

### HEXFRED ULTRAFAST, SOFT RECOVERY DIODE

#### Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetically Sealed
- Ceramic Eyelets

$$V_R = 600V$$

$$V_F = 1.75V$$

$$Q_{rr} = 380nC$$

$$di_{(rec)M}/dt = 400A/\mu s$$

#### Description

HFA35HB60 is part of the International Rectifier HiRel family of products. These 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

Characteristics	Characteristics	Max.	Units
$V_R$	D.C. Reverse Voltage	600	V
$I_F @ T_C = 100^\circ C$	Continuous Forward Current ①	22	A
$I_{FSM} @ T_C = 25^\circ C$	Single Pulse Forward Current ②	225	A
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	83	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ C$

#### Notes:

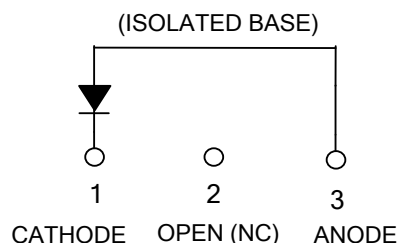
- ① D.C. = 50% rectangle wave  
② 1/2 sine wave, 60Hz, Pulse Width = 8.33ms

#### CASE STYLE



TO-254AA

#### PIN ASSIGNMENTS



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

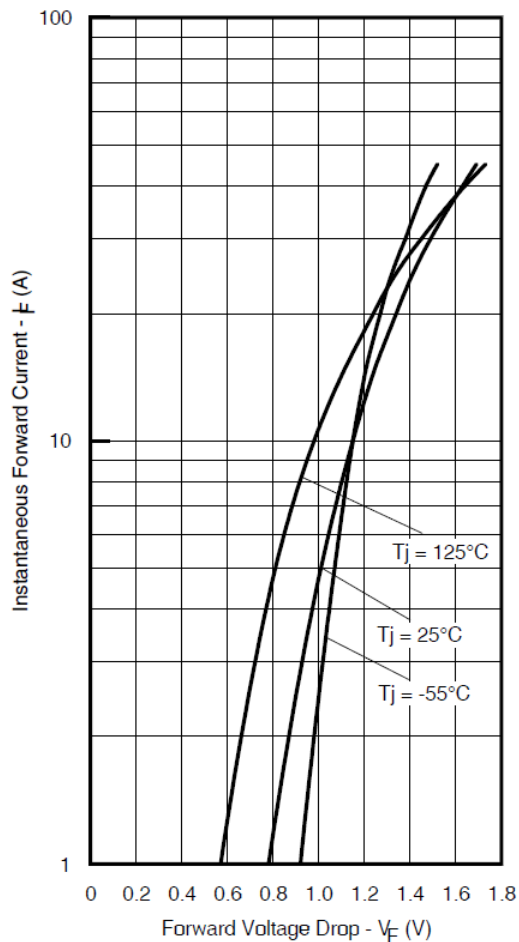
	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{BR}$	Cathode Anode Breakdown Voltage	600	—	—	V	$I_R = 100\mu\text{A}$
$V_{FM}$	Max. Forward Voltage See Fig. 1	—	—	1.55	V	$I_F = 22\text{A}, T_J = -55^\circ\text{C}$
		—	—	1.75		$I_F = 22\text{A}, T_J = 25^\circ\text{C}$
		—	—	2.25		$I_F = 45\text{A}, T_J = 25^\circ\text{C}$
		—	—	1.64		$I_F = 22\text{A}, T_J = 125^\circ\text{C}$
$I_{RM}$	Max. Reverse Leakage Current See Fig. 2	—	—	10	$\mu\text{A}$	$V_R = V_R \text{ Rated}$
		—	—	1.0	mA	$V_R = 480\text{V}, T_J = 125^\circ\text{C}$
$C_T$	Junction Capacitance, See Fig. 3	—	56	59	pF	$V_R = 200\text{V}$
$L_S$	Series Inductance	—	8.7	—	nH	Measured from center of bond pad to end of anode bonding wire

