International
IOR Rectifier

PD -2.445 rev. B 02/99

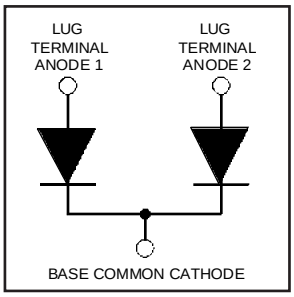
HFA280NJ60C

HEXFRED™

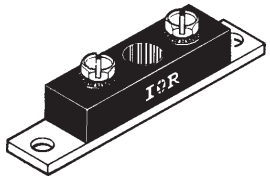
Ultrafast, Soft Recovery Diode

Features

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



V_R = 600V
V_F(typ.)③ = 1.3V
$I_{F(AV)}$ = 280A
Q_{rr} (typ.) = 490nC
I_{RRM}(typ.) = 9.3A
t_{rr}(typ.) = 39ns
$di_{(rec)M}/dt$ (typ.)③ = 200A/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	600	V
I_F @ T_C = 25°C	Continuous Forward Current	222	A
I_F @ T_C = 100°C	Continuous Forward Current	111	
I_{FSM}	Single Pulse Forward Current ①	800	
E_{AS}	Non-Repetitive Avalanche Energy ②	220	µJ
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	———	———	0.20	°C/W K/W
	Junction-to-Case, Both Legs Conducting	———	———	0.10	
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	

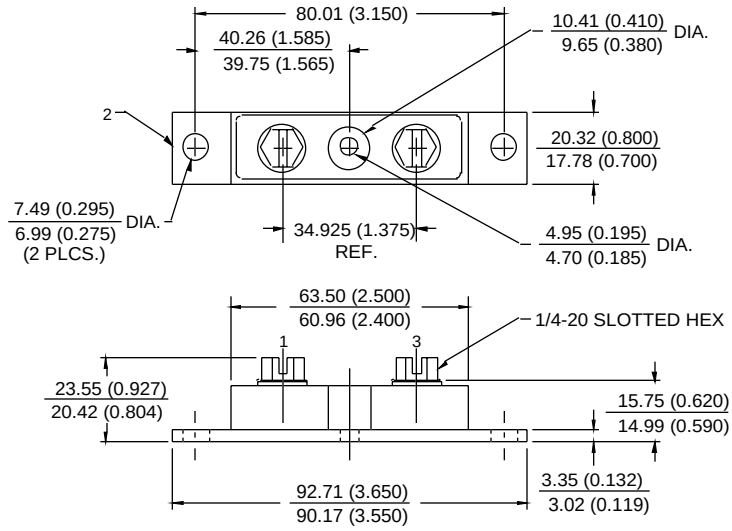
Note: ① Limited by junction temperature
② L = 100µH, duty cycle limited by max T_J
③ 125°C
④ Mounting surface must be smooth, flat, free or burrs or other protrusions. Apply a thin even film or thermal grease to mounting surface. Gradually tighten each mounting bolt in 5-10 lbf•in steps until desired 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	600	—	—	V	I_R = 100µA	
V_{FM}	Max Forward Voltage	—	1.4	1.6	V	I_F = 140A	See Fig. 1
		—	1.6	1.8		I_F = 280A	
		—	1.3	1.5		I_F = 140A, T_J = 125°C	
I_{RM}	Max Reverse Leakage Current	—	8.0	40	µA	V_R = V_R Rated	See Fig. 2
		—	2.0	8.0	mA	T_J = 125°C, V_R = 480V	
C_T	Junction Capacitance	—	280	400	pF	V_R = 200V	See Fig. 3
L_S	Series Inductance	—	5.0	—	nH	From top of terminal hole to mounting plane	

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

Parameter		Min.	Typ.	Max.	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	—	39	—	ns	I_F = 1.0A, di_f/dt = 200A/µs, V_R = 30V	
t_{rr1}		—	92	140		T_J = 25°C	I_F = 140A
t_{rr2}		—	180	270		T_J = 125°C	
I_{RRM1}	Peak Recovery Current	—	9.3	17	A	T_J = 25°C	V_R = 200V
I_{RRM2}		—	16	30		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge	—	490	1200	nC	T_J = 25°C	di_f/dt = 200A/µs
Q_{rr2}		—	1400	4000		T_J = 125°C	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	290	—	A/µs	T_J = 25°C	
$di_{(rec)M}/dt2$	During t_b	—	200	—		T_J = 125°C	



LEAD ASSIGNMENTS
1 - ANODE
2 - CATHODE
3 - ANODE

CONFORMS TO JEDEC OUTLINE TO-244AB
Dimensions in Millimeters and (Inches)

