Bulletin PD -2.361 rev. B 05/01

International
IOR Rectifier

HFA16PA120C

HEXFRED™

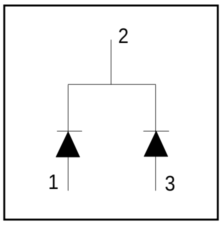
Ultrafast, Soft Recovery Diode

Features

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

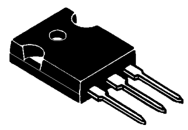
Benefits

- 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 (max.) = 3.3V
$I_{F\ (AV)}$ = 8.0A
I_{RRM} (typ.) = 4.5A

* per Leg



TO-247AC

Description

International Rectifier's HFA16PA120C 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 8 amps continuous current, the HFA16PA120C 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 HFA16PA120C 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 (per Leg)

	Parameter	Max	Units
V_R	Cathode-to-Anode Voltage	1200	V
I_F @ T_C = 100°C	Continuous Forward Current	8	A
I_{FSM}	Single Pulse Forward Current	130	
I_{FRM}	Maximum Repetitive Forward Current	32	
P_D @ T_C = 25°C	Maximum Power Dissipation	73.5	W
P_D @ T_C = 100°C	Maximum Power Dissipation	29	
T_J T_{STG}	Operating Junction and Storage Temperature Range	- 55 to 150	°C

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	-	2.6	3.3	V	I_F = 8.0A
		-	3.4	4.3		I_F = 16A
		-	2.4	3.1		I_F = 8.0A, T_J = 125°C
I_{RM}	Max. Reverse Leakage Current	-	0.31	10	µA	V_R = V_R Rated
		-	135	1000		T_J = 125°C, V_R = 0.8 x V_R Rated
C_T	Junction Capacitance	-	11	20	pF	V_R = 200V
L_S	Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from pkg

body

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

	Parameter	Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	-	28	-	ns	I_F = 1.0A, di_f/dt = 200A/µs, V_R = 30V	
t_{rr1}		-	63	95		T_J = 25°C	I_F = 8.0A
t_{rr2}		-	106	160		T_J = 125°C	V_R = 200V
I_{RRM1}	Peak Recovery Current	-	4.5	8.0	A	T_J = 25°C	di_f/dt = 200A/µs
I_{RRM2}		-	6.2	11		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge	-	140	380	nC	T_J = 25°C	
Q_{rr2}		-	335	880		T_J = 125°C	
$di_{(rec)M}/dt1$	Peak Rate of Recovery	-	133	-	A/µs	T_J = 25°C	
$di_{(rec)M}/dt2$	Current During t_b	-	85	-		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	-	-	1.7	k/W
R_{thJA} ②	Thermal Resistance, Junction to Ambient	-	-	40	
R_{thCS}③	Thermal Resistance, Case to Heat Sink	-	0.25	-	
Wt	Weight	-	6.0	-	g
		-	0.21	-	(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

pecified)

