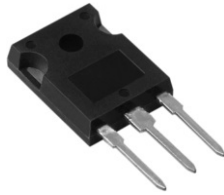
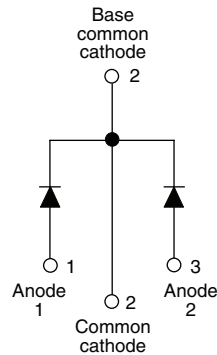


## HEXFRED®

### Ultrafast Soft Recovery Diode, 2 x 16 A


**TO-247AC**

**FEATURES**

- Ultrafast recovery
- Ultrasoft recovery
- Very low  $I_{RRM}$
- Very low  $Q_{rr}$
- Specified at operating conditions
- Designed and qualified for industrial level

**BENEFITS**

- Reduced RFI and EMI
- Reduced power loss in diode and switching transistor
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

**DESCRIPTION**

HFA32PA120C is a state of the art ultrafast 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 V and 16 A per leg continuous current, the HFA32PA120C is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultrafast 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 HFA32PA120C 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.

**PRODUCT SUMMARY**

$V_R$ per leg	1200 V
$V_F$ at 16 A at 25 °C	3.0 V
$I_{F(AV)}$	2 x 16 A
$t_{rr}$ (typical) per leg	5.8 ns
$T_J$ (maximum)	150 °C
$Q_{rr}$ (typical) per leg	260 nC
$I_{RRM}$ (typical) per leg	5.8 A

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	$V_R$		1200	V
Maximum continuous forward current	$I_F$	$T_C = 100\text{ °C}$	per leg	16
			per device	32
				190
				64
Single pulse forward current	$I_{FSM}$		190	A
Maximum repetitive forward current	$I_{FRM}$		64	
Maximum power dissipation	$P_D$	$T_C = 25\text{ °C}$	151	°C
		$T_C = 100\text{ °C}$	60	
Operating junction and storage temperature range	$T_J, T_{Stg}$		- 55 to + 150	W

ELECTRICAL SPECIFICATIONS PER LEG (T <sub>J</sub> = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V <sub>BR</sub>	I <sub>R</sub> = 100 μA	1200	-	-	V
Maximum forward voltage	V <sub>FM</sub>	I <sub>F</sub> = 16 A	-	2.5	3.0	
		I <sub>F</sub> = 32 A	-	3.2	3.93	
		I <sub>F</sub> = 16 A, T <sub>J</sub> = 125 °C	-	2.3	2.7	
Maximum reverse leakage current	I <sub>RM</sub>	V <sub>R</sub> = V <sub>R</sub> rated	-	0.75	20	μA
		T <sub>J</sub> = 125 °C, V <sub>R</sub> = 0.8 x V <sub>R</sub> rated	-	375	2000	
Junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 200 V	-	27	40	pF
Series inductance	L <sub>S</sub>	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS PER LEG (T <sub>J</sub> = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time See fig. 5, 10	t <sub>rr</sub>	I <sub>F</sub> = 1.0 A, dI <sub>F</sub> /dt = 200 A/μs, V <sub>R</sub> = 30 V	-	30	-	ns
	t <sub>rr1</sub>	T <sub>J</sub> = 25 °C	-	90	135	
	t <sub>rr2</sub>	T <sub>J</sub> = 125 °C	-	164	245	
Peak recovery current See fig. 6	I <sub>RRM1</sub>	T <sub>J</sub> = 25 °C	-	5.8	10	A
	I <sub>RRM2</sub>	T <sub>J</sub> = 125 °C	-	8.3	15	
Reverse recovery charge See fig. 7	Q <sub>rr1</sub>	T <sub>J</sub> = 25 °C	-	260	675	nC
	Q <sub>rr2</sub>	T <sub>J</sub> = 125 °C	-	680	1838	
Peak rate of fall of recovery current during t <sub>b</sub> See fig. 8	dI <sub>(rec)M</sub> /dt1	T <sub>J</sub> = 25 °C	-	120	-	A/μs
	dI <sub>(rec)M</sub> /dt2	T <sub>J</sub> = 125 °C	-	76	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Lead temperature	T <sub>lead</sub>	0.063" from case (1.6 mm) for 10 s	-	-	300	°C
Thermal resistance, junction to case	R <sub>thJC</sub>		-	-	0.83	K/W
Thermal resistance, junction to ambient	R <sub>thJA</sub>	Typical socket mount	-	-	80	
Thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, flat, smooth and greased	-	0.50	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-247AC (JEDEC)	HFA32PA120C			



