HFB50HC20C

PD-94238C

Ultrafast, Soft Recovery Diode
Thru-Hole (TO-258AA)
200V, 50A

Features

- Dual common cathode configuration
- Reduced RFI and EMI
- Reduced snubbing
- Extensive characterization of recovery parameters
- Hermetic package
- ESD Rating: Class 3B per MIL-STD-750, Method 1020

Product Summary

- **V_R (per leg):** 200V
- **V_F:** 1.49V
- **t_{rr} :** 50ns
- **$di_{(rec)M}/dt$:** 530A/µs

Potential Applications

- DC-DC converter
- Motor drives

TO-258AA

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
HFB50HC20C	TO-258AA	COTS
HFB50HC20CCSCV	TO-258AA	JANTXV-equivalent
HFB50HC20CSCS	TO-258AA	S-level

Table of contents

1 Absolute Maximum Ratings

Table 2 Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_R	Cathode to anode voltage (per leg)	200	V
$I_{F(AV)}$	Continuous forward current, T_C = 107°C [1]	50	A
I_{FSM}	Single pulse forward current, T_C = 25°C (per leg) [2]	300	A
P_D @ T_C = 25°C	Maximum power dissipation	130	W
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C
Wt	Weight	10.9 (Typical)	g

[1] DC = 50% rect. wave

[2] ½ sine wave, 60 Hz, Pulse width = 8.33 ms

2 Device Characteristics

2.1 Electrical Characteristics

Table 3 Electrical Characteristics (Per Leg) @ T_J =25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	200	—	—	V	I_R = 100µA
V_F	Forward Voltage Drop (Per Leg) See Fig. 1	—	—	1.36	V	I_F = 25A, T_J = -55°C
		—	—	1.20	V	I_F = 25A, T_J = 25°C
		—	—	1.49	V	I_F = 50A, T_J = 25°C
		—	—	0.99	V	I_F = 25A, T_J = 125°C
I_R	Reverse Leakage Current (Per Leg) See Fig. 2	—	—	10	µA	V_R = V_R Rated
		—	—	1	mA	V_R = V_R Rated, T_J = 125°C
C_J	Junction Capacitance (Per Leg) See Fig. 3	—	—	65	pF	V_R = 200V
L_S	Series Inductance (Per Leg)	—	8.7	—	nH	Measured from anode lead to cathode lead, 6mm (0.025 in) from package

2.2 Dynamic Recovery Characteristics

Table 4 Dynamic Recovery Characteristics (Per Leg) @ T_J =25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	
t_{rr1}	Reverse Recovery Time (Per Leg) See Fig. 5	—	46	50	ns	T_J = 25°C	I_F = 50A
t_{rr2}		—	84	—		T_J = 125°C	
I_{RRM1}	Peak Recovery Current (Per Leg) See Fig. 6	—	5.7	—	A	T_J = 25°C	V_R = 160V
I_{RRM2}		—	12.5	—		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge (Per Leg) See Fig. 7	—	150	—	nC	T_J = 25°C	di_f/dt = 200 A/ µs
Q_{rr2}		—	595	—		T_J = 125°C	
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During t_b (Per Leg) See Fig. 8	—	530	—	A/ µs	T_J = 25°C	
$di_{(rec)M}/dt_2$		—	1130	—		T_J = 125°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	—	0.96	°C/W

