HFA45HI120C

HEXFRED
ULTRAFAST, SOFT RECOVERY DIODE

V_R = 1200V
V_F = 3.0V
Q_{RR} = 675nC

Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetically Sealed
- Ceramic Eyelets

Description

HFA45HI120C is part of the International Rectifier HiRel family of products. These 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

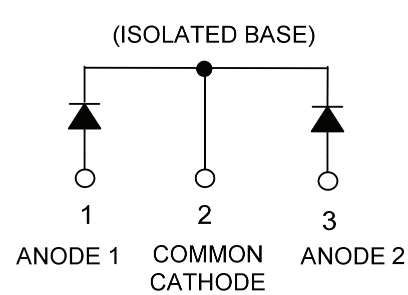
Characteristics	Characteristics	Max.	Units
V_R	Cathode to Anode Voltage (Per Leg)	1200	V
$I_{F\ (AV)}$	Continuous Forward Current, T_C = 100°C (Per Leg) ①	14	A
I_{FSM}	Single Pulse Forward Current , T_C = 25°C (Per Leg) ②	190	A
P_D @ T_C = 25°C	Maximum Power Dissipation	104	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C

Notes:
① D.C. = 50% rectangle wave
② 1/2 sine wave, 60Hz, Pulse Width = 8.33ms

CASE STYLE

TO-259AA

PIN ASSIGNMENTS



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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	1200	—		V	I_R = 100µA
V_{FM}	Max Forward Voltage	—	—	3.5	V	I_F =14A, T_J = -55°C
	See Fig. 1	—	—	3.0		I_F =14A
		—	—	3.9		I_F = 28A
		—	—	2.7		I_F = 14A, T_J = 125°C
I_{RM}	Max Reverse Leakage Current	—	—	10	µA	$V_R = V_R$ Rated
	See Fig. 2	—	—	1.0	mA	$V_R = V_R$ Rated, T_J = 125°C
C_T	Junction Capacitance, See Fig. 3	—	—	40	pF	V_R = 200V
L_S	Series Inductance	—	13	—	nH	Measured from Anode lead to Cathode lead, 6mm (0.25 in) from package

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions	
t_{rr1}	Reverse Recovery Time	—	80	135	ns	T_J = 25°C	I_F = 14A
t_{rr2}	See Fig. 5	—	120	—		T_J = 125°C	
I_{RRM1}	Peak Recovery Current	—	6.0	10	A	T_J = 25°C	V_R = 200V
I_{RRM2}	See Fig. 6	—	9.0	—		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge	—	400	675	nC	T_J = 25°C	di_f/dt = 200A/µs
Q_{rr2}	See Fig. 7	—	800	—		T_J = 125°C	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	190	—	A/µs	T_J = 25°C	
$di_{(rec)M}/dt1$	During tb - See Fig. 8	—	170	—		T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, Single Leg Conducting. See Fig. 4	—	1.2	°C/W
Wt	Weight	10.9	—	g

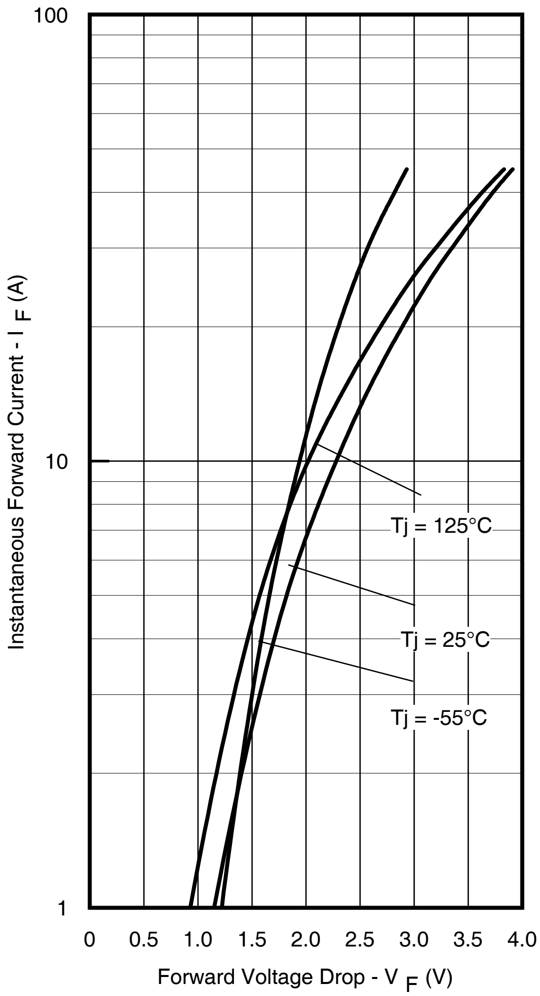


Fig. 1 Typical Forward Voltage Drop Characteristics (Per Leg)