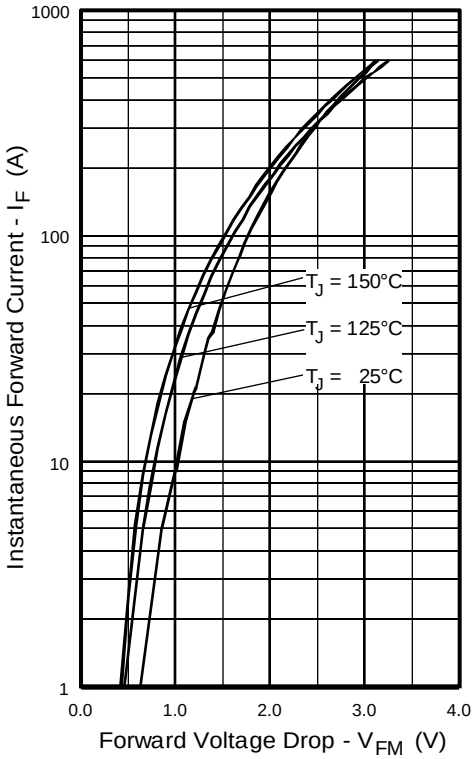


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

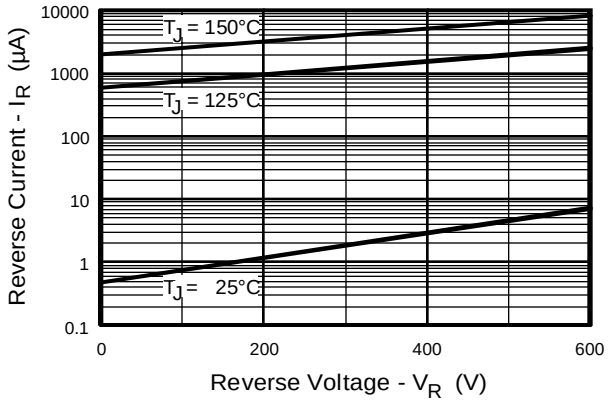


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

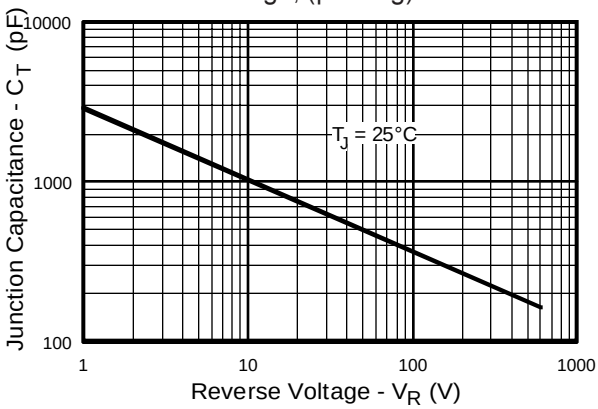


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

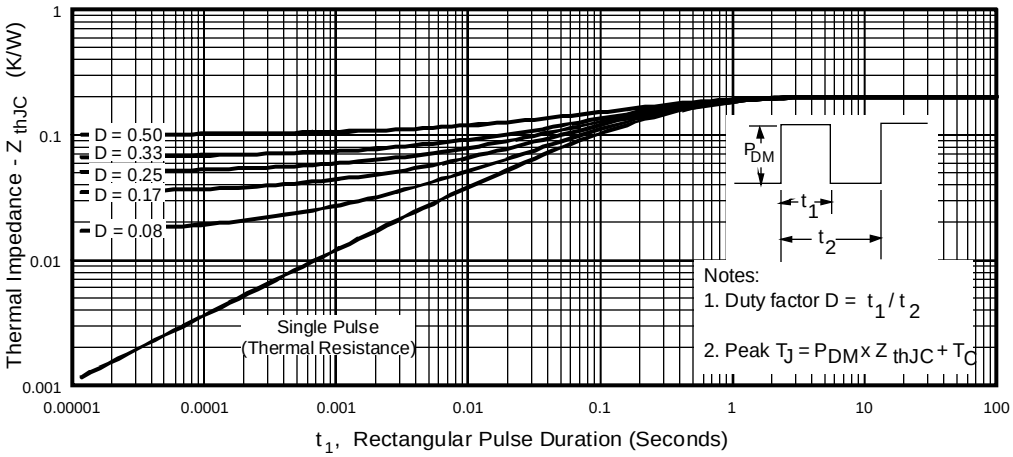


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics, (per Leg)