HEXFRED®  
Ultrafast Soft Recovery Diode, 2 x 16 A

Vishay High Power Products

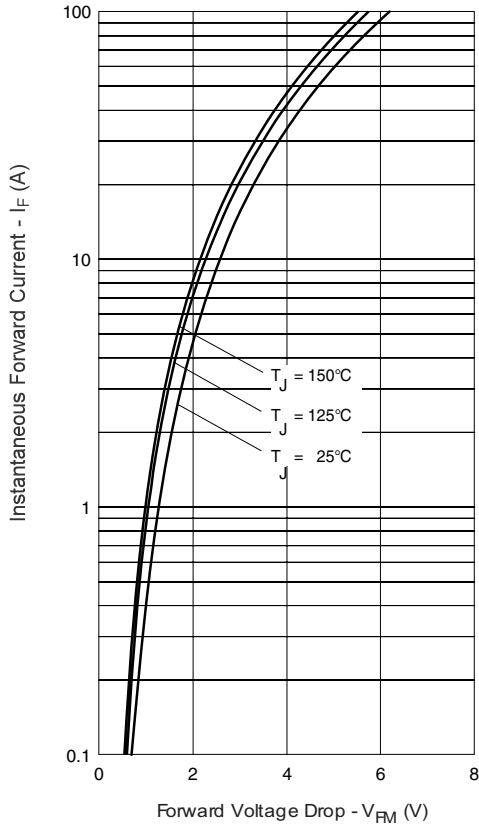


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

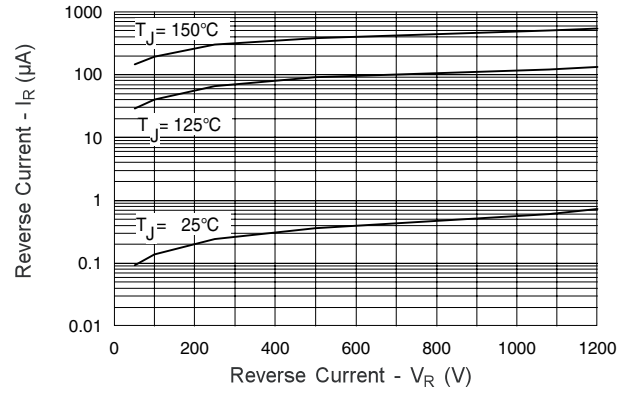


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

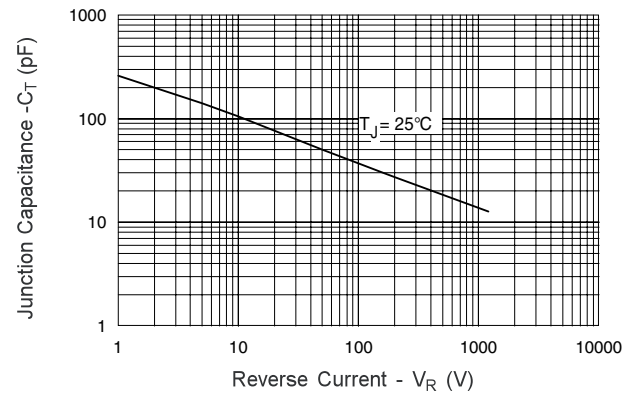


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

