Bulletin PD -2.364 rev. B 11/00

International
IOR Rectifier

HFA16PB120

HEXFRED™

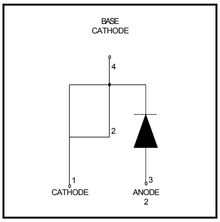
Ultrafast, Soft Recovery Diode

Features

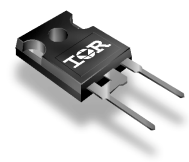
- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low I_{RRM}
- Very Low Q_{rr}
- Specified at Operating Conditions

Benefits

- Reduced RFI and EMI
- Reduced Power Loss in Diode and Switching Transistor
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count



V_R = 1200V
V_F(typ.)* = 2.3V
$I_{F(AV)}$ = 16A
Q_{rr} (typ.)= 260nC
I_{RRM}(typ.) = 5.8A
t_{rr}(typ.) = 30ns
$di_{(rec)M}/dt$ (typ.)* = 76A/µs



TO-247AC (Modified)

Description

International Rectifier's HFA16PB120 is a state of the art ultra fast recovery diode. Employing the latest in epitaxial construction and advanced processing techniques it features a superb combination of characteristics which result in performance which is unsurpassed by any rectifier previously available. With basic ratings of 1200 volts and 16 amps continuous current, the HFA16PB120 is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultra fast recovery time, the HEXFRED product line features extremely low values of peak recovery current (I_{RRM}) and does not exhibit any tendency to "snap-off" during the t_b portion of recovery. The HEXFRED features combine to offer designers a rectifier with lower noise and significantly lower switching losses in both the diode and the switching transistor. These HEXFRED advantages can help to significantly reduce snubbing, component count and heatsink sizes. The HEXFRED HFA16PB120 is ideally suited for applications in power supplies and power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.

Absolute Maximum Ratings

	Parameter	Max	Units
V_R	Cathode-to-Anode Voltage	1200	V
I_F @ T_C = 25°C	Continuous Forward Current		A
I_F @ T_C = 100°C	Continuous Forward Current	16	
I_{FSM}	Single Pulse Forward Current	190	
I_{FRM}	Maximum Repetitive Forward Current	64	
P_D @ T_C = 25°C	Maximum Power Dissipation	151	W
P_D @ T_C = 100°C	Maximum Power Dissipation	60	
T_J	Operating Junction and	-55 to +150	°C
T_{STG}	Storage Temperature Range		

* 125°C

Electrical Characteristics @ 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		2.5	3.0	V	I_F = 16A; See Fig. 1
			3.2	3.93		I_F = 32A
			2.3	2.7		I_F = 16A, T_J = 125°C
I_{RM}	Max Reverse Leakage Current		0.75	20	µA	V_R = V_R Rated; See Fig. 2
			375	2000		T_J = 125°C, V_R = 0.8 x V_R Rated
C_T	Junction Capacitance		27	40	pF	V_R = 200V; See Fig. 3
L_S	Series Inductance		8.0		nH	Measured lead to lead 5mm from package body

Dynamic Recovery Characteristics @ 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}	See Fig. 5, 10		90	135		T_J = 25°C	I_F = 16A
t_{rr2}			164	245		T_J = 125°C	
I_{RRM1}	Peak Recovery Current		5.8	10	A	T_J = 25°C	V_R = 200V
I_{RRM2}	See Fig. 6		8.3	15		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge		260	675	nC	T_J = 25°C	di_f/dt = 200A/µs
Q_{rr2}	See Fig. 7		680	1838		T_J = 125°C	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current		120		A/µs	T_J = 25°C	
$di_{(rec)M}/dt2$	During t_b See Fig. 8		76			T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameter	Min	Typ	Max	Units
T_{lead}①	Lead Temperature			300	°C
R_{thJC}	Thermal Resistance, Junction to Case			0.83	K/W
R_{thJA}②	Thermal Resistance, Junction to Ambient			80	
R_{thCS}③	Thermal Resistance, Case to Heat Sink		0.50		
Wt	Weight		2.0		g
			0.07		(oz)
	Mounting Torque	6.0		12	Kg-cm
		5.0		10	lbf•in