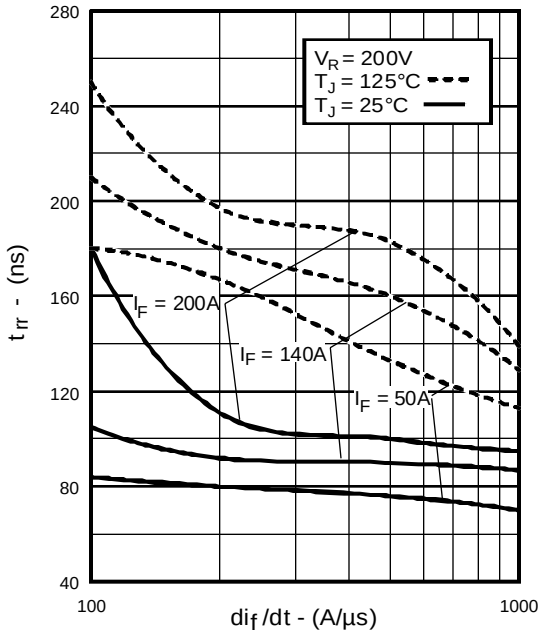


Fig. 5 - Typical Reverse Recovery vs. di_f/dt, (per Leg)

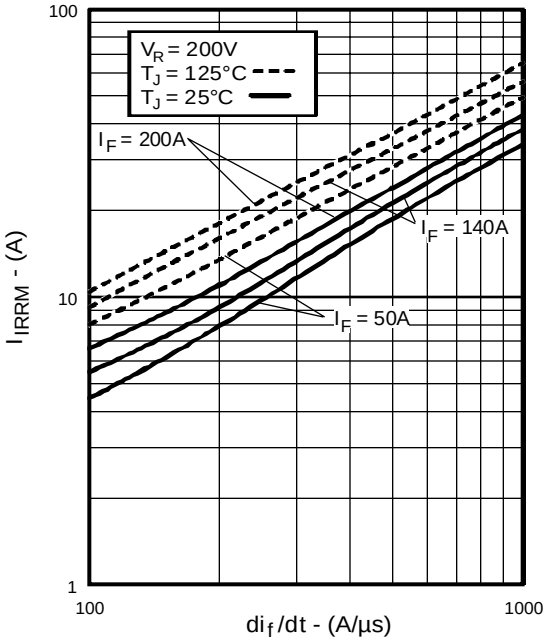


Fig. 6 - Typical Recovery Current vs. di_f/dt, (per Leg)

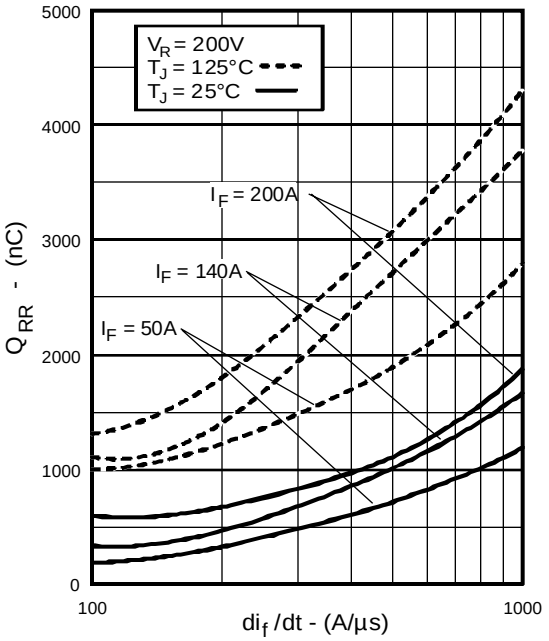


Fig. 7 - Typical Stored Charge vs. di_f/dt, (per Leg)

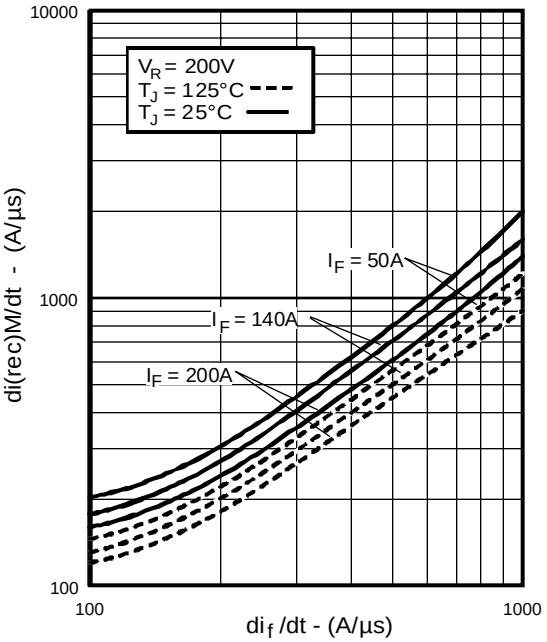


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt, (per Leg)