3 Electrical Characteristics Curves

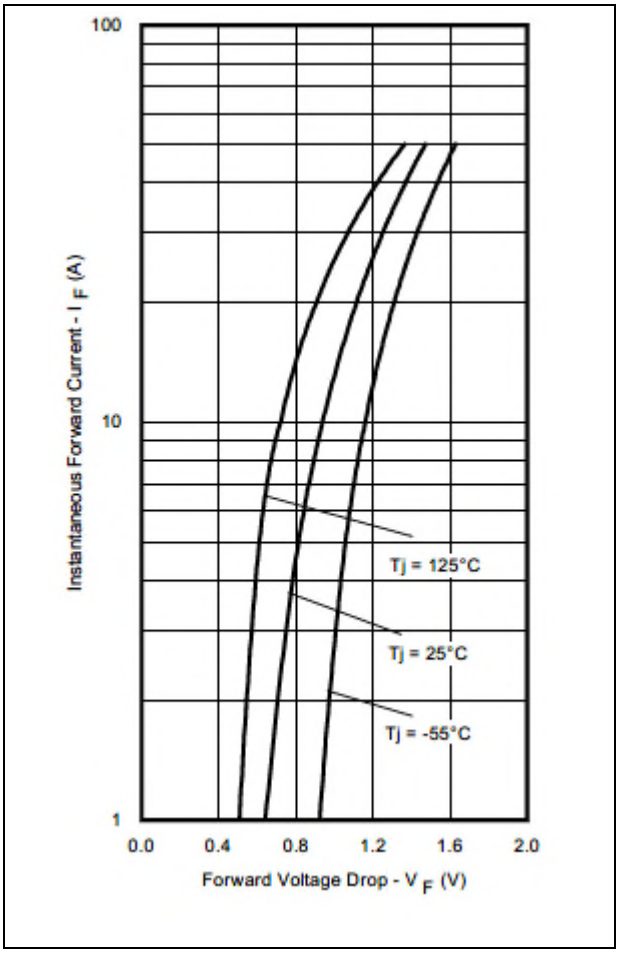


Figure 1 Maximum Forward Voltage Drop Characteristics (Per Leg)

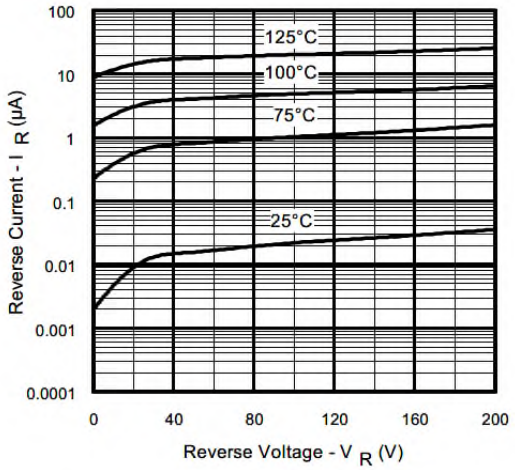


Figure 2 Typical Values of Reverse Current Vs. Reverse Voltage (Per Leg)