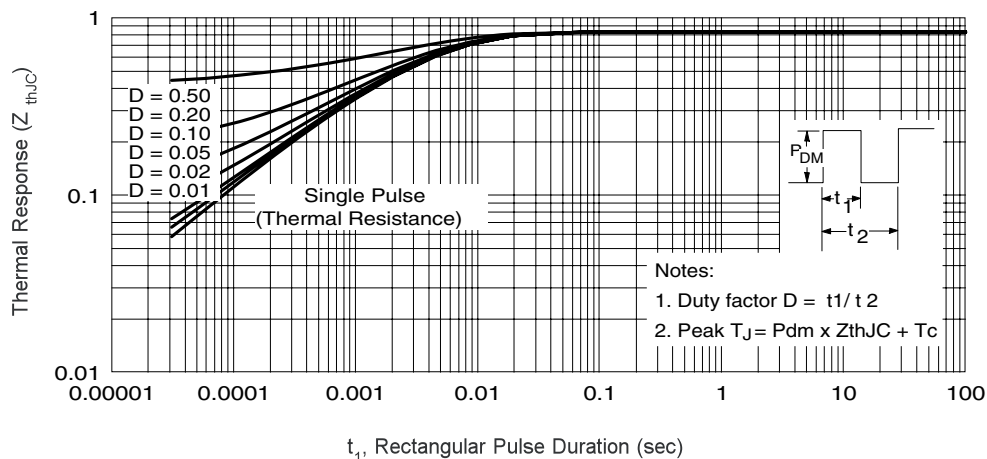


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

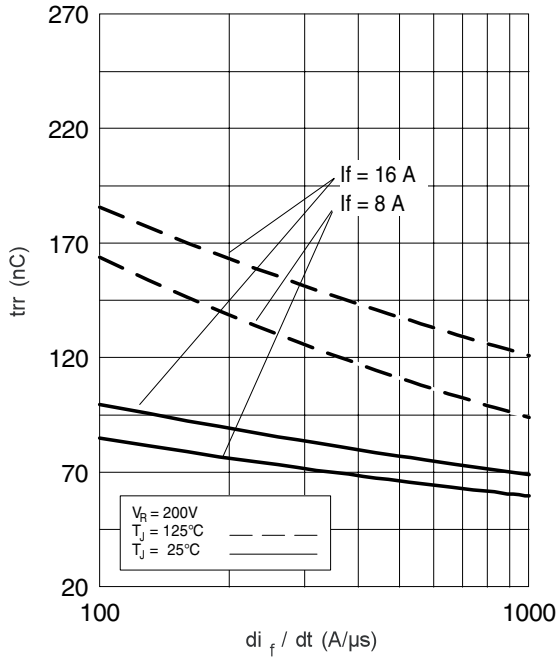


Fig. 5 - Typical Reverse Recovery Time vs.  $di_F/dt$  (Per Leg)

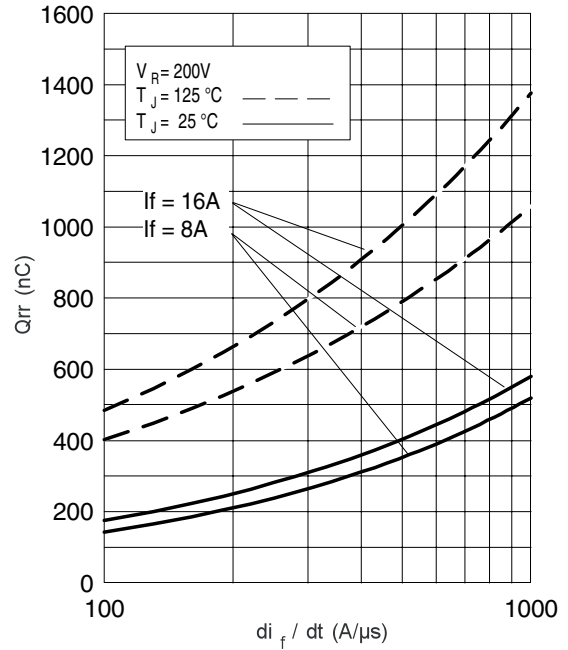


Fig. 7 - Typical Stored Charge vs.  $di_F/dt$  (Per Leg)

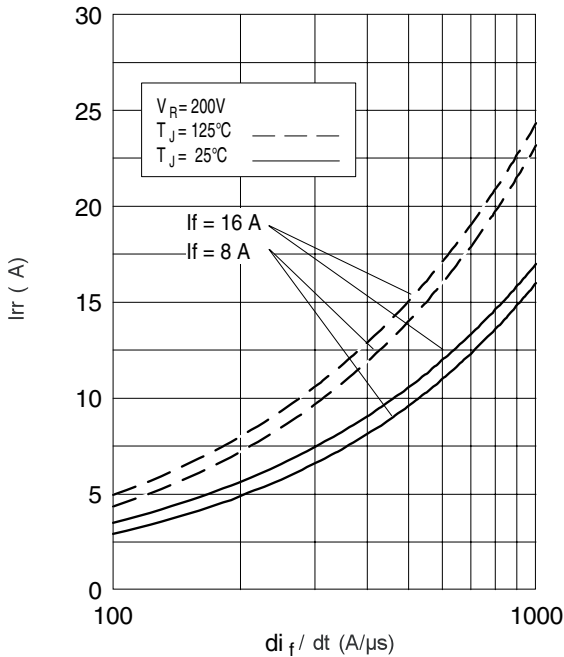


Fig. 6 - Typical Recovery Current vs.  $di_F/dt$  (Per Leg)

