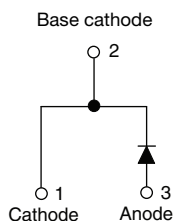


# Hyperfast Rectifier, 30 A FRED Pt®



TO-220AC 2L



## FEATURES

- Hyper fast and soft recovery time
- Low forward voltage drop
- 175 °C maximum operating junction temperature
- Low leakage current
- True 2 pin package
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## PRIMARY CHARACTERISTICS

|                          |             |
|--------------------------|-------------|
| $I_{F(AV)}$              | 30 A        |
| $V_R$                    | 650 V       |
| $V_F$ at $I_F$ at 125 °C | 1.6 V       |
| $t_{rr}$                 | 27 ns       |
| $T_J$ max.               | 175 °C      |
| Package                  | TO-220AC 2L |
| Circuit configuration    | Single      |

## DESCRIPTION / APPLICATIONS

Ultra low  $V_F$ , soft-switching hyper fast rectifiers optimized for discontinuous (critical) mode (DCM) power factor correction (PFC).

The minimized conduction loss, optimized stored charge and low recovery current minimized the switching losses and reduce over dissipation in the switching element and snubbers.

The device is also intended for use as a freewheeling diode in power supplies and other power switching applications.

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                  | SYMBOL         | TEST CONDITIONS       | VALUES      | UNITS |
|--------------------------------------------|----------------|-----------------------|-------------|-------|
| Repetitive peak reverse voltage            | $V_{RRM}$      |                       | 650         | V     |
| Average rectified forward current          | $I_{F(AV)}$    | $T_C = 120\text{ °C}$ | 30          | A     |
| Non-repetitive peak surge current          | $I_{FSM}$      | $T_C = 25\text{ °C}$  | 210         |       |
| Operating junction and storage temperature | $T_J, T_{Stg}$ |                       | -55 to +175 | °C    |

## ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified)

| PARAMETER                           | SYMBOL        | TEST CONDITIONS                              | MIN. | TYP. | MAX. | UNITS         |
|-------------------------------------|---------------|----------------------------------------------|------|------|------|---------------|
| Breakdown voltage, blocking voltage | $V_{BR}, V_R$ | $I_R = 250\text{ }\mu\text{A}$               | 650  | -    | -    | V             |
| Forward voltage                     | $V_F$         | $I_F = 30\text{ A}$                          | -    | 2.1  | 2.5  |               |
|                                     |               | $I_F = 30\text{ A}, T_J = 125\text{ °C}$     | -    | 1.6  | 1.7  |               |
| Reverse leakage current             | $I_R$         | $V_R = V_R$ rated                            | -    | 0.02 | 30   | $\mu\text{A}$ |
|                                     |               | $T_J = 150\text{ °C}, V_R = V_R$ rated       | -    | 50   | 300  |               |
| Junction capacitance                | $C_T$         | $V_R = 200\text{ V}$                         | -    | 22   | -    | pF            |
| Series inductance                   | $L_S$         | Measured lead to lead 5 mm from package body | -    | 8.0  | -    | nH            |

**DYNAMIC RECOVERY CHARACTERISTICS** ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

| PARAMETER               | SYMBOL    | TEST CONDITIONS                     | MIN. | TYP. | MAX. | UNITS |
|-------------------------|-----------|-------------------------------------|------|------|------|-------|
| Reverse recovery time   | $t_{rr}$  | $T_J = 25\text{ }^{\circ}\text{C}$  | -    | 35   | -    | ns    |
|                         |           | $T_J = 25\text{ }^{\circ}\text{C}$  |      |      |      |       |
|                         |           | $T_J = 125\text{ }^{\circ}\text{C}$ |      |      |      |       |
| Peak recovery current   | $I_{RRM}$ | $T_J = 25\text{ }^{\circ}\text{C}$  | -    | 15   | -    | A     |
|                         |           | $T_J = 125\text{ }^{\circ}\text{C}$ | -    | 24   | -    |       |
| Reverse recovery charge | $Q_{rr}$  | $T_J = 25\text{ }^{\circ}\text{C}$  | -    | 330  | -    | nC    |
|                         |           | $T_J = 125\text{ }^{\circ}\text{C}$ | -    | 1350 | -    |       |

