

# International IOR Rectifier

## 150EBU04

### Ultrafast Soft Recovery Diode

#### Features

- Ultrafast Recovery
- 175°C Operating Junction Temperature

#### Benefits

- Reduced RFI and EMI
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

$$t_{rr} = 60\text{ns}$$

$$I_{F(AV)} = 150\text{Amp}$$

$$V_R = 400\text{V}$$

#### Description/Applications

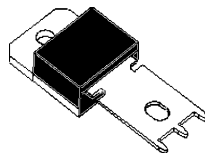
These diodes are optimized to reduce losses and EMI/ RFI in high frequency power conditioning systems. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are not significant portion of the total losses.

#### Absolute Maximum Ratings

| Parameters  | Max         | Units            |
|---|-------------|------------------|
| $V_R$ Cathode to Anode Voltage                                    | 400         | V                |
| $I_{F(AV)}$ Continuous Forward Current, $T_C = 104^\circ\text{C}$ | 150         | A                |
| $I_{FSM}$ Single Pulse Forward Current, $T_C = 25^\circ\text{C}$  | 1500        |                  |
| $I_{FRM}^{\text{①}}$ Maximum Repetitive Forward Current           | 300         |                  |
| $T_J, T_{STG}$ Operating Junction and Storage Temperatures        | - 55 to 175 | $^\circ\text{C}$ |

① Square Wave, 20kHz

#### Case Styles



PowIRtab

**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

| Parameters   | Min | Typ  | Max  | Units | Test Conditions   |
|--|-----|------|------|-------|---|
| V <sub>BR</sub> , V <sub>r</sub> Breakdown Voltage, Blocking Voltage | 400 | -    | -    | V     | I <sub>R</sub> = 200μA  |
| V <sub>F</sub> Forward Voltage                                       | -   | 1.07 | 1.3  | V     | I <sub>F</sub> = 150A   |
|  | -   | 0.9  | 1.1  | V     | I <sub>F</sub> = 150A, T <sub>J</sub> = 175°C                 |
|  | -   | 0.96 | 1.17 | V     | I <sub>F</sub> = 150A, T <sub>J</sub> = 125°C                 |
| I <sub>R</sub> Reverse Leakage Current                               | -   | -    | 50   | μA    | V <sub>R</sub> = V <sub>R</sub> Rated                         |
|  | -   | -    | 4    | mA    | T <sub>J</sub> = 150°C, V <sub>R</sub> = V <sub>R</sub> Rated |
| C <sub>T</sub> Junction Capacitance                                  | -   | 100  | -    | pF    | V <sub>R</sub> = 400V   |
| L <sub>S</sub> Series Inductance                                     | -   | 3.5  | -    | nH    | Measured lead to lead 5mm from package body                   |

**Dynamic Recovery Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

| Parameters                              | Min | Typ  | Max | Units | Test Conditions   |                        |
|---|-----|------|-----|-------|---|------------------------|
| t <sub>rr</sub> Reverse Recovery Time   | -   | -    | 60  | ns    | I <sub>F</sub> = 1.0A, di <sub>F</sub> /dt = 200A/μs, V <sub>R</sub> = 30V<br>I <sub>F</sub> = 150A<br>V <sub>R</sub> = 200V<br>di <sub>F</sub> /dt = 200A/μs |                        |
|   | -   | 93   | -   |       |   | T <sub>J</sub> = 25°C  |
|   | -   | 172  | -   |       |   | T <sub>J</sub> = 125°C |
| I <sub>R</sub> Peak Recovery Current    | -   | 11   | -   | A     | T <sub>J</sub> = 25°C<br>T <sub>J</sub> = 125°C   |                        |
|   | -   | 20   | -   |       |   |                        |
| Q <sub>rr</sub> Reverse Recovery Charge | -   | 490  | -   | nC    | T <sub>J</sub> = 25°C<br>T <sub>J</sub> = 125°C   |                        |
|   | -   | 1740 | -   |       |   |                        |