① 0.063 in. from Case (1.6mm) for 10 sec
② Typical Socket Mount
③ Mounting Surface, Flat, Smooth and Greased

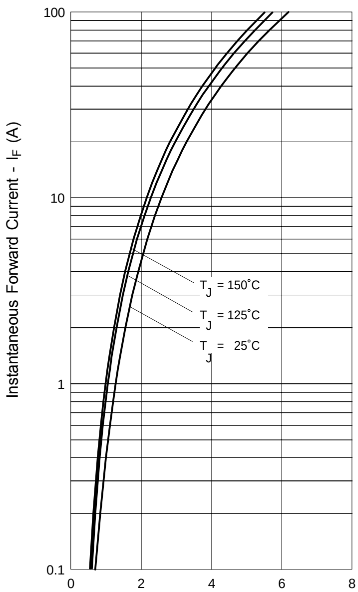


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

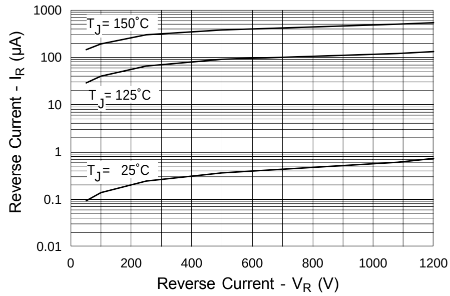


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

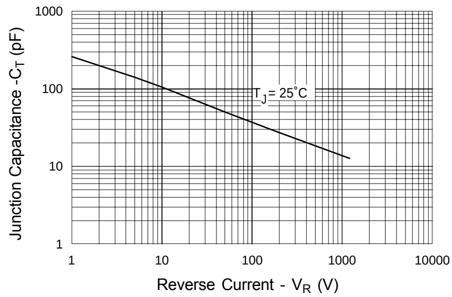


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

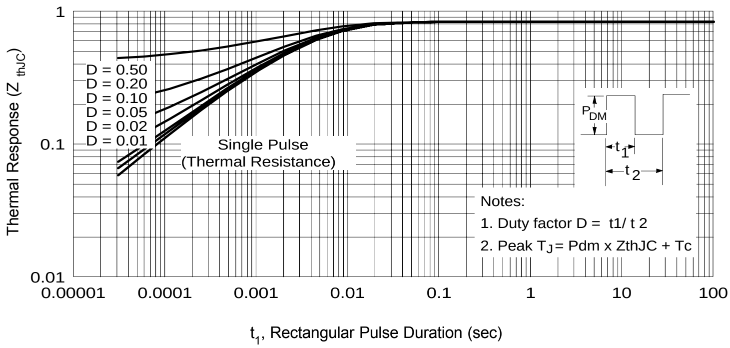


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics

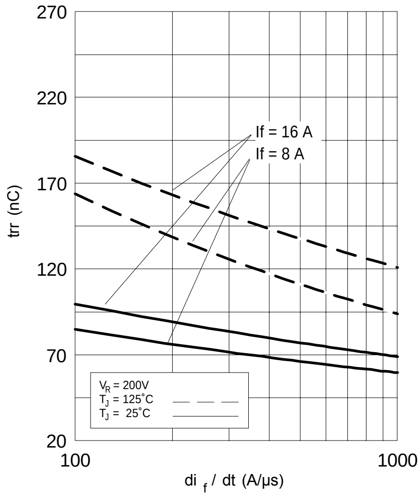


Fig. 5 - Typical Reverse Recovery vs. di_f/dt, (per Leg)

