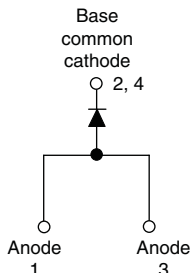


## Fast Soft Recovery Rectifier Diode, 80 A



TO-247AC



### FEATURES/DESCRIPTION

The 80EPF..PbF fast soft recovery rectifier series has been optimized for combined short reverse recovery time and low forward voltage drop.

The glass passivation ensures stable reliable operation in the most severe temperature and power cycling conditions.

This product series has been designed and qualified for Industrial level and lead (Pb)-free.



RoHS\*  
COMPLIANT

### PRODUCT SUMMARY

|               |              |
|---------------|--------------|
| $V_F$ at 40 A | < 1.1 V      |
| $t_{rr}$      | 70 ns        |
| $V_{RRM}$     | 200 to 600 V |

### APPLICATIONS

- Output rectification and freewheeling in inverters, choppers and converters
- Input rectifications where severe restrictions on conducted EMI should be met

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                | VALUES      | UNITS            |
|-------------|--------------------------------|-------------|------------------|
| $V_{RRM}$   |                                | 200 to 600  | V                |
| $I_{F(AV)}$ | Sinusoidal waveform            | 80          | A                |
| $I_{FSM}$   |                                | 1000        |                  |
| $t_{rr}$    | 1 A, - 100 A/ $\mu$ s          | 70          | ns               |
| $V_F$       | 40 A, $T_J = 25^\circ\text{C}$ | 1.1         | V                |
| $T_J$       | Range                          | - 40 to 150 | $^\circ\text{C}$ |

### 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 $^\circ\text{C}$<br>mA |
|-------------|-----------------------------------------------|--------------------------------------------------------------|-----------------------------------------|
| 80EPF02PbF  | 200                                           | 300                                                          | 17                                      |
| 80EPF04PbF  | 400                                           | 500                                                          |                                         |
| 80EPF06PbF  | 600                                           | 700                                                          |                                         |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                           | SYMBOL        | TEST CONDITIONS                                           | VALUES | UNITS                       |
|-----------------------------------------------------|---------------|-----------------------------------------------------------|--------|-----------------------------|
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 95^\circ\text{C}$ , 180° conduction half sine wave | 80     | A                           |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$     | 10 ms sine pulse, rated $V_{RRM}$ applied                 | 850    |                             |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                    | 1000   |                             |
| Maximum $I^2t$ for fusing                           | $I^2t$        | 10 ms sine pulse, rated $V_{RRM}$ applied                 | 3610   | $\text{A}^2\text{s}$        |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                    | 5100   |                             |
| Maximum $I^2\sqrt{t}$ for fusing                    | $I^2\sqrt{t}$ | $t = 0.1$ to 10 ms, no voltage reapplied                  | 51 000 | $\text{A}^2\sqrt{\text{s}}$ |

\* Pb containing terminations are not RoHS compliant, exemptions may apply

# 80EPF..PbF Soft Recovery Series

Vishay High Power Products

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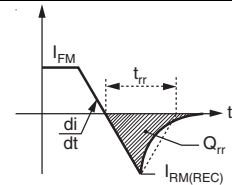


## ELECTRICAL SPECIFICATIONS

| PARAMETER                       | SYMBOL      | TEST CONDITIONS                          |                               | VALUES | UNITS            |
|---------------------------------|-------------|------------------------------------------|-------------------------------|--------|------------------|
| Maximum forward voltage drop    | $V_{FM}$    | 80 A, $T_J = 25\text{ }^{\circ}\text{C}$ |                               | 1.25   | V                |
| Forward slope resistance        | $r_t$       | $T_J = 125\text{ }^{\circ}\text{C}$      |                               | 3.5    | $\text{m}\Omega$ |
| Threshold voltage               | $V_{F(TO)}$ |                                          |                               | 0.85   | V                |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25\text{ }^{\circ}\text{C}$       | $V_R = \text{Rated } V_{RRM}$ | 0.1    | mA               |
|                                 |             | $T_J = 150\text{ }^{\circ}\text{C}$      |                               | 17     |                  |

