PD -2.470A

International
IOR Rectifier

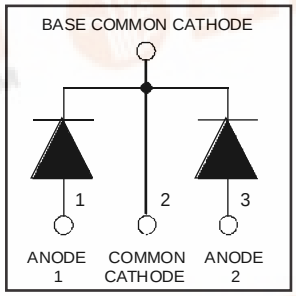
HFA80NK40C

HEXFRED™

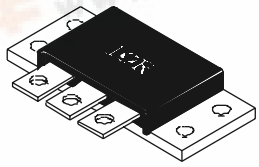
Ultrafast, Soft Recovery Diode

Features

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



V_R = 400V
V_F(typ.)③ = 1V
$I_{F(AV)}$ = 80A
Q_{rr} (typ.) = 200nC
I_{RRM}(typ.) = 6A
t_{rr}(typ.) = 30ns
$di_{(rec)M}/dt$ (typ.)③ = 190A/µs



TO-249AA (MODIFIED)

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	89	A
I_F @ T_C = 100°C	Continuous Forward Current	44	
I_{FSM}	Single Pulse Forward Current ①	300	
I_{AS}	Maximum Single Pulse Avalanche Current ②	5.0	
E_{AS}	Non-Repetitive Avalanche Energy ②	1.4	mJ
P_D @ T_C = 25°C	Maximum Power Dissipation	160	W
P_D @ T_C = 100°C	Maximum Power Dissipation	63	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C
	Soldering Temperature, for 10 sec.	300 (0.063 in. (1.6mm) from case)	

Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, Single Leg Conducting	-----	-----	0.80	°C/W K/W
	Junction-to-Case, Both Legs Conducting	-----	-----	0.40	
$R_{\theta CS}$	Case-to-Sink, Flat , Greased Surface	-----	0.10	-----	
Wt	Weight	-----	58 (2.0)	-----	g (oz)
	Mounting Torque	35 (4.0)	-----	50 (5.7)	lbf•in (N•m)

Note: ① Limited by junction temperature
② L = 100µH, duty cycle limited by max T_J
③ 125°C

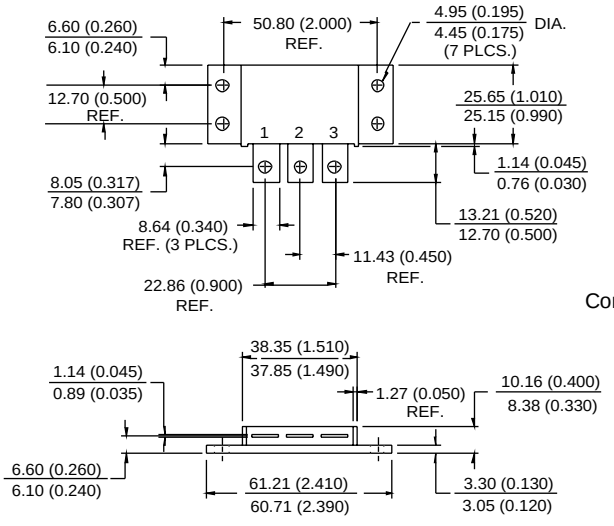
5/5/97

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	–––	1.1	1.3	V	I_F = 40A	See Fig. 1
		–––	1.3	1.5		I_F = 80A	
		–––	1.0	1.2		I_F = 40A, T_J = 125°C	
I_{RM}	Max Reverse Leakage Current	–––	0.50	3.0	µA	V_R = V_R Rated	See Fig. 2
		–––	0.75	4.0	mA	T_J = 125°C, V_R = 320V	
C_T	Junction Capacitance	–––	90	125	pF	V_R = 200V	See Fig. 3
L_S	Series Inductance	–––	8.0	–––	nH	From terminal hole to terminal hole	

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions		
t_{rr}	Reverse Recovery Time	–––	30	–––	ns	I_F = 1.0A, di_f/dt = 200A/µs, V_R = 30V		
t_{rr1}		–––	67	100		T_J = 25°C	See Fig.	I_F = 40A
t_{rr2}		–––	110	170		T_J = 125°C	5	
I_{RRM1}	Peak Recovery Current	–––	6.0	11	A	T_J = 25°C	See Fig.	V_R = 200V
I_{RRM2}		–––	9.0	16		T_J = 125°C	6	
Q_{rr1}	Reverse Recovery Charge	–––	200	540	nC	T_J = 25°C	See Fig.	di_f/dt = 200A/µs
Q_{rr2}		–––	500	1300		T_J = 125°C	7	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	–––	240	–––	A/µs	T_J = 25°C	See Fig.	
$di_{(rec)M}/dt2$	During t_b	–––	190	–––		T_J = 125°C	8	



