HFA40HF120C

HEXFRED
ULTRAFAST, SOFT RECOVERY DIODE

V_R = 1200V
$I_{F(AV)}$ = 15A
Q_{rr} = 370nC

Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetically Sealed
- Surface Mount

Description

HFA40HF120C is part of the International Rectifier HiRel family of products. These Ultrafast, soft recovery 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)

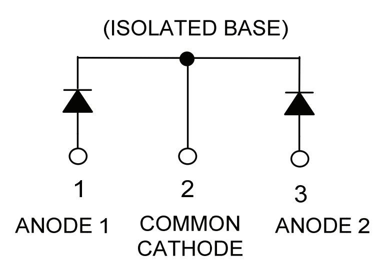
Characteristics	Characteristics	Max.	Units
V_R	Cathode to Anode Voltage	1200	V
$I_{F(AV)}$	Continuous Forward Current ① T_C = 100°C	15	A
I_{FSM}	Single Pulse Forward Current ② T_C = 25°C	80	A
P_D @ T_C = 25°C	Maximum Power Dissipation	63	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C

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

CASE STYLE

SMD-1

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 = 250μA
V_{FM}	Max. Forward Voltage See Fig. 1	——	——	3.9	V	I_F = 7.0A, T_J = -55°C
		——	——	3.3		I_F = 7.0A, T_J = 25°C
		——	——	4.4		I_F = 15A, T_J = 25°C
		——	——	2.8		I_F = 7.0A, 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 = 960V T_J = 125°C
C_T	Junction Capacitance, See Fig. 3	——	15	20	pF	V_R = 200V
L_S	Series Inductance	——	2.8	——	nH	Measured from center of bond pad to end of anode bonding wire

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions	
t_{rr1}	Reverse Recovery Time	——	58	100	ns	T_J = 25°C	I_F = 7.0A
t_{rr2}	See Fig. 5	——	110	165		T_J = 125°C	
I_{RRM1}	Peak Recovery Current	——	5.4	8.1	A	T_J = 25°C	V_R = 200V
I_{RRM2}	See Fig. 6	——	7.2	10.8		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge	——	185	370	nC	T_J = 25°C	di_f/dt = 200A/μs
Q_{rr2}	See Fig. 7	——	395	590		T_J = 125°C	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	——	255	380	A/μs	T_J = 25°C	
$di_{(rec)M}/dt1$	During tb - See Fig. 8	——	160	240		T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, Single Leg Conducting	——	2.0	°C/W
Wt	Weight	2.6	——	g

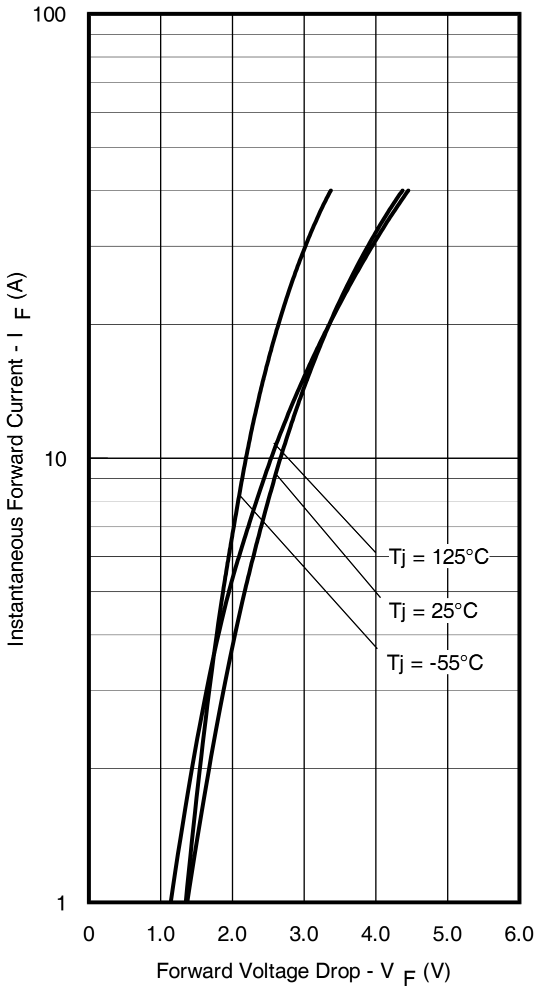


Fig. 1 Typical Forward Voltage Drop Vs. Instantaneous Forward Current (Per Leg)

