

HFB35HB20

PD-94100E

Ultrafast, Soft Recovery Diode Thru-Hole (TO-254AA) 200V, 35A

Features

- Single devices configuration
- Reduced RFI and EMI
- Reduced snubbing
- Extensive characterization of recovery parameters
- Hermetically sealed
- Ceramic eyelets
- ESD Rating: Class 3B per MIL-STD-750, Method 1020

Product Summary

- V_R : 200V
- V_F : 1.41V
- t_{rr} : 50ns
- $di_{(rec)M}/dt$: 236A/ μ s

Potential Applications

- DC-DC converter
- Motor drives

Product Validation

Qualified according to MIL-PRF-19500 for space applications



Description

HEXFRED™ 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, motor drives and other applications where switching losses are significant portion of the total losses.

Ordering Information

Table 1 Ordering options

Part number	Package	Screening Level
HFB35HB20	TO-254AA	COTS
HFB35HB20SCS	TO-254AA	S-level

HFB35HB20

FRED Ultrafast, Soft Recovery Diode

Table of contents

Table of contents

- Features 1**
- Potential Applications..... 1**
- Product Validation..... 1**
- Description 1**
- Ordering Information..... 1**
- Table of contents..... 2**
- 1 Absolute Maximum Ratings 3**
- 2 Device Characteristics 4**
 - 2.1 Electrical Characteristics4
 - 2.2 Dynamic Recovery Characteristics4
 - 2.3 Thermal-Mechanical Characteristics.....4
- 3 Electrical Characteristics Curves..... 5**
- 4 Test Circuit..... 8**
- 5 Package Outline..... 9**
- Revision history.....10**

Absolute Maximum Ratings

1 Absolute Maximum Ratings**Table 2 Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
V_R	Cathode to anode voltage	200	V
$I_{F(AV)}$	Continuous forward current, $T_C = 80^\circ\text{C}$ ¹	35	A
I_{FSM}	Single pulse forward current, $T_C = 25^\circ\text{C}$ ²	150	A
$P_D @ T_C = 25^\circ\text{C}$	Maximum power dissipation	125	W
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
Wt	Weight	9.3 (Typical)	g

¹ DC = 50% rectangle wave² $\frac{1}{2}$ sine wave, 60 Hz, Pulse width = 8.33 ms

Device Characteristics

2 Device Characteristics

2.1 Electrical Characteristics

Table 3 Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	200	—	—	V	$I_R = 100\mu\text{A}$
V_F	Max Forward Voltage Drop See Fig. 1	—	—	1.25	V	$I_F = 20\text{A}$, $T_J = -55^\circ\text{C}$
		—	—	1.15	V	$I_F = 20\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	1.41	V	$I_F = 35\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	1.92	V	$I_F = 70\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	1.01	V	$I_F = 20\text{A}$, $T_J = 125^\circ\text{C}$
I_R	Max Reverse Leakage Current See Fig. 2	—	—	10	μA	$V_R = V_R$ Rated
		—	—	1.0	mA	$V_R = V_R$ Rated, $T_J = 125^\circ\text{C}$
C_J	Junction Capacitance See Fig. 3	—	—	200	pF	$V_R = 200\text{V}$
L_S	Series Inductance	—	7.8	—	nH	Measured from anode lead to Cathode lead, 6mm (0.25 in) from package

2.2 Dynamic Recovery Characteristics

Table 4 Dynamic Recovery Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
t_{rr1}	Reverse Recovery Time See Fig. 5	—	45	50	ns	$T_J = 25^\circ\text{C}$
t_{rr2}		—	68	—		$T_J = 125^\circ\text{C}$
I_{RRM1}	Peak Recovery Current See Fig. 6	—	3.3	—	A	$T_J = 25^\circ\text{C}$
I_{RRM2}		—	7.6	—		$T_J = 125^\circ\text{C}$
Q_{rr1}	Reverse Recovery Charge See Fig. 7	—	76	—	nC	$T_J = 25^\circ\text{C}$
Q_{rr2}		—	270	—		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During t_b See Fig. 8	—	236	—	A/ μs	$T_J = 25^\circ\text{C}$
$di_{(rec)M}/dt_2$		—	1020	—		$T_J = 125^\circ\text{C}$

2.3 Thermal-Mechanical Characteristics

Table 5 Thermal-Mechanical Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Junction to Case, See Fig. 4	—	1.0	$^\circ\text{C}/\text{W}$

