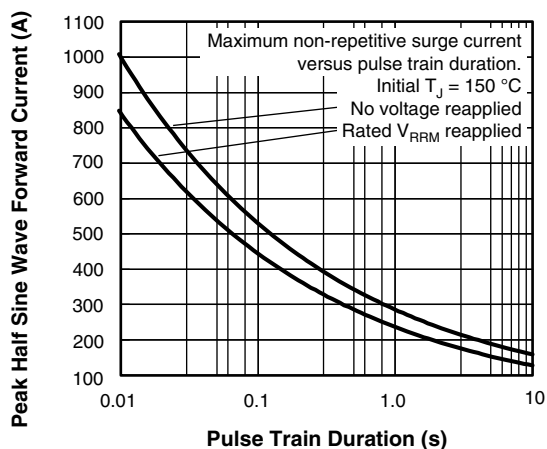


Fig. 6 - Maximum Non-Repetitive Surge Current

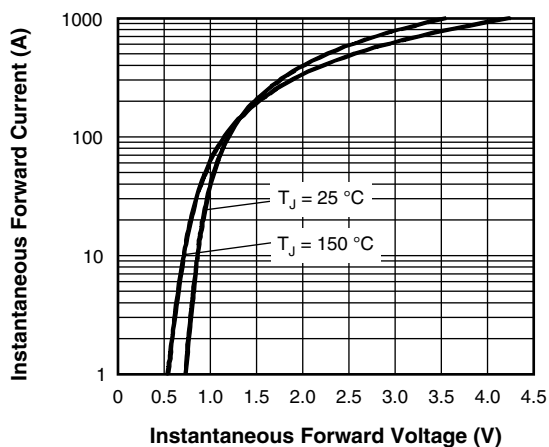
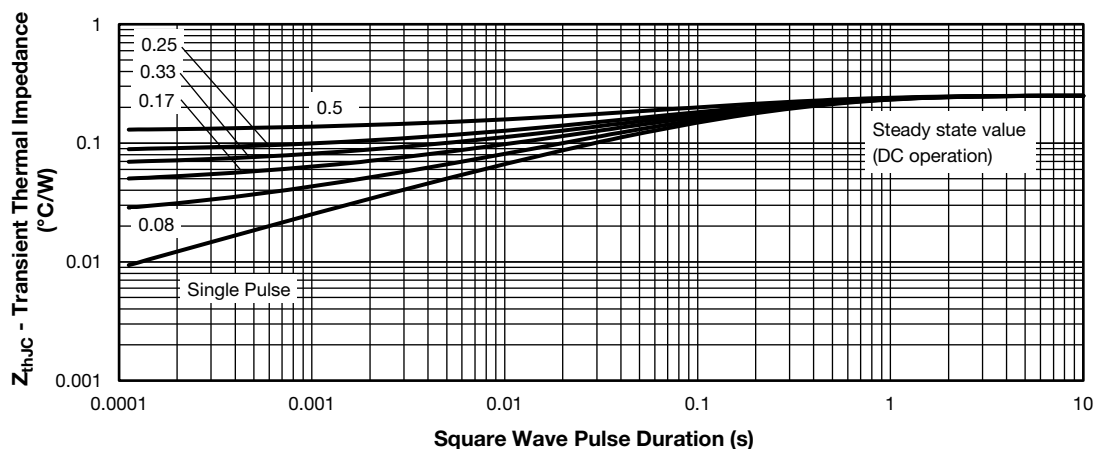


Fig. 7 - Forward Voltage Drop Characteristics

Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics**ORDERING INFORMATION TABLE**

| Device code | VS-                                                                                        | 65 | E | P | S | 12 | L | H | M3 |
|-------------|--------------------------------------------------------------------------------------------|----|---|---|---|----|---|---|----|
|             | 1                                                                                          | 2  | 3 | 4 | 5 | 6  | 7 | 8 | 9  |
| 1           | Vishay Semiconductors product                                                              |    |   |   |   |    |   |   |    |
| 2           | Current rating (65 = 65 A)                                                                 |    |   |   |   |    |   |   |    |
| 3           | Circuit configuration:<br>E = single, 2 pins<br>A = single, 3 pins                         |    |   |   |   |    |   |   |    |
| 4           | Package:<br>P = TO-247AD                                                                   |    |   |   |   |    |   |   |    |
| 5           | Type of silicon:<br>S = standard recovery rectifier                                        |    |   |   |   |    |   |   |    |
| 6           | Voltage code x 100 = $V_{RRM}$ ————— 12 = 1200 V                                           |    |   |   |   |    |   |   |    |
| 7           | L = long leads                                                                             |    |   |   |   |    |   |   |    |
| 8           | H = AEC-Q101 qualified                                                                     |    |   |   |   |    |   |   |    |
| 9           | Environmental digit:<br>M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free |    |   |   |   |    |   |   |    |

**ORDERING INFORMATION (Example)**

| PREFERRED P/N  | BASE QUANTITY | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION    |
|----------------|---------------|------------------------|--------------------------|
| VS-65EPS12LHM3 | 25            | 500                    | Antistatic plastic tubes |
| VS-65APS12LHM3 | 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> |
| SPIICE model             |             | <a href="http://www.vishay.com/doc?97124">www.vishay.com/doc?97124</a> |



### TO-247AD 2L

**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 |       |
| 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     |
| 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      | 19.81       | 20.32 | 0.780     | 0.800 |       |
| L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| 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

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



### TO-247AD 3L

**DIMENSIONS** in millimeters and inches



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES |
|--------|-------------|-------|--------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |
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| 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        | 13.46       | -     | 0.53      | -     |       |
| e         | 5.46 BSC    |       | 0.215 BSC |       |       |
| $\phi K$  | 0.254       |       | 0.010     |       |       |
| L         | 19.81       | 20.32 | 0.780     | 0.800 |       |
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- 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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