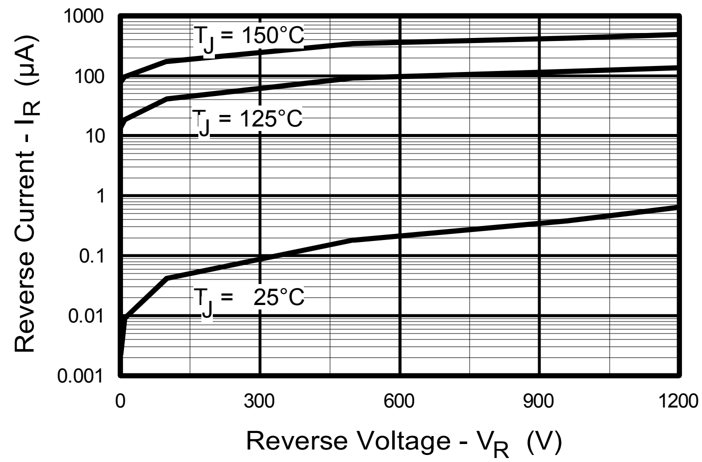


Fig. 2 Typical Values of Reverse Current Vs. Reverse Voltage (Per Leg)

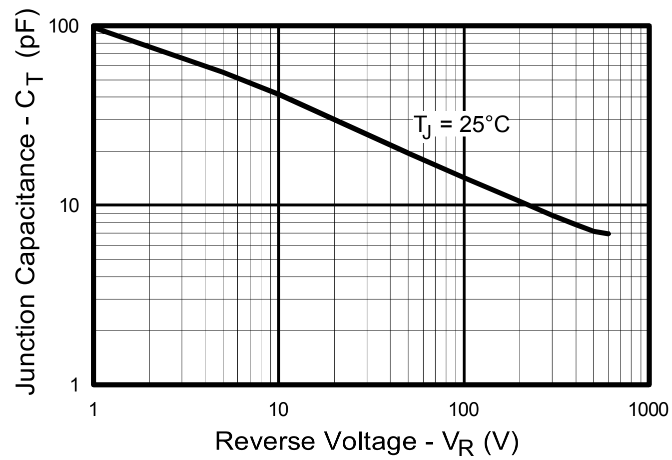


Fig. 3 Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

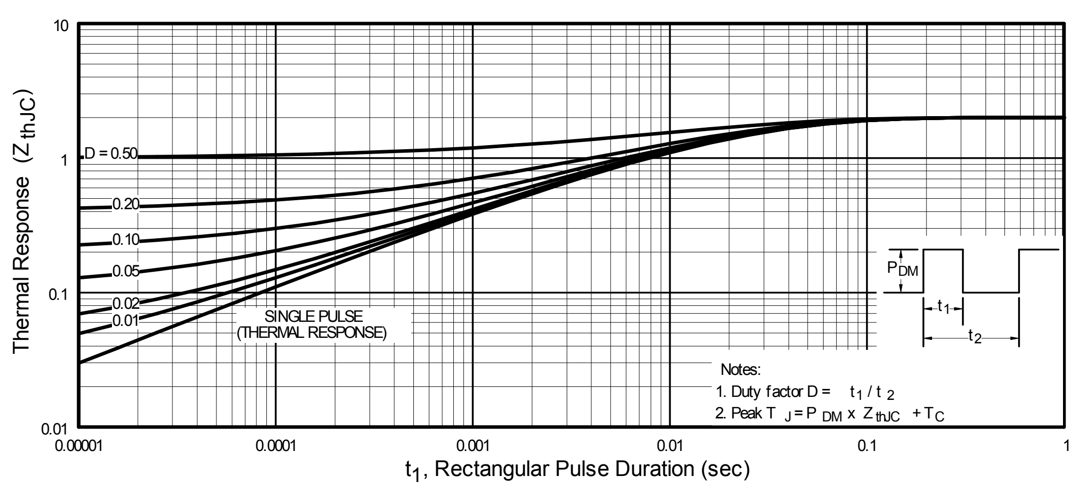


Fig. 4 Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

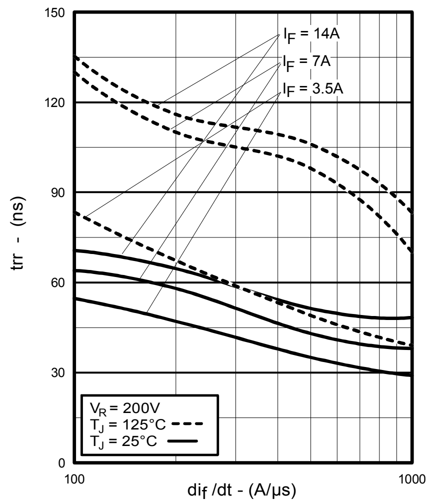