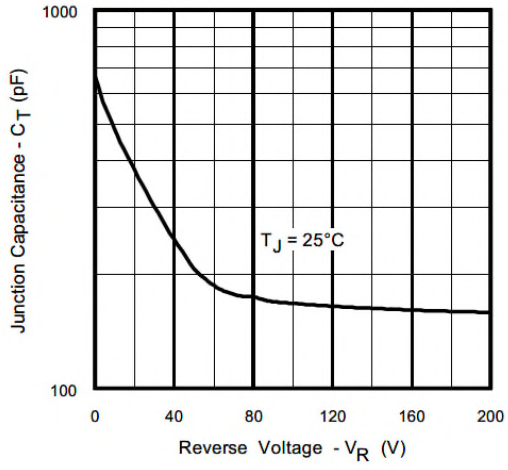


Figure 3 Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

Electrical Characteristics Curves

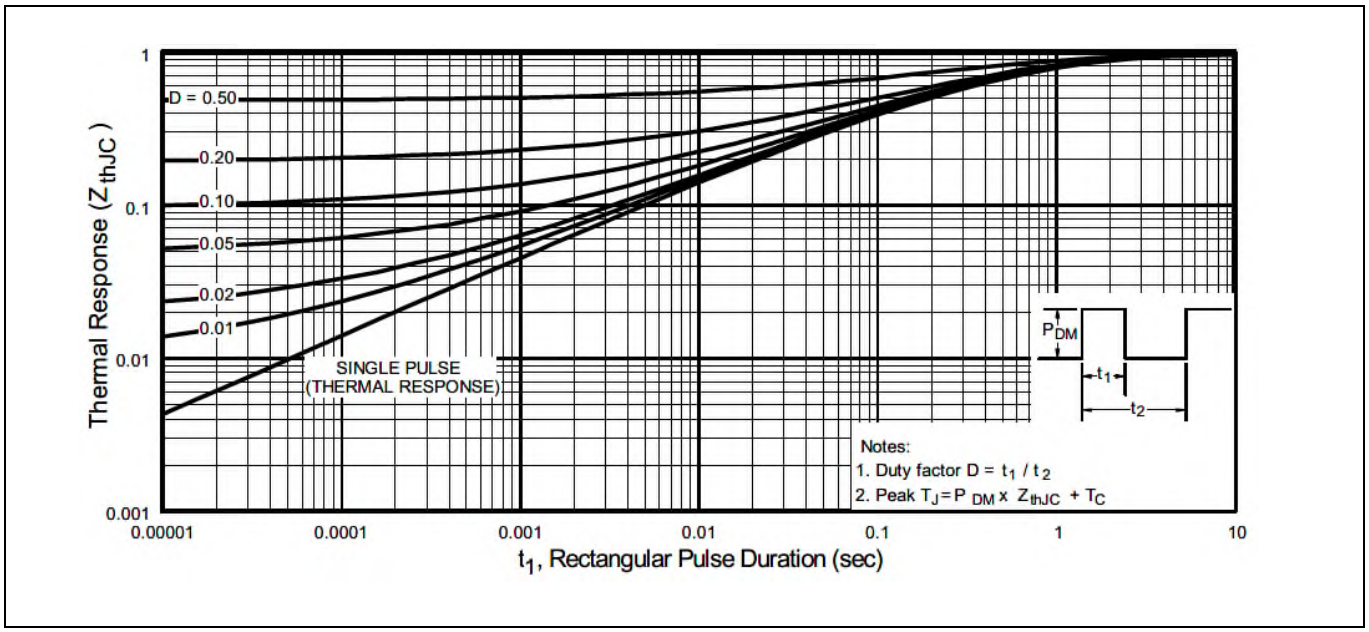


Figure 4 Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

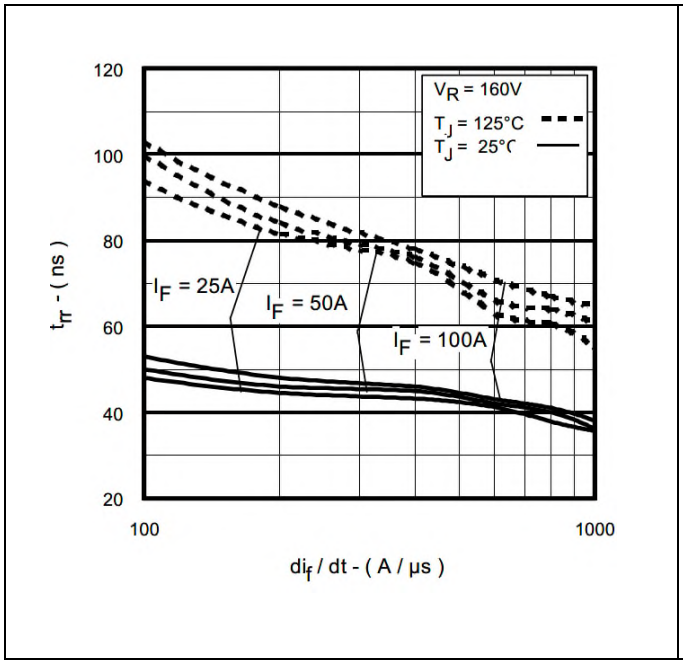


Figure 5 Typical Reverse Recovery Vs. di_f/dt (Per Leg)

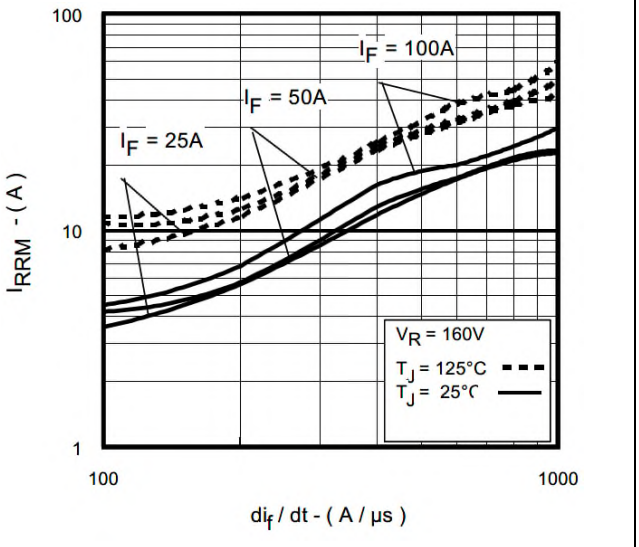


Figure 6 Typical Recovery Current Vs. di_f/dt (Per Leg)

Electrical Characteristics Curves

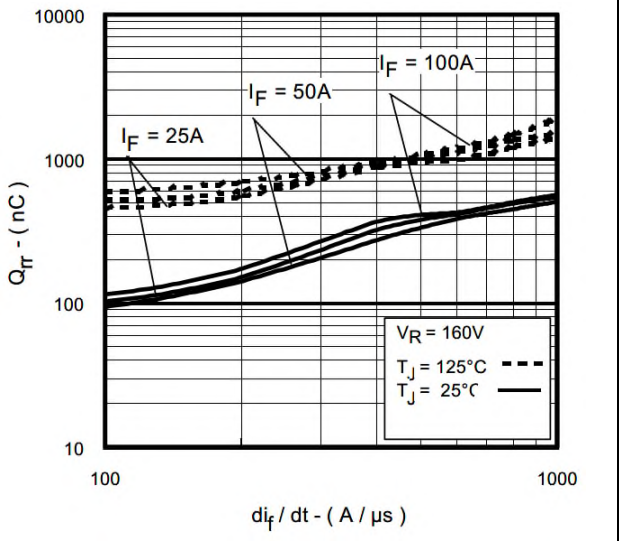


Figure 7 Typical Stored Charge Vs. di_f/dt (Per Leg)