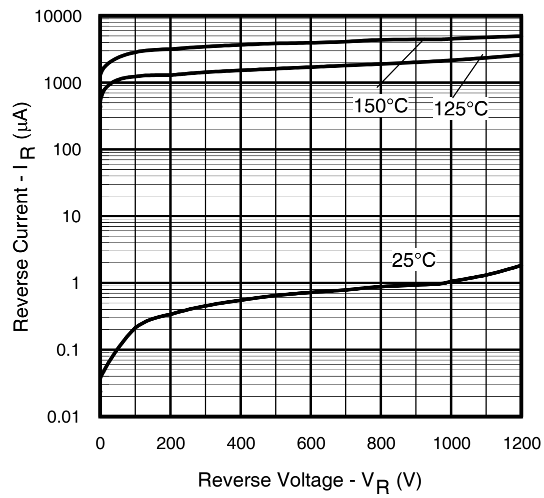


Fig. 2 Typical Values of Reverse Current Vs. Reverse Voltage (Per Leg)

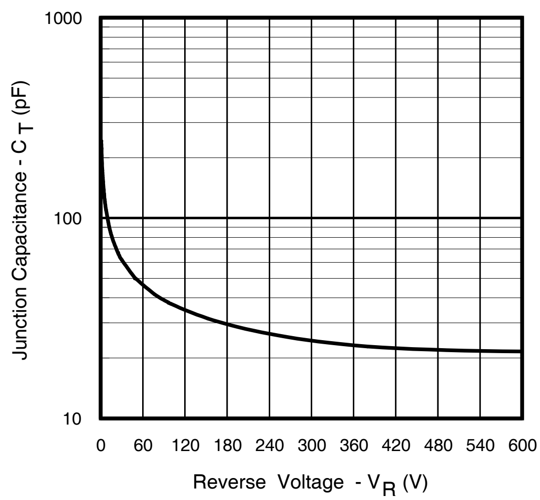


Fig. 3 Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

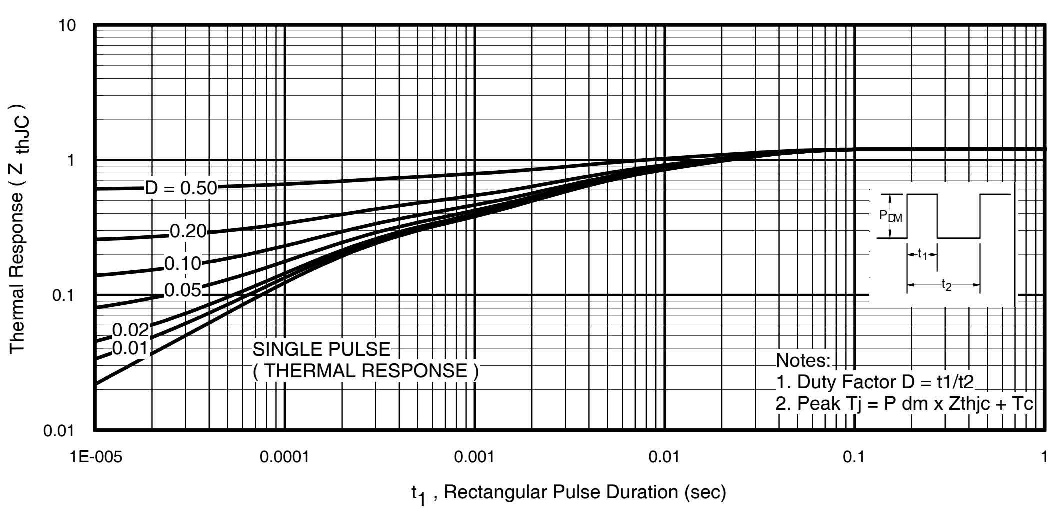


Fig. 4 Max. Thermal Impedance ZthJC Characteristics (Per Leg)

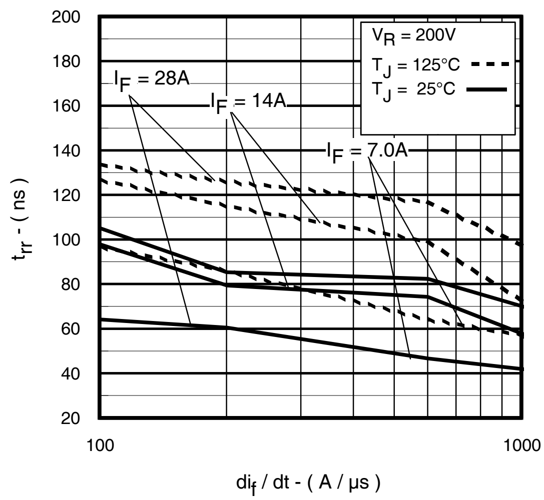


Fig. 5 Typical Reverse Recovery Vs di_f/dt (Per Leg)