Fig. 5 Typical Reverse Recovery Vs di_f /dt (Per Leg)

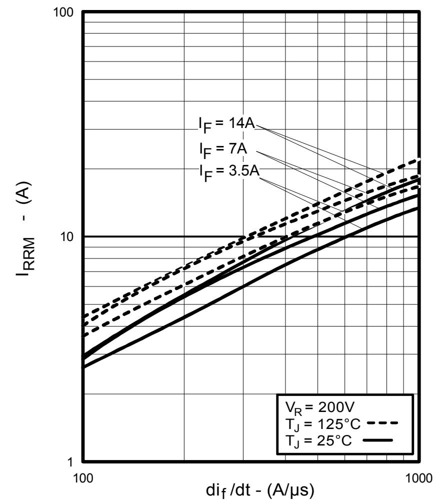


Fig. 6 Typical Recovery Current Vs di_f /dt (Per Leg)

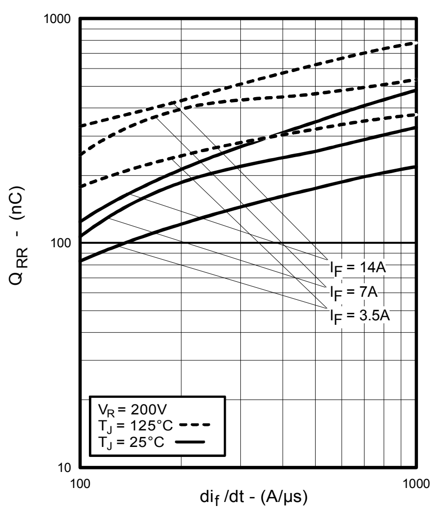


Fig. 7 Typical Stored Charge Vs di_f /dt (Per Leg)

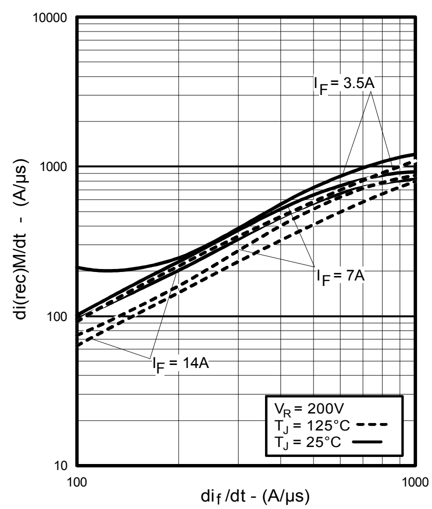


Fig. 8 Typical $di_{(rec)M}$ /dt Vs di_f /dt (Per Leg)

