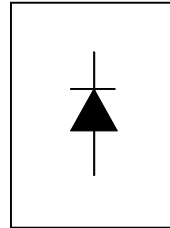


International  
**IR** Rectifier

## QUIETIR Series 40EPF..

### FAST SOFT RECOVERY RECTIFIER DIODE



$$V_F < 1V @ 10A$$

$$t_{rr} = 60ns$$

$$V_{RRM} 200 \text{ to } 600V$$

#### Description/Features

The 40EPF.. fast soft recovery **QUIETIR** 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.

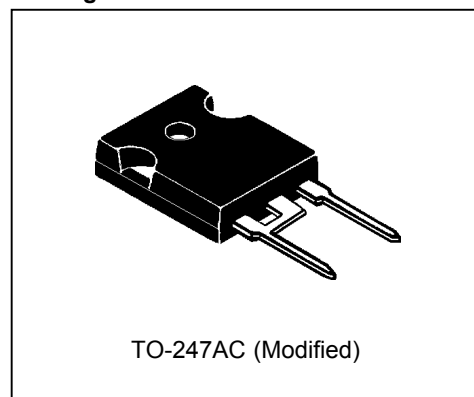
Typical applications are both:

- output rectification and freewheeling in inverters, choppers and converters
- and input rectifications where severe restrictions on conducted EMI should be met.

#### Major Ratings and Characteristics

| Characteristics                        | 40EPF..    | Units            |
|----------------------------------------|------------|------------------|
| $I_{F(AV)}$ Sinusoidal waveform        | 40         | A                |
| $V_{RRM}$                              | 200 to 600 | V                |
| $I_{FSM}$                              | 475        | A                |
| $V_F$ @ 10 A, $T_J = 25^\circ\text{C}$ | 1          | V                |
| $t_{rr}$ @ 1 A, - 100 A/ $\mu\text{s}$ | 60         | ns               |
| $T_J$                                  | -40 to 150 | $^\circ\text{C}$ |

#### Package Outline



## Voltage Ratings

| Part Number | $V_{RRM}$ , maximum peak reverse voltage<br>V | $V_{RSM}$ , maximum non repetitive peak reverse voltage<br>V | $I_{RRM}$<br>150°C<br>mA |
|-------------|-----------------------------------------------|--------------------------------------------------------------|--------------------------|
| 40EPF02     | 200                                           | 300                                                          | 7                        |
| 40EPF04     | 400                                           | 500                                                          |                          |
| 40EPF06     | 600                                           | 700                                                          |                          |

## Absolute Maximum Ratings

| Parameters                                                 | 40EPF.. | Units         | Conditions                                                   |
|------------------------------------------------------------|---------|---------------|--------------------------------------------------------------|
| $I_{F(AV)}$ Max. Average Forward Current                   | 40      | A             | @ $T_C = 105^\circ\text{C}$ , 180° conduction half sine wave |
| $I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current | 400     | A             | 10ms Sine pulse, rated $V_{RRM}$ applied                     |
|                                                            | 475     |               | 10ms Sine pulse, no voltage reapplied                        |
| $I^2t$ Max. $I^2t$ for fusing                              | 800     | $A^2s$        | 10ms Sine pulse, rated $V_{RRM}$ applied                     |
|                                                            | 1131    |               | 10ms Sine pulse, no voltage reapplied                        |
| $I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for fusing                | 11310   | $A^2\sqrt{s}$ | $t = 0.1$ to 10ms, no voltage reapplied                      |

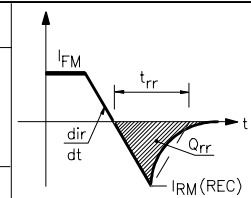
## Electrical Specifications

| Parameters                            | 40EPF.. | Units     | Conditions                      |
|---------------------------------------|---------|-----------|---------------------------------|
| $V_{FM}$ Max. Forward Voltage Drop    | 1.25    | V         | @ 40A, $T_J = 25^\circ\text{C}$ |
| $r_t$ Forward slope resistance        | 4.4     | $m\Omega$ | $T_J = 125^\circ\text{C}$       |
| $V_{F(TO)}$ Threshold voltage         | 1.1     | V         |                                 |
| $I_{RM}$ Max. Reverse Leakage Current | 0.1     | mA        | $T_J = 25^\circ\text{C}$        |
|                                       | 7.0     |           | $T_J = 150^\circ\text{C}$       |