LEAD ASSIGNMENTS
1 - ANODE
2 - CATHODE
3 - ANODE
BASE COMMON CATHODE

Conforms to JEDEC Outline TO - 249AA (Modified)
Dimensions in millimeters and inches

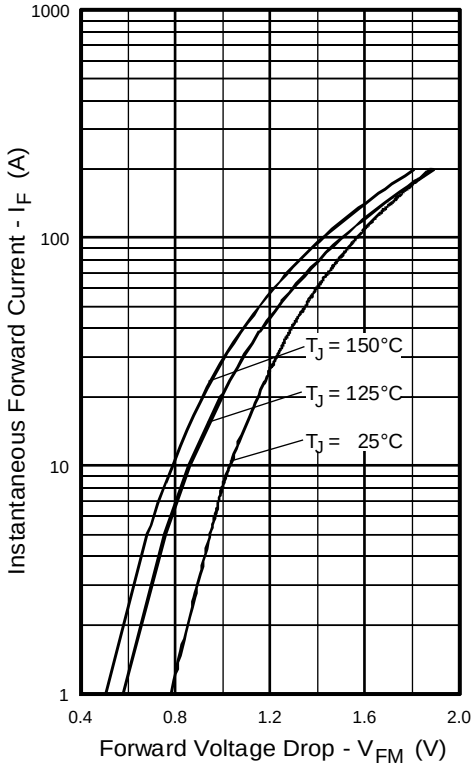


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

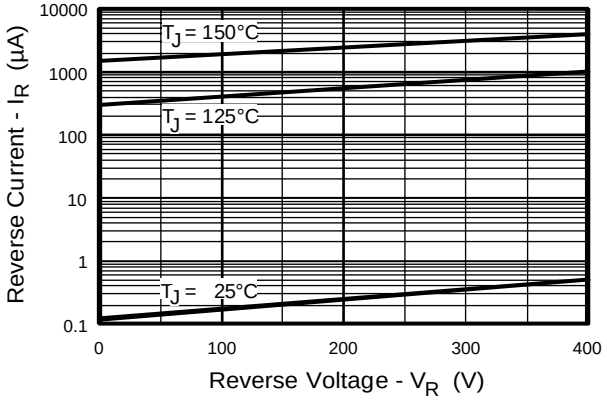


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

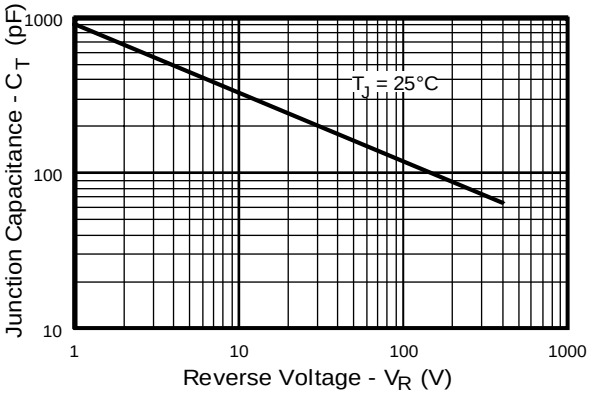


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

