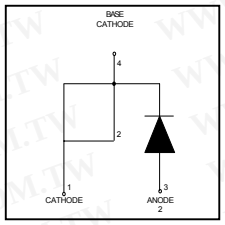
Bulletin PD -2.383 rev. C 11/00

International
IOR Rectifier

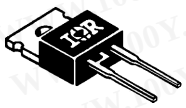
# HFA08TB120

HEXFRED™

Ultrafast, Soft Recovery Diode




$V_R$ = 1200V
$V_F$ (typ.)* = 2.4V
$I_{F\ (AV)}$ = 8.0A
$Q_{rr}$ (typ.)= 140nC
$I_{RRM}$ (typ.) = 4.5A
$t_{rr}$ (typ.) = 28ns
$di_{(rec)\ M}/dt$ (typ.)* = 85A /µs



**TO-220AC**

## Features

- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low $I_{RRM}$
- Very Low $Q_{rr}$
- Specified at Operating Conditions

## Benefits

- Reduced RFI and EMI
- Reduced Power Loss in Diode and Switching Transistor
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

## Description

International Rectifier's HFA08TB120 is a state of the art ultra fast recovery diode. Employing the latest in epitaxial construction and advanced processing techniques it features a superb combination of characteristics which result in performance which is unsurpassed by any rectifier previously available. With basic ratings of 1200 volts and 8 amps continuous current, the HFA08TB120 is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultra fast recovery time, the HEXFRED product line features extremely low values of peak recovery current ($I_{RRM}$) and does not exhibit any tendency to "snap-off" during the $t_b$ portion of recovery. The HEXFRED features combine to offer designers a rectifier with lower noise and significantly lower switching losses in both the diode and the switching transistor. These HEXFRED advantages can help to significantly reduce snubbing, component count and heatsink sizes. The HEXFRED HFA08TB120 is ideally suited for applications in power supplies and power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.

## Absolute Maximum Ratings

| | Parameter | Max | Units |
|---|---|---|---|
| $V_R$ | Cathode-to-Anode Voltage | 1200 | V |
| $I_F$ @ $T_C$ = 100°C | Continuous Forward Current | 8.0 | A |
| $I_{FSM}$ | Single Pulse Forward Current | 130 | |
| $I_{FRM}$ | Maximum Repetitive Forward Current | 32 | |
| $P_D$ @ $T_C$ = 25°C | Maximum Power Dissipation | 73.5 | W |
| $P_D$ @ $T_C$ = 100°C | Maximum Power Dissipation | 29 | |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | - 55 to 150 | °C |

*125°C

## Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $V_{BR}$ | Cathode Anode Breakdown Voltage | 1200 | - | - | V | $I_R$ = 100µA |
| $V_{FM}$ | Max. Forward Voltage | - | 2.6 | 3.3 | V | $I_F$ = 8.0A |
| | | - | 3.4 | 4.3 | | $I_F$ = 16A |
| | | - | 2.4 | 3.1 | | $I_F$ = 8.0A, $T_J$ = 125°C |
| $I_{RM}$ | Max. Reverse Leakage Current | - | 0.31 | 10 | µA | $V_R$ = $V_R$ Rated |
| | | - | 135 | 1000 | | $T_J$ = 125°C, $V_R$ = 0.8 x $V_R$ Rated |
| $C_T$ | Junction Capacitance | - | 11 | 20 | pF | $V_R$ = 200V |
| $L_S$ | Series Inductance | - | 8.0 | - | nH | Measured lead to lead 5mm from pkg body |

