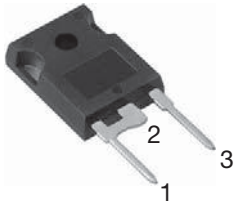
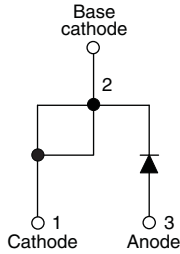




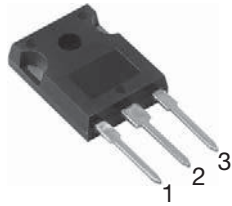
# High Voltage, Input Rectifier Diode, 40 A



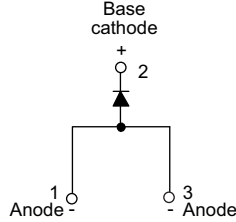
TO-247AC modified



VS-40EPS16PbF  
VS-40EPS16-M3



TO-247AC



VS-40APS16PbF  
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).

| PRODUCT SUMMARY                  |                                      |
|----------------------------------|--------------------------------------|
| Package                          | TO-247AC modified (2 pins), TO-247AC |
| I <sub>F(AV)</sub>               | 40 A                                 |
| V <sub>R</sub>                   | 1600 V                               |
| V <sub>F</sub> at I <sub>F</sub> | 1.14 V                               |
| I <sub>FSM</sub>                 | 475 A                                |
| T <sub>J</sub> max.              | 150 °C                               |
| Diode variation                  | Single die                           |

| MAJOR RATINGS AND CHARACTERISTICS |                              |             |       |
|-----------------------------------|------------------------------|-------------|-------|
| SYMBOL                            | CHARACTERISTICS              | VALUES      | UNITS |
| I <sub>F(AV)</sub>                | Sinusoidal waveform          | 40          | A     |
| V <sub>R(RM)</sub>                |                              | 1600        | V     |
| I <sub>FSM</sub>                  |                              | 475         | A     |
| V <sub>F</sub>                    | 20 A, T <sub>J</sub> = 25 °C | 1.0         | V     |
| T <sub>J</sub>                    |                              | -40 to +150 | °C    |

| VOLTAGE RATINGS |  |   |                                  |
|-----------------|--|---|----------------------------------|
| PART NUMBER     | V <sub>RRM</sub> , MAXIMUM PEAK REVERSE VOLTAGE<br>V | V <sub>RSM</sub> , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE<br>V | I <sub>RRM</sub> AT 150 °C<br>mA |
| VS-40EPS16PbF   | 1600   | 1700  | 1                                |
| VS-40EPS16-M3   |  |   |                                  |
| VS-40APS16PbF   |  |   |                                  |
| VS-40APS16-M3   |  |   |                                  |



| ABSOLUTE MAXIMUM RATINGS                            |               |  |        |               |
|---|---------------|--|--------|---------------|
| PARAMETER   | SYMBOL        | TEST CONDITIONS  | VALUES | UNITS         |
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 105\text{ }^\circ\text{C}$ , 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    | $A^2s$        |
|   |               | 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 | $A^2\sqrt{s}$ |

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

| 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)        | 40EPS16     |                        |
|   |                | Case style TO-247AC                         | 40APS16     |                        |

