

## FRED

## HFA35HB120

### Ultrafast, Soft Recovery Diode

#### Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetic
- Electrically Isolated
- Ceramic Eyelets

$$V_R = 1200V$$

$$V_F = 3.1V$$

$$Q_{rr} = 510nC$$

$$di_{(rec)M}/dt = 350A/\mu s$$

#### Description

These Ultrafast, soft recovery diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. An extensive characterization of the recovery behavior for different values of current, temperature and di/dt simplifies the calculations of losses in the operating conditions. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for power converters, motors drives and other applications where switching losses are significant portion of the total losses.

#### Absolute Maximum Ratings

|                          | Parameter                                          | Max.        | Units      |
|--------------------------|----------------------------------------------------|-------------|------------|
| $V_R$                    | Cathode to Anode Voltage                           | 1200        | V          |
| $I_{F(AV)}$              | Continuous Forward Current, ① $T_C = 100^\circ C$  | 11          | A          |
| $I_{FSM}$                | Single Pulse Forward Current, ② $T_C = 25^\circ C$ | 150         |            |
| $P_D @ T_C = 25^\circ C$ | Maximum Power Dissipation                          | 83          | W          |
| $T_J, T_{STG}$           | Operating Junction and Storage Temperature Range   | -55 to +150 | $^\circ C$ |

**Note:** ① D.C. = 50% rect. wave

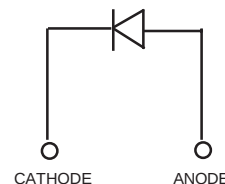
② 1/2 sine wave, 60 Hz, P.W. = 8.33 ms

#### CASE STYLE



TO-254AA

(ISOLATED BASE)



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

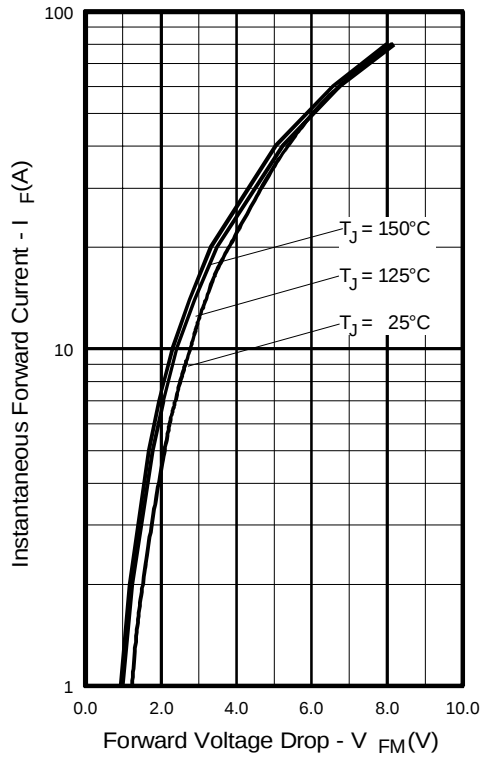
|          | Parameter                        | Min. | Typ. | Max. | Units         | Test Conditions                                                       |
|----------|----------------------------------|------|------|------|---------------|-----------------------------------------------------------------------|
| $V_{BR}$ | Cathode Anode Breakdown Voltage  | 1200 | —    | —    | V             | $I_R = 100\mu\text{A}$                                                |
| $V_F$    | Forward Voltage                  | —    | —    | 3.1  | V             | $I_F = 11\text{A}$                                                    |
|          | See Fig. 1                       | —    | —    | 4.0  |               | $I_F = 22\text{A}$                                                    |
|          |                                  | —    | —    | 2.7  |               | $I_F = 11\text{A}, T_J = 125^\circ\text{C}$                           |
| $I_R$    | Reverse Leakage Current          | —    | —    | 10   | $\mu\text{A}$ | $V_R = V_R \text{ Rated}$                                             |
|          | See Fig. 2                       | —    | —    | 1.0  | mA            | $V_R = 960\text{V}, T_J = 125^\circ\text{C}$                          |
| $C_T$    | Junction Capacitance, See Fig. 3 | —    | 28   | 42   | pF            | $V_R = 200\text{V}$                                                   |
| $L_S$    | Series Inductance                | —    | 6.7  | —    | nH            | Measured from anode lead to cathode lead, 6mm( 0.025 in) from package |