## Dynamic Recovery Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min | Typ | Max | Units | Test Conditions | |
|---|---|---|---|---|---|---|---|
| $t_{rr}$ | Reverse Recovery Time | - | 28 | - | ns | $I_F$ = 1.0A, $di_f/dt$ = 200A/µs, $V_R$ = 30V | |
| $t_{rr1}$ | | - | 63 | 95 | | $T_J$ = 25°C | $I_F$ = 8.0A |
| $t_{rr2}$ | | - | 106 | 160 | | $T_J$ = 125°C | $V_R$ = 200V |
| $I_{RRM1}$ | Peak Recovery Current | - | 4.5 | 8.0 | A | $T_J$ = 25°C | $di_f/dt$ = 200A/µs |
| $I_{RRM2}$ | | - | 6.2 | 11 | | $T_J$ = 125°C | |
| $Q_{rr1}$ | Reverse Recovery Charge | - | 140 | 380 | nC | $T_J$ = 25°C | |
| $Q_{rr2}$ | | - | 335 | 880 | | $T_J$ = 125°C | |
| $di_{(rec)M}/dt1$ | Peak Rate of Recovery | - | 133 | - | A/µs | $T_J$ = 25°C | |
| $di_{(rec)M}/dt2$ | Current During $t_b$ | - | 85 | - | | $T_J$ = 125°C | |

## Thermal - Mechanical Characteristics

| | Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| $T_{lead}$ ① | Lead Temperature | - | - | 300 | °C |
| $R_{thJC}$ | Thermal Resistance, Junction to Case | - | - | 1.7 | k/W |
| $R_{thJA}$ ② | Thermal Resistance, Junction to Ambient | - | - | 40 | |
| $R_{thCS}$ ③ | Thermal Resistance, Case to Heat Sink | - | 0.25 | - | |
| Wt | Weight | - | 6.0 | - | g |
| | | - | 0.21 | - | (oz) |
| | Mounting Torque | 6.0 | - | 12 | Kg-cm |
| | | 5.0 | - | 10 | lbf•in |

① 0.063 in. from Case (1.6mm) for 10 sec
② Typical Socket Mount
③ Mounting Surface, Flat, Smooth and Greased