HFB35HB20
FRED Ultrafast, Soft Recovery Diode
Electrical Characteristics Curves

3 Electrical Characteristics Curves

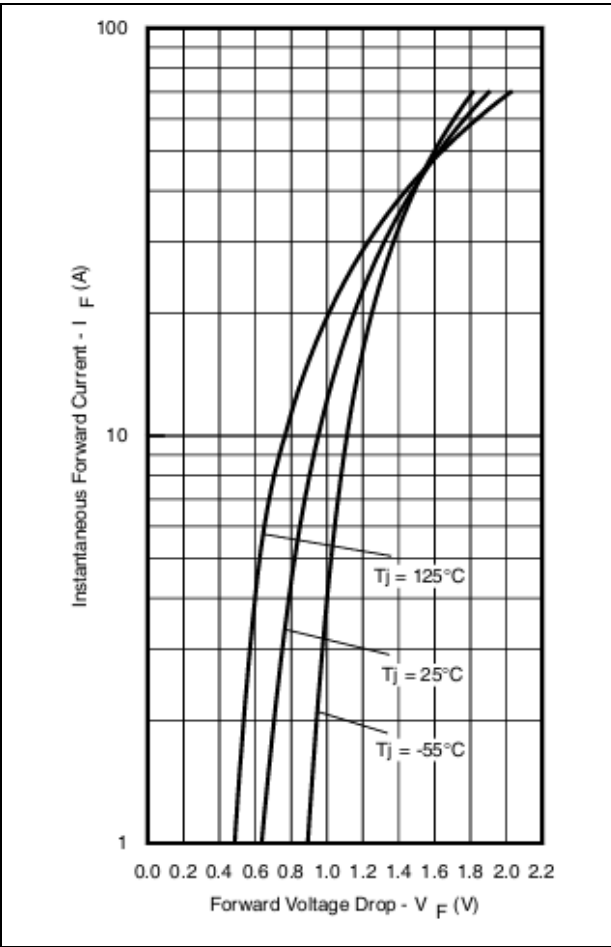


Figure 1 Maximum Forward Voltage Drop Characteristics

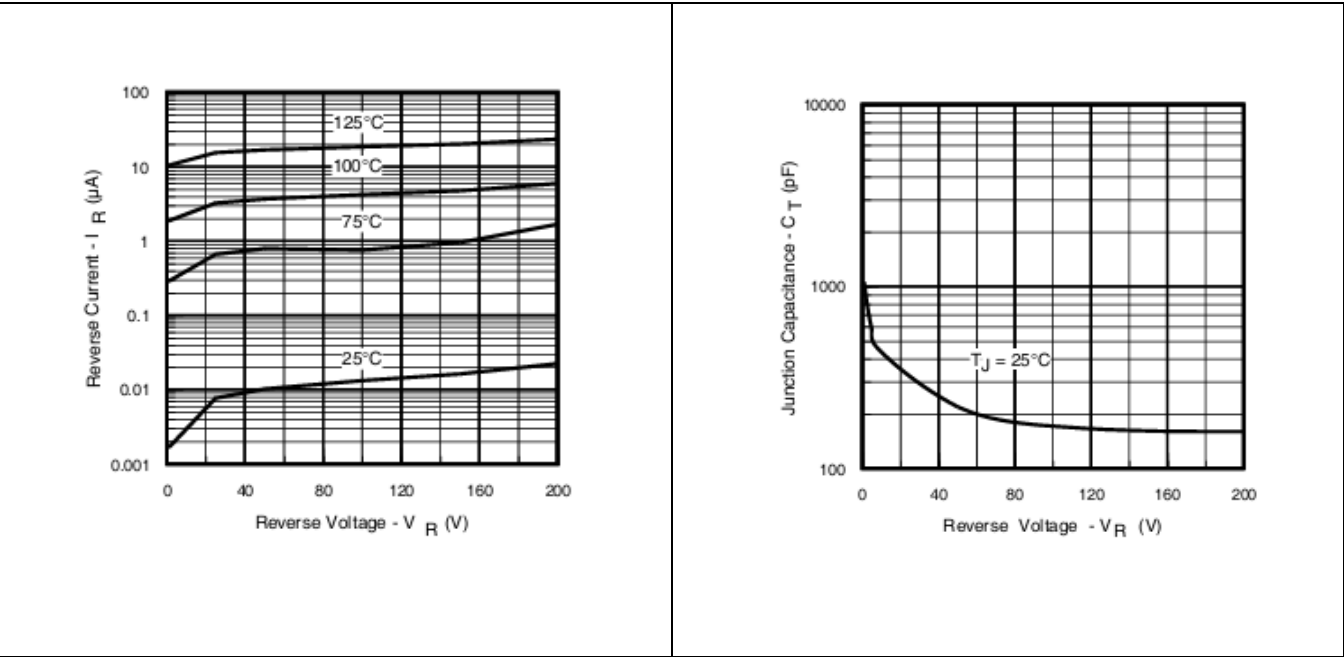


Figure 2 Typical Values of Reverse Current Vs. Reverse Voltage

Figure 3 Typical Junction Capacitance Vs. Reverse Voltage

HFB35HB20

FRED Ultrafast, Soft Recovery Diode

Electrical Characteristics Curves

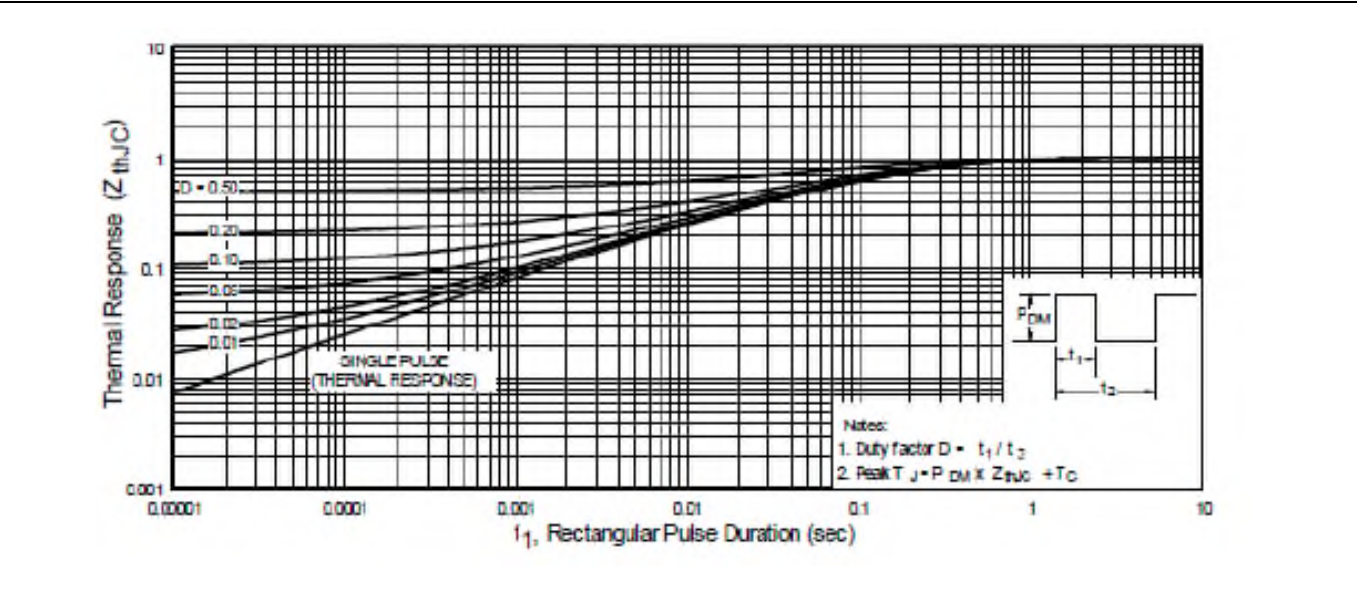


Figure 4 Maximum Thermal Impedance Z_{thJC} Characteristics

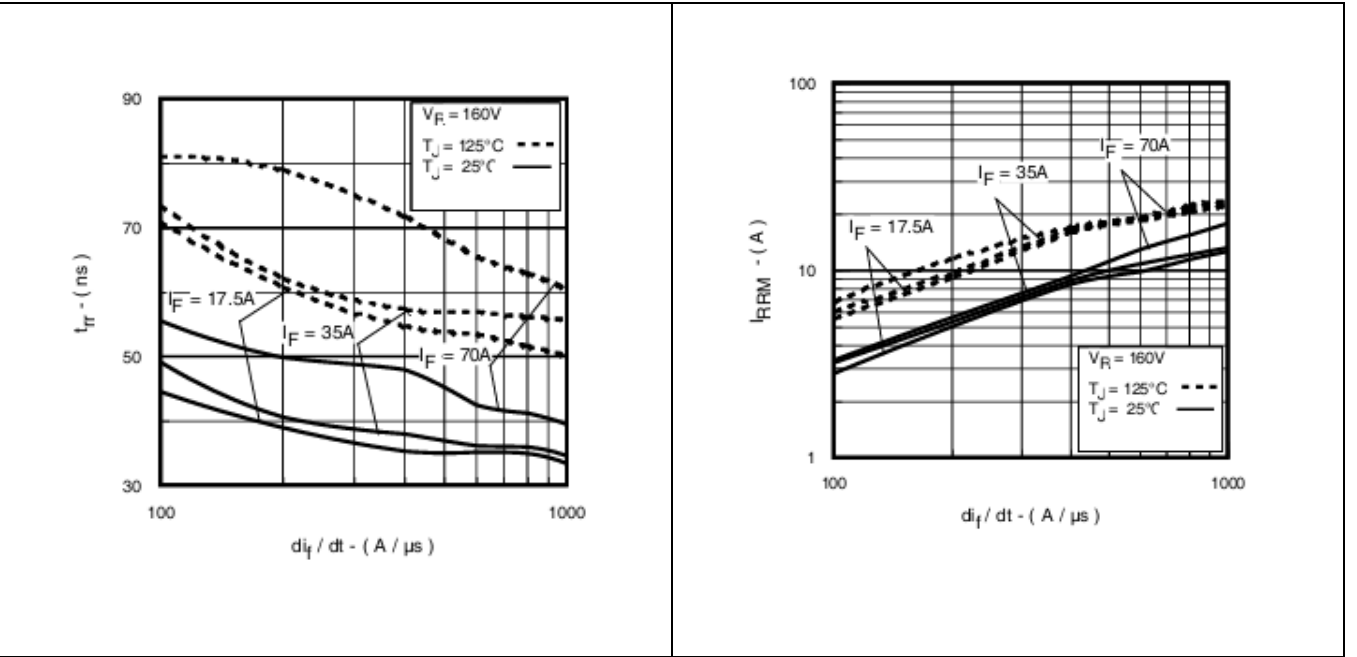


