

HFA40HF120C

PD-91797D

Ultrafast, Soft Recovery Diode Surface Mount (SMD-1) 1200V, 15A

Features

- Reduced RFI and EMI
- Reduced snubbing
- Extensive characterization of recovery parameters
- Hermetic package
- Surface mount

Product Summary

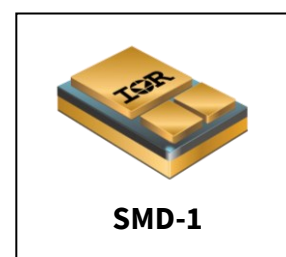
- V_R : 1200V
- V_F : 4.4V
- t_{rr} : 100ns
- Q_{rr} : 370nC
- $di_{(rec)M}/dt$: 380A/ μ s

Potential Applications

- DC-DC converter
- Motor drives

Product Validation

Qualified according to MIL-PRF-19500 for space applications



Description

HFA40HF120C is part of the IR HiRel family of products. 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, 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
HFA40HF120C	SMD-1	COTS
HFA40HF120SCV	SMD-1	JANTXV-equivalent

HFA40HF120C

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 Characteristics	4
2.2 Dynamic Recovery Characteristics	4
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	1200	V
$I_{F(AV)}$	Continuous forward current, $T_C = 100^\circ\text{C}$ ¹	15	A
I_{FSM}	Single pulse forward current, $T_C = 25^\circ\text{C}$ ²	50	A
$P_D @ T_C = 25^\circ\text{C}$	Maximum power dissipation	63	W
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
Wt	Weight	2.6 (Typical)	g

¹ DC = 50% rectangle wave

² 1/2 sine wave, 60 Hz, Pulse width = 8.33 ms

Device Characteristics

2 Device Characteristics

2.1 Electrical Characteristics

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	1200	—	—	V	$I_R = 250\mu\text{A}$
V_F	Max Forward Voltage Drop See Fig. 1	—	—	3.9	V	$I_F = 7.0\text{A}$, $T_J = -55^\circ\text{C}$
		—	—	3.3	V	$I_F = 7.0\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	4.4	V	$I_F = 15\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	2.8	V	$I_F = 7.0\text{A}$, $T_J = 125^\circ\text{C}$
I_R	Max Reverse Leakage Current See Fig. 2	—	—	10	μA	$V_R = V_R$ Rated
		—	—	1.0	mA	$V_R = 960\text{V}$, $T_J = 125^\circ\text{C}$
C_J	Junction Capacitance See Fig. 3	—	15	20	pF	$V_R = 200\text{V}$
L_S	Series Inductance	—	2.8	—	nH	Measured from center of cathode pad to center of anode pad

2.2 Dynamic Recovery Characteristics

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
t_{rr1}	Reverse Recovery Time See Fig. 5	—	58	100	ns	$T_J = 25^\circ\text{C}$
t_{rr2}		—	110	165		$T_J = 125^\circ\text{C}$
I_{RRM1}	Peak Recovery Current See Fig. 6	—	5.4	8.1	A	$T_J = 25^\circ\text{C}$
I_{RRM2}		—	7.2	10.8		$T_J = 125^\circ\text{C}$
Q_{rr1}	Reverse Recovery Charge See Fig. 7	—	185	370	nC	$T_J = 25^\circ\text{C}$
Q_{rr2}		—	395	590		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During t_b See Fig. 8	—	255	380	A/ μs	$T_J = 25^\circ\text{C}$
$di_{(rec)M}/dt_2$		—	160	240		$T_J = 125^\circ\text{C}$

2.3 Thermal-Mechanical Characteristics

Table 5 Thermal-Mechanical Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Junction to Case, Single Leg Conducting	—	2.0	$^\circ\text{C}/\text{W}$