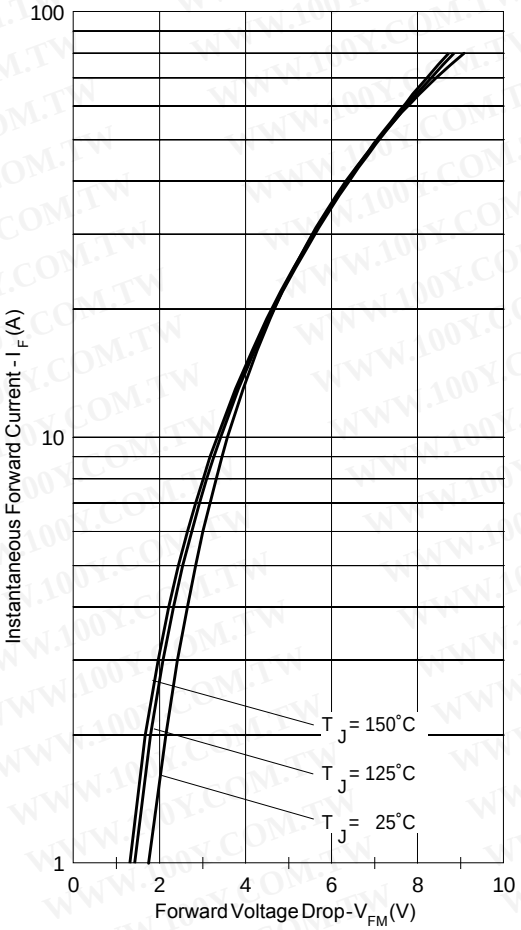



**Fig. 1 - Max. Forward Voltage Drop Characteristics**

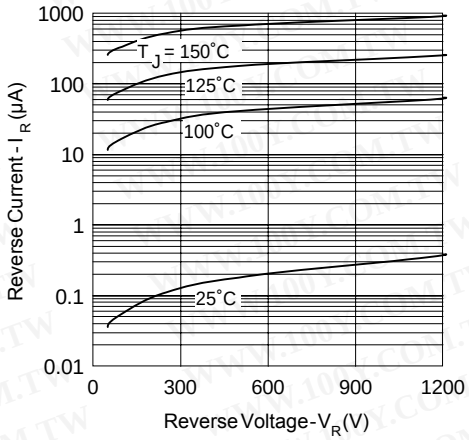



**Fig. 2 - Typ. Values Of Reverse Current Vs. Reverse Voltage**

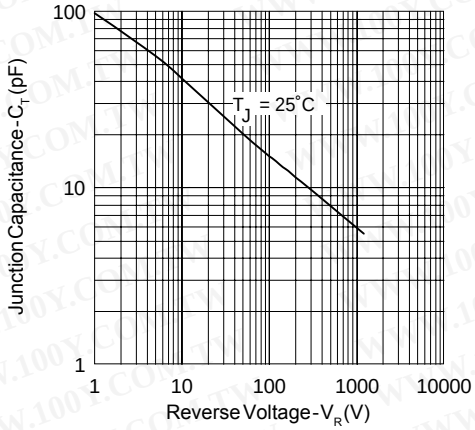



**Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage**

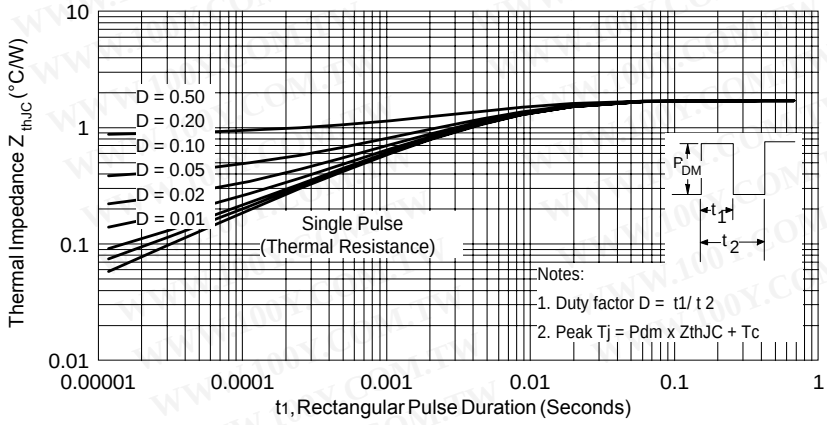



**Fig. 4 - Max. Thermal Impedance $Z_{thJC}$ Characteristics**

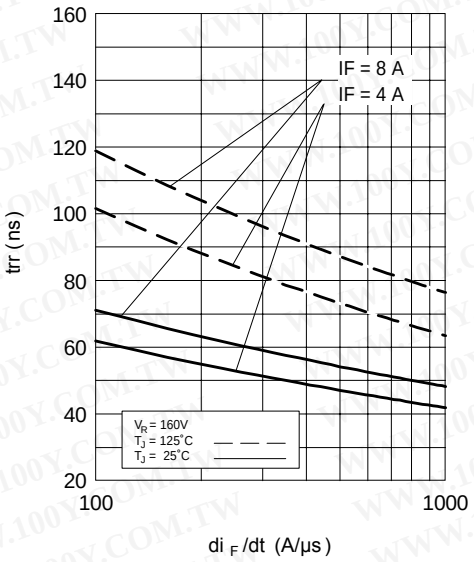