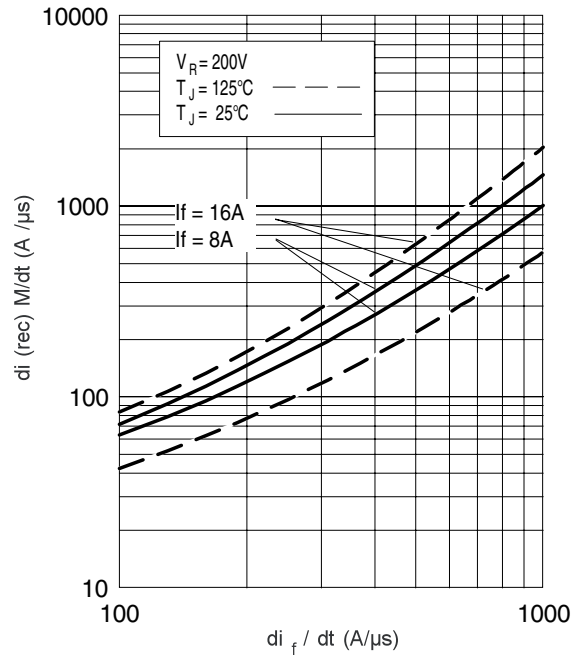


Fig. 8 - Typical  $di_{(rec)}M/dt$  vs.  $di_F/dt$  (Per Leg)

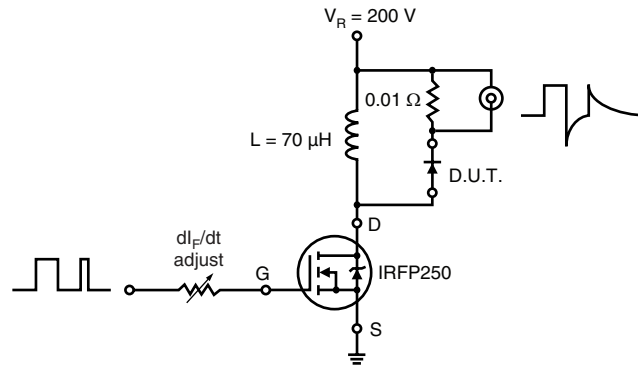
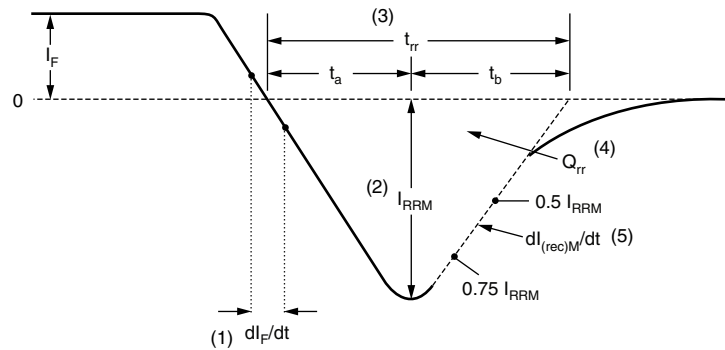


Fig. 9 - Reverse Recovery Parameter Test Circuit


 (1)  $di_F/dt$  - rate of change of current through zero crossing

 (2)  $I_{RRM}$  - peak reverse recovery current

 (3)  $t_{rr}$  - 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

## ORDERING INFORMATION TABLE

Device code	HF	A	32	PA	120	C	-
	①	②	③	④	⑤	⑥	⑦

- 1** - HEXFRED® family
- 2** - Process designator: A = Subs. electron irradiated  
B = Subs. platinum
- 3** - Current rating (32 = 32 A)
- 4** - Package outline (PA = TO-247, 3 pins)
- 5** - Voltage rating (120 = 1200 V)
- 6** - Configuration (C = Center tap common cathode)
- 7** -
  - None = Standard production
  - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95223">http://www.vishay.com/doc?95223</a>
Part marking information	<a href="http://www.vishay.com/doc?95226">http://www.vishay.com/doc?95226</a>



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