

UltraFast Rectifier

Features

- Ultrafast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Lead-Free ("PbF" suffix)

$t_{rr} = 40\text{ns}$  $I_{F(AV)} = 30\text{Amp}$  $V_R = 300\text{V}$

Description/ Applications

International Rectifier's 300V series are the state of the art Ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and Ultrafast recovery time. The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics. These devices are intended for use in the output rectification stage of SMPS, UPS, DC-DC converters as well as freewheeling diodes in low voltage inverters and chopper motor drives. Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

Absolute Maximum Ratings

| Parameters     |                                             |              | Max         | Units              |
|----------------|---------------------------------------------|--------------|-------------|--------------------|
| $V_{RRM}$      | Repetitive Peak Reverse Voltage             |              | 300         | V                  |
| $I_{F(AV)}$    | Average Rectified Forward Current           | Per Leg      | 15          | A                  |
|                | @ $T_C = 142^{\circ}\text{C}$               | Total Device | 30          |                    |
| $I_{FSM}$      | Non Repetitive Peak Surge Current           | Per Leg      | 140         |                    |
|                | @ $T_J = 25^{\circ}\text{C}$                |              |             |                    |
| $T_J, T_{STG}$ | Operating Junction and Storage Temperatures |              | - 65 to 175 | $^{\circ}\text{C}$ |

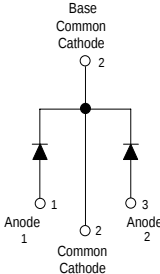
Case Styles

30CPH03PbF



TO247

Base  
Common  
Cathode



Anode 1  
Common Cathode  
Anode 2

**Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

| Parameters                                        | Min | Typ  | Max  | Units         | Test Conditions                             |
|---------------------------------------------------|-----|------|------|---------------|---------------------------------------------|
| $V_{BR}, V_R$ Breakdown Voltage, Blocking Voltage | 300 | -    | -    | V             | $I_R = 100\mu\text{A}$                      |
| $V_F$ Forward Voltage                             | -   | 1.05 | 1.25 | V             | $I_F = 15\text{A}, T_J = 25^\circ\text{C}$  |
|                                                   | -   | 0.85 | 1.00 | V             | $I_F = 15\text{A}, T_J = 125^\circ\text{C}$ |
| $I_R$ Reverse Leakage Current                     | -   | 0.05 | 40   | $\mu\text{A}$ | $V_R = V_R$ Rated                           |
|                                                   | -   | 12   | 400  | $\mu\text{A}$ | $T_J = 125^\circ\text{C}, V_R = V_R$ Rated  |
| $C_T$ Junction Capacitance                        | -   | 45   | -    | pF            | $V_R = 300\text{V}$                         |
| $L_S$ Series Inductance                           | -   | 8    | -    | nH            | Measured lead to lead 5mm from package body |

**Dynamic Recovery Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

| Parameters                       | Min | Typ | Max | Units | Test Conditions                                                         |
|----------------------------------|-----|-----|-----|-------|-------------------------------------------------------------------------|
| $t_{rr}$ Reverse Recovery Time   | -   | -   | 40  | ns    | $I_F = 1.0\text{A}, di_F/dt = 50\text{A}/\mu\text{s}, V_R = 30\text{V}$ |
|                                  | -   | 32  | -   |       | $T_J = 25^\circ\text{C}$                                                |
|                                  | -   | 45  | -   |       | $T_J = 125^\circ\text{C}$                                               |
| $I_{RRM}$ Peak Recovery Current  | -   | 2.4 | -   | A     | $T_J = 25^\circ\text{C}$                                                |
|                                  | -   | 6.1 | -   |       | $T_J = 125^\circ\text{C}$                                               |
| $Q_{rr}$ Reverse Recovery Charge | -   | 38  | -   | nC    | $T_J = 25^\circ\text{C}$                                                |
|                                  | -   | 137 | -   |       | $T_J = 125^\circ\text{C}$                                               |

$I_F = 15\text{A}$   
 $di_F/dt = -200\text{A}/\mu\text{s}$   
 $V_R = 200\text{V}$