Electrical Characteristics Curves

3 Electrical Characteristics Curves

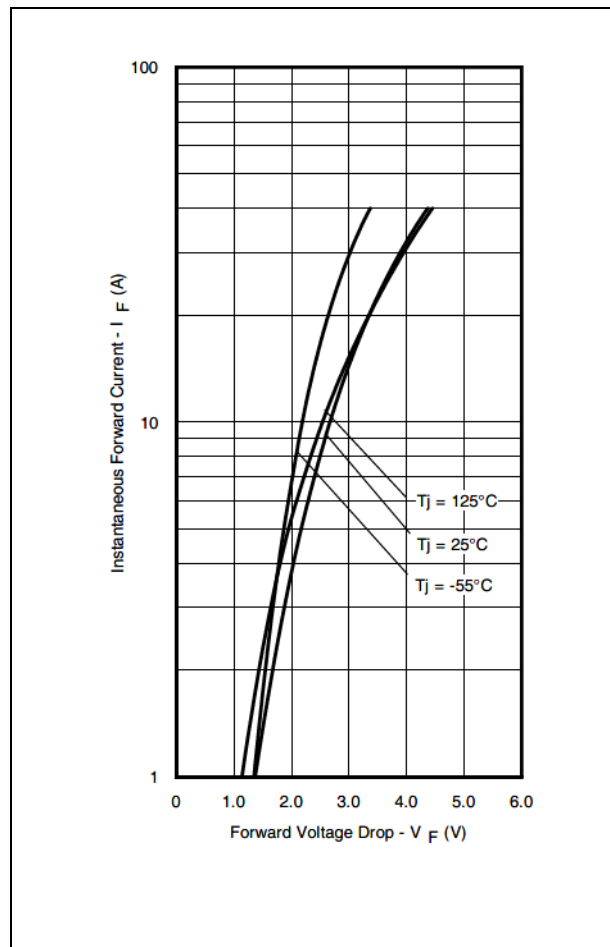


Figure 1 Typical Forward Voltage Drop Vs. Instantaneous Forward Current (Per Leg)

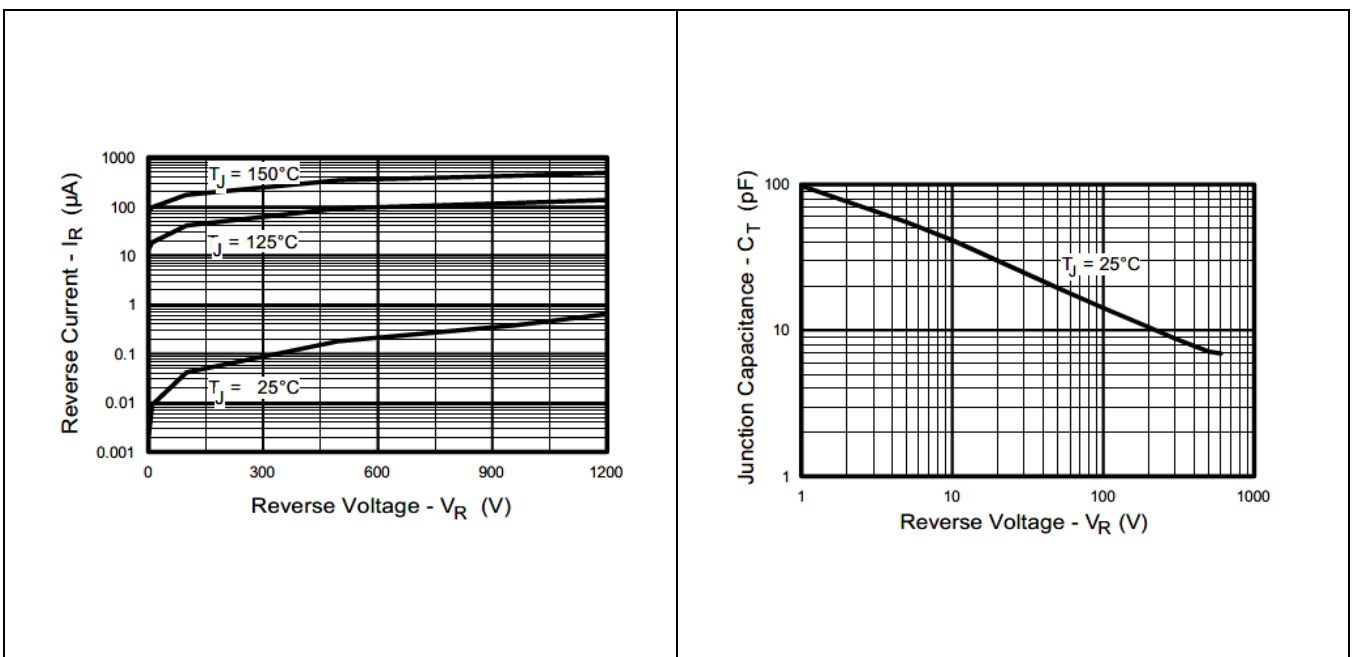


Figure 2 Typical Values of Reverse Current Vs. Reverse Voltage (Per Leg)

