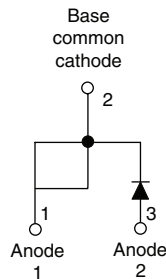


## HEXFRED®

### Ultrafast Soft Recovery Diode, 6 A


**TO-247AC modified**
**FEATURES**

- Ultrafast recovery
- Ultrasoft recovery
- Very low  $I_{RRM}$
- Very low  $Q_{rr}$
- Specified at operating temperature
- Lead (Pb)-free
- Designed and qualified for industrial level


**RoHS\***  
 COMPLIANT

**BENEFITS**

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

**DESCRIPTION**

HFA06PB120 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 6 A continuous current, the HFA06PB120 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 HFA06PB120 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**

$V_R$	1200 V
$V_F$ at 6 A at 25 °C	3.0 V
$I_{F(AV)}$	6 A
$t_{rr}$ (typical)	26 ns
$T_J$ (maximum)	150 °C
$Q_{rr}$ (typical)	116 nC
$di_{(rec)M}/dt$ (typical) at 125 °C	100 A/ $\mu$ s
$I_{RRM}$ (typical)	4.4 A

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	$V_R$		1200	V
Maximum continuous forward current	$I_F$	$T_C = 100\text{ °C}$	6	A
Single pulse forward current	$I_{FSM}$		80	
Maximum repetitive forward current	$I_{FRM}$		24	
Maximum power dissipation	$P_D$	$T_C = 25\text{ °C}$	62.5	W
		$T_C = 100\text{ °C}$	25	
Operating junction and storage temperature range	$T_J, T_{Stg}$		- 55 to + 150	°C

\* Pb containing terminations are not RoHS compliant, exemptions may apply

ELECTRICAL SPECIFICATIONS (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> = 6.0 A	-	2.7	3.0	
		I <sub>F</sub> = 12 A	-	3.5	3.9	
		I <sub>F</sub> = 6.0 A, T <sub>J</sub> = 125 °C	-	2.4	2.8	
Maximum reverse leakage current	I <sub>RM</sub>	V <sub>R</sub> = V <sub>R</sub> rated	-	0.26	5.0	μA
		T <sub>J</sub> = 125 °C, V <sub>R</sub> = 0.8 x V <sub>R</sub> rated	-	110	500	
Junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 200 V	-	9.0	14	pF
Series inductance	L <sub>S</sub>	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T <sub>C</sub> = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	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	-	26	-	ns
	t <sub>rr1</sub>	T <sub>J</sub> = 25 °C	-	53	80	
	t <sub>rr2</sub>	T <sub>J</sub> = 125 °C	-	87	130	
Peak recovery current	I <sub>RRM1</sub>	T <sub>J</sub> = 25 °C	-	4.4	8.0	A
	I <sub>RRM2</sub>	T <sub>J</sub> = 125 °C	-	5.0	9.0	
Reverse recovery charge	Q <sub>rr1</sub>	T <sub>J</sub> = 25 °C	-	116	320	nC
	Q <sub>rr2</sub>	T <sub>J</sub> = 125 °C	-	233	585	
Peak rate of recovery current during t <sub>b</sub>	di <sub>(rec)M</sub> /dt1	T <sub>J</sub> = 25 °C	-	180	-	A/μs
	di <sub>(rec)M</sub> /dt2	T <sub>J</sub> = 125 °C	-	100	-	

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>		-	-	2.0	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	-	0.5	-	
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 modified	HFA06PB120			