$V_R = \text{rated } V_{RRM}$

## Recovery Characteristics

| Parameters                        | 40EPF.. | Units   | Conditions                                       |
|-----------------------------------|---------|---------|--------------------------------------------------|
| $t_{rr}$ Reverse Recovery Time    | 180     | ns      | $I_F @ 40\text{Apk}$<br>@ 25A/ $\mu s$<br>@ 25°C |
| $I_{rr}$ Reverse Recovery Current | 3.2     | A       |                                                  |
| $Q_{rr}$ Reverse Recovery Charge  | 0.5     | $\mu C$ |                                                  |
| S Snap Factor                     | 0.5     |         |                                                  |



### Thermal-Mechanical Specifications

| Parameters                                              | 40EPF..    | Units  | Conditions                            |
|---------------------------------------------------------|------------|--------|---------------------------------------|
| $T_J$ Max. Junction Temperature Range                   | -40 to 150 | °C     |                                       |
| $T_{stg}$ Max. Storage Temperature Range                | -40 to 150 | °C     |                                       |
| $R_{thJC}$ Max. Thermal Resistance Junction to Case     | 0.6        | °C/W   | DCoperation                           |
| $R_{thJA}$ Max. Thermal Resistance Junction to Ambient  | 40         | °C/W   |                                       |
| $R_{thCS}$ Typical Thermal Resistance, Case to Heatsink | 0.2        | °C/W   | Mounting surface , smooth and greased |
| wt Approximate Weight                                   | 6(0.21)    | g(oz.) |                                       |
| T Mounting Torque                                       | Min.       | 6(5)   | Kg-cm<br>(lbf-in)                     |
|                                                         | Max.       | 12(10) |                                       |
| Case Style                                              | TO-247AC   |        | JEDEC(Modified)                       |