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

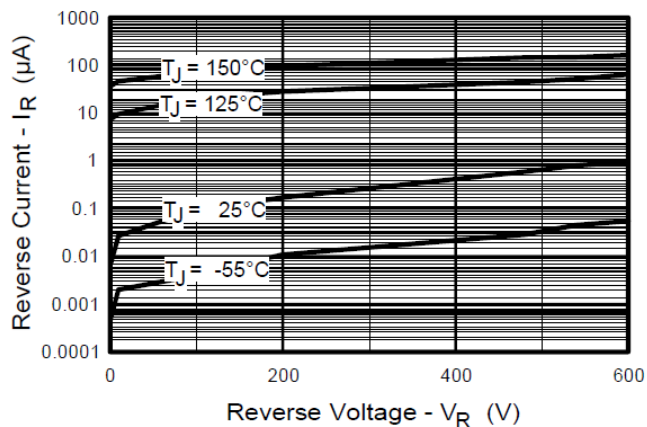
	Parameter	Min.	Typ.	Max.	Units	Test Conditions	
$t_{rr1}$	Reverse Recovery Time	—	60	97	ns	$T_J = 25^\circ\text{C}$	$I_F = 22\text{A}$
$t_{rr2}$	See Fig. 5	—	110	165		$T_J = 125^\circ\text{C}$	
$I_{RRM1}$	Peak Recovery Current	—	5.2	11	A	$T_J = 25^\circ\text{C}$	$V_R = 200\text{V}$
$I_{RRM2}$	See Fig. 6	—	8.5	13		$T_J = 125^\circ\text{C}$	
$Q_{rr1}$	Reverse Recovery Charge	—	190	380	nC	$T_J = 25^\circ\text{C}$	$di_F/dt = 200\text{A}/\mu\text{s}$
$Q_{rr2}$	See Fig. 7	—	560	840		$T_J = 125^\circ\text{C}$	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	270	400	$\text{A}/\mu\text{s}$	$T_J = 25^\circ\text{C}$	
$di_{(rec)M}/dt1$	During $t_b$ - See Fig. 8	—	170	250		$T_J = 125^\circ\text{C}$	

**Thermal - Mechanical Characteristics**

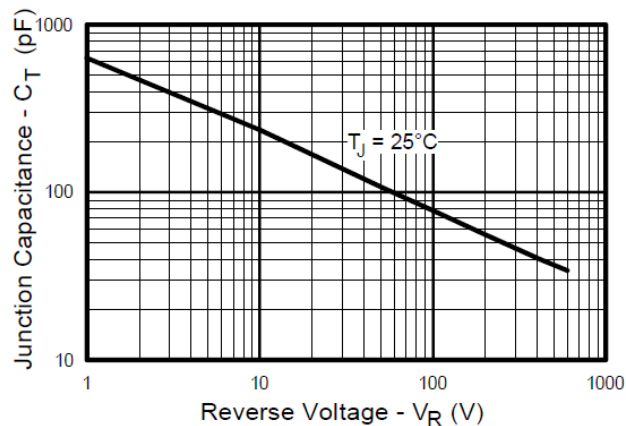
	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, Single Leg Conducting	—	1.5	$^\circ\text{C}/\text{W}$
Wt	Weight	9.3	—	g