Figure 3 Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

HFA40HF120C

FRED Ultrafast, Soft Recovery Diode

Electrical Characteristics Curves

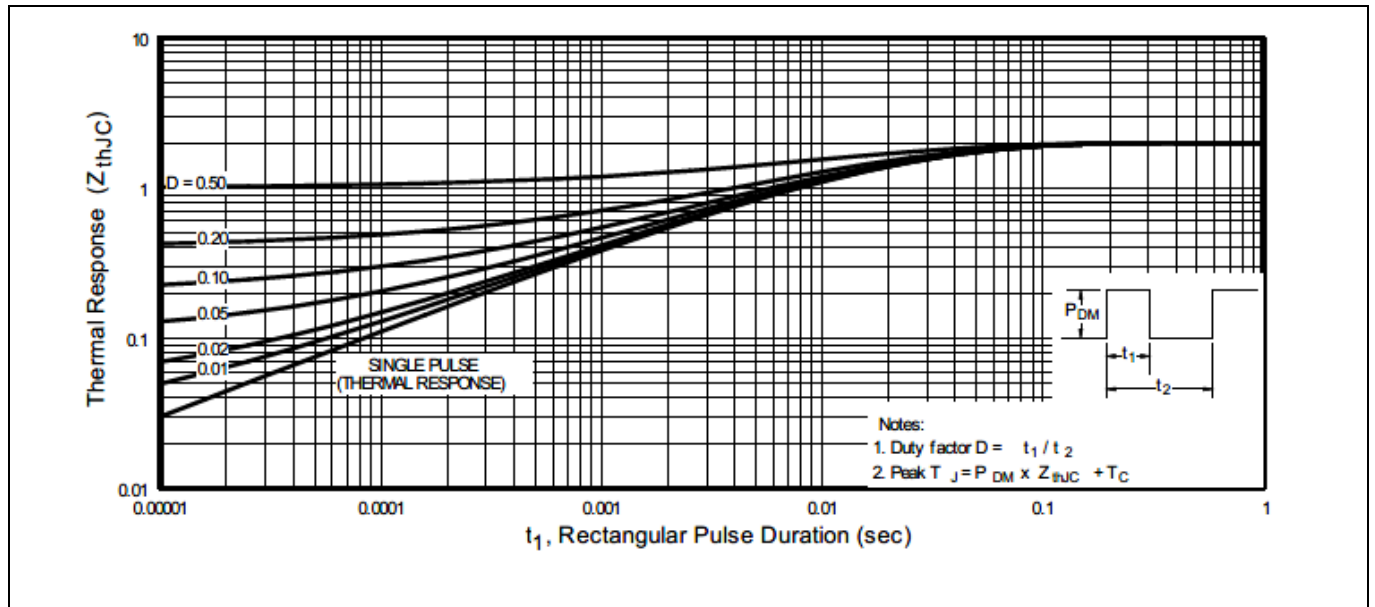


Figure 4 Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

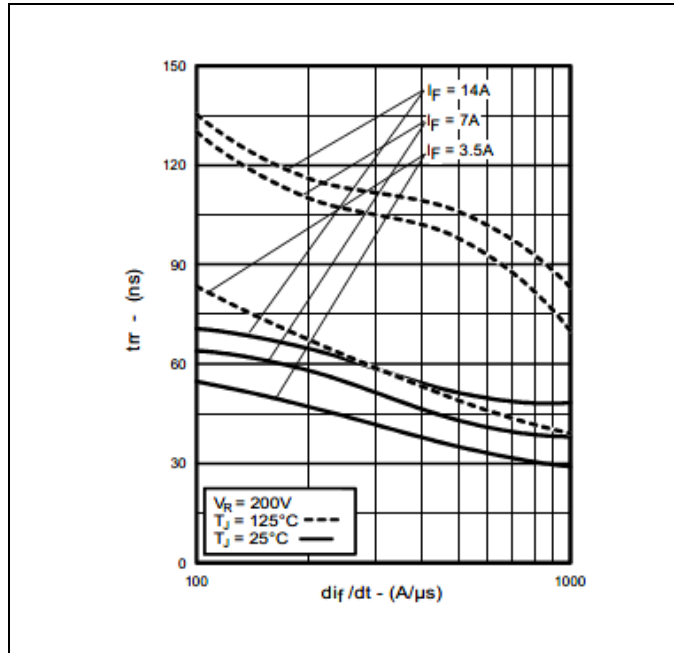


Figure 5 Typical Reverse Recovery Vs. di_i/dt (Per Leg)