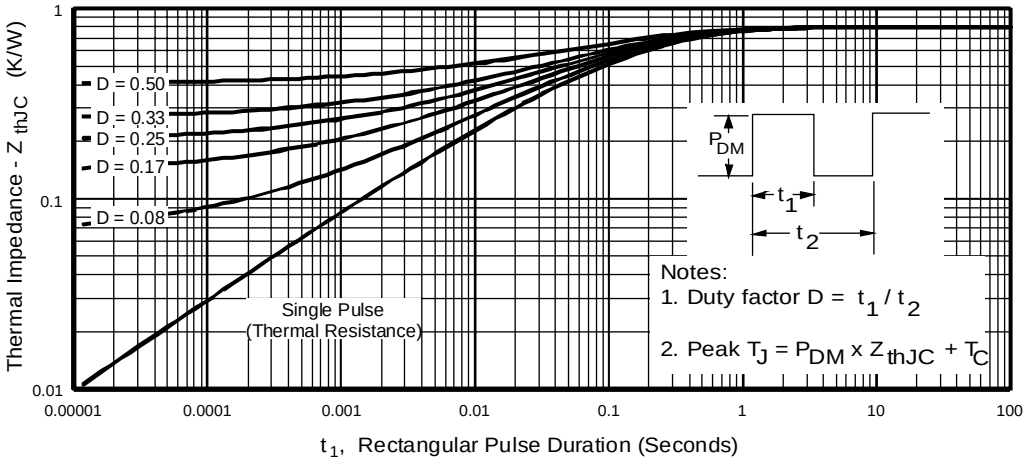


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics, (per Leg)

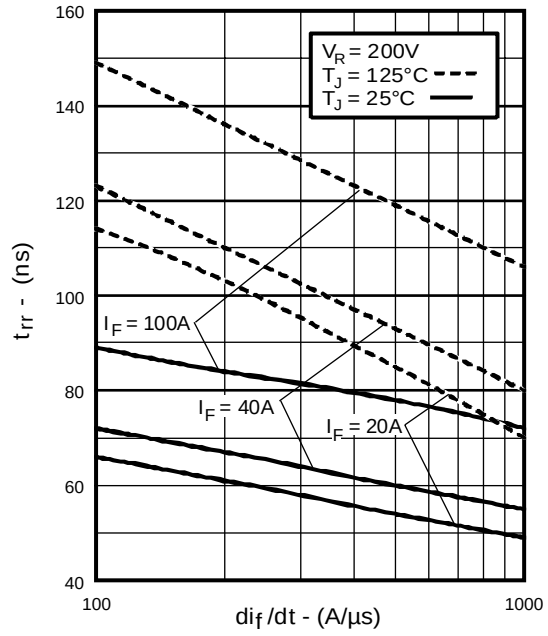


Fig. 5 - Typical Reverse Recovery vs. di_f/dt, (per Leg)

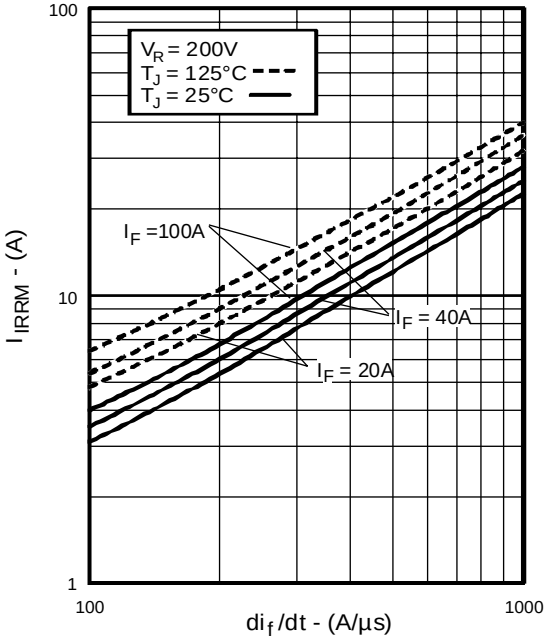


Fig. 6 - Typical Recovery Current vs. di_f/dt, (per Leg)

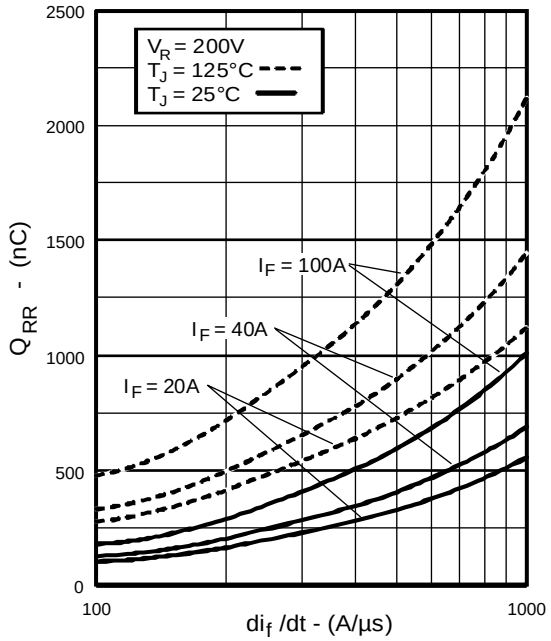


Fig. 7 - Typical Stored Charge vs. di_f/dt, (per Leg)