**Thermal - Mechanical Characteristics**

| Parameters                                                   | Min     | Typ  | Max | Units                     |
|--------------------------------------------------------------|---------|------|-----|---------------------------|
| $T_J$ Max. Junction Temperature Range                        | - 65    | -    | 175 | $^\circ\text{C}$          |
| $T_{Stg}$ Max. Storage Temperature Range                     | - 65    | -    | 175 |                           |
| $R_{thJC}$ Thermal Resistance, Junction to Case Per Leg      | -       | 0.9  | 2.0 | $^\circ\text{C}/\text{W}$ |
| $R_{thJA}$ ① Thermal Resistance, Junction to Ambient Per Leg | -       | -    | 40  |                           |
| $R_{thCS}$ ② Thermal Resistance, Case to Heatsink            | -       | 0.4  | -   |                           |
| $Wt$ Weight                                                  | -       | 6.0  | -   | g                         |
|                                                              | -       | 0.21 | -   | (oz)                      |
| Mounting Torque                                              | 6.0     | -    | 12  | Kg-cm                     |
|                                                              | 5.0     | -    | 10  | lbf.in                    |
| Marking Device                                               | 30CPH03 |      |     |                           |

① Typical Socket Mount

② Mounting Surface, Flat, Smooth and Greased

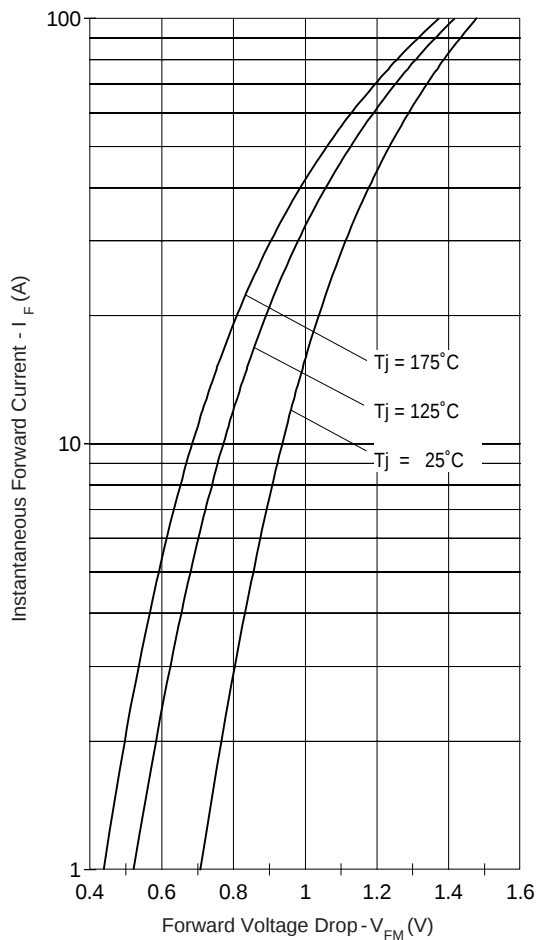


Fig. 1 - Typical Forward Voltage Drop Characteristics

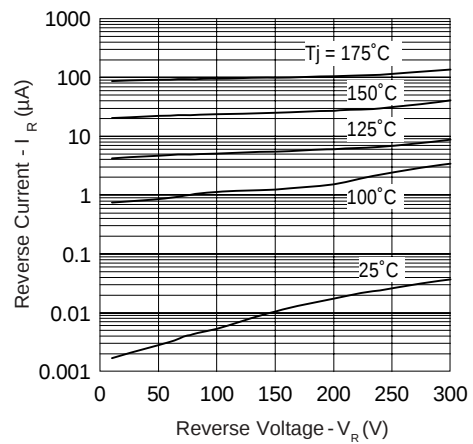


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

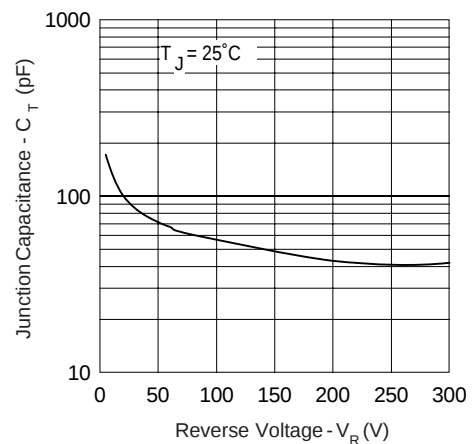