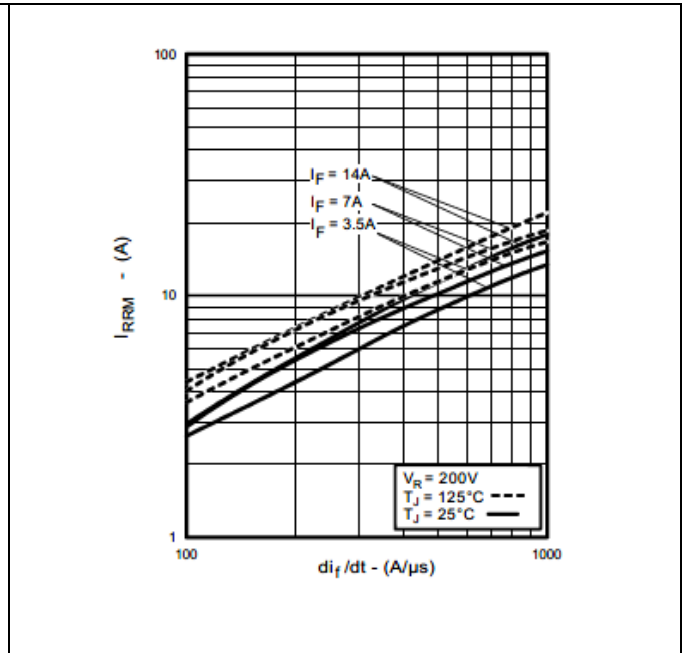


Figure 6 Typical Recovery Current Vs. di_i/dt (Per Leg)