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

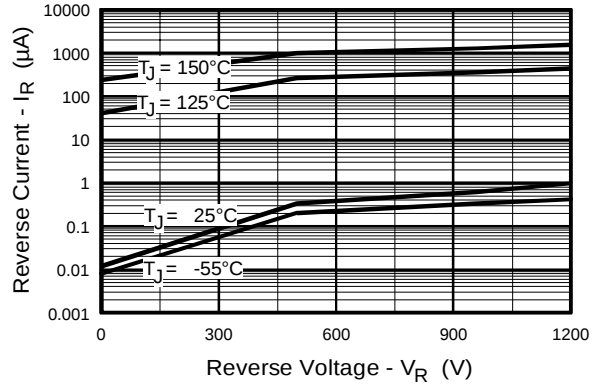
|                   | Parameter                             | Min. | Typ. | Max. | Units            | Test Conditions                   |
|-------------------|---------------------------------------|------|------|------|------------------|-----------------------------------|
| $t_{rr1}$         | Reverse Recovery Time                 | —    | 80   | 120  | ns               | $T_J = 25^\circ\text{C}$ See Fig. |
| $t_{rr2}$         |                                       | —    | 130  | 195  |                  | $T_J = 125^\circ\text{C}$ 5       |
| $I_{RRM1}$        | Peak Recovery Current                 | —    | 7.25 | 10.9 | A                | $T_J = 25^\circ\text{C}$ See Fig. |
| $I_{RRM2}$        |                                       | —    | 10.2 | 15.3 |                  | $T_J = 125^\circ\text{C}$ 6       |
| $Q_{rr1}$         | Reverse Recovery Charge               | —    | 340  | 510  | nC               | $T_J = 25^\circ\text{C}$ See Fig. |
| $Q_{rr2}$         |                                       | —    | 825  | 1240 |                  | $T_J = 125^\circ\text{C}$ 7       |
| $di_{(rec)M}/dt1$ | Peak Rate of Fall of Recovery Current | —    | 230  | 350  | A/ $\mu\text{s}$ | $T_J = 25^\circ\text{C}$ See Fig. |
| $di_{(rec)M}/dt2$ | During $t_b$                          | —    | 160  | 240  |                  | $T_J = 125^\circ\text{C}$ 8       |

**Thermal - Mechanical Characteristics**

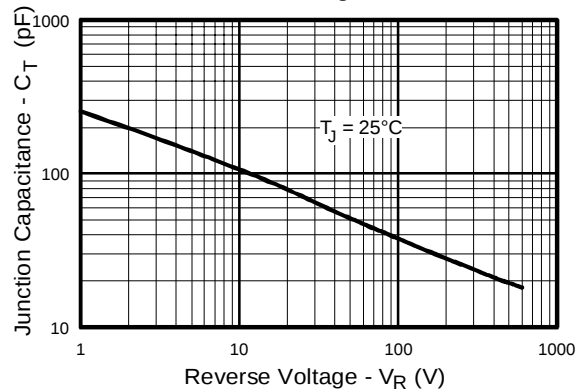
|            | Parameter        | Typ. | Max. | Units              |
|------------|------------------|------|------|--------------------|
| $R_{thJC}$ | Junction-to-Case | —    | 1.5  | $^\circ\text{C/W}$ |
| Wt         | Weight           | 9.3  | —    | g                  |



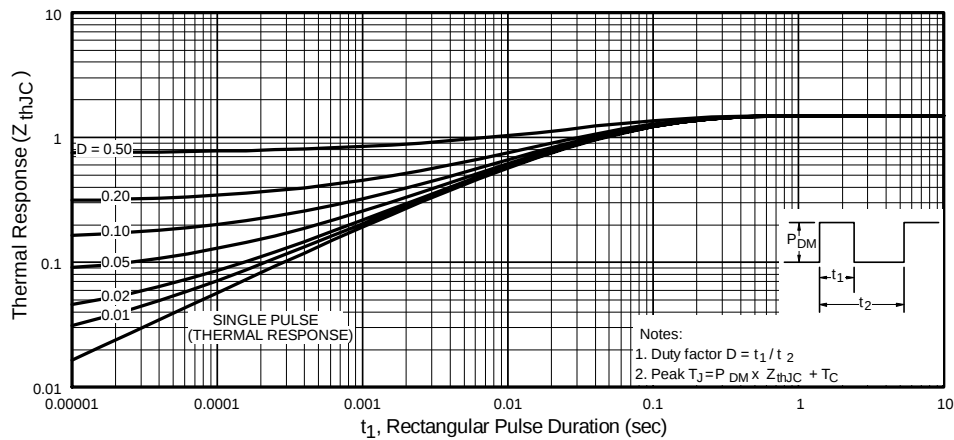
**Fig. 1** - Maximum Forward Voltage Drop Vs. Instantaneous Forward Current