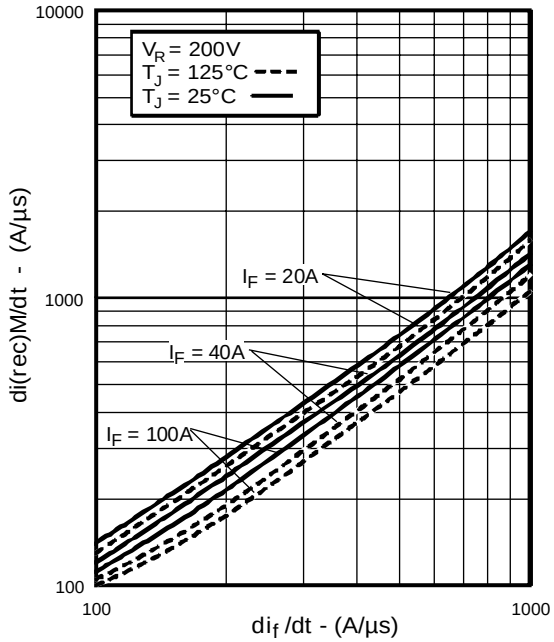


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt, (per Leg)

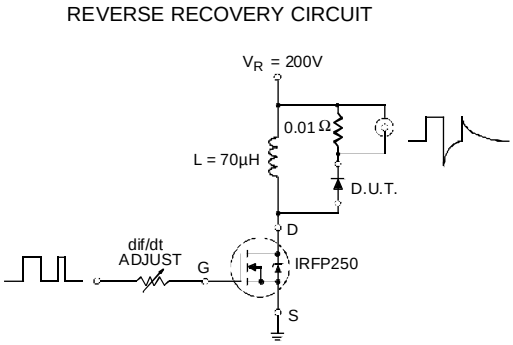


Fig. 9 - Reverse Recovery Parameter Test Circuit

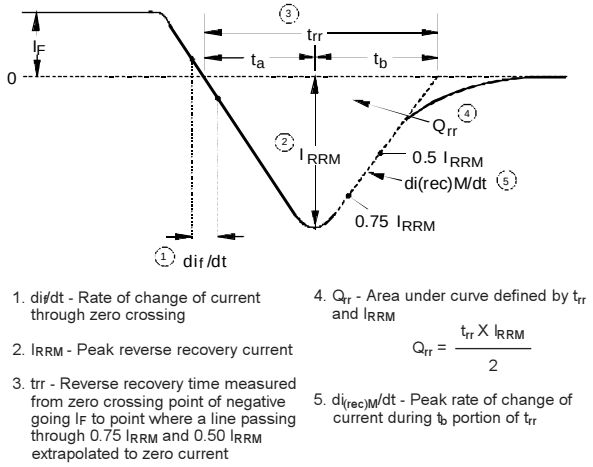


Fig. 10 - Reverse Recovery Waveform and Definitions

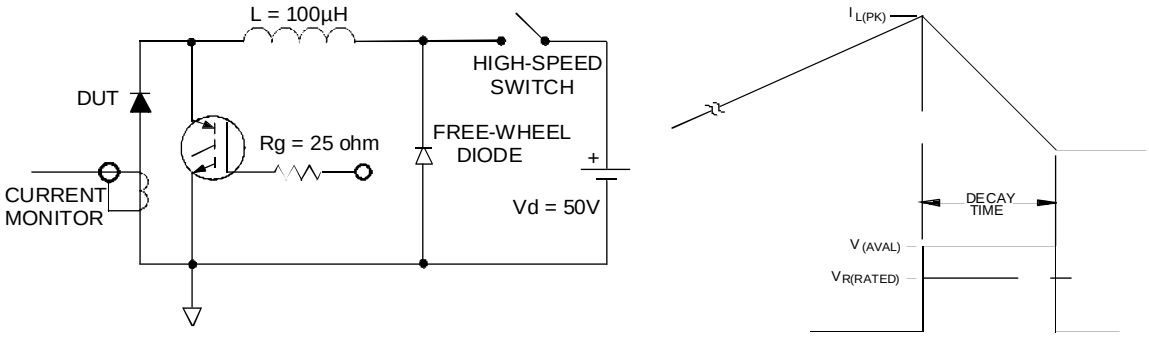


Fig. 11 - Avalanche Test Circuit and Waveforms

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