HFA40HF120C

FRED Ultrafast, Soft Recovery Diode

Electrical Characteristics Curves

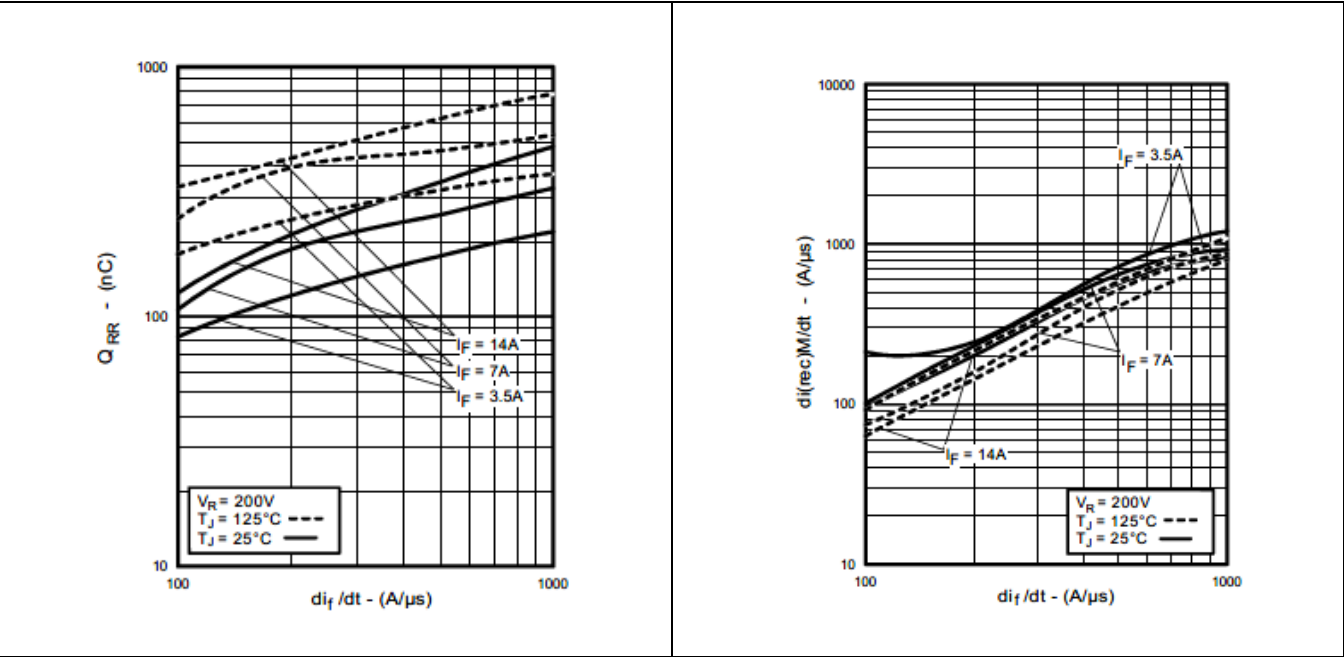


Figure 7 Typical Stored Charge Vs. di_f/dt
(Per Leg)

Figure 8 Typical $di_{(rec)M}/dt$ Vs. di_f/dt (Per Leg)