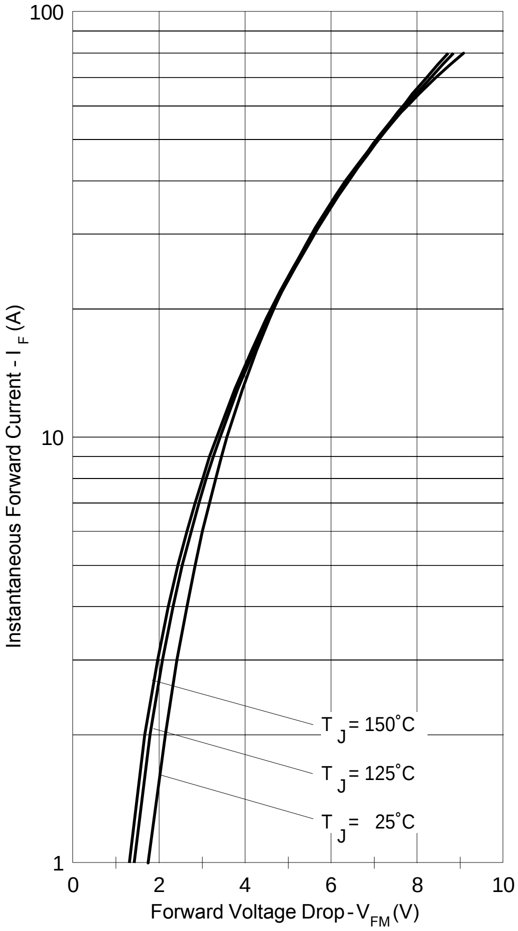


Fig. 1 - Max. Forward Voltage Drop Characteristics

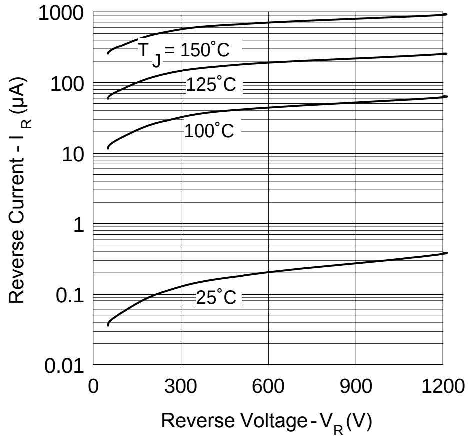


Fig. 2 - Typ. Values Of Reverse Current Vs. Reverse Voltage

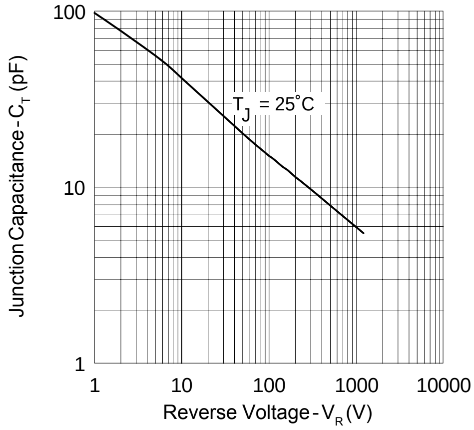


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

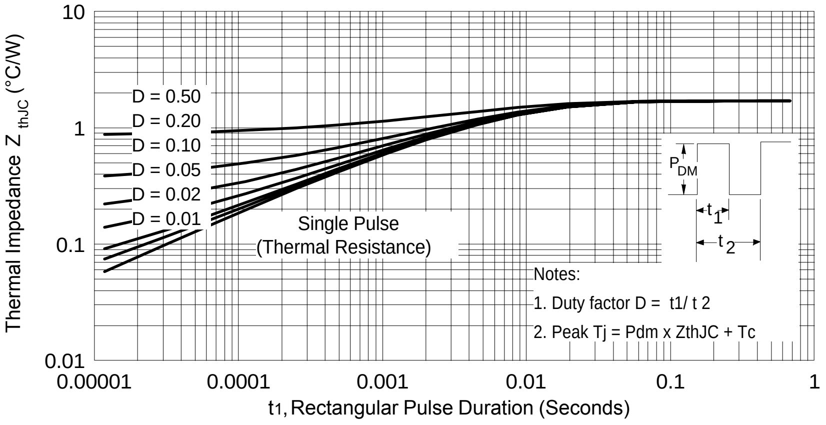


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

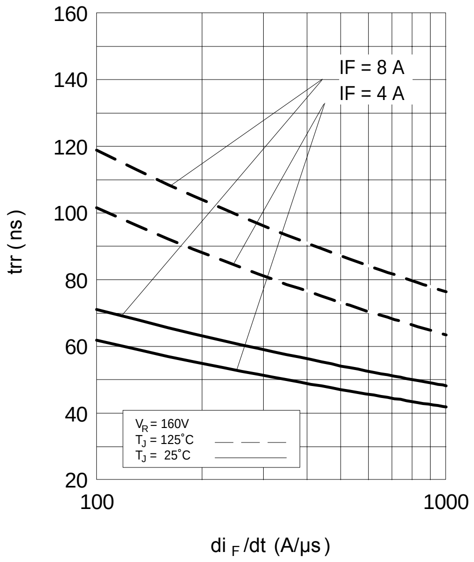


Fig. 5 - Typical Reverse Recovery Vs. di_f/dt