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

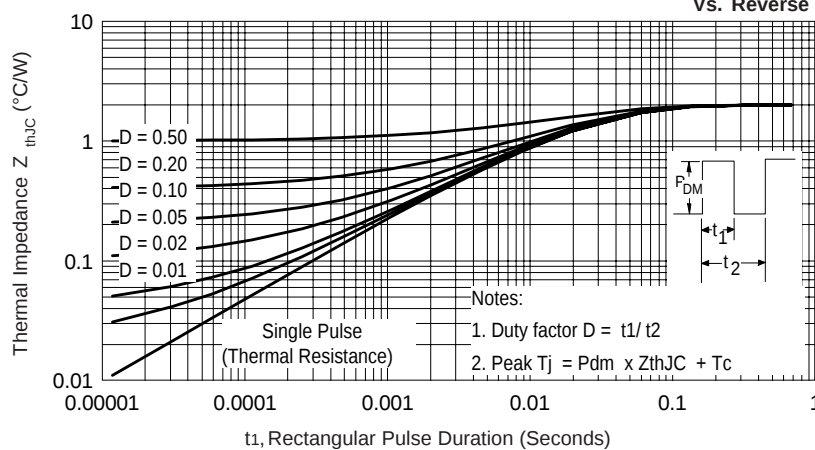


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

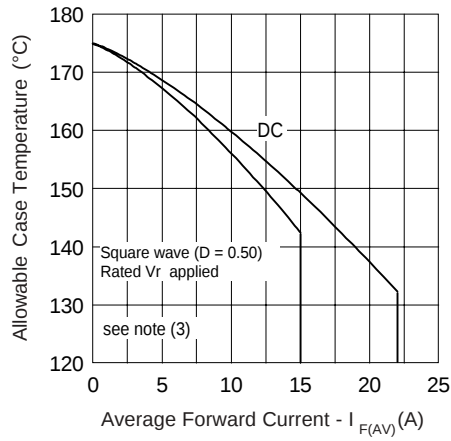


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

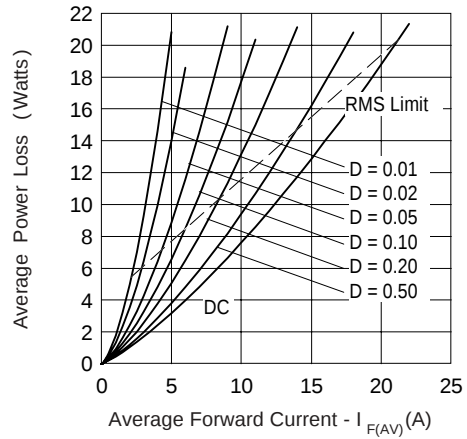


Fig. 6 - Forward Power Loss Characteristics

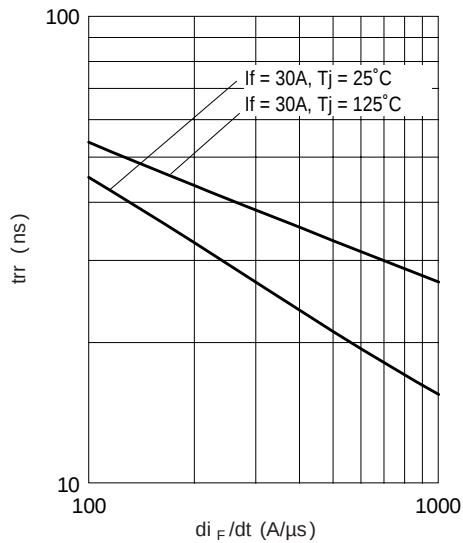


Fig. 7 - Typical Reverse Recovery vs.  $di_F/dt$

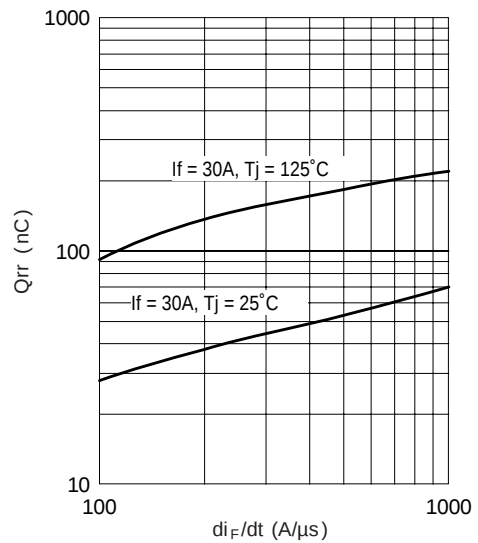
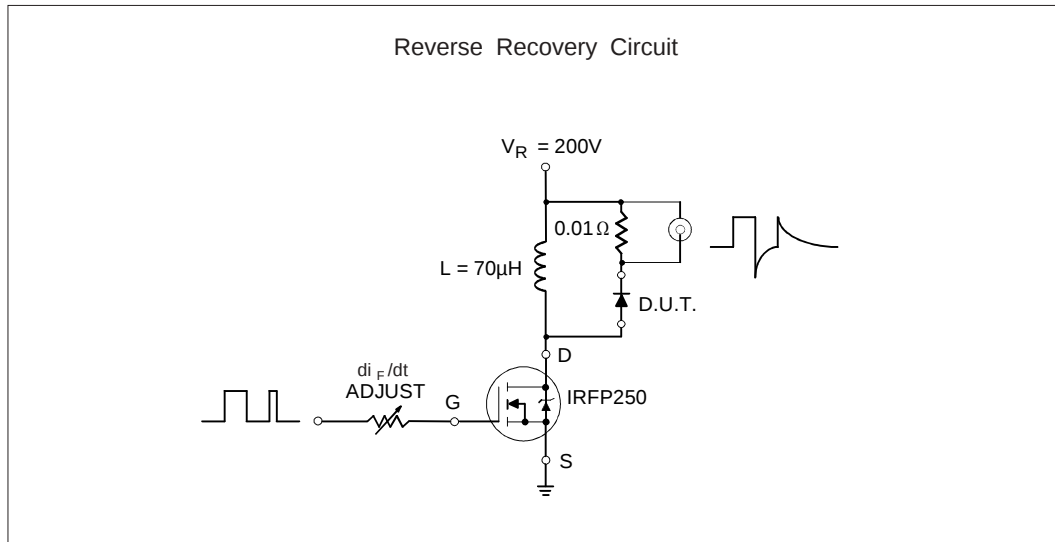


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

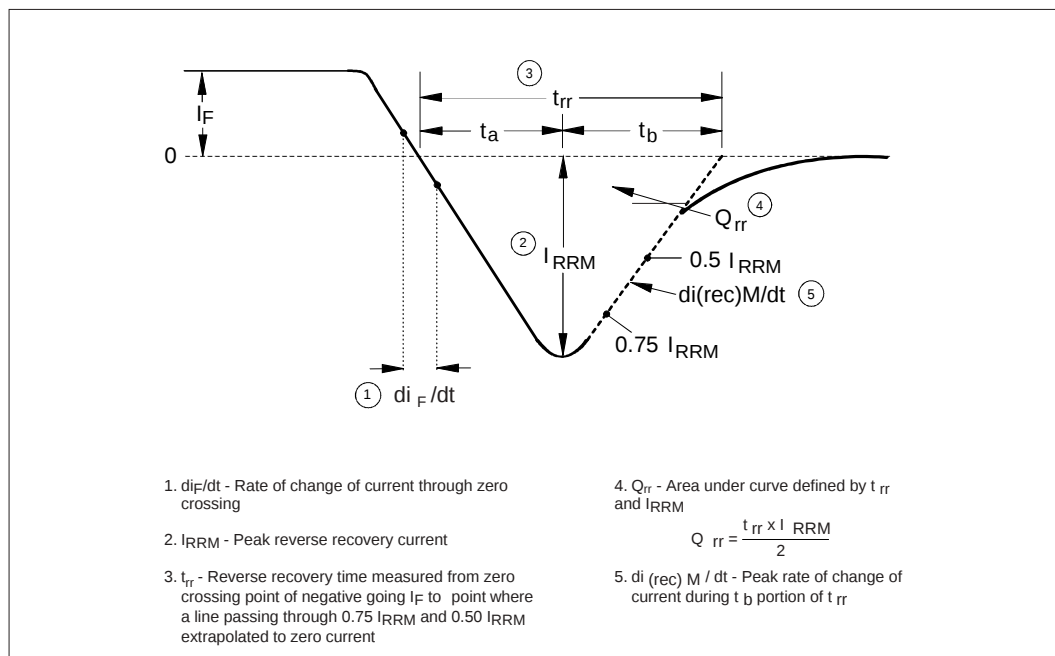
(3) Formula used:  $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$ ;

$Pd$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)}/D)$  (see Fig. 6);

$Pd_{REV}$  = Inverse Power Loss =  $V_{R1} \times I_R (1-D)$ ;  $I_R @ V_{R1}$  = rated  $V_R$