## RECOVERY CHARACTERISTICS

| PARAMETER                | SYMBOL   | TEST CONDITIONS                                                 | VALUES | UNITS         |
|--------------------------|----------|-----------------------------------------------------------------|--------|---------------|
| Reverse recovery time    | $t_{rr}$ | $I_F$ at 40 Apk<br>25 A/ $\mu\text{s}$<br>25 $^{\circ}\text{C}$ | 190    | ns            |
| Reverse recovery current | $I_{rr}$ |                                                                 | 3.4    | A             |
| Reverse recovery charge  | $Q_{rr}$ |                                                                 | 0.5    | $\mu\text{C}$ |
| Snap factor              | S        |                                                                 | 0.5    |               |



## 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                         | 0.35        | °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-247AC                  | 80EPF02     |                        |
|                                                 |                                   |                                      | 80EPF04     |                        |
|                                                 |                                   |                                      | 80EPF06     |                        |



# 80EPF..PbF Soft Recovery Series

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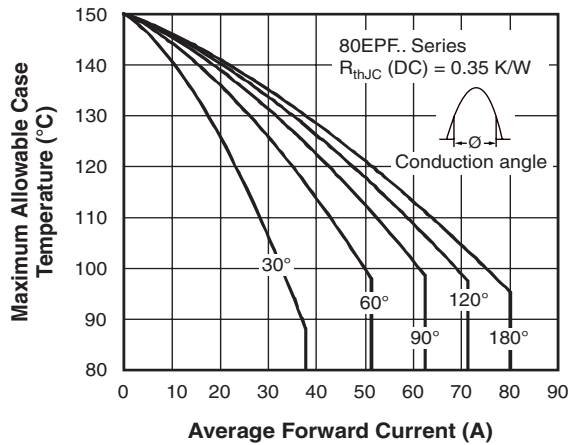