## HEXFRED® Ultrafast Soft Recovery Diode, 6 A

Vishay High Power Products

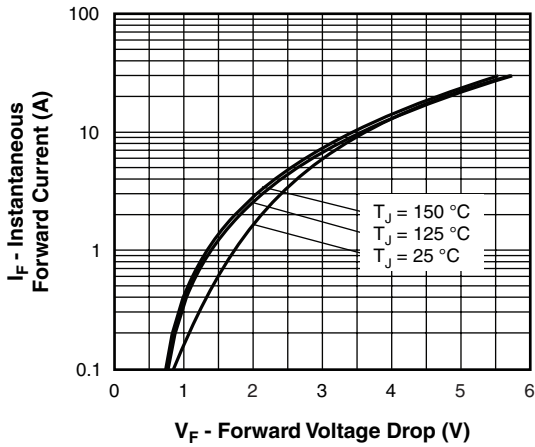


Fig. 1 - Typical Forward Voltage Drop Characteristics

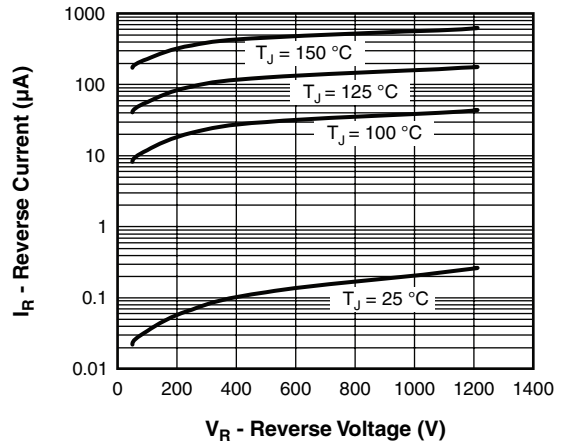


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

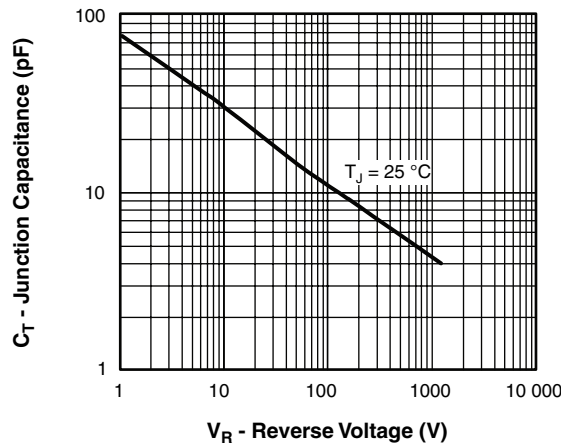


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

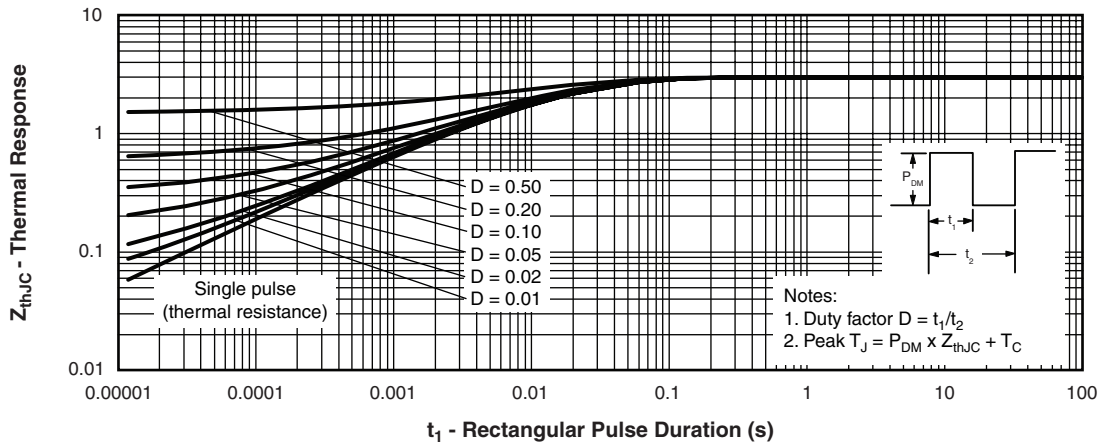


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

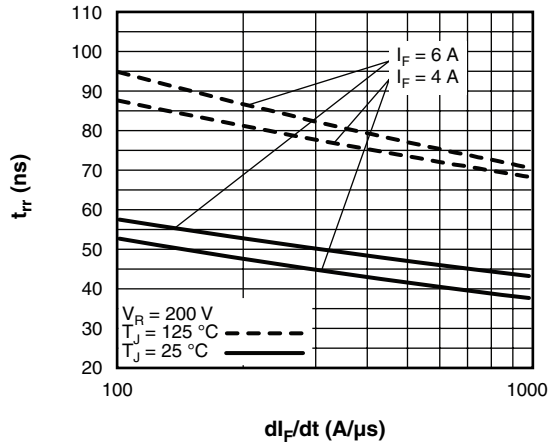


Fig. 5 - Typical Reverse Recovery Time vs.  $dI_F/dt$

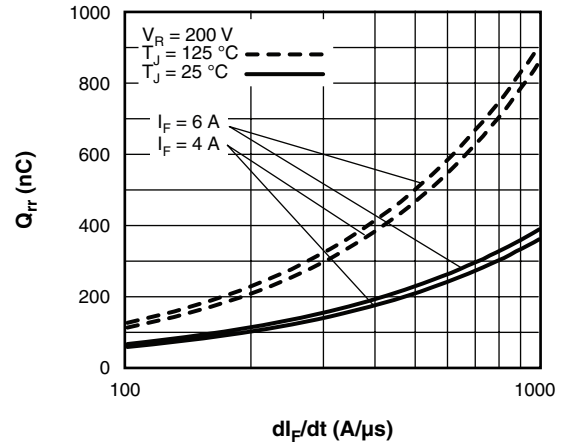


Fig. 7 - Typical Stored Charge vs.  $dI_F/dt$

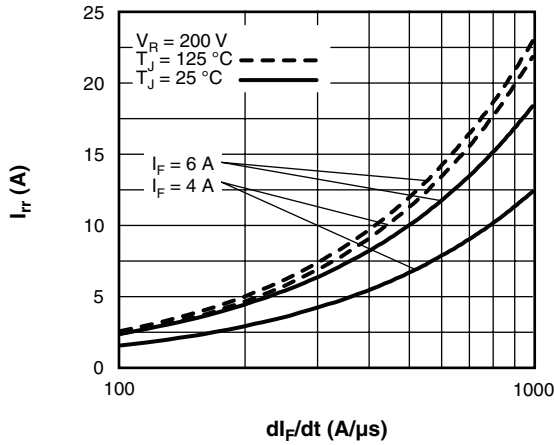


Fig. 6 - Typical Recovery Current vs.  $dI_F/dt$

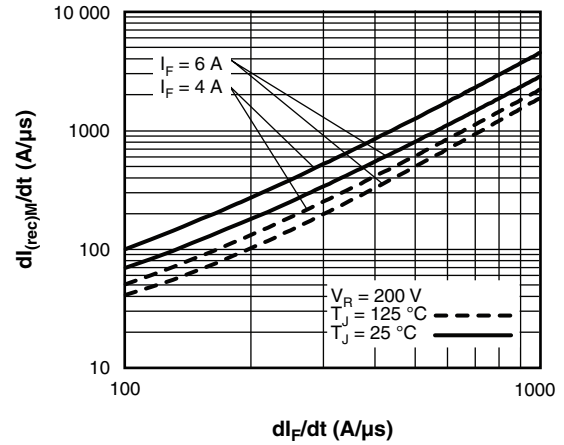


Fig. 8 - Typical  $dI_{(rec)M}/dt$  vs.  $dI_F/dt$

**HEXFRED®**  
 Ultrafast Soft Recovery Diode, 6 A