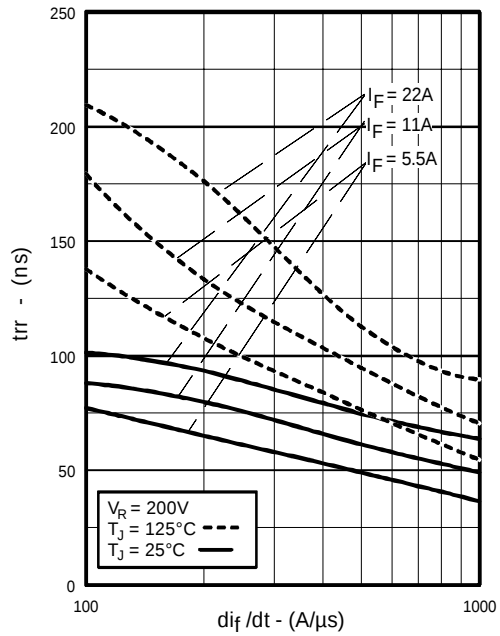
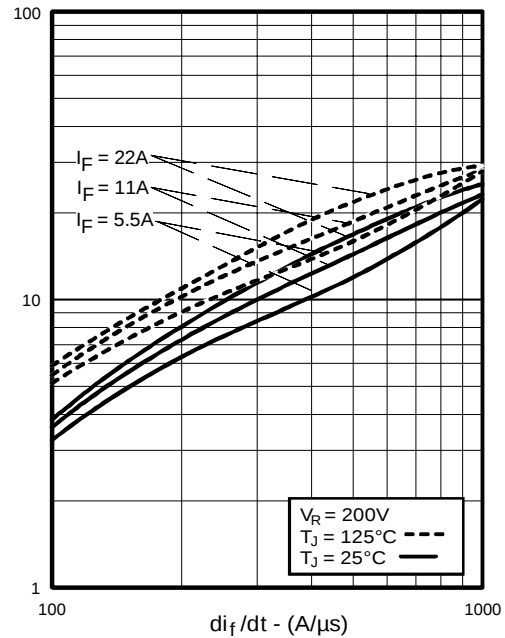
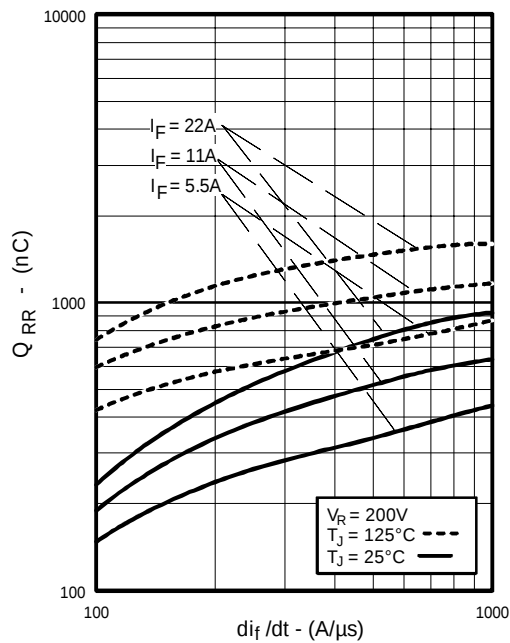
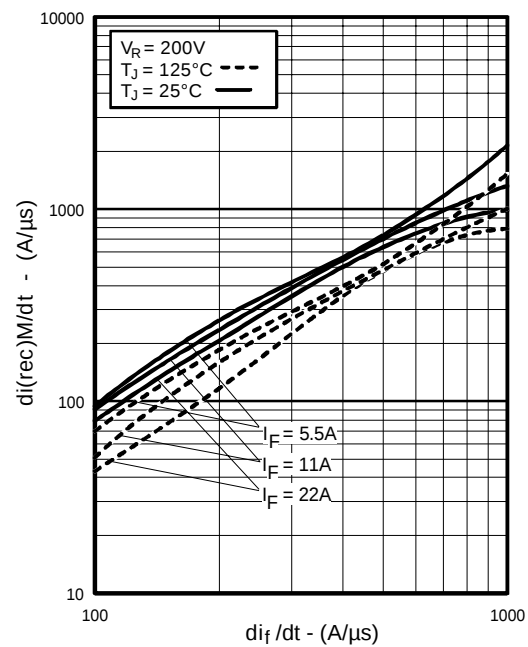
**Fig. 2** - Typical Reverse Current Vs. Reverse Voltage