Fig. 1 - Current Rating Characteristics

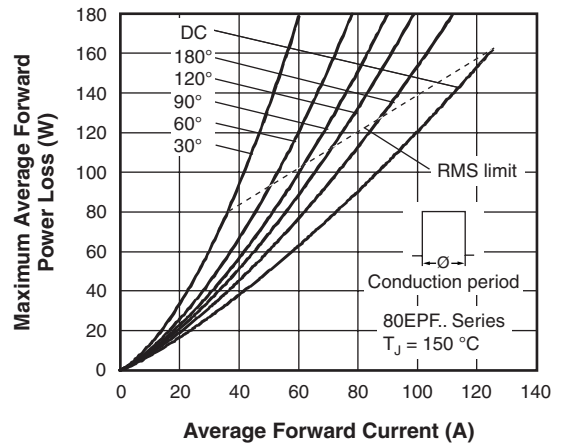


Fig. 4 - Forward Power Loss Characteristics

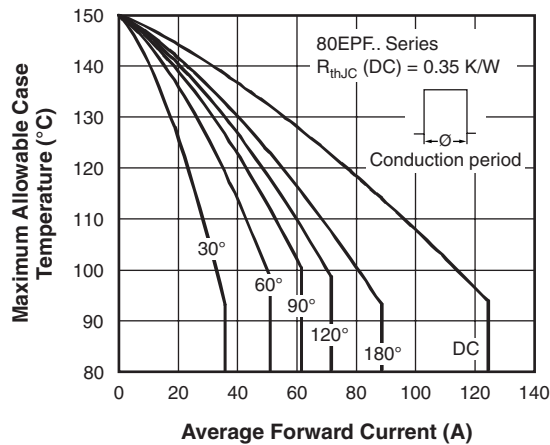


Fig. 2 - Current Rating Characteristics

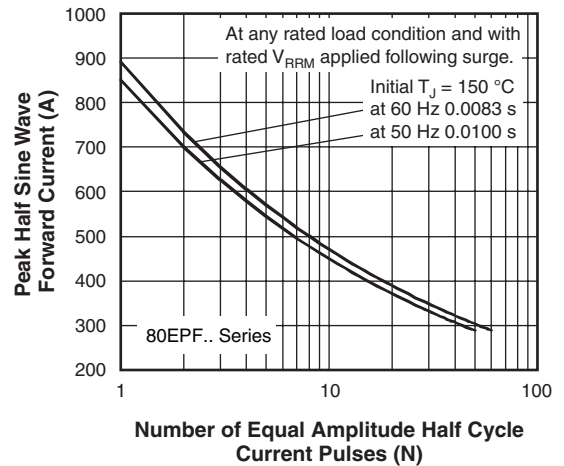


Fig. 5 - Maximum Non-Repetitive Surge Current

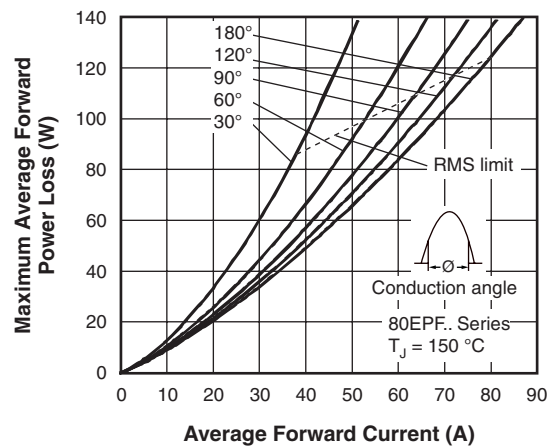


Fig. 3 - Forward Power Loss Characteristics

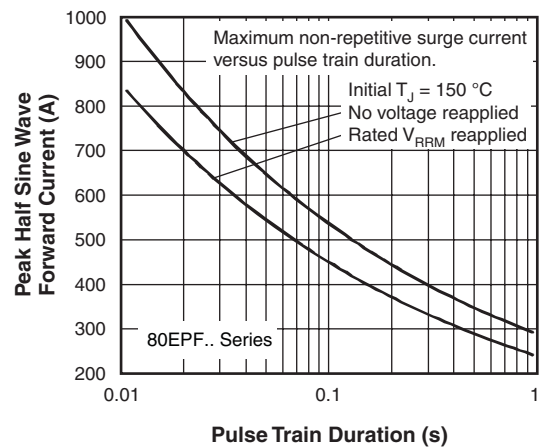


Fig. 6 - Maximum Non-Repetitive Surge Current

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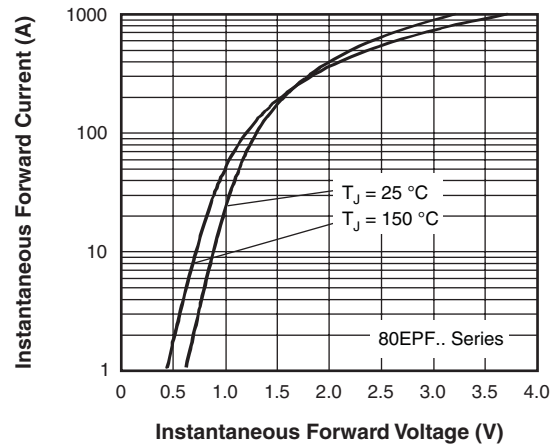


