International
IOR Rectifier

PD -2.513 rev. A 02/99

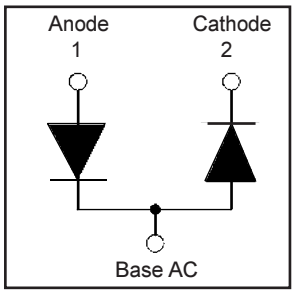
HFA320NJ40D

HEXFRED™

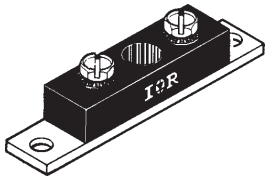
Ultrafast, Soft Recovery Diode

Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters



V_R = 400V
V_F(typ.)③ = 1V
$I_{F(AV)}$ = 320A
Q_{rr} (typ.) = 420nC
I_{RRM}(typ.) = 8.7A
t_{rr}(typ.) = 45ns
$di_{(rec)M}/dt$ (typ.)③ = 280A/µs



TO-244AB

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, motors drives and other applications where switching losses are significant portion of the total losses.

Absolute Maximum Ratings (per Leg)

	Parameter	Max.	Units
V_R	Cathode-to-Anode Voltage	400	V
I_F @ T_C = 25°C	Continuous Forward Current	321	A
I_F @ T_C = 100°C	Continuous Forward Current	160	
I_{FSM}	Single Pulse Forward Current ①	1200	
E_{AS}	Non-Repetitive Avalanche Energy ②	1.4	mJ
P_D @ T_C = 25°C	Maximum Power Dissipation	625	W
P_D @ T_C = 100°C	Maximum Power Dissipation	250	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	C

Thermal - Mechanical Characteristics

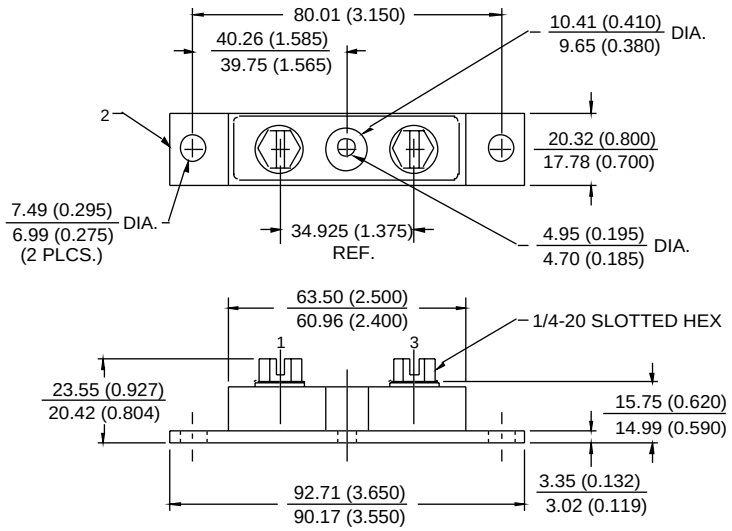
	Parameter	Min.	Typ.	Max.	Units
R_{thJC}	Junction-to-Case, Single Leg Conducting	——	——	0.24	°C/W K/W
	Junction-to-Case, Both Legs Conducting	——	——	0.12	
R_{thCS}	Case-to-Sink, Flat, Greased Surface	——	0.10	——	
Wt	Weight	——	79 (2.8)	——	g (oz)
	Mounting Torque ④	30 (3.4)	——	40 (4.6)	lbf•in (N•m)
	Mounting Torque Center Hole	12 (1.4)	——	18 (2.1)	
	Terminal Torque	30 (3.4)	——	40 (4.6)	
	Vertical Pull	——	——	80	lbf•in
	2 inch Lever Pull	——	——	35	

Note: ① Limited by junction temperature
② L = 100µH, duty cycle limited by max T_J
③ 125°C
④ Mounting surface must be smooth, flat, free or burrs or other protrusions. Apply a thin even film or thermal grease to mounting surface. Gradually tighten each mounting bolt in 5-10 lbf•in steps until desired or maximum torque limits are reached. Module

Electrical Characteristics (per Leg) @ T_J = 25°C (unless otherwise specified)

Parameter		Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	400	——	——	V	I_R = 100µA
V_{FM}	Max Forward Voltage	——	1.10	1.35	V	I_F = 160A
		——	1.30	1.55		I_F = 320A See Fig. 1
		——	1.00	1.20		I_F = 160A, T_J = 125°C
I_{RM}	Max Reverse Leakage Current	——	2.0	12	µA	V_R = V_R Rated See Fig. 2
		——	3.0	16	mA	T_J = 125°C, V_R = 320V
C_T	Junction Capacitance	——	370	500	pF	V_R = 200V See Fig. 3
L_S	Series Inductance	——	5.0	——	nH	From top of terminal hole to mounting plane