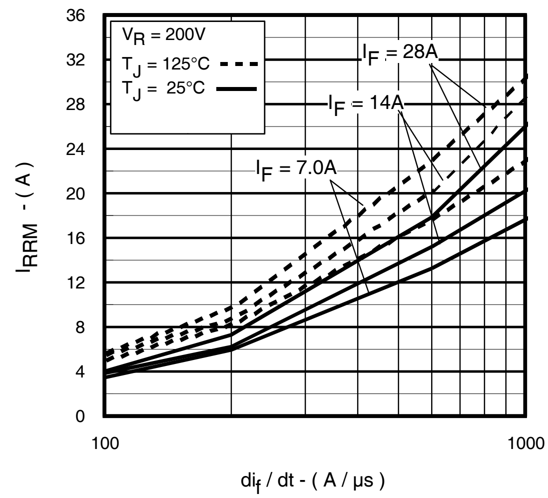


Fig. 6 Typical Recovery Current Vs di_f/dt (Per Leg)

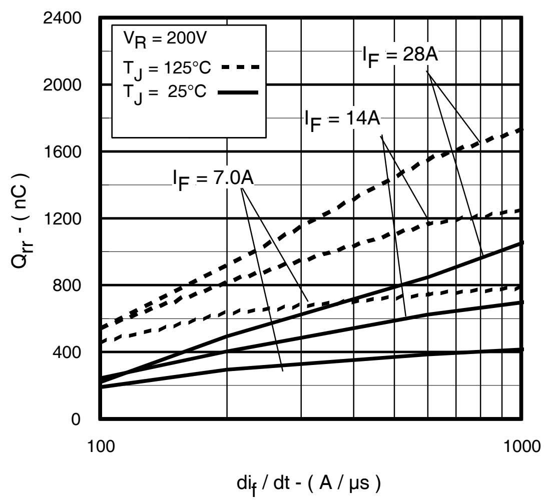


Fig. 7 Typical Stored Charge Vs di_f/dt (Per Leg)

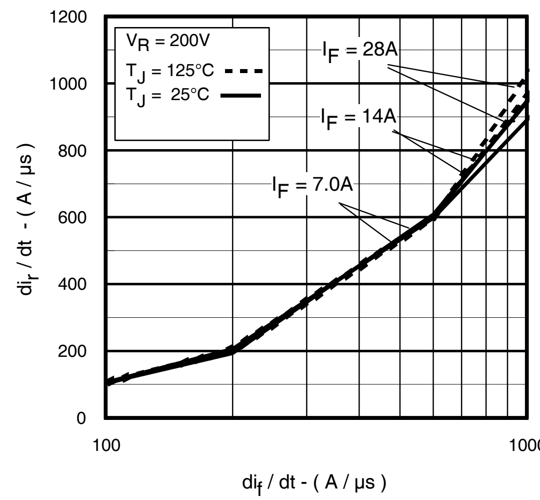


Fig. 8 Typical $di_{(rec)M}$/dt Vs di_f/dt (Per Leg)

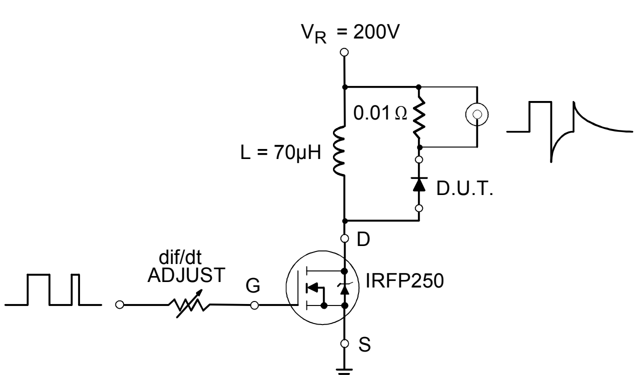
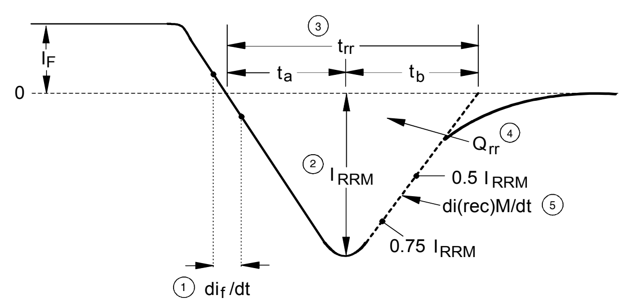


Fig. 9 Typical Reverse Recovery Parameter Test Circuit



① di_f /dt - Rate of change of current through zero crossing.