Fig. 7 - Forward Voltage Drop Characteristics

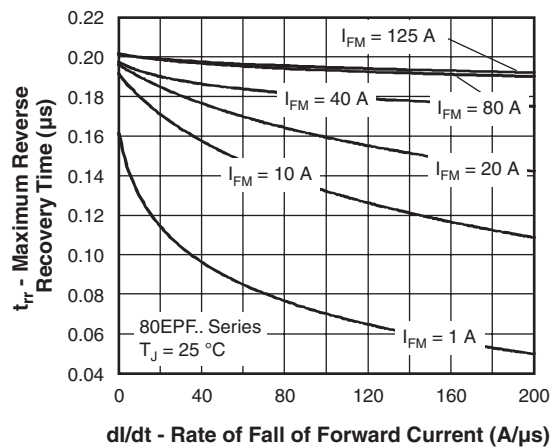


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ }^{\circ}\text{C}$

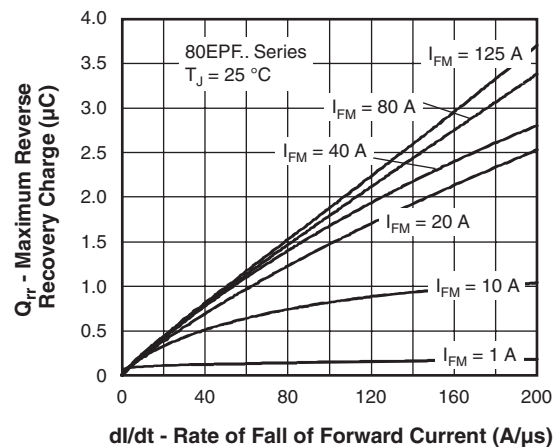


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ }^{\circ}\text{C}$

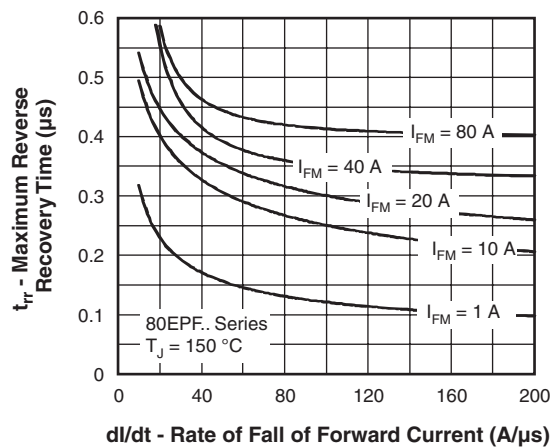


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ }^{\circ}\text{C}$

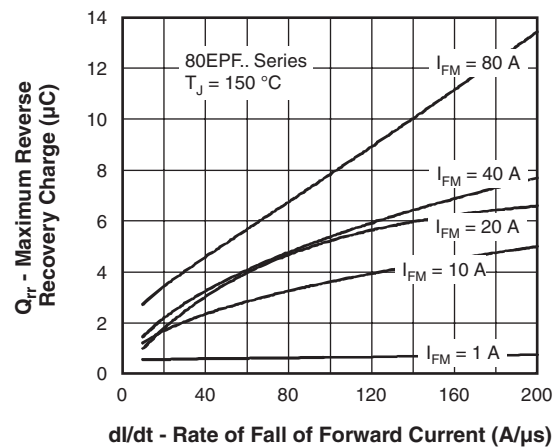


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ }^{\circ}\text{C}$



## 80EPF..PbF Soft Recovery Series

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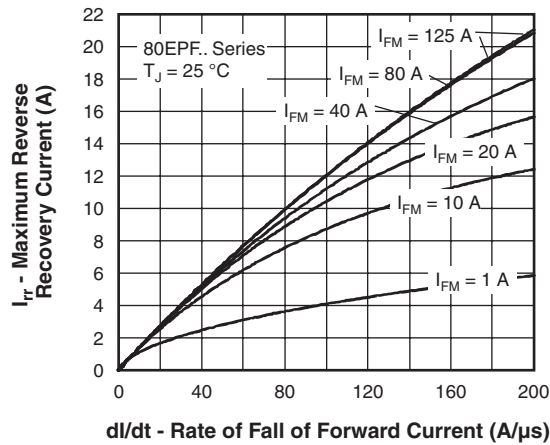