Parameter		Min.	Typ.	Max.	Units	Test Conditions
t_{rr}	Reverse Recovery Time	——	45	——	ns	I_F = 1.0A, di_f/dt = 200A/µs, V_R = 30V
t_{rr1}		——	90	140		T_J = 25°C See Fig. 5 I_F = 160A
t_{rr2}		——	290	440		T_J = 125°C
I_{RRM1}	Peak Recovery Current	——	8.7	20	A	T_J = 25°C See Fig. 6 V_R = 200V
I_{RRM2}		——	18	30		T_J = 125°C
Q_{rr1}	Reverse Recovery Charge	——	420	1100	nC	T_J = 25°C See Fig. 7 di_f/dt = 200A/µs
Q_{rr2}		——	2600	7000		T_J = 125°C
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	——	300	——	A/µs	T_J = 25°C See Fig. 8
$di_{(rec)M}/dt2$	During t_b	——	280	——		T_J = 125°C



LEAD ASSIGNMENTS
1 - ANODE
2 - CATHODE
3 - ANODE

CONFORMS TO JEDEC OUTLINE TO-244AB

Dimensions in Millimeters and (Inches)

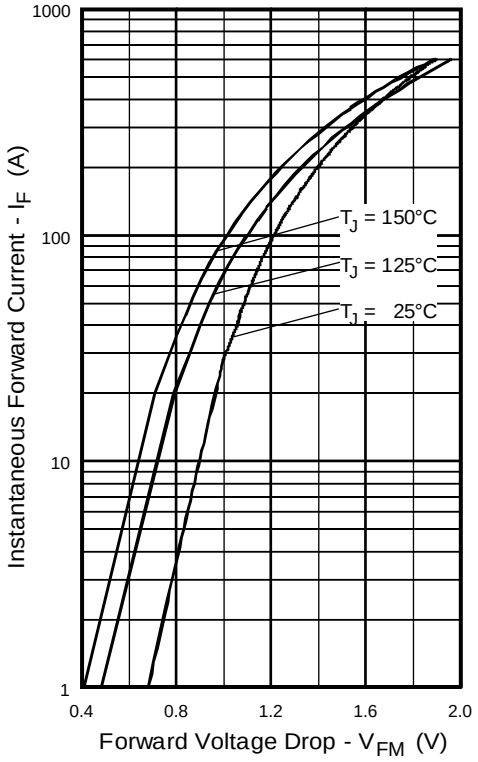


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

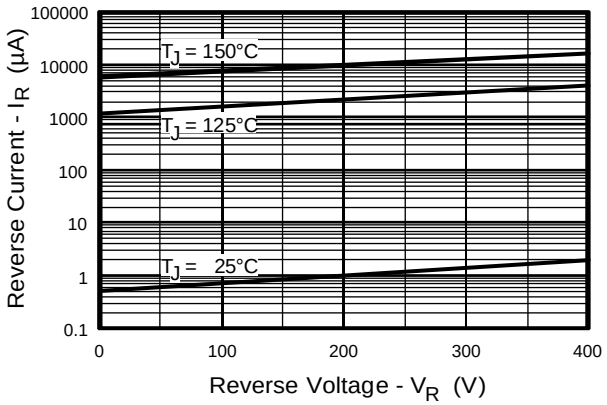


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

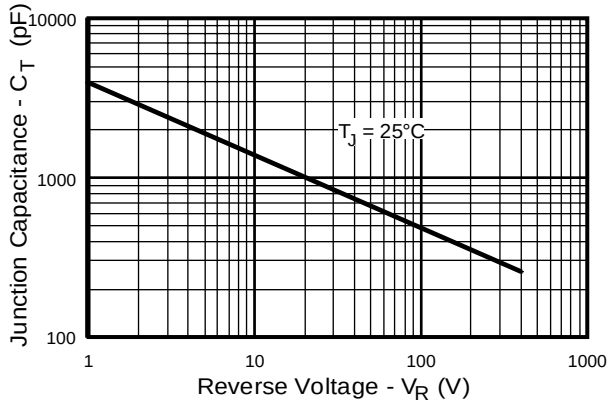


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

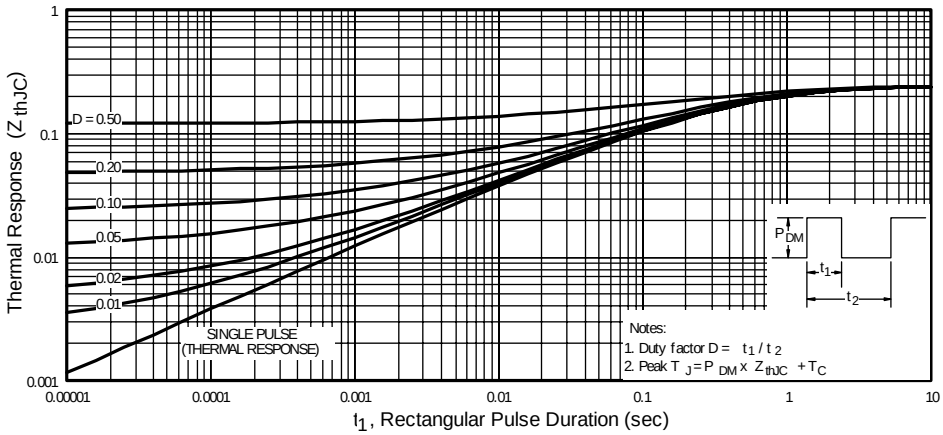


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics, (per Leg)

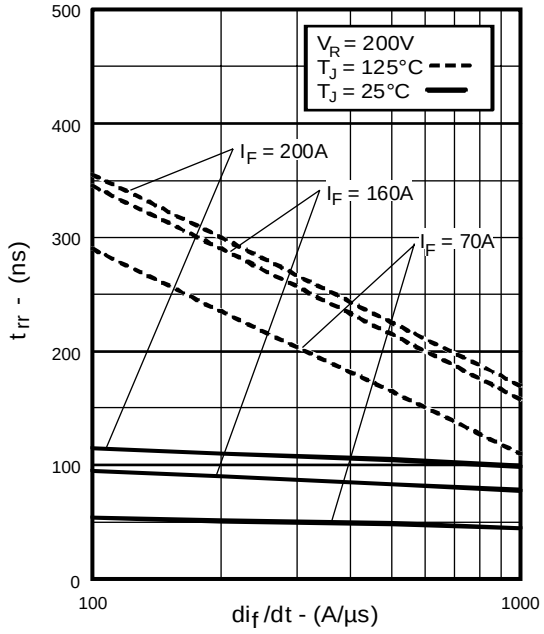


Fig. 5 - Typical Reverse Recovery vs. di_f/dt, (per Leg)

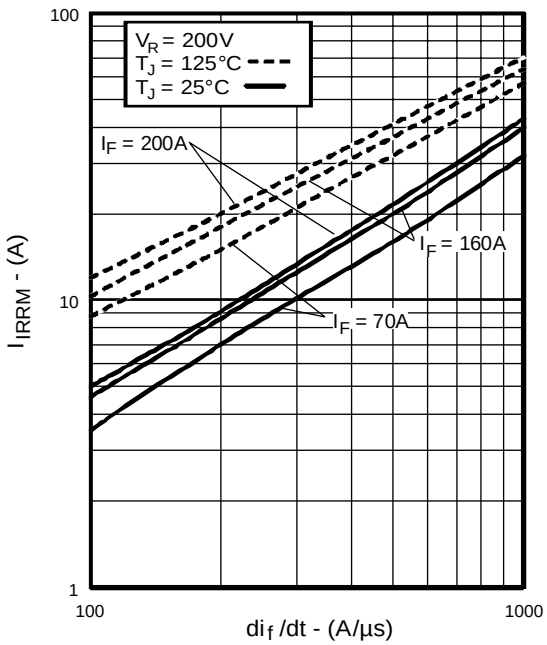


Fig. 6 - Typical Recovery Current vs. di_f/dt, (per Leg)

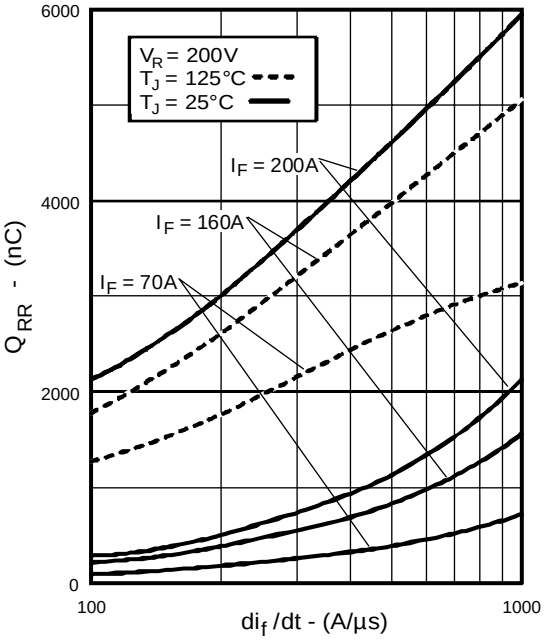


Fig. 7 - Typical Stored Charge vs. di_f/dt, (per Leg)