**Fig. 5 - Typical Reverse Recovery Vs. $di_f/dt$**

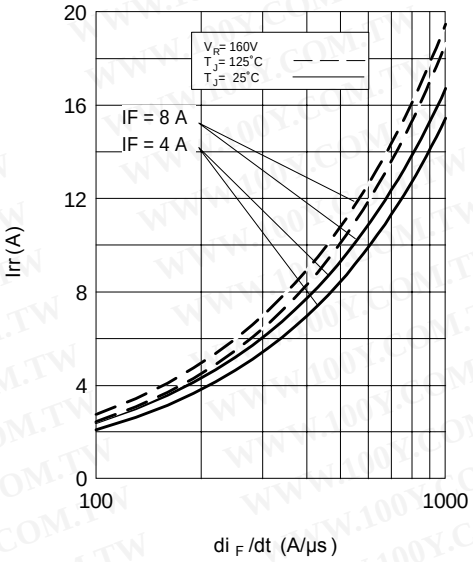



**Fig. 6 - Typical Recovery Current Vs. $di_f/dt$**

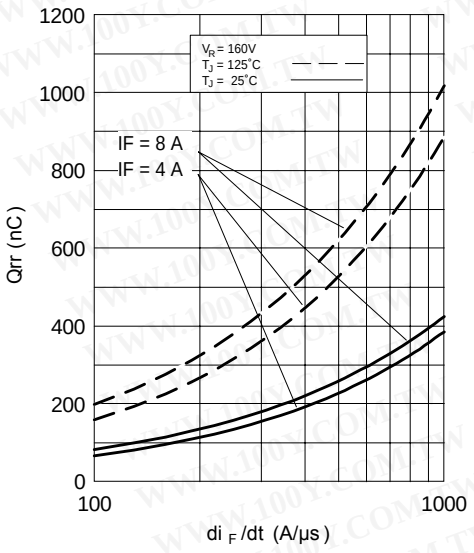



**Fig. 8 - Typical Stored Charge vs. $di_f/dt$**

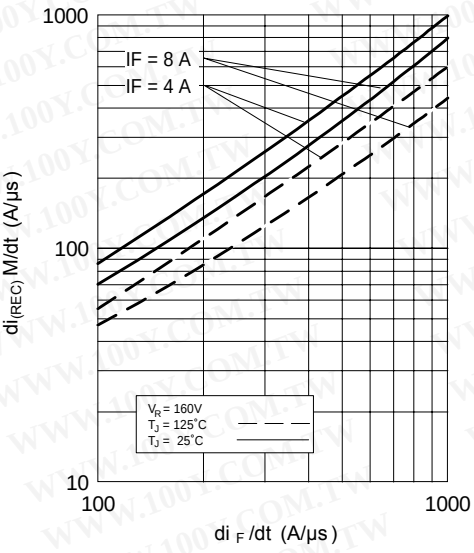



**Fig. 7 - Typical $di_{(REC)}$ M/dt vs. $di_f/dt$**

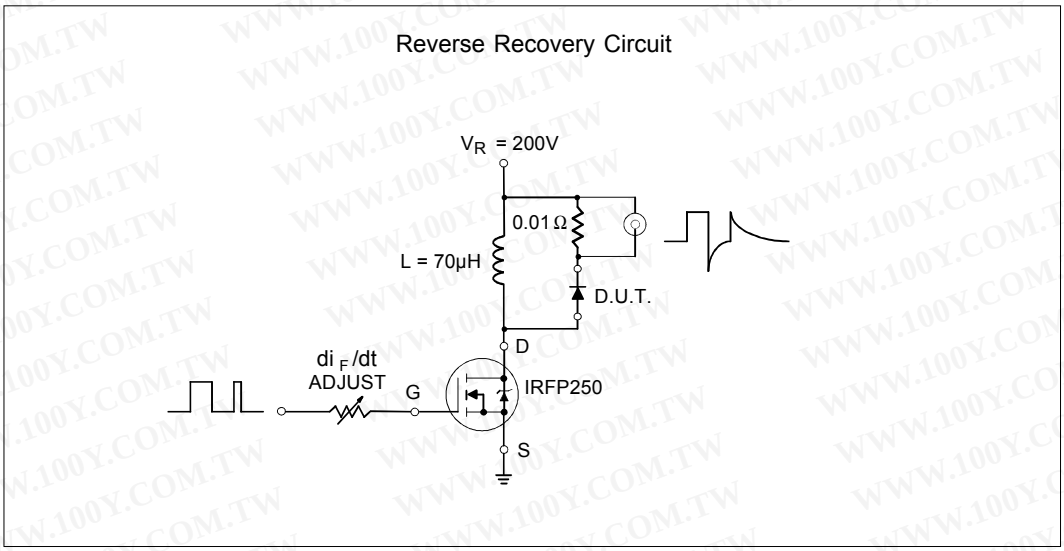
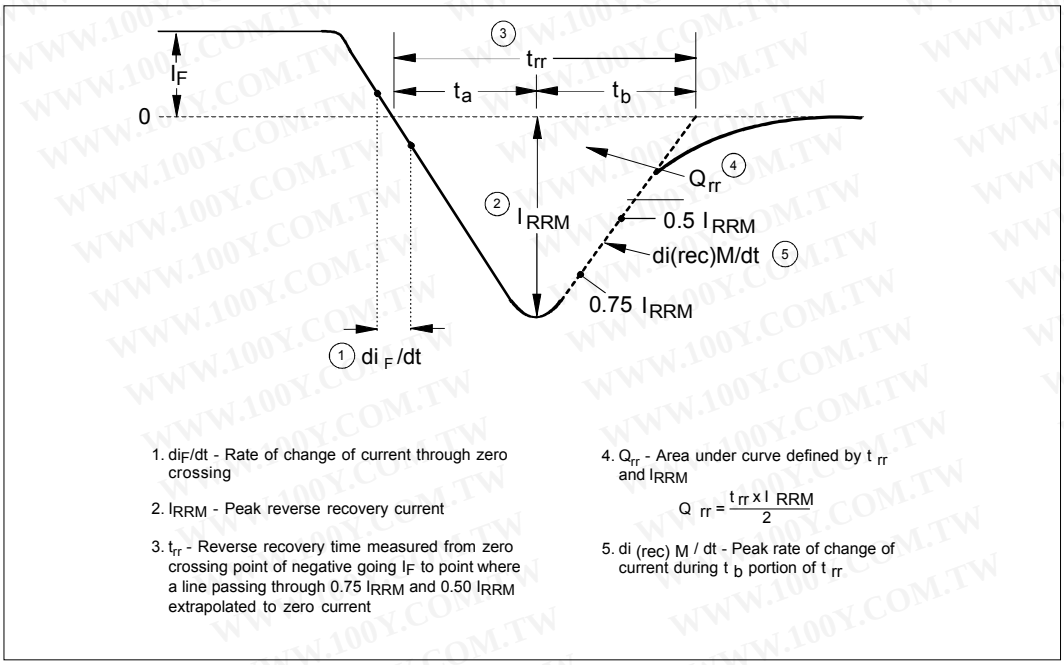