Figure 5 Typical Reverse Recovery Vs. di/dt

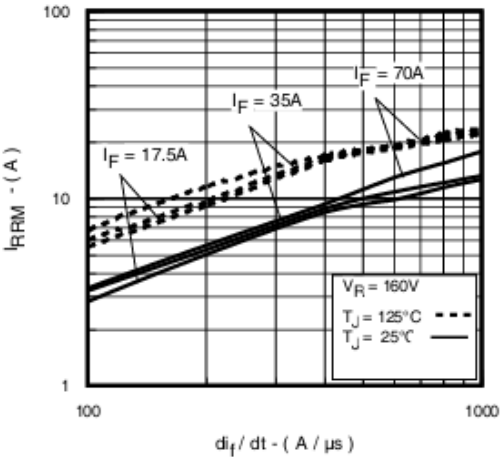


Figure 6 Typical Recovery Current Vs. di/dt

HFB35HB20

FRED Ultrafast, Soft Recovery Diode

Electrical Characteristics Curves

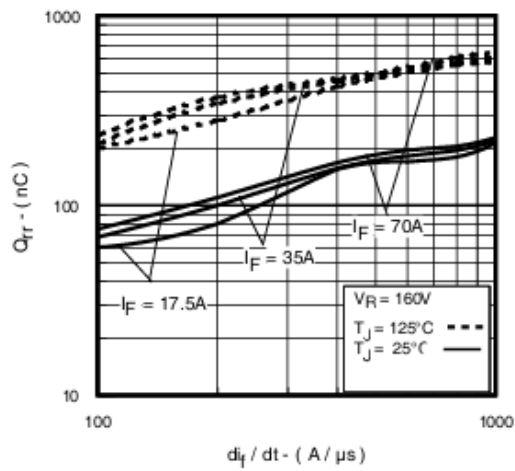


Figure 7 Typical Stored Charge Vs. di/dt

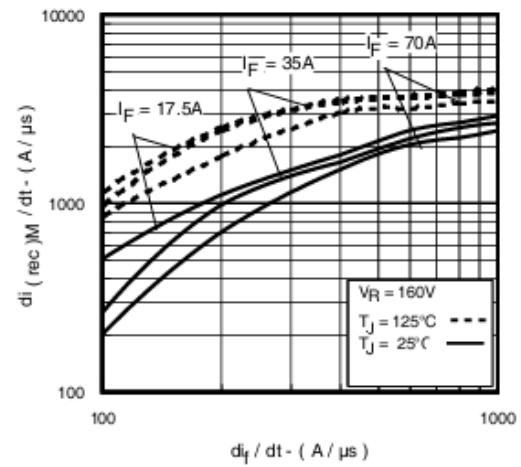


Figure 8 Typical $di_{(rec)M}/dt$ Vs. di/dt

HFB35HB20

FRED Ultrafast, Soft Recovery Diode

Test Circuit

4 Test Circuit

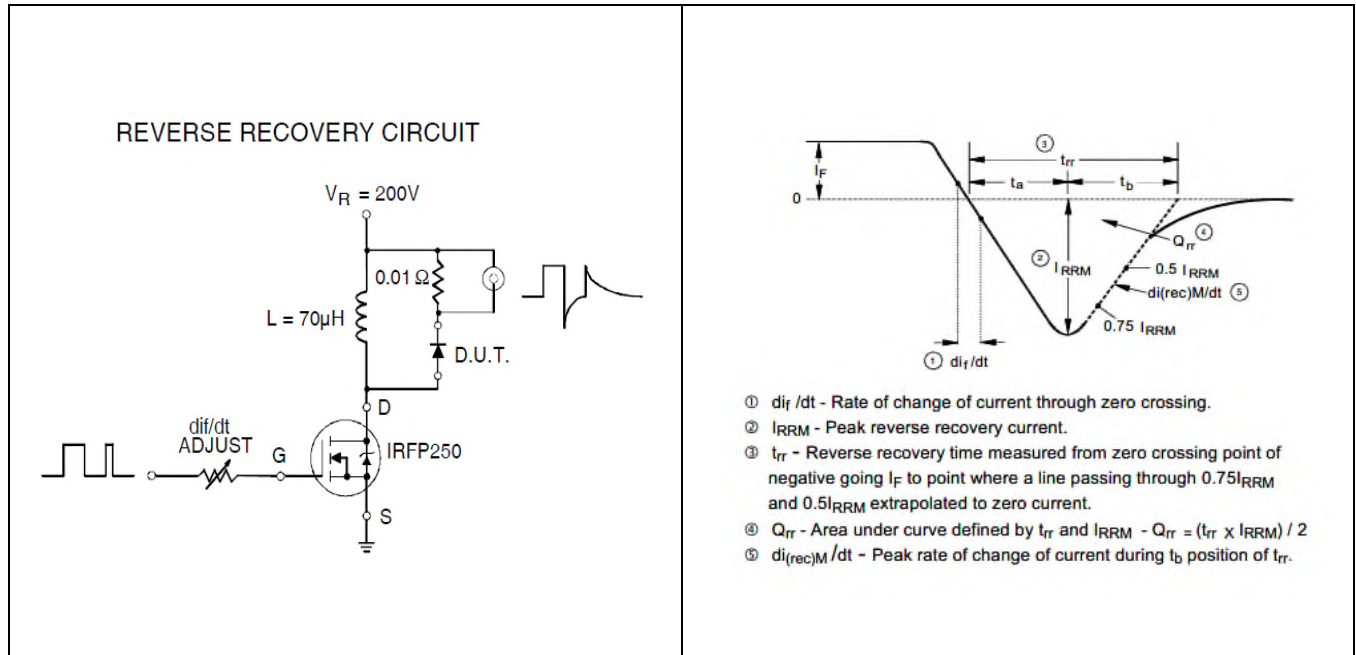


Figure 9 Reverse Recovery Parameter Test Circuit

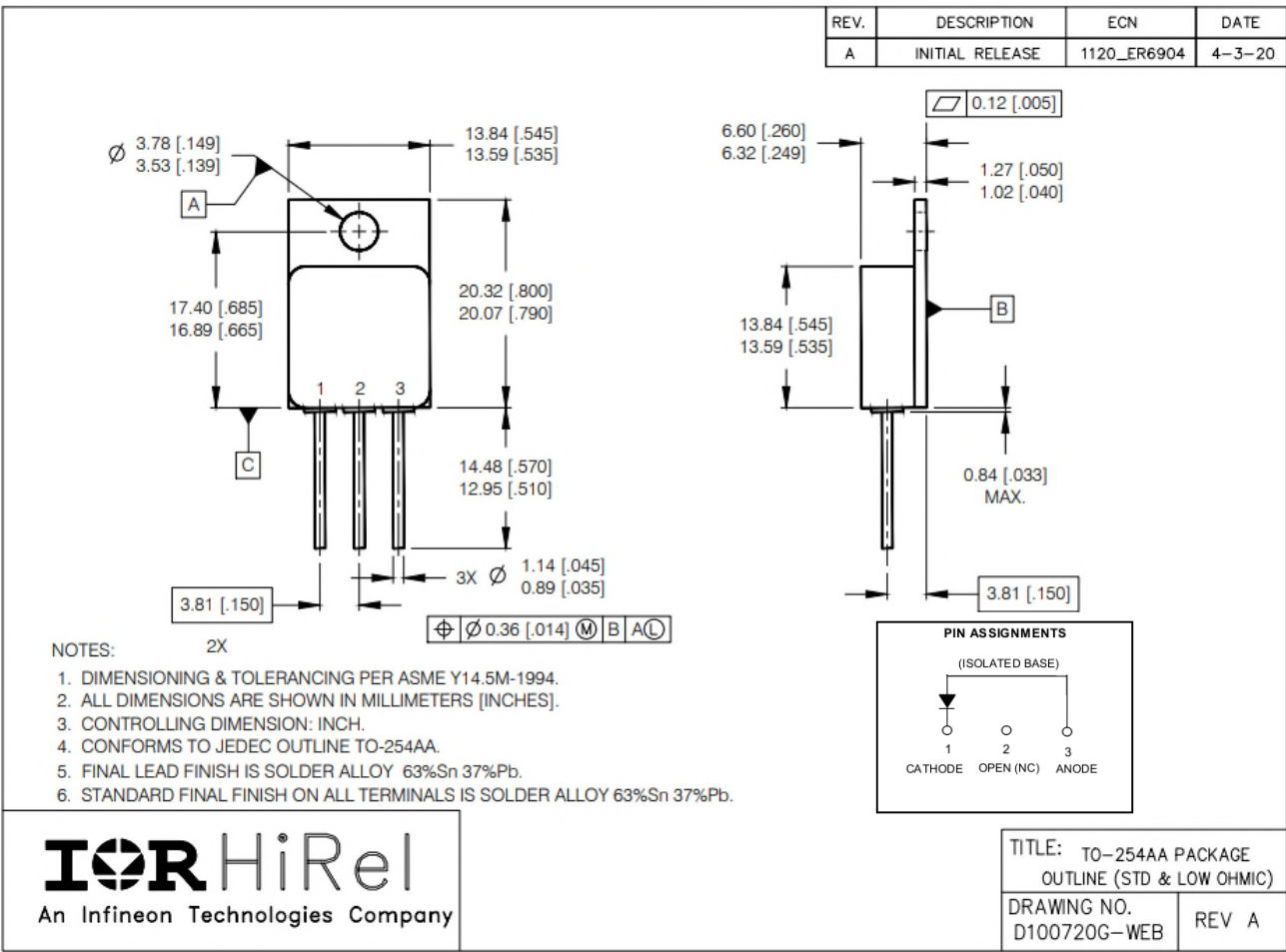
Figure 10 Reverse Recovery Waveform and Definitions