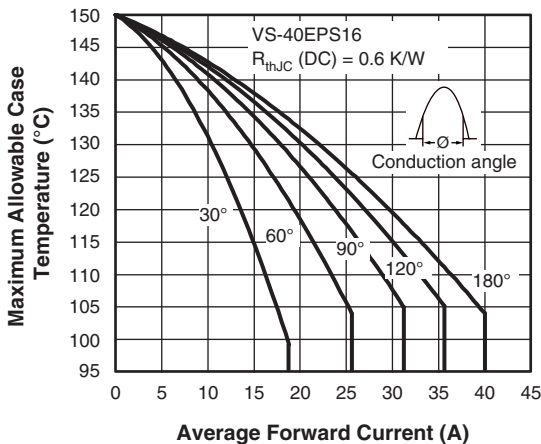


Fig. 1 - Current Rating Characteristics

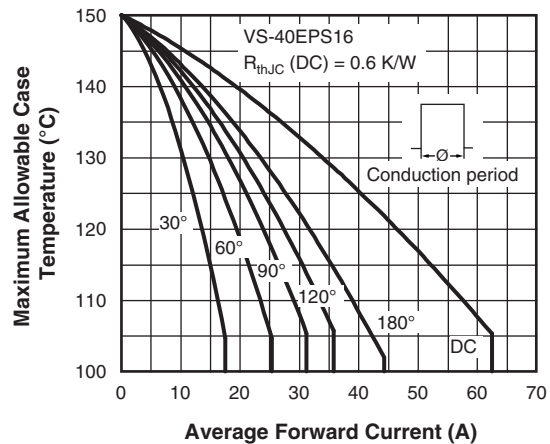


Fig. 2 - Current Rating Characteristics

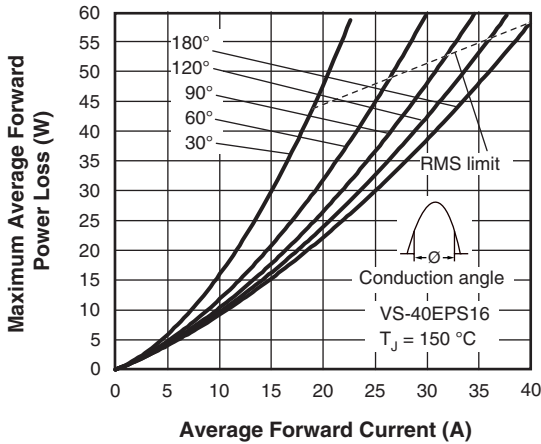


Fig. 3 - Forward Power Loss Characteristics

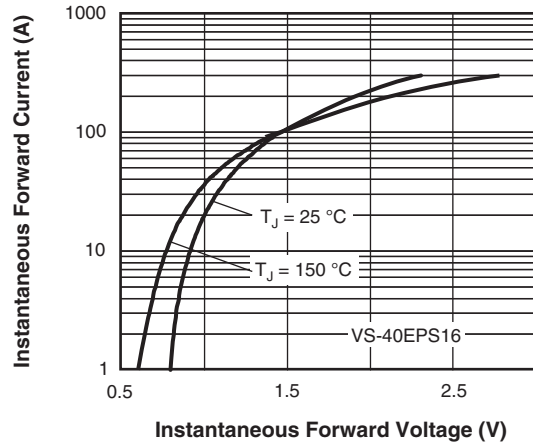


Fig. 5 - Forward Voltage Drop Characteristics

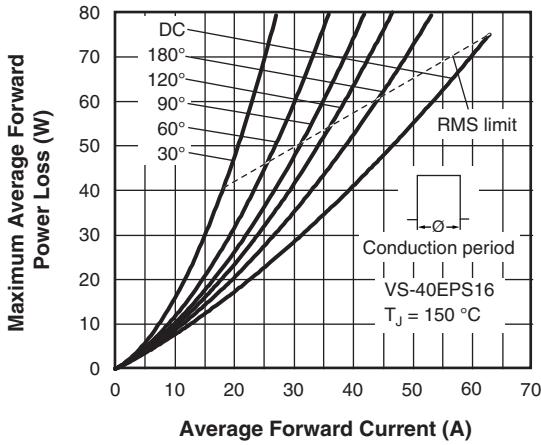


Fig. 4 - Forward Power Loss Characteristics

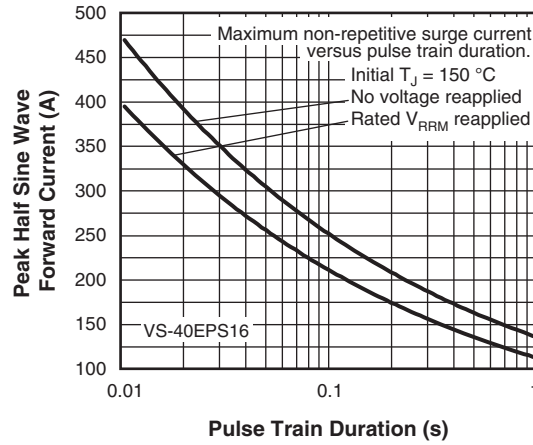