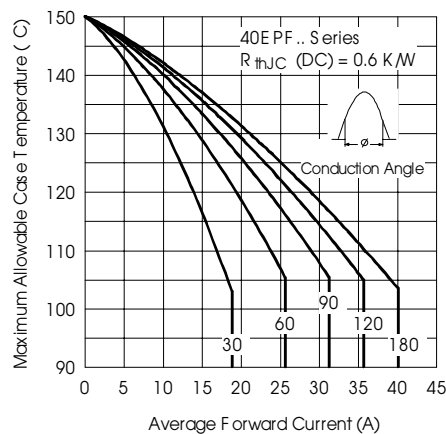


Fig. 1 - Current Rating Characteristics

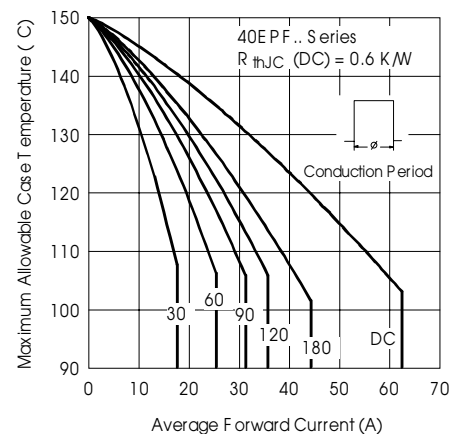


Fig. 2 - Current Rating Characteristics

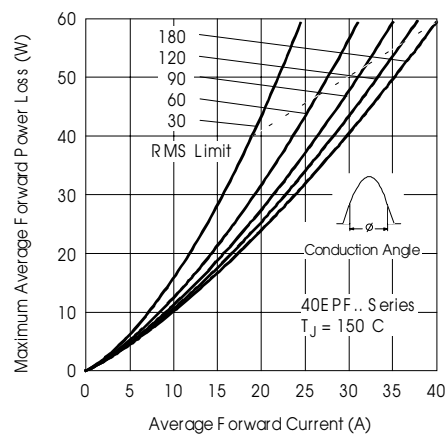


Fig. 3 - Forward Power Loss Characteristics

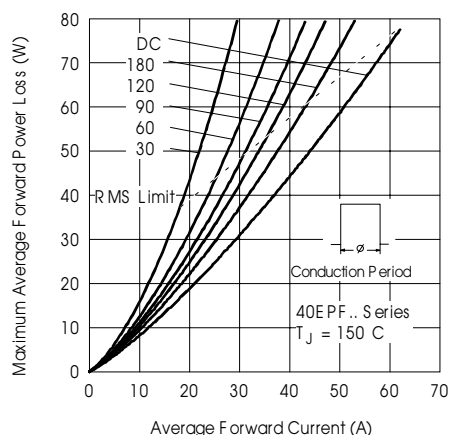


Fig. 4 - Forward Power Loss Characteristics

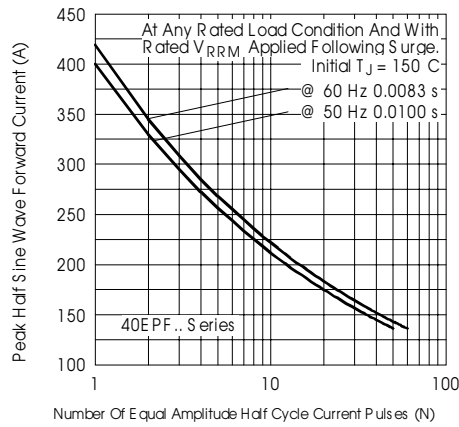


Fig. 5 - Maximum Non-Repetitive Surge Current

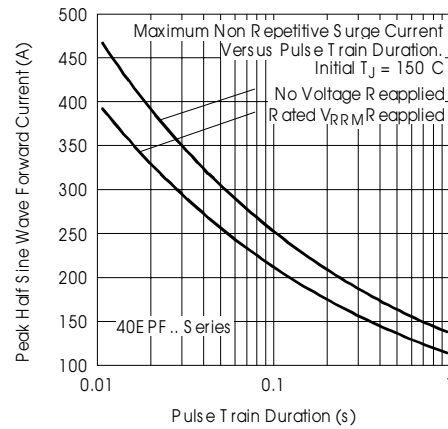


Fig. 6 - Maximum Non-Repetitive Surge Current

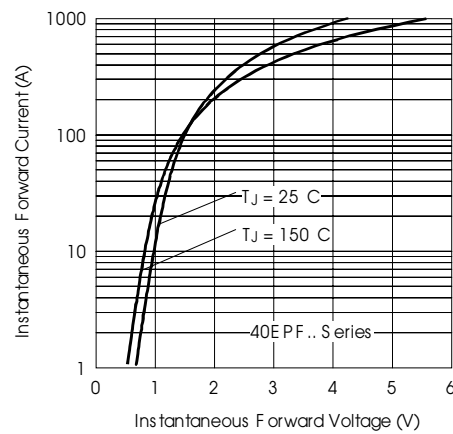


Fig. 7 - Forward Voltage Drop Characteristics

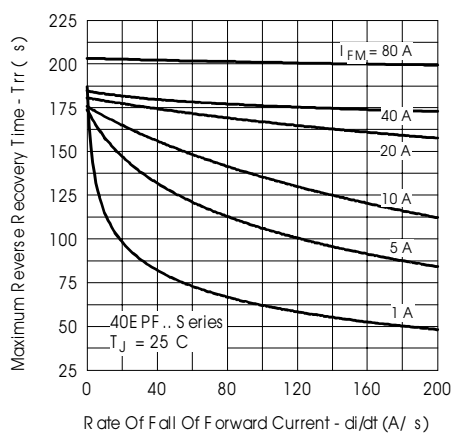


Fig. 8 - Recovery Time Characteristics,  $T_J = 25^\circ\text{C}$

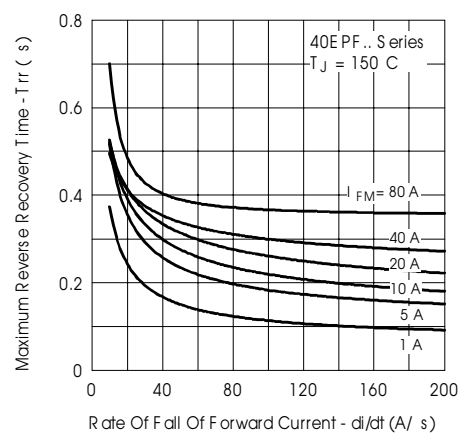


Fig. 9 - Recovery Time Characteristics,  $T_J = 150^\circ\text{C}$

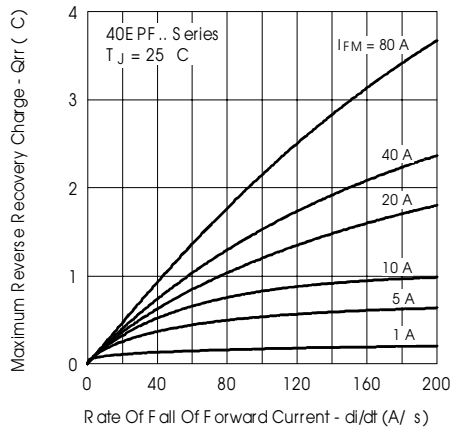


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25^\circ\text{C}$

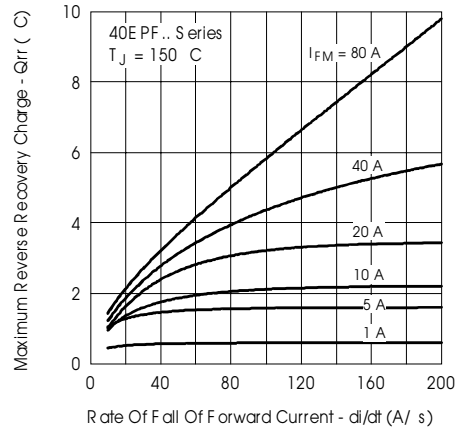


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150^\circ\text{C}$

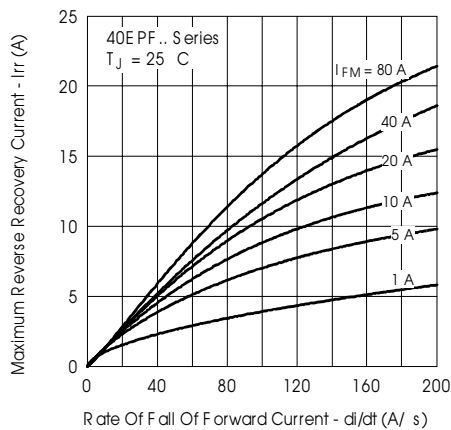