HFB35HB20
FRED Ultrafast, Soft Recovery Diode

Package Outline

5 Package Outline

Note: For the most updated package outline, please see the website: TO-254AA



BERYLLIA WARNING PER MIL-PRF-19500

Package containing beryllia shall not be ground, sandblasted, machined, or have other operations performed on them which will produce beryllia or beryllium dust. Furthermore, beryllium oxide packages shall not be placed in acids that will produce fumes containing beryllium.

HFB35HB20
FRED Ultrafast, Soft Recovery Diode

Revision history

Revision history

Document version	Date of release	Description of changes
	3/23/2001	Final datasheet (PD-94100)
Rev A	7/26/2006	Updated per ECN-14107
Rev B	10/3/2016	Updated per ECN-1120-04401
Rev C	8/13/2019	Updated per ECN-1120-07208
Rev D	04/29/2021	Updated per ECN-1120-08526
Rev E	05/02/2023	Updated per ECN-1120-09532

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2024-05-02

Published by

**International Rectifier HiRel Products,
Inc.**

**An Infineon Technologies company
El Segundo, California 90245 USA**

**© 2023 Infineon Technologies AG.
All Rights Reserved.**

**Do you have a question about this
document?**

Email: erratum@infineon.com

Document reference

IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenhheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

WARNINGS

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest International Rectifier HiRel Products, Inc., an Infineon Technologies company, office.

International Rectifier HiRel Components may only be used in life-support devices or systems with the expressed written approval of International Rectifier HiRel Products, Inc., an Infineon Technologies company, if failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety and effectiveness of that device or system.

Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.