Fig. 6 - Maximum Non-Repetitive Surge Current

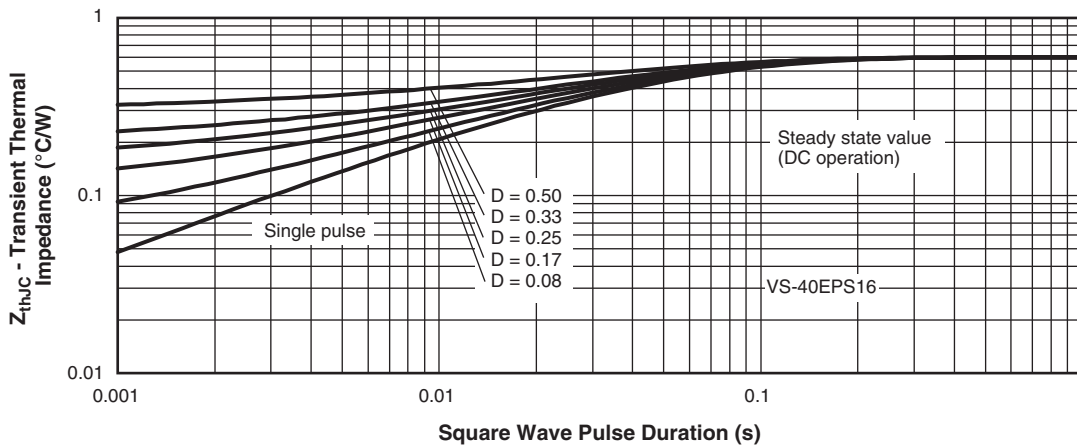
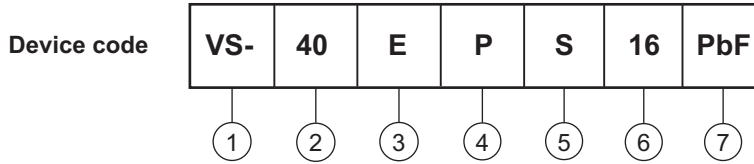


Fig. 7 - Thermal Impedance  $Z_{thJC}$  Characteristics



**ORDERING INFORMATION TABLE**



- 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 modified
- 5** - Type of silicon:  
S = standard recovery rectifier
- 6** - Voltage rating (16 = 1600 V)
- 7** - Environmental digit:  
PbF = lead (Pb)-free and RoHS-compliant  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