**Thermal - Mechanical Characteristics**

| Parameters   | Min | Typ | Max  | Units  |
|--|-----|-----|------|--------|
| R <sub>thJC</sub> Thermal Resistance, Junction to Case   |     |     | 0.35 | K/W    |
| R <sub>thCS</sub> ② Thermal Resistance, Case to Heatsink |     | 0.2 |      |        |
| Wt Weight  |     |     | 5.02 | g      |
|  |     |     | 0.18 | (oz)   |
| T Mounting Torque  | 1.2 |     | 2.4  | N * m  |
|  | 10  |     | 20   | lbf.in |

② Mounting Surface, Flat, Smooth and Greased

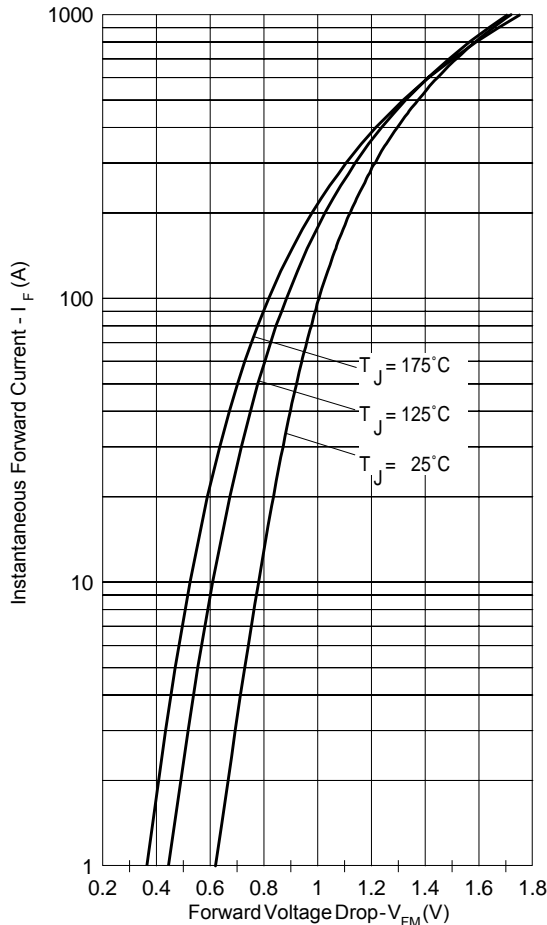


Fig. 1 - Typical Forward Voltage Drop Characteristics

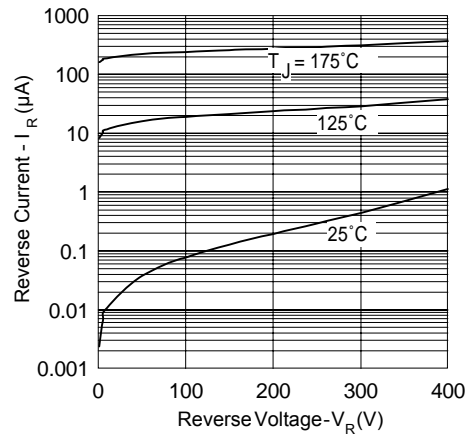


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

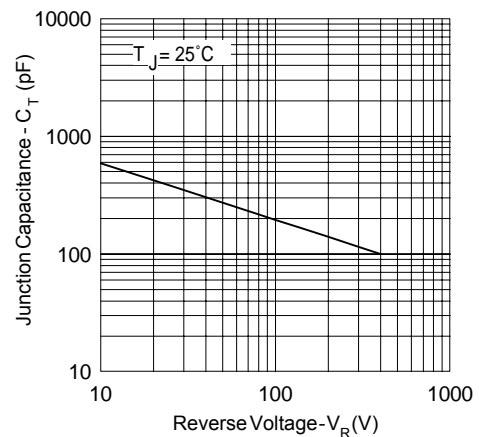


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

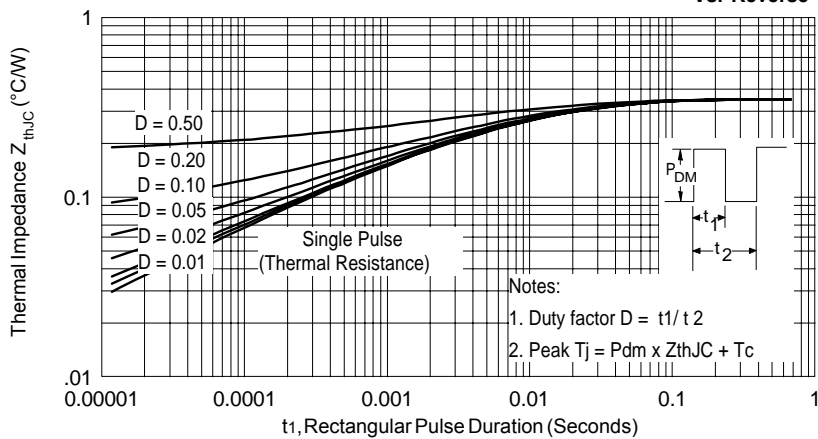


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