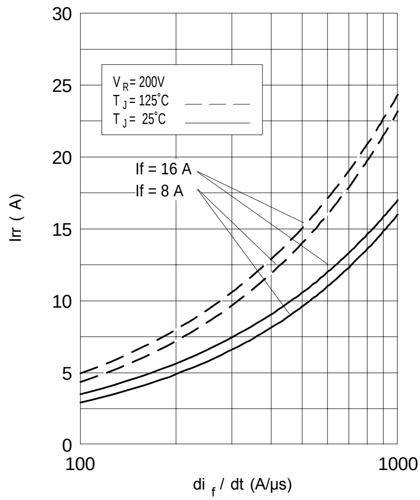


Fig. 6 - Typical Recovery Current vs. di_f/dt, (per Leg)

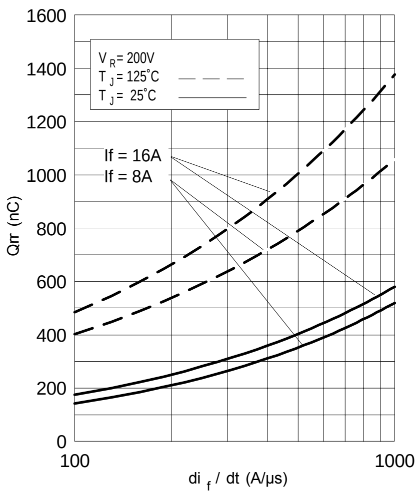


Fig. 7 - Typical Stored Charge vs. di_f/dt, (per Leg)

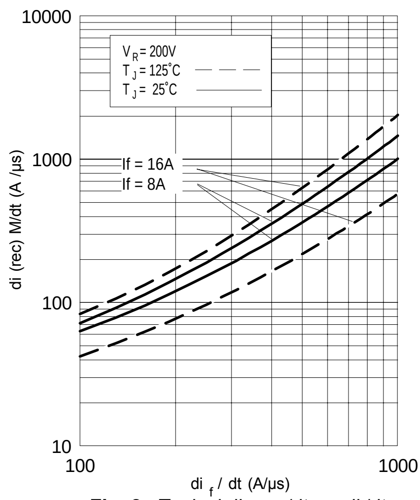


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt, (per Leg)

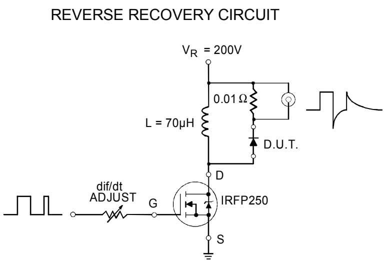
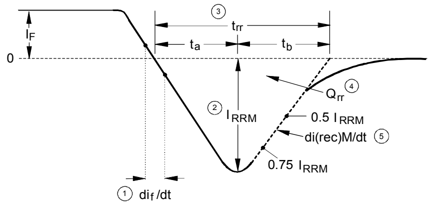


Fig. 9 - Reverse Recovery Parameter Test Circuit

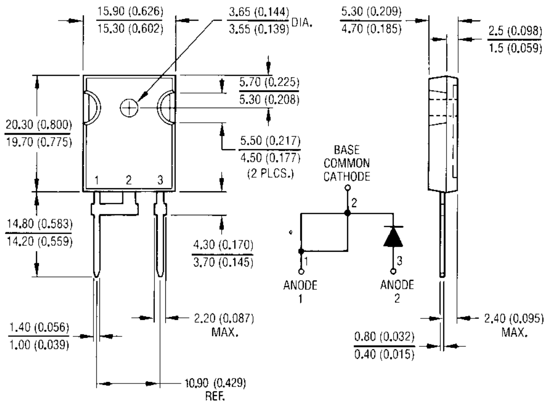


1. di_f/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. trr - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

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

Fig. 10 - Reverse Recovery Waveform and Definitions



Conforms to JEDEC Outline TO-247AC(Modified)
Dimensions in millimeters and inches

International IOR Rectifier

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