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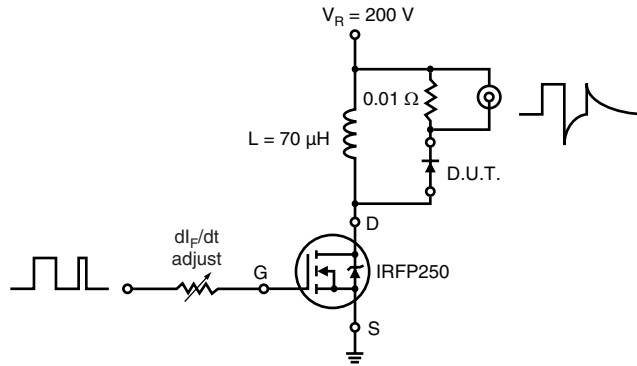
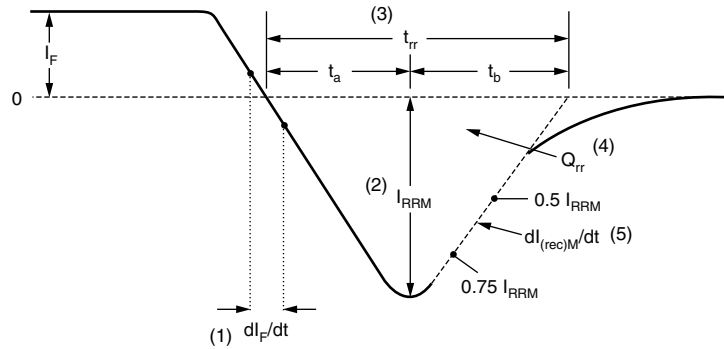


Fig. 9 - Reverse Recovery Parameter Test Circuit



- (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

# HFA06PB120PbF

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HEXFRED®  
Ultrafast Soft Recovery Diode, 6 A



## ORDERING INFORMATION TABLE

Device code	HF	A	06	PB	120	PbF
	①	②	③	④	⑤	⑥

- 1** - HEXFRED® family
- 2** - Process designator:
  - A = A subs. elec. irradiation
  - B = B subs. platinum
- 3** - Average current: 06 = 6 A
- 4** - Package outline: PB = TO-247 2 lead
- 5** - Voltage code: 120 = 1200 V
- 6** -
  - None = Standard production
  - PbF = Lead (Pb)-free

### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95253">http://www.vishay.com/doc?95253</a>
Part marking information	<a href="http://www.vishay.com/doc?95255">http://www.vishay.com/doc?95255</a>



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