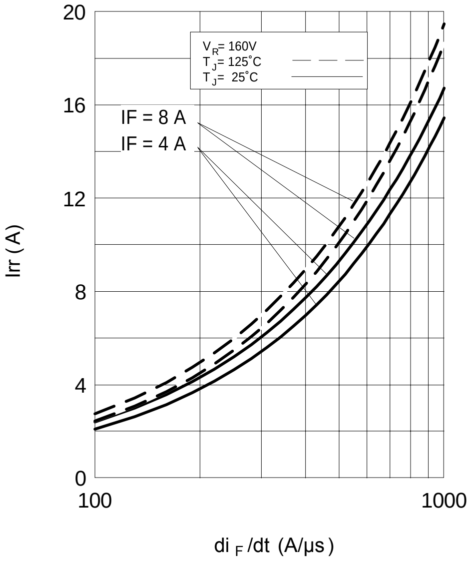


Fig. 6 - Typical Recovery Current Vs. di_f/dt

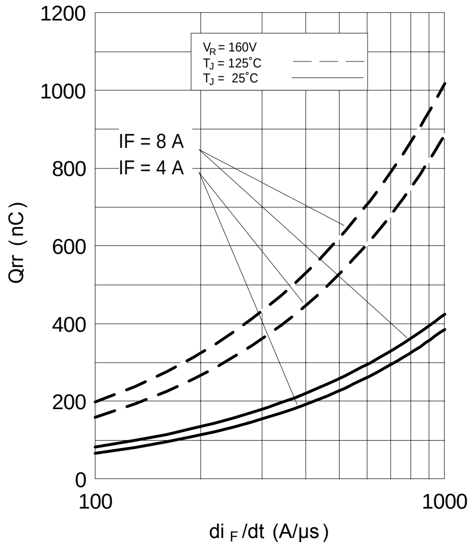


Fig. 8 - Typical Stored Charge vs. di_f/dt

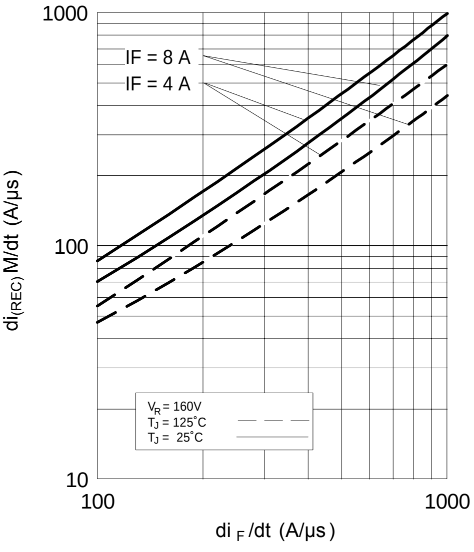


Fig. 7 - Typical $di_{(REC)}$ M/dt vs. di_f/dt

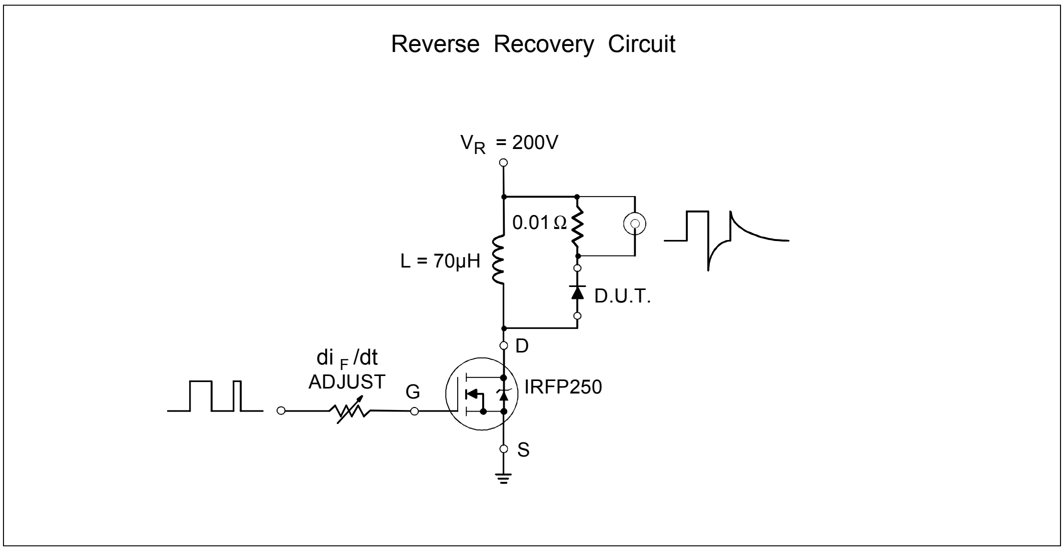
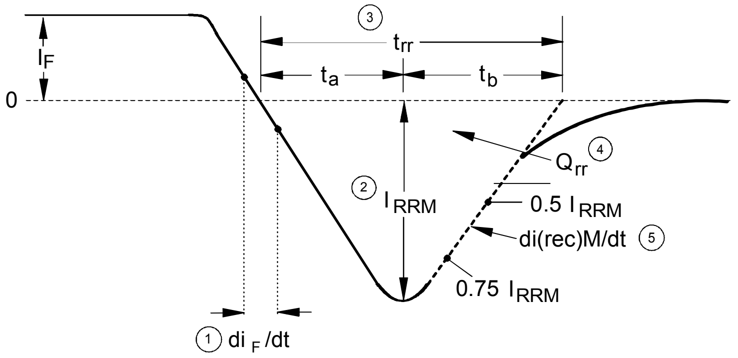


Fig. 9- Reverse Recovery Parameter Test Circuit



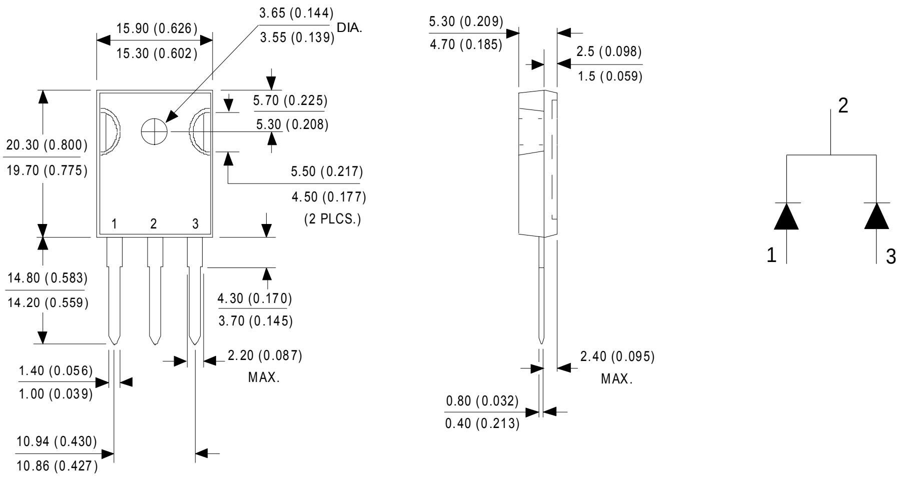
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr}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

Outline Table

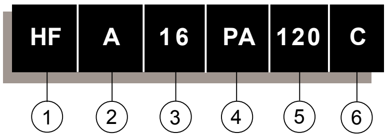


Conforms to JEDEC Outline TO-247AC

Dimensions in millimeters and inches

Ordering Information Table

Device Code



1 - Hexfred Family
2 - Process Designator A = subs. elec. irrad.
B = subs. Platinum
3 - Current Rating (16 = 16A)
4 - Package Outline (PA = TO-247, 3 pins)
5 - Voltage Rating (120= 1200V)
6 - Configuration (C = Center Tap Common Cathode)

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