**Fig. 9- Reverse Recovery Parameter Test Circuit**



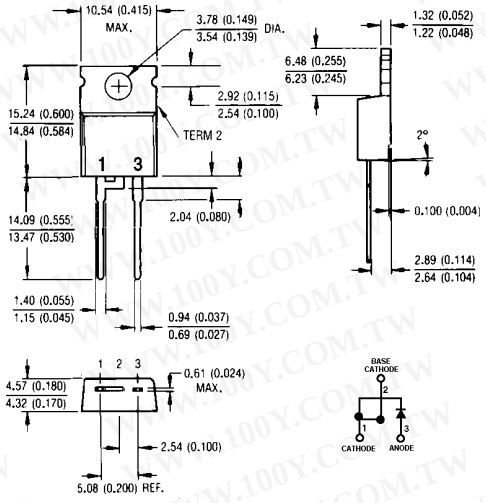

1. $di_F/dt$ - Rate of change of current through zero crossing
2. $I_{RRM}$ - Peak reverse recovery current
3. $t_{rr}$ - Reverse recovery time measured from zero crossing point of negative going $I_F$ to point where a line passing through 0.75 $I_{RRM}$ and 0.50 $I_{RRM}$ extrapolated to zero current
4. $Q_{rr}$ - Area under curve defined by $t_{rr}$ and $I_{RRM}$

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

5. di (rec) M / dt - Peak rate of change of current during $t_b$ portion of $t_{rr}$

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

## Outline Table




**Conforms to JEDEC Outline TO-220AB**
Dimensions in millimeters and (inches)

## Ordering Information Table

**Device Code**

| HF | A | 08 | TB | 120 |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

| | | | | |
|---|---|---|---|---|
| 1 | - | Hexfred Family | | |
| 2 | - | Process Designator | A | = subs. elec. irrad. |
| | | | B | = subs. Platinum |
| 3 | - | Current Rating | (08 | = 8A) |
| 4 | - | Package Outline | (TB | = TO-220, 2 Leads) |
| 5 | - | Voltage Rating | (120 | = 1200V) |