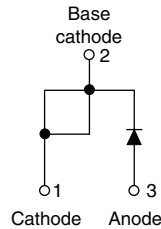


## HEXFRED® Ultrafast Soft Recovery Diode, 16 A


**TO-220AC**
**FEATURES**

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


 Available  
**RoHS\***  
 COMPLIANT

**BENEFITS**

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

**DESCRIPTION**

HFA16TB120 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 continuous current, the HFA16TB120 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 HFA16TB120 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 16 A at 25 °C	3.0 V
$I_{F(AV)}$	16 A
$t_{rr}$ (typical)	30 ns
$T_J$ (maximum)	150 °C
$Q_{rr}$ (typical)	260 nC
$di_{(rec)M}/dt$ (typical) at 125 °C	76 A/ $\mu$ s
$I_{RRM}$ (typical)	5.8 A

**ABSOLUTE MAXIMUM RATINGS**

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

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

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	$V_{BR}$	$I_R = 100\text{ }\mu\text{A}$	1200	-	-	V
Maximum forward voltage	$V_{FM}$	$I_F = 16\text{ A}$	-	2.5	3.0	
		$I_F = 32\text{ A}$	-	3.2	3.93	
		$I_F = 16\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	2.3	2.7	
Maximum reverse leakage current	$I_{RM}$	$V_R = V_R\text{ rated}$	-	0.75	20	$\mu\text{A}$
		$T_J = 125\text{ }^\circ\text{C}, V_R = 0.8 \times V_R\text{ rated}$	-	375	2000	
Junction capacitance	$C_T$	$V_R = 200\text{ V}$	-	27	40	pF
Series inductance	$L_S$	Measured lead to lead 5 mm from package body	-	8.0	-	nH

<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time See fig. 5 and 10	$t_{rr}$	$I_F = 1.0\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	30	-	ns
	$t_{rr1}$	$T_J = 25\text{ }^\circ\text{C}$	-	90	135	
	$t_{rr2}$	$T_J = 125\text{ }^\circ\text{C}$	-	164	245	
Peak recovery current See fig. 6	$I_{RRM1}$	$T_J = 25\text{ }^\circ\text{C}$	-	5.8	10	A
	$I_{RRM2}$	$T_J = 125\text{ }^\circ\text{C}$	-	8.3	15	
Reverse recovery charge See fig. 7	$Q_{rr1}$	$T_J = 25\text{ }^\circ\text{C}$	-	260	675	nC
	$Q_{rr2}$	$T_J = 125\text{ }^\circ\text{C}$	-	680	1838	
Peak rate of fall of recovery current during $t_b$ See fig. 8	$dI_{(rec)M}/dt1$	$T_J = 25\text{ }^\circ\text{C}$	-	120	-	$\text{A}/\mu\text{s}$
	$dI_{(rec)M}/dt2$	$T_J = 125\text{ }^\circ\text{C}$	-	76	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Lead temperature	$T_{lead}$	0.063" from case (1.6 mm) for 10 s	-	-	300	$^\circ\text{C}$
Thermal resistance, junction to case	$R_{thJC}$		-	-	0.83	K/W
Thermal resistance, junction to ambient	$R_{thJA}$	Typical socket mount	-	-	80	
Thermal resistance, case to heatsink	$R_{thCS}$	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-220AC	HFA16TB120			



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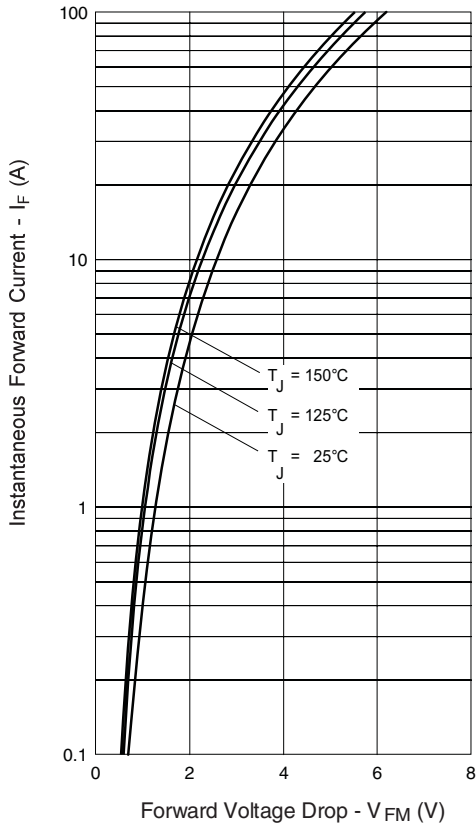


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

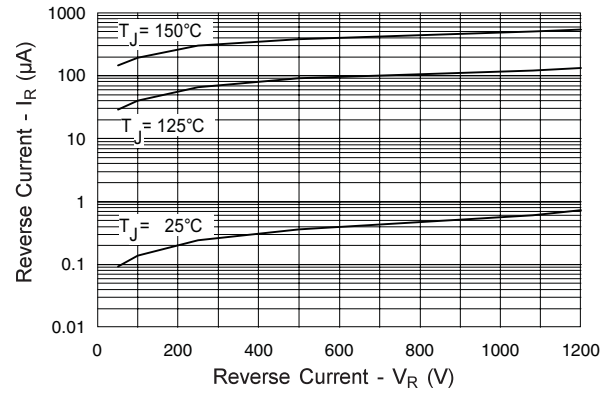


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