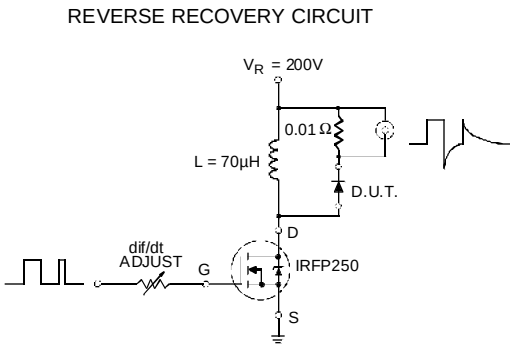


Fig. 9 - Reverse Recovery Parameter Test Circuit

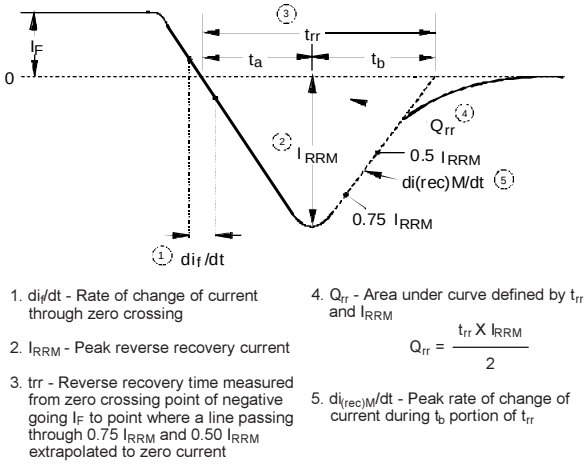


Fig. 10 - Reverse Recovery Waveform and Definitions

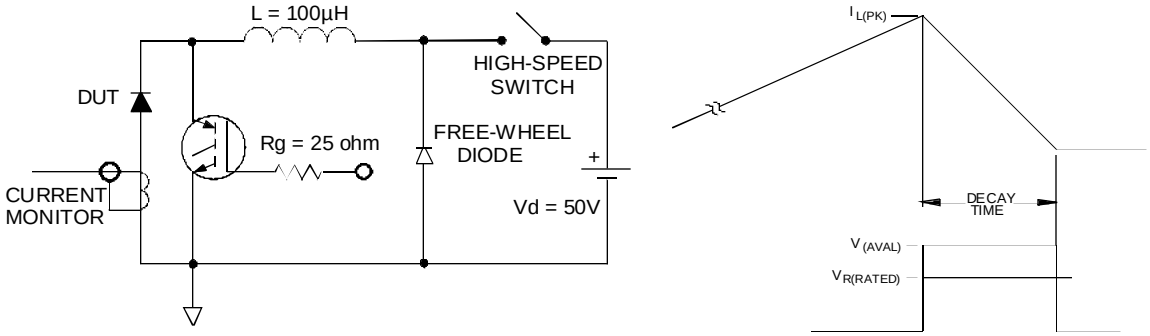


Fig. 11 - Avalanche Test Circuit and Waveforms

International
IOR Rectifier

WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 U.S.A. Tel: (310) 322 3331. Fax: (310) 322 3332.
EUROPEAN HEADQUARTERS: Hurst Green, Oxted, Surrey RH8 9BB, U.K. Tel: ++ 44 1883 732020. Fax: ++ 44 1883 733408.
IR CANADA: 15 Lincoln Court, Brampton, Markham, Ontario L6T3Z2. Tel: (905) 453 2200. Fax: (905) 475 8801.
IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg. Tel: ++ 49 6172 96590. Fax: ++ 49 6172 965933.
IR ITALY: Via Liguria 49, 10071 Borgaro, Torino. Tel: ++ 39 11 4510111. Fax: ++ 39 11 4510220.
IR FAR EAST: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo, Japan 171. Tel: 81 3 3983 0086.
IR SOUTHEAST ASIA: 1 Kim Seng Promenade, Great World City West Tower,13-11, Singapore 237994. Tel: ++ 65 838 4630.
IR TAIWAN: 16 Fl. Suite D.207, Sec. 2, Tun Haw South Road, Taipei, 10673, Taiwan. Tel: 886 2 2377 9936.