HFA40HF120C

FRED Ultrafast, Soft Recovery Diode

Test Circuit

4 Test Circuit

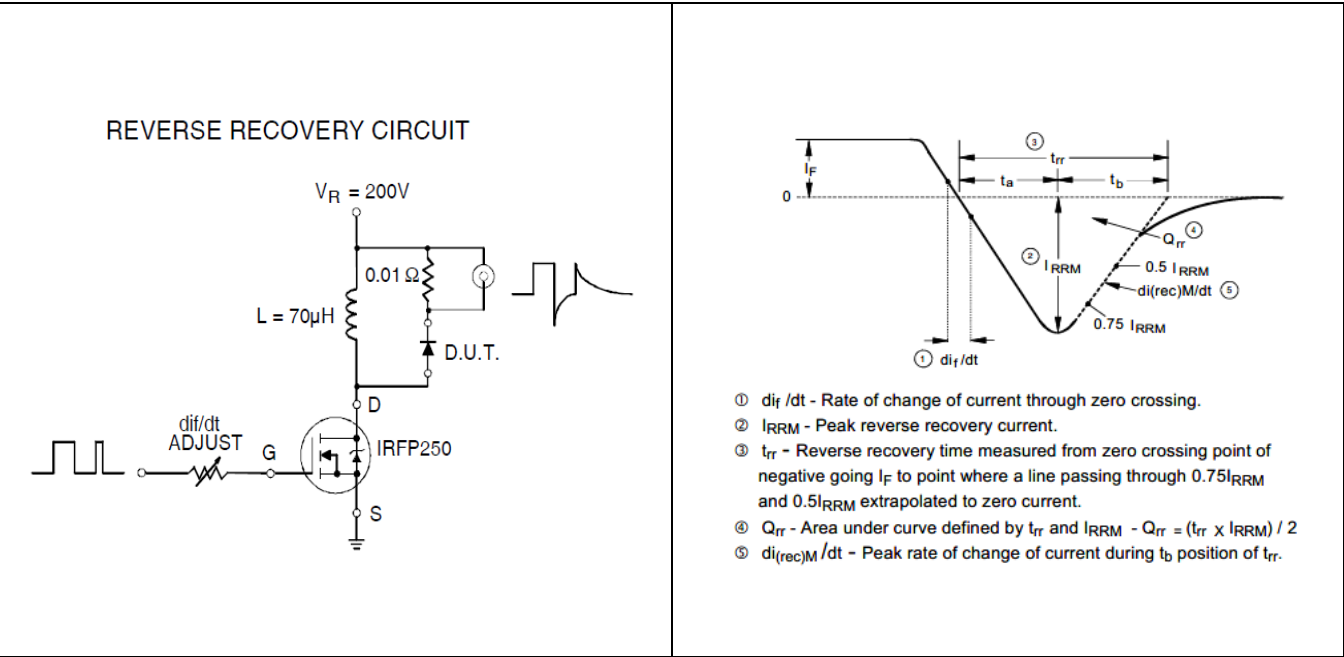


Figure 9 Reverse Recovery Parameter Test Circuit

Figure 10 Reverse Recovery Waveform and Definitions

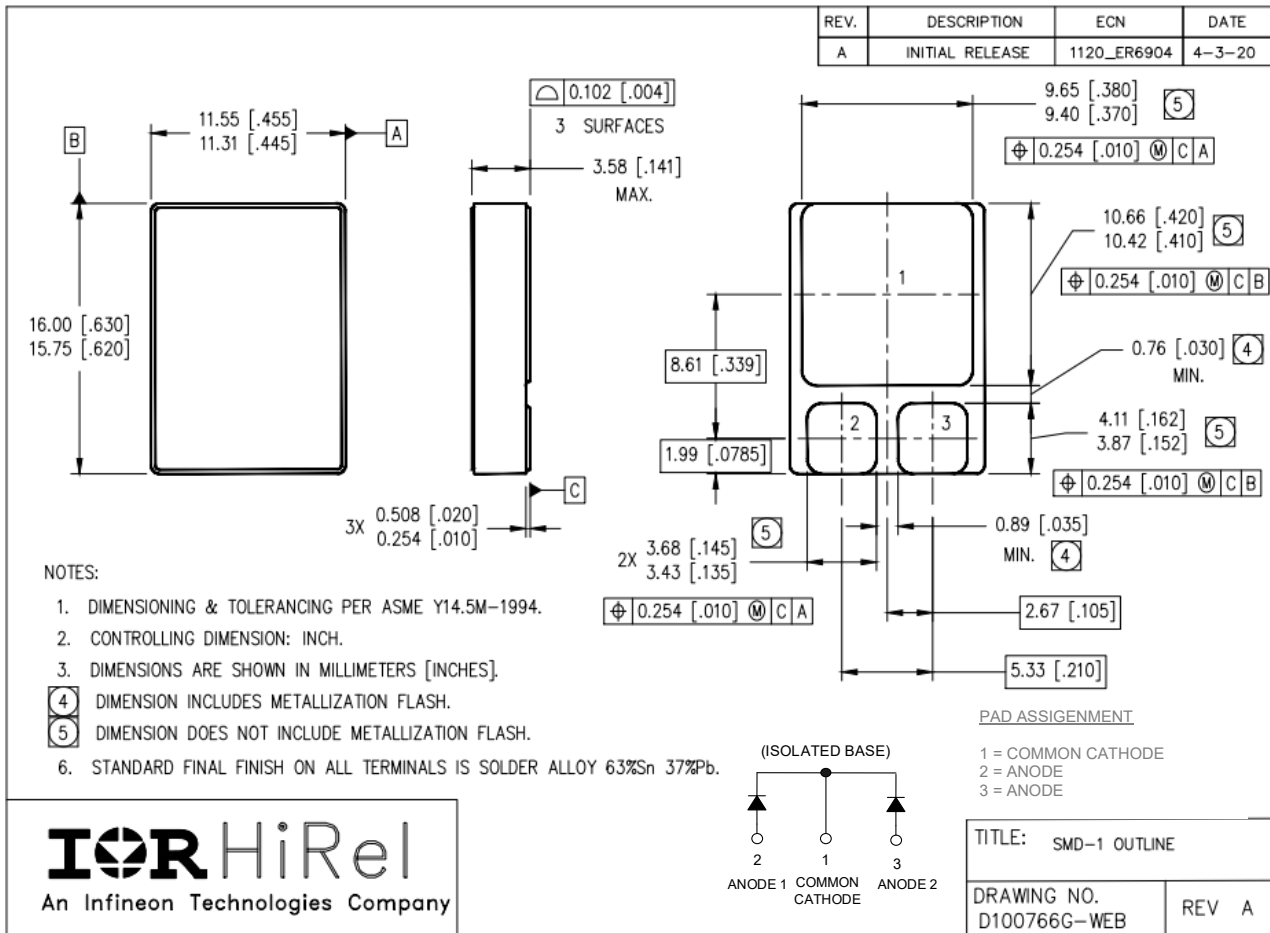
HFA40HF120C

FRED Ultrafast, Soft Recovery Diode

Package Outline

5 Package Outline

Note: For the most updated package outline, please see the website: [SMD-1](#)



HFA40HF120C
FRED Ultrafast, Soft Recovery Diode

Revision history

Revision history

Document version	Date of release	Description of changes
	04/30/1998	Final datasheet (PD-91797)
Rev A	12/14/2015	Updated per ECN-1120-03627
Rev B	09/21/2016	Updated per ECN-1120-04688
Rev C	10/13/2017	Updated per ECN-1120-05515
Rev D	05/31/2024	Updated per ECN-1120-09961

Trademarks

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

Edition 2024-05-31

Published by

**International Rectifier HiRel Products,
Inc.**

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

**© 2024 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.

IR 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.

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.