② I_{RRM} - Peak reverse recovery current.

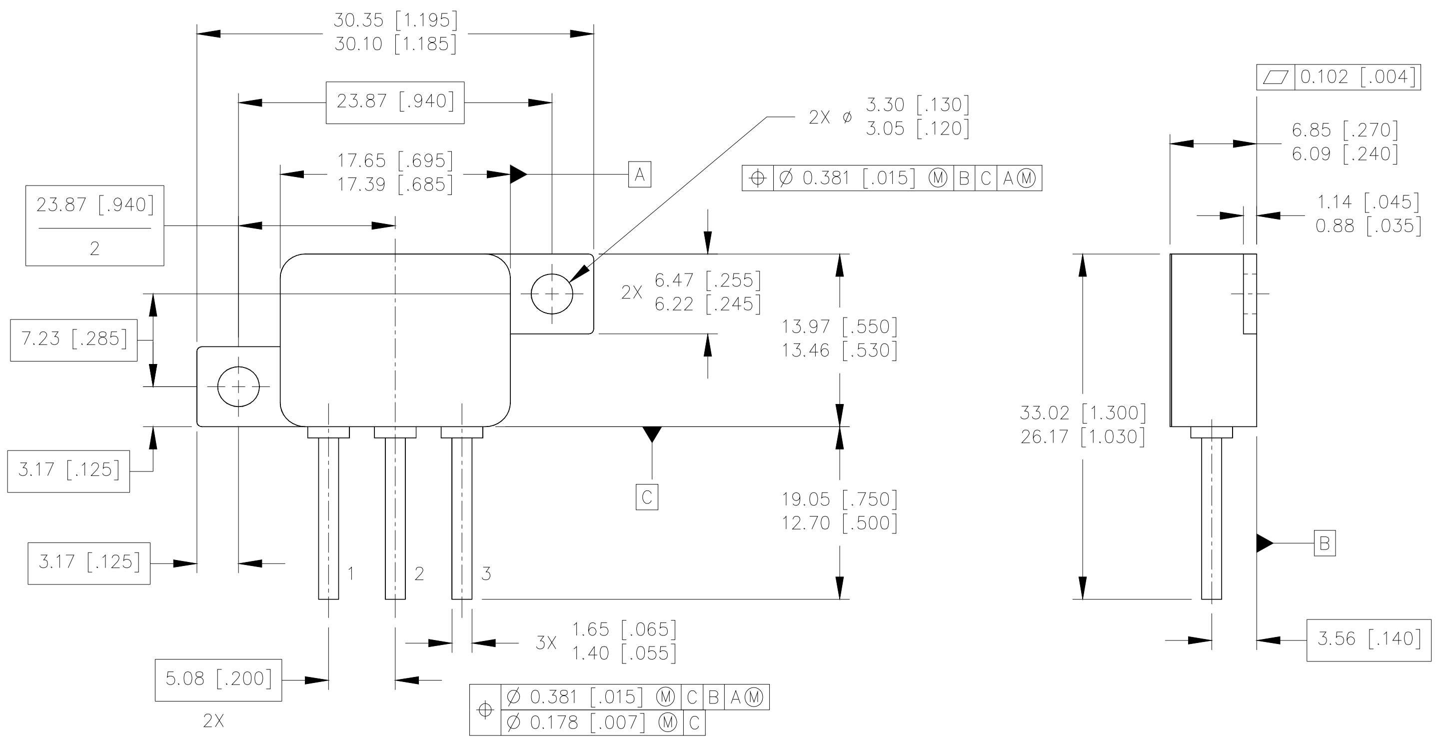
③ t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75I_{RRM}$ and $0.5I_{RRM}$ extrapolated to zero current.

④ Q_{rr} - Area under curve defined by t_{rr} and I_{RRM} - $Q_{rr} = (t_{rr} \times I_{RRM}) / 2$

⑤ $di_{(rec)M}$ /dt - Peak rate of change of current during t_b position of t_{rr}.

Fig. 10 Reverse Recovery Waveform and Definitions

Case Outline and Dimensions — TO-259AA



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS ARE SHOWN IN MILILIMETERS [INCHES].
3. CONTROLLING DIMENSION: INCH.
4. CONFORMS TO JEDEC OUTLINE TO-259AA.

PIN ASSIGNMENTS

Refer to page 1.

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