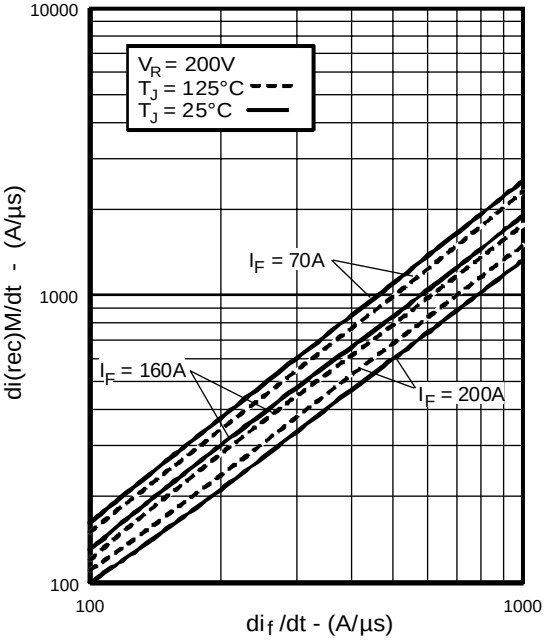


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt, (per Leg)

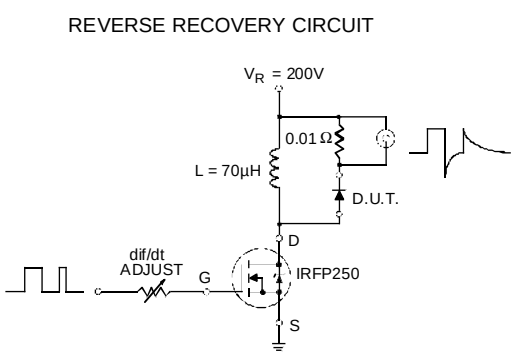


Fig. 9 - Reverse Recovery Parameter Test Circuit

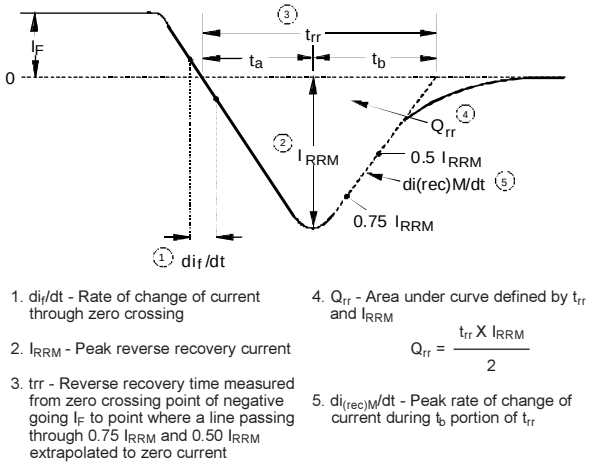


Fig. 10 - Reverse Recovery Waveform and Definitions

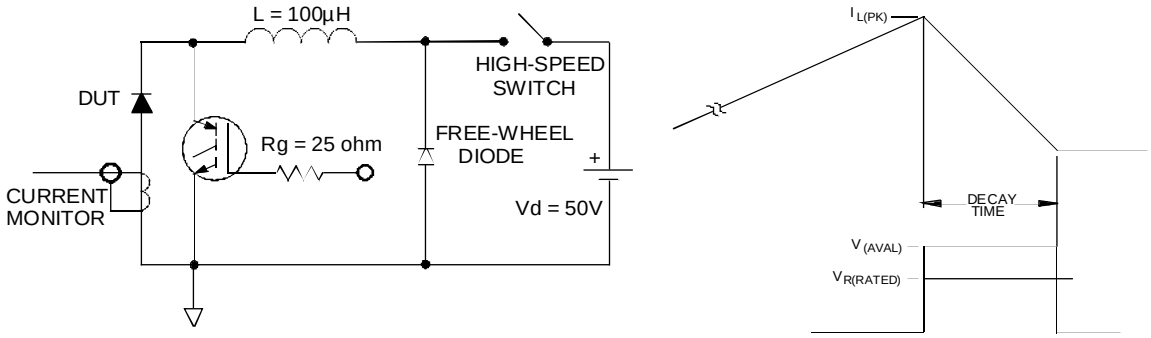


Fig. 11 - Avalanche Test Circuit and Waveforms

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