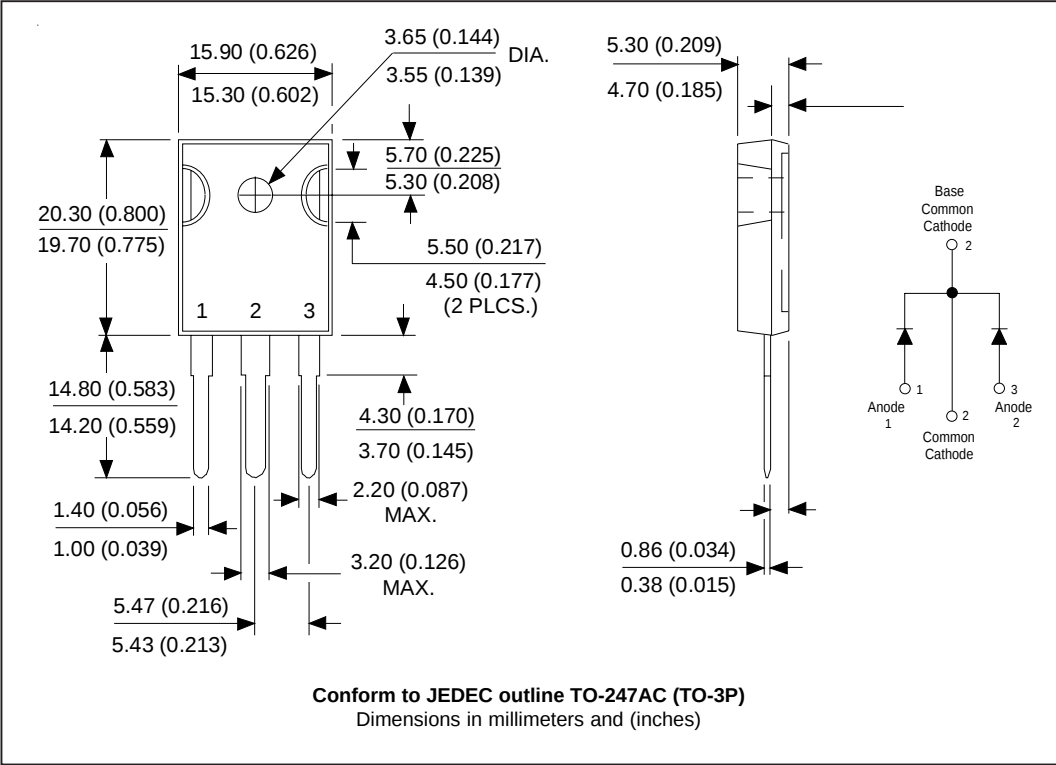


**Fig. 9 - Reverse Recovery Parameter Test Circuit**

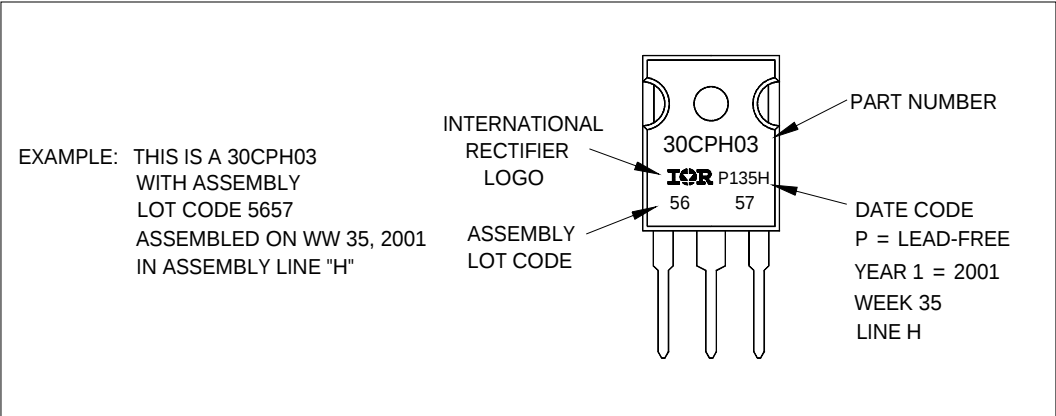


**Fig. 10 - Reverse Recovery Waveform and Definitions**

Outline Table



Marking Information



## Ordering Information Table

## Device Code

|    |   |   |   |    |     |
|----|---|---|---|----|-----|
| 30 | C | P | H | 03 | PbF |
| 1  | 2 | 3 | 4 | 5  | 6   |

- 1** - Current Rating (30 = 30A)
- 2** - Circuit Configuration  
C = Common Cathode
- 3** - Package  
P = TO-247
- 4** - Hyperfast Recovery
- 5** - Voltage Rating (03 = 300V)
- 6** -
  - none = Standard Production
  - PbF = Lead-Free

Tube Standard Pack Quantity : 25 pieces

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