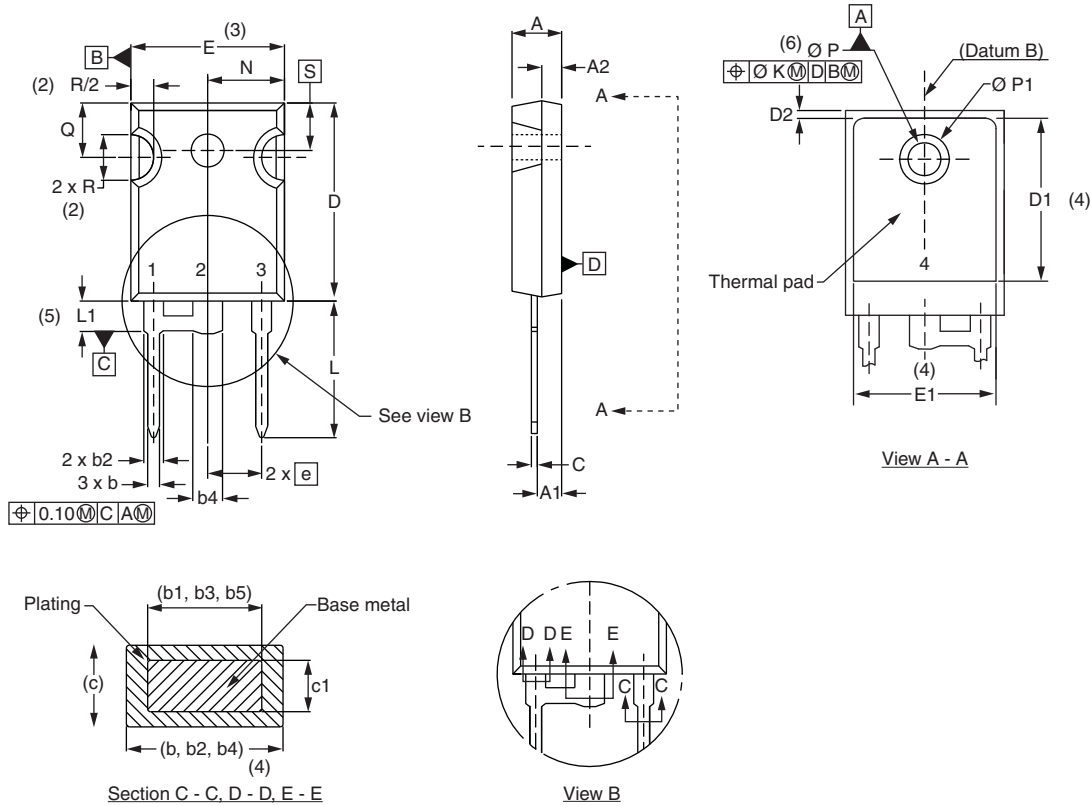
| <b>ORDERING INFORMATION (Example)</b> |                         |                               |                              |
|---------------------------------------|-------------------------|-------------------------------|------------------------------|
| <b>PREFERRED P/N</b>                  | <b>QUANTITY PER T/R</b> | <b>MINIMUM ORDER QUANTITY</b> | <b>PACKAGING DESCRIPTION</b> |
| VS-40EPS16PbF                         | 25                      | 500                           | Antistatic plastic tubes     |
| VS-40EPS16-M3                         | 25                      | 500                           | Antistatic plastic tubes     |
| VS-40APS16PbF                         | 25                      | 500                           | Antistatic plastic tubes     |
| VS-40APS16-M3                         | 25                      | 500                           | Antistatic plastic tubes     |

| <b>LINKS TO RELATED DOCUMENTS</b> |                       |  |
|-----------------------------------|-----------------------|--|
| Dimensions                        | TO-247AC modified     | <a href="http://www.vishay.com/doc?95541">www.vishay.com/doc?95541</a> |
|                                   | TO-247AC              | <a href="http://www.vishay.com/doc?95542">www.vishay.com/doc?95542</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-247AC PbF          | <a href="http://www.vishay.com/doc?95226">www.vishay.com/doc?95226</a> |
|                                   | TO-247AC -M3          | <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a> |



TO-247 - 50 mils L/F modified

**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        | 1.35  | 0.020     | 0.053 |       |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       | E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| A2     | 1.17        | 1.37  | 0.046  | 0.054 |       | 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      | 14.20       | 16.10 | 0.559     | 0.634 |       |
| 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 |       | N      | 7.62 BSC    |       | 0.3       |       |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       | Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       | Ø P1   | -           | 7.39  | -         | 0.291 |       |
| 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 |       |       |

**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 and Q



# TO-247 - 50 mils L/F

**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        | 1.35  | 0.020     | 0.053 |       |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       | E         | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| A2     | 1.17        | 1.37  | 0.046  | 0.054 |       | 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 |       | $\phi K$  | 0.254       |       | 0.010     |       |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       | L         | 14.20       | 16.10 | 0.559     | 0.634 |       |
| 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 |       | N         | 7.62 BSC    |       | 0.3       |       |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       | $\phi P$  | 3.56        | 3.66  | 0.14      | 0.144 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       | $\phi P1$ | -           | 7.39  | -         | 0.291 |       |
| 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 |       |       |

**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. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
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- (5) Lead finish uncontrolled in L1
- (6)  $\phi P$  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 and Q



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