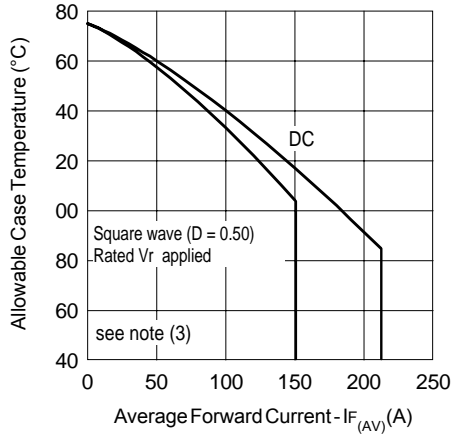


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

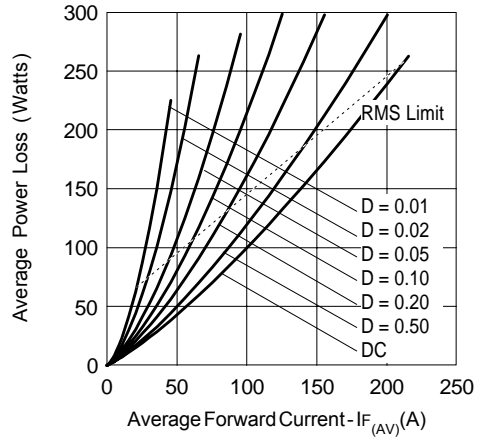


Fig. 6 - Forward Power Loss Characteristics

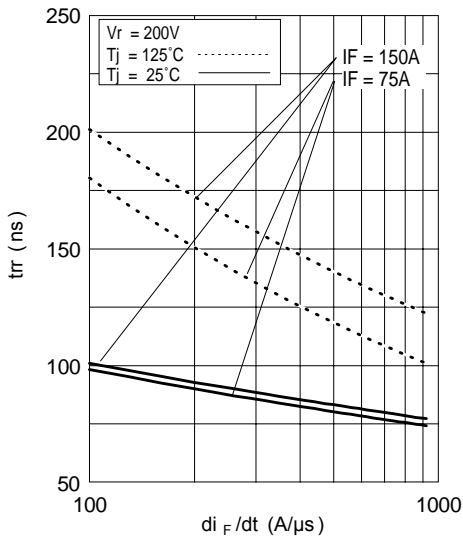


Fig. 7 - Typical Reverse Recovery time vs.  $di_F/dt$

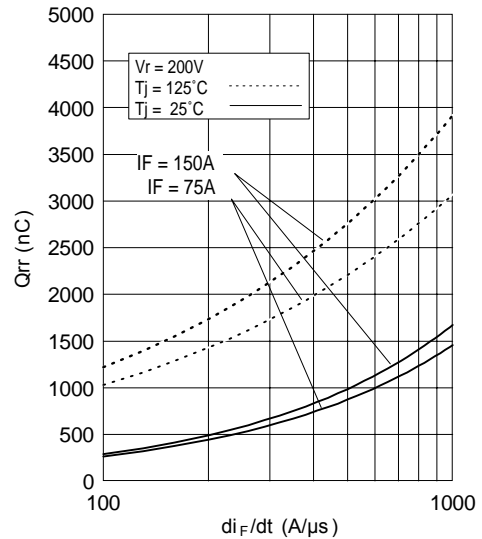
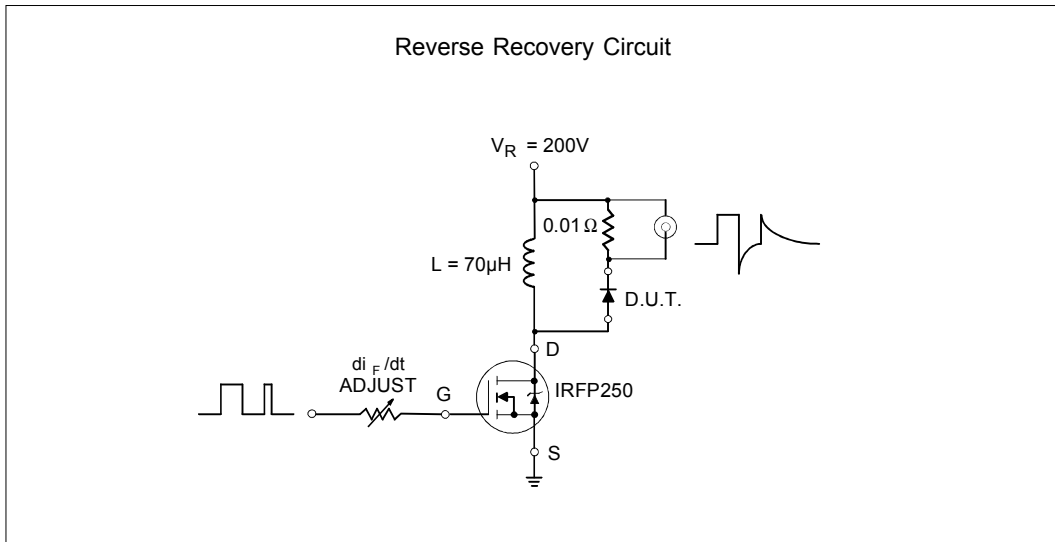
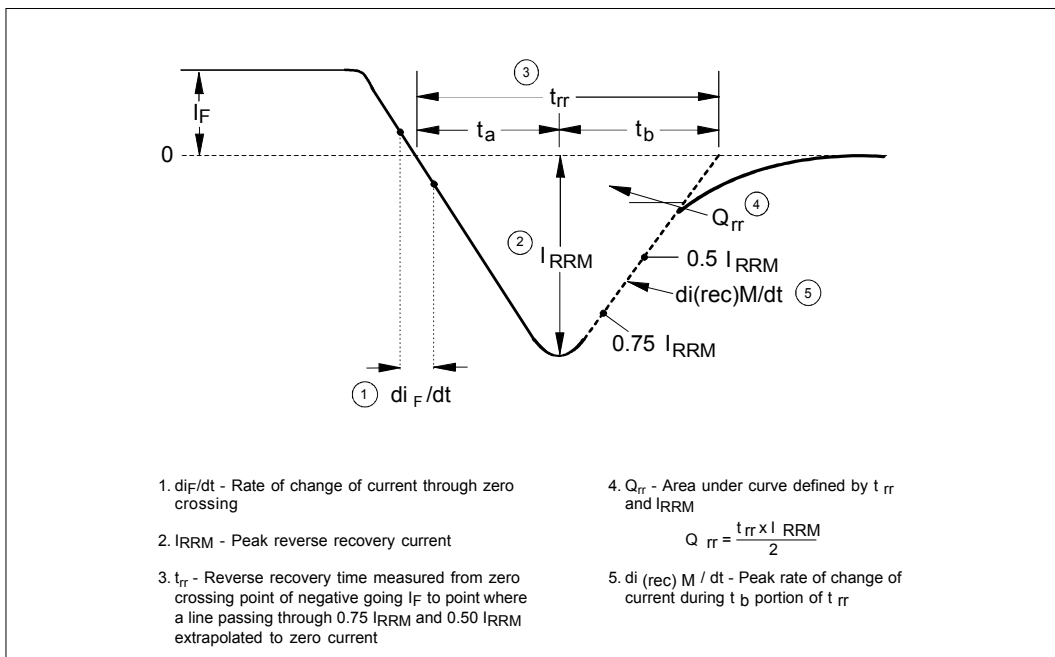