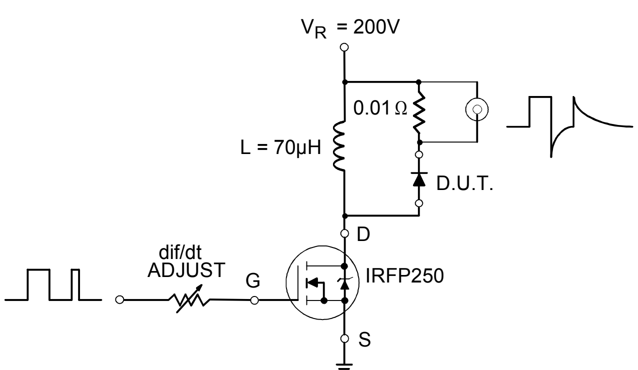
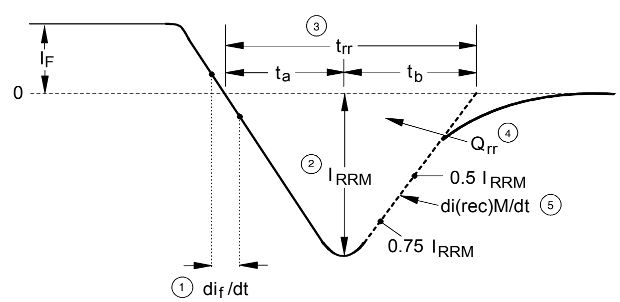


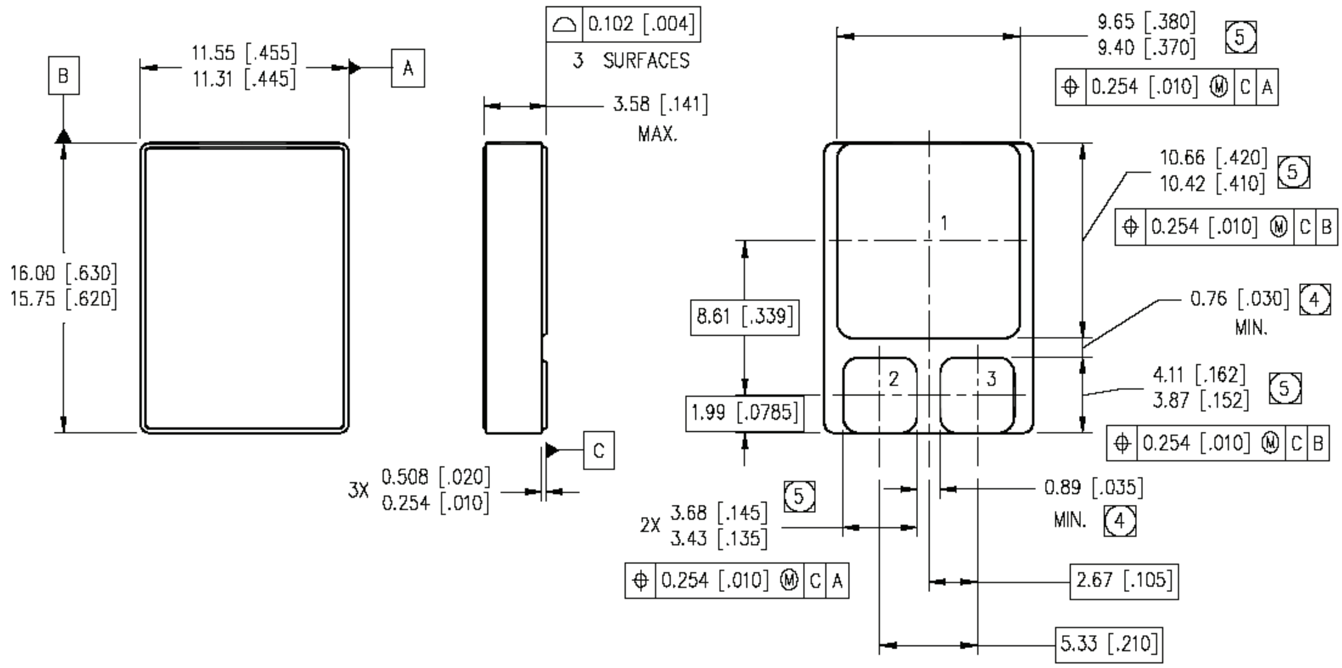
Fig. 9 Typical Reverse Recovery Parameter Test Circuit



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 — SMD-1



NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. DIMENSION INCLUDES METALLIZATION FLASH.
5. DIMENSION DOES NOT INCLUDE METALLIZATION FLASH.

PAD ASSIGNMENTS

Refer to page 1.

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