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ }^{\circ}\text{C}$

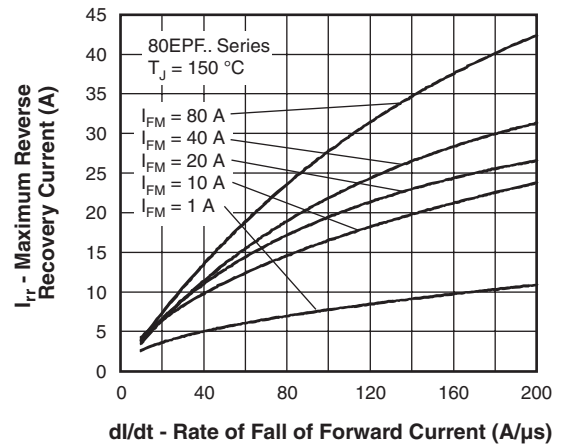


Fig. 13 - Recovery Current Characteristics,  $T_J = 150\text{ }^{\circ}\text{C}$

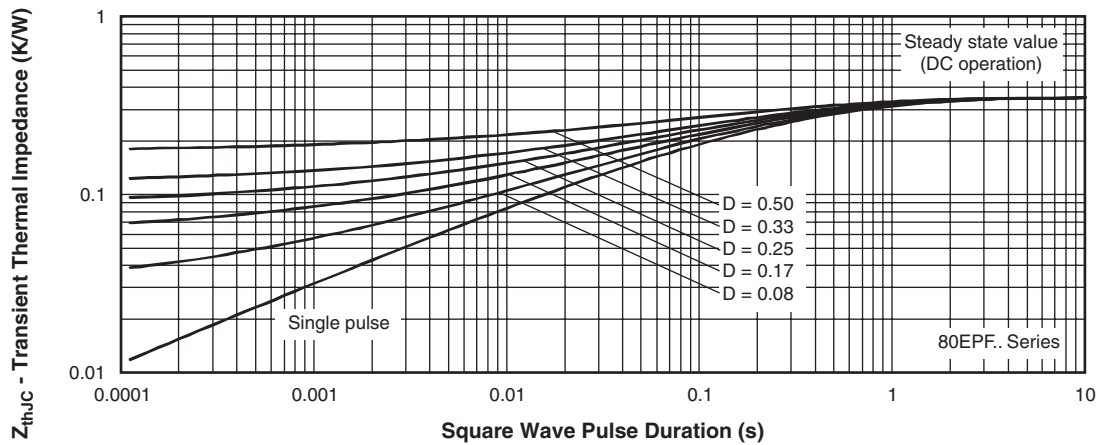


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

## Vishay High Power Products



## Device code

|           |          |          |          |           |            |
|-----------|----------|----------|----------|-----------|------------|
| <b>80</b> | <b>E</b> | <b>P</b> | <b>F</b> | <b>06</b> | <b>PbF</b> |
| ↓         | ↓        | ↓        | ↓        | ↓         | ↓          |
| ①         | ②        | ③        | ④        | ⑤         | ⑥          |

- 1 - Current rating ( $80 = 80\text{ A}$ )
- 2 - Circuit configuration:  
E = Single diode
- 3 - Package:  
P = TO-247AC
- 4 - Type of silicon:  
F = Fast diode
- 5 - Voltage code  $\times 100 = V_{\text{RRM}}$
- 6 -
  - None = Standard production
  - PbF = Lead (Pb)-free

|            |
|------------|
| 02 = 200 V |
| 04 = 400 V |
| 06 = 600 V |

| LINKS TO RELATED DOCUMENTS |                                                                               |
|----------------------------|-------------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95223">http://www.vishay.com/doc?95223</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95226">http://www.vishay.com/doc?95226</a> |



**DIMENSIONS** in millimeters and inches



### Lead assignments

#### Diodes

1. - Anode/open
2. - Cathode
3. - Anode

| 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        | 2.37  | 0.065  | 0.094 |       |
| b4     | 2.59        | 3.43  | 0.102  | 0.135 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       |
| c      | 0.38        | 0.86  | 0.015  | 0.034 |       |
| c1     | 0.38        | 0.76  | 0.015  | 0.030 |       |
| 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 |       |       |
| FK        | 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       |       |       |
| $\Phi P$  | 3.56        | 3.66  | 0.14      | 0.144 |       |
| $\Phi P1$ | -           | 6.98  | -         | 0.275 |       |
| Q         | 5.31        | 5.69  | 0.209     | 0.224 |       |
| R         | 4.52        | 5.49  | 1.78      | 0.216 |       |
| 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
- (4) Thermal pad contour optional with dimensions D1 and E1
- (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



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