Fig. 12 - Recovery Current Characteristics,  $T_J = 25^\circ\text{C}$

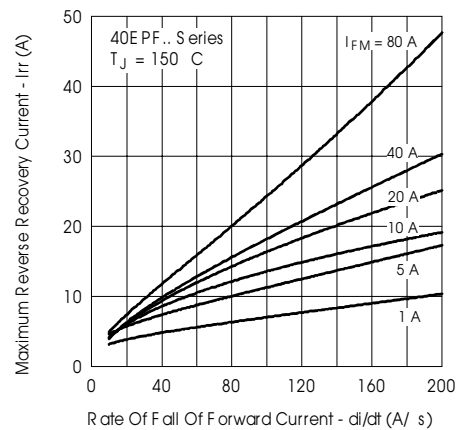


Fig. 13 - Recovery Current Characteristics,  $T_J = 150^\circ\text{C}$

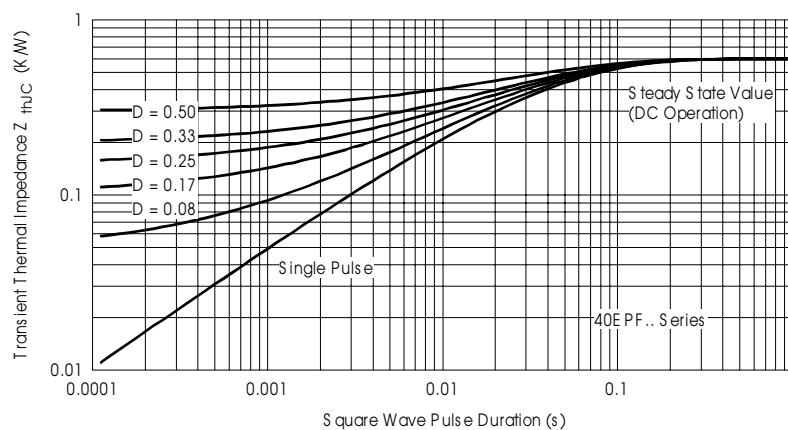
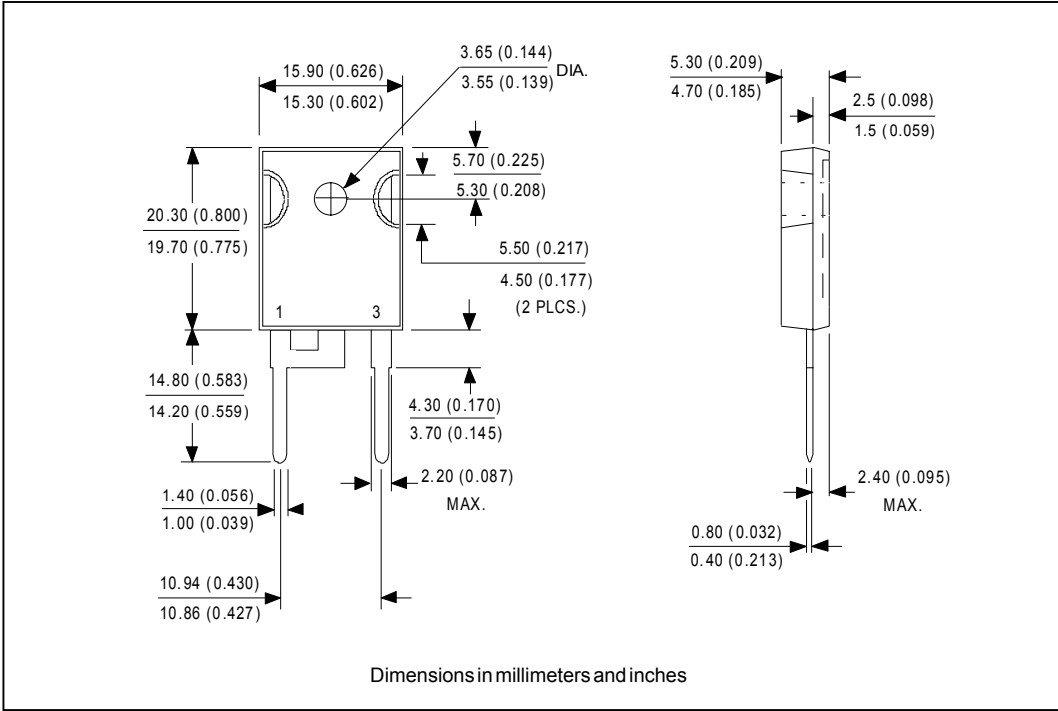


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

Outline Table



Ordering Information Table

| Device Code |                                        |   |   |    |
|-------------|----------------------------------------|---|---|----|
| 40          | E                                      | P | F | 06 |
| ①           | ②                                      | ③ | ④ | ⑤  |
| 1           | - Current Rating                       |   |   |    |
| 2           | - Circuit Configuration:               |   |   |    |
|             | E = Single Diode                       |   |   |    |
| 3           | - Package:                             |   |   |    |
|             | P = TO-247AC (Modified)                |   |   |    |
| 4           | - Type of Silicon:                     |   |   |    |