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

(3) Formula used:  $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$ ;  
 $Pd = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);  
 $Pd_{REV} = \text{Inverse Power Loss} = V_{R1} \times I_{R1} (1 - D)$ ;  $I_{R1} @ V_{R1} = \text{rated } V_R$

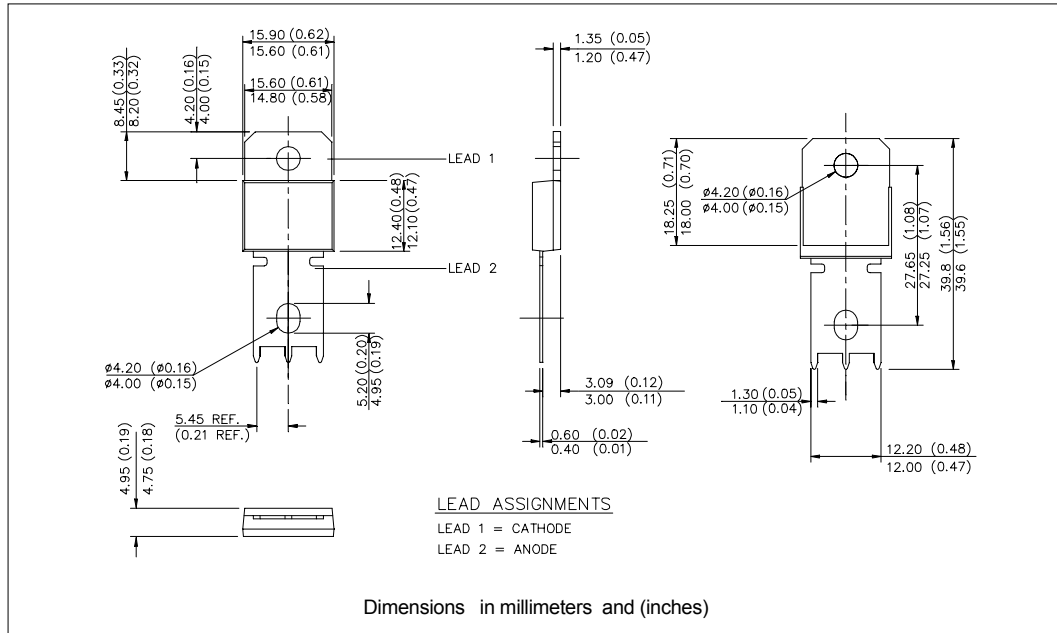


**Fig. 9- Reverse Recovery Parameter Test Circuit**



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

Outline Table



Ordering Information Table

| Device Code |          |                    |                             |           |
|-------------|----------|--------------------|-----------------------------|-----------|
| <b>150</b>  | <b>E</b> | <b>B</b>           | <b>U</b>                    | <b>04</b> |
| ①           | ②        | ③                  | ④                           | ⑤         |
| <b>1</b>    | -        | Current Rating     | (150 = 150A)                |           |
| <b>2</b>    | -        | Single Diode       |                             |           |
| <b>3</b>    | -        | Pow/Rtab           | (Ultrafast/ Hyperfast only) |           |
| <b>4</b>    | -        | Ultrafast Recovery |                             |           |
| <b>5</b>    | -        | Voltage Rating     | (04 = 400V)                 |           |