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                      | SYMBOL         | TEST CONDITIONS                             | MIN.         | TYP. | MAX.       | UNITS                  |
|------------------------------------------------|----------------|---------------------------------------------|--------------|------|------------|------------------------|
| Thermal resistance, junction to case           | $R_{thJC}$     |                                             | -            | 1.0  | 1.3        | $^{\circ}\text{C/W}$   |
| Thermal resistance, junction to ambient        | $R_{thJA}$     | Typical socket mount                        | -            | -    | 70         |                        |
| Thermal resistance, case to heat sink          | $R_{thCS}$     | Mounting surface, flat, smooth, and greased | -            | -    | 0.5        |                        |
| Weight                                         |                |                                             | -            | 0.2  | -          | g                      |
|                                                |                |                                             | -            | 0.07 | -          | oz.                    |
| Mounting torque                                |                |                                             | 6.0<br>(5.0) | -    | 12<br>(10) | kgf · cm<br>(lbf · in) |
| Maximum junction and storage temperature range | $T_J, T_{Stg}$ |                                             | -55          | -    | 175        | $^{\circ}\text{C}$     |
| Marking device                                 |                | Case style: TO-220AC 2L                     | ETX3007      |      |            |                        |

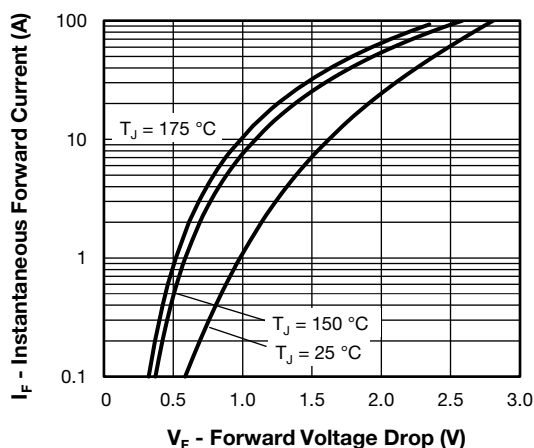


Fig. 1 - Typical Forward Voltage Drop Characteristics

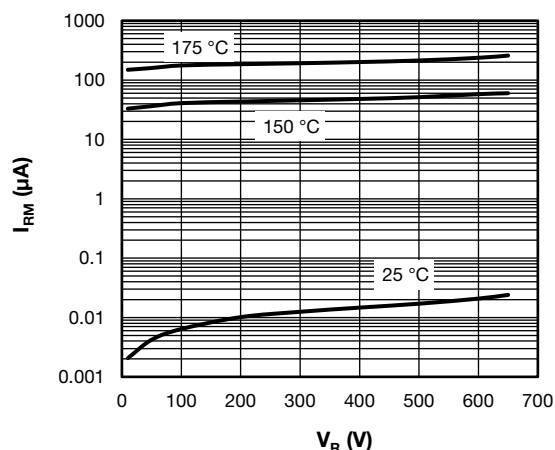


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

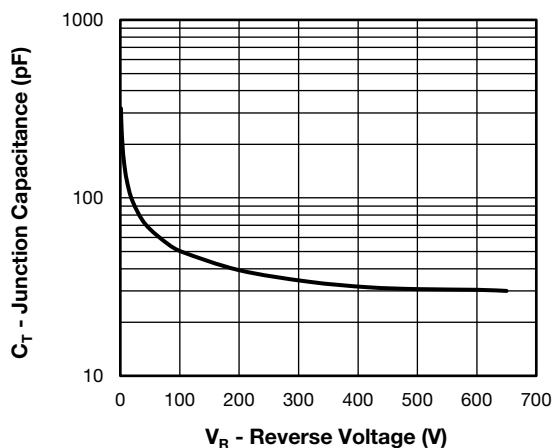


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

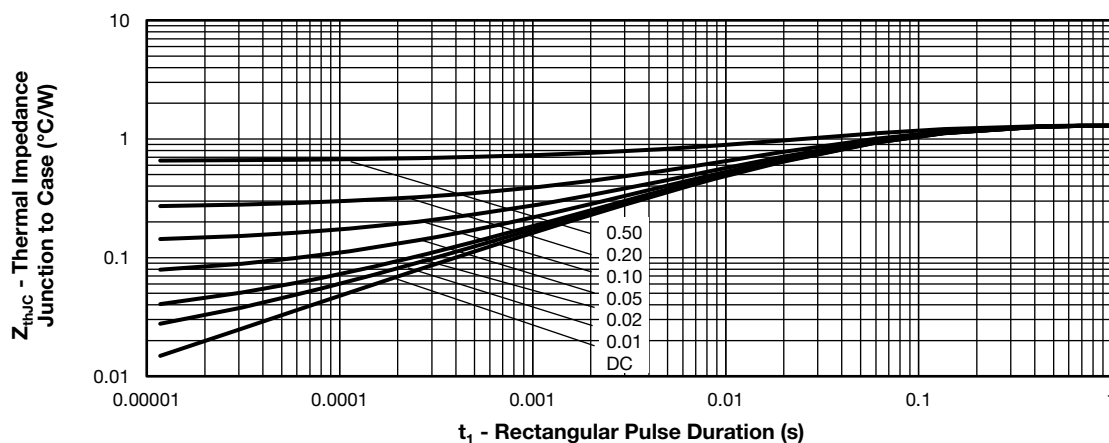
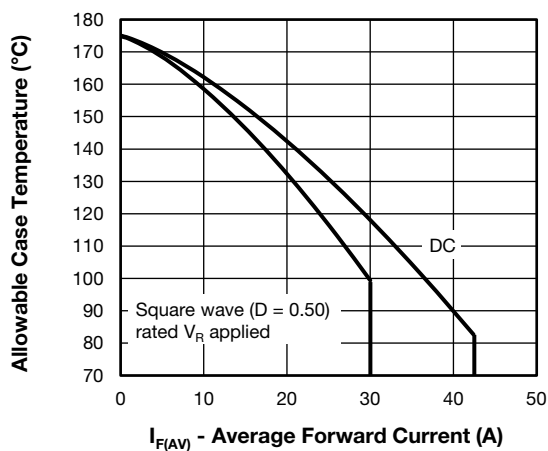