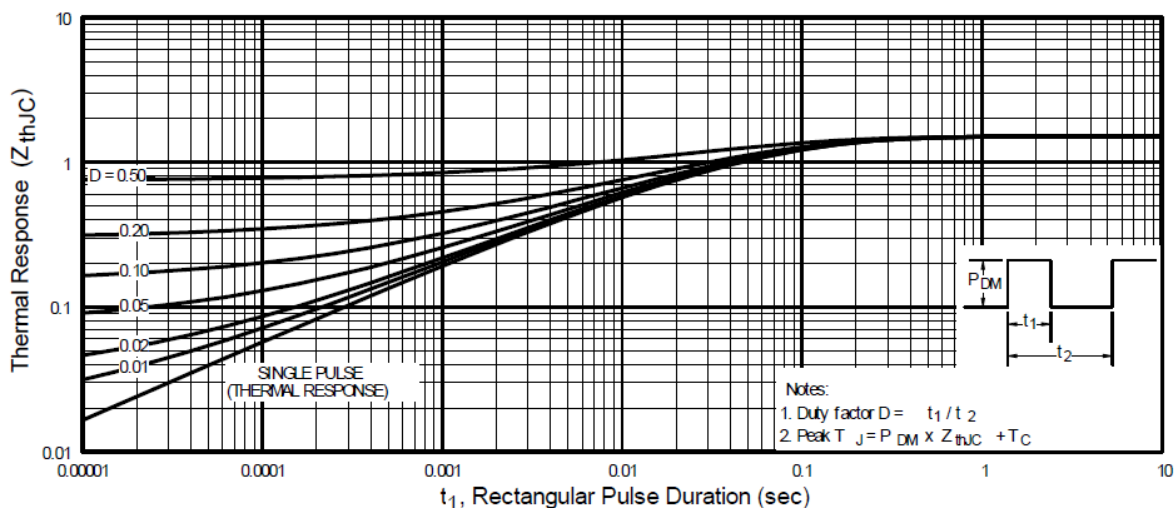
**Fig. 1** Typical Forward Voltage Drop Vs. Instantaneous Forward Current



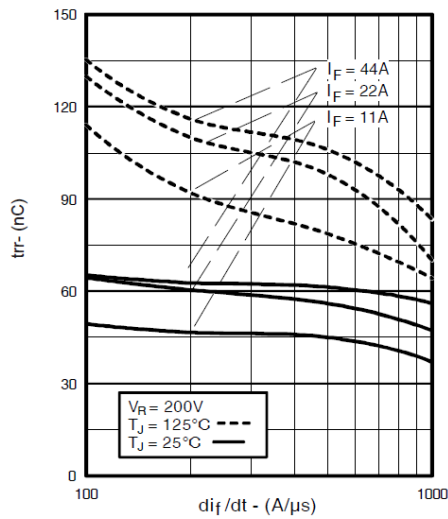
**Fig. 2** Typical Values of Reverse Current Vs. Reverse Voltage



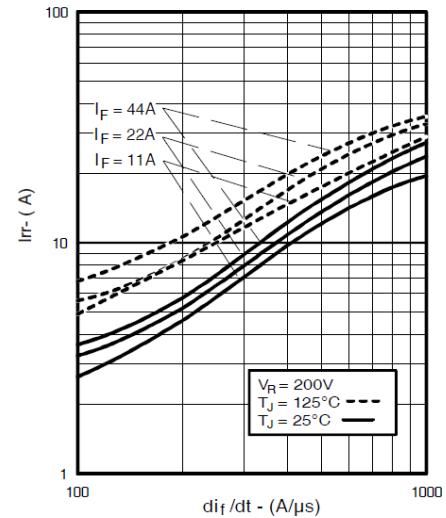
**Fig. 3** Typical Junction Capacitance Vs. Reverse Voltage



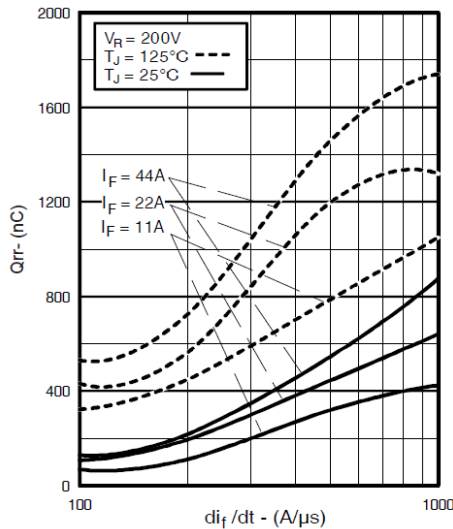
**Fig. 4** Maximum Thermal Impedance  $Z_{thJC}$  Characteristics