|             | F = Fast diode                         |   |   |    |
| 5           | - Voltage code: Code x 100 = $V_{RRM}$ |   |   |    |
|             | 02 = 200V<br>04 = 400V<br>06 = 600V    |   |   |    |

The circuit diagram shows a diode symbol with the cathode connected to pin 1 and the anode connected to pin 3. Pin 2 is labeled as the base connection.

```

40EPF06
*****
* SPICE Model Diode *
*****
.SUBCKT 40EPF06 ANO CAT
D1 ANO 1 CAT
*Define diode model
.MODEL DMOD D(Is=122.1E-06 N=3.087 Rs=2.709E-03 Ikf=9.017 Xti=3 Eg=1.11
Cjo=550.8E-12 M=.272 Vj=1.523 Fc=.5 Isr=1.92E-21 Nr=4.755 Bv=730 +Ibv=35.43E-06)
*****

.ENDS 40EPF06

Thermal Model Subcircuit
.SUBCKT 40EPF06 5 1

CTHERM1 5 4 8.75E-04
CTHERM2 4 3 6.85E+00
CTHERM3 3 2 2.07E+01
CTHERM4 2 1 7.97E+01

RTHERM1 5 4 1.00E-07
RTHERM2 4 3 3.94E-01
RTHERM1 3 2 1.81E-01
RTHERM1 2 1 2.40E-02

.ENDS 40EPF06

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Data and specifications subject to change without notice.  
This product has been designed and qualified for Industrial Level.  
Qualification Standards can be found on IR's Web site.