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

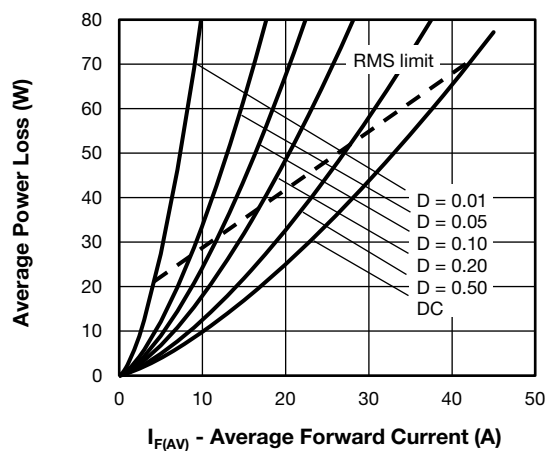


Fig. 6 - Forward Power Loss Characteristics

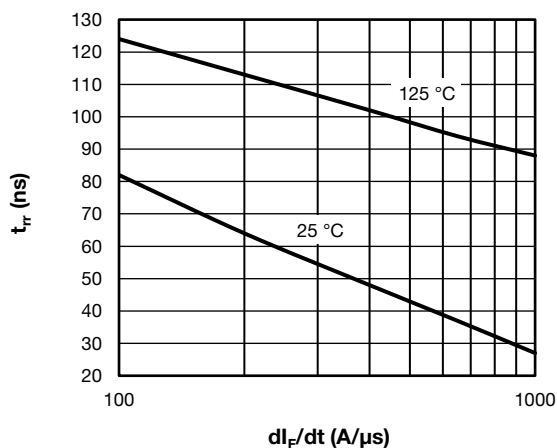
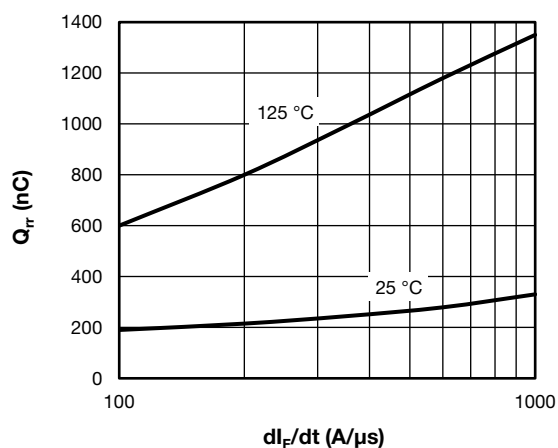
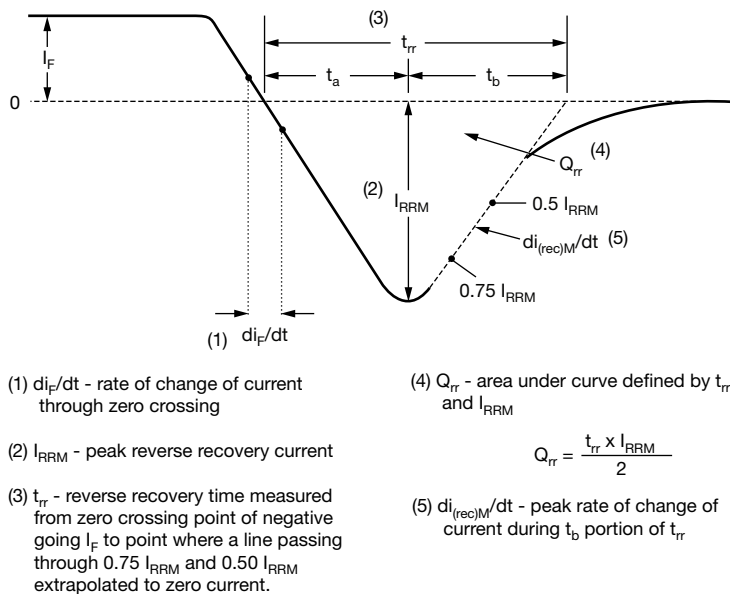

Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$ 

Fig. 8 - Typical Reverse Recovery Time vs.  $dI_F/dt$ 


Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

|             |     |   |   |   |    |    |     |
|-------------|-----|---|---|---|----|----|-----|
| Device code | VS- | E | T | X | 30 | 07 | -M3 |
|             | 1   | 2 | 3 | 4 | 5  | 6  | 7   |

- 1 - Vishay Semiconductors product
- 2 - E = single diode
- 3 - Package:  
T = TO-220AC
- 4 - X = hyper fast recovery
- 5 - Current rating (30 = 30 A)
- 6 - Voltage rating (07 = 650 V)
- 7 - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

| ORDERING INFORMATION (Example) |               |                          |
|--------------------------------|---------------|--------------------------|
| PREFERRED P/N                  | BASE QUANTITY | PACKAGING DESCRIPTION    |
| VS-ETX3007-M3                  | 50            | Antistatic plastic tubes |

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?96156">www.vishay.com/doc?96156</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a> |
| SPICE model                | <a href="http://www.vishay.com/doc?96532">www.vishay.com/doc?96532</a> |



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