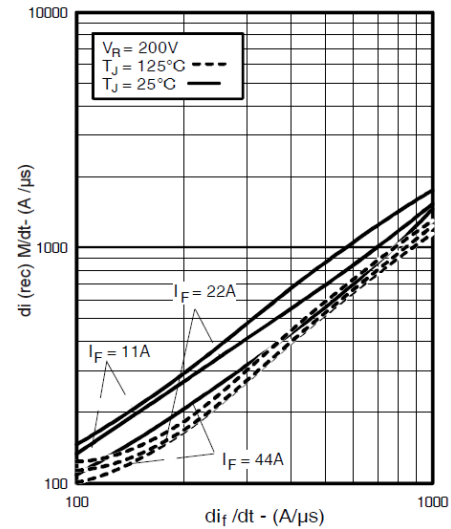
**Fig. 5** Typical Reverse Recovery Vs  $di_f/dt$



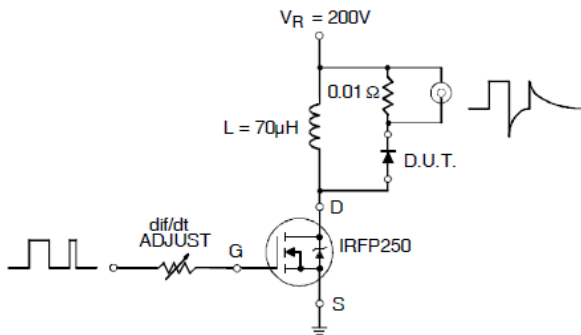
**Fig. 6** Typical Recovery Current Vs  $di_f/dt$



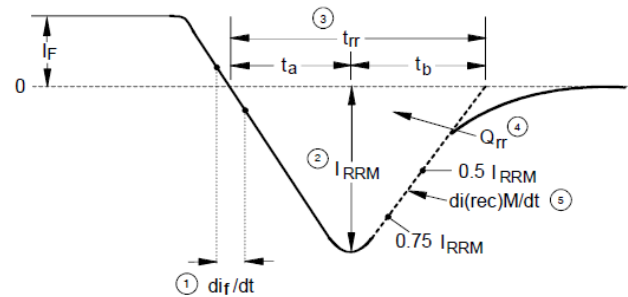
**Fig. 7** Typical Stored Charge Vs  $di_f/dt$