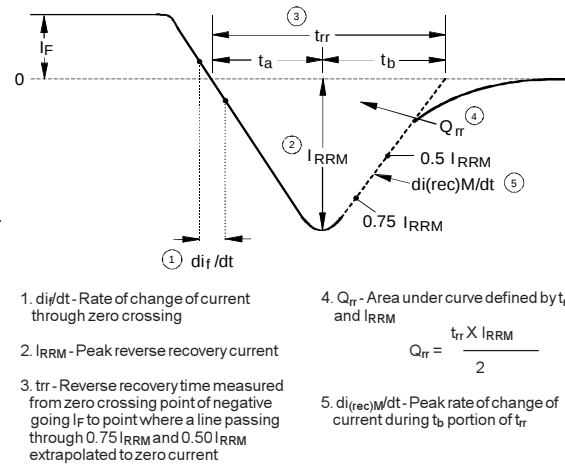
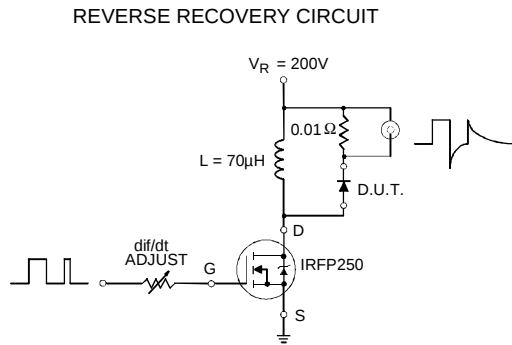


**Fig. 3** - Typical Junction Capacitance Vs. Reverse Voltage



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

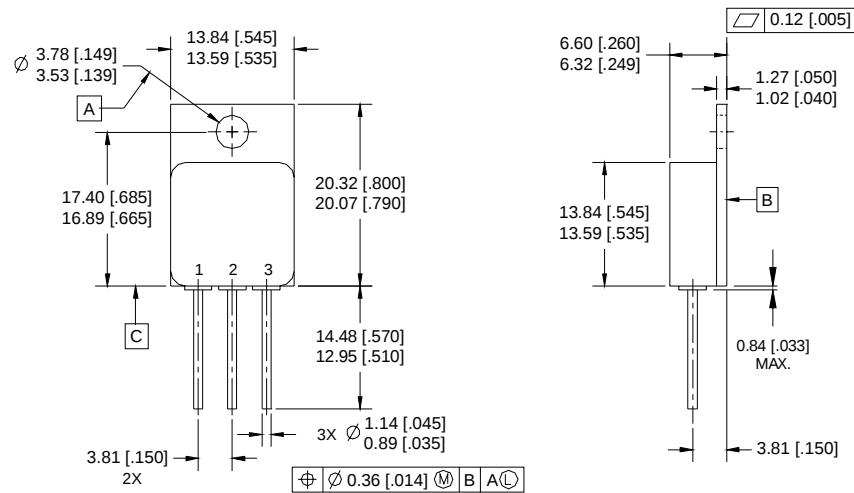
Fig. 5 - Typical Reverse Recovery Vs.  $di_f/dt$ ,Fig. 6 - Typical Recovery Current Vs.  $di_f/dt$ ,Fig. 7 - Typical Stored Charge Vs.  $di_f/dt$ Fig. 8 - Typical  $di_{(rec)M}/dt$  Vs.  $di_f/dt$



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

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

## Case Outline and Dimensions — TO-254AA



**NOTES:**

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. CONTROLLING DIMENSION: INCH.
4. CONFORMS TO JEDEC OUTLINE TO-254AA.

**PIN ASSIGNMENTS**

- 1 = CATHODE
- 2 = N/C
- 3 = ANODE