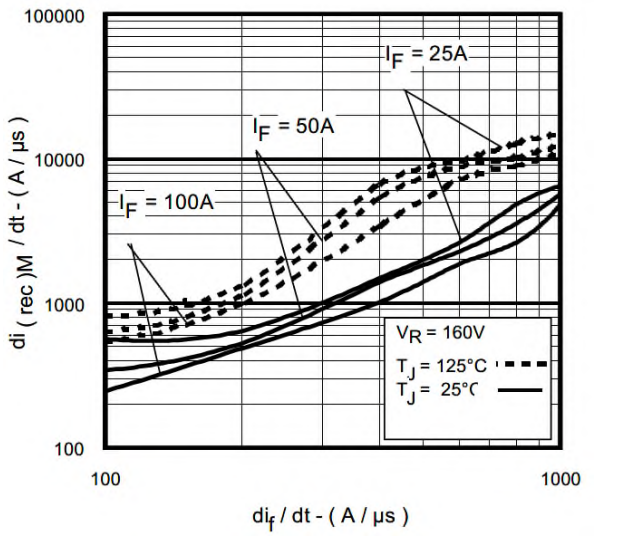


Figure 8 Typical $di_{(rec)M}/dt$ Vs. di_f/dt (Per Leg)

4 Test Circuit

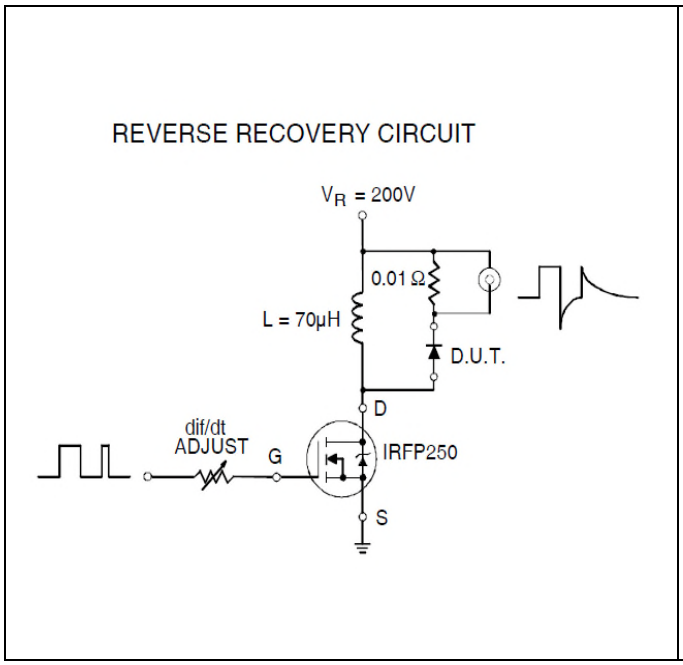


Figure 9 Reverse Recovery Parameter Test Circuit

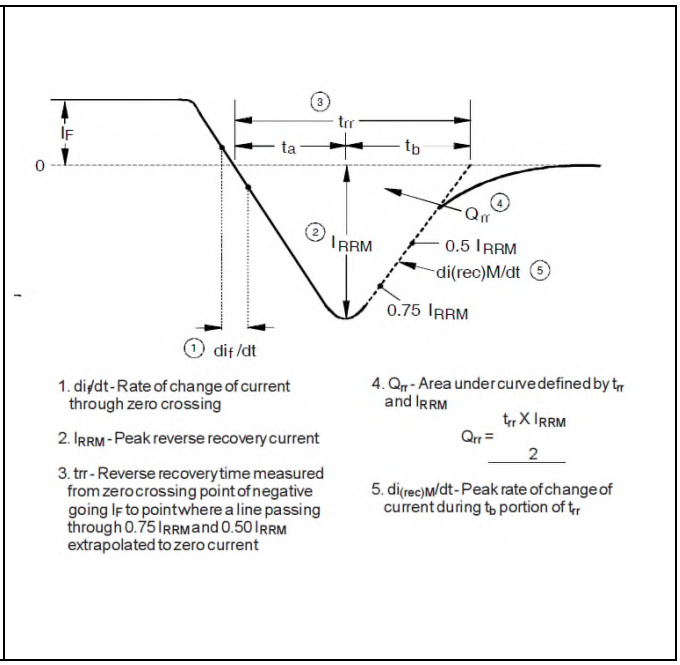
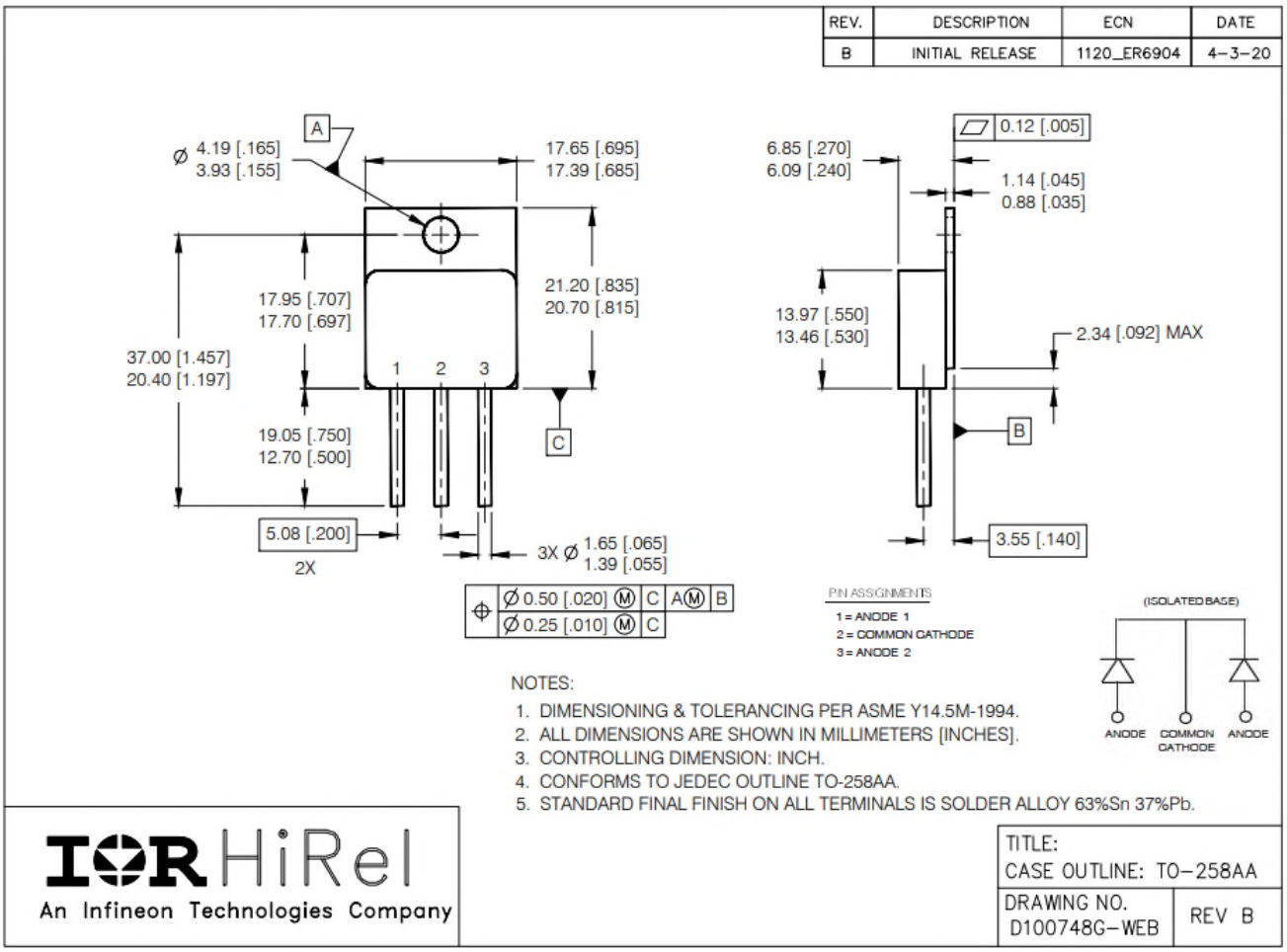


Figure 10 Reverse Recovery Waveform and Definitions

5 Package Outline

Note: For the most updated package outline, please see the website: TO-258AA



Revision history

Document version	Date of release	Description of changes
	07/06/2001	Final datasheet (PD-94238)
Rev A	08/02/2001	Updated per DR2
Rev B	02/20/2006	Updated per ECN-13811
Rev C	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 2023-05-02

Published by

International Rectifier HiRel Products, Inc.

An Infineon Technologies company

El Segundo, California 90245 USA

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 ("Beschaffenheitsgarantie").

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.