**Fig. 8** Typical  $di_{(rec)M}/dt$  Vs  $di_f/dt$



**Fig. 9** Typical Reverse Recovery Parameter Test Cir-

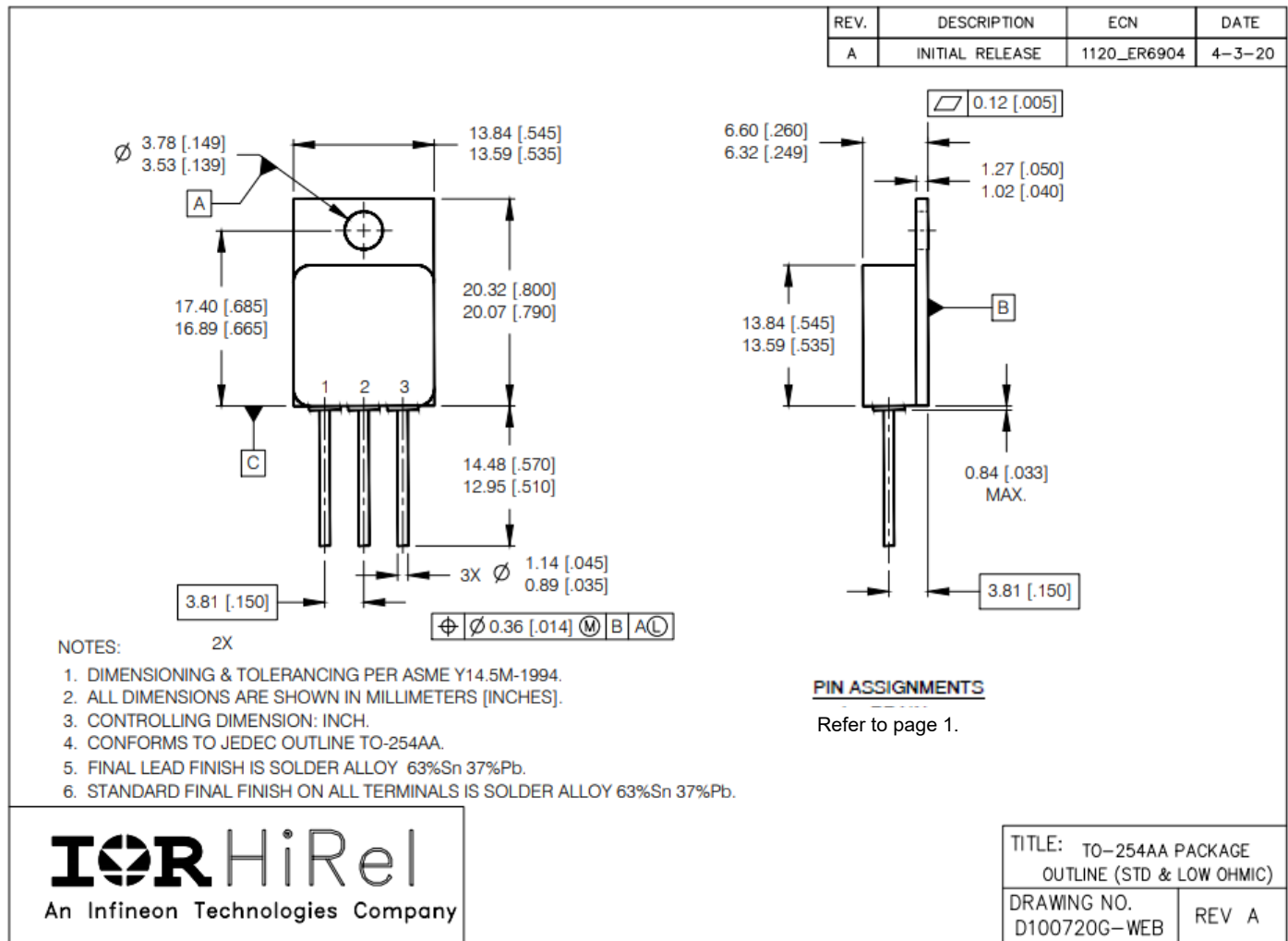


- ①  $di_f/dt$  - Rate of change of current through zero crossing.
- ②  $I_{RRM}$  - Peak reverse recovery current.
- ③  $t_{rr}$  - Reverse recovery time measured from zero crossing point of negative going  $I_F$  to point where a line passing through  $0.75I_{RRM}$  and  $0.5I_{RRM}$  extrapolated to zero current.
- ④  $Q_{rr}$  - Area under curve defined by  $t_{rr}$  and  $I_{RRM}$  -  $Q_{rr} = (t_{rr} \times I_{RRM}) / 2$
- ⑤  $di_{(rec)M}/dt$  - Peak rate of change of current during  $t_b$  position of  $t_{rr}$ .

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

Note: For the most updated package outline, please see the website: [TO-254AA](http://TO-254AA)

## Case Outline and Dimensions - Low-Ohmic 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.

### **IMPORTANT NOTICE**

The information given in this document shall be in no event regarded as guarantee of conditions or characteristic. The data contained herein is a characterization of the component based on internal standards and is intended to demonstrate and provide guidance for typical part performance. It will require further evaluation, qualification and analysis to determine suitability in the application environment to confirm compliance to your system requirements.

With respect to any example 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 on non-infringement of intellectual property rights and 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 product 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 any customer's technical departments to evaluate the suitability of the product for the intended applications and the completeness of the product information given in this document with respect to applications.

For further information on the product, technology, delivery terms and conditions and prices, please contact your local sales representative or go to ([www.infineon.com/irhirel](http://www.infineon.com/irhirel)).

### **WARNING**

Due to technical requirements products may contain dangerous substances. For information on the types in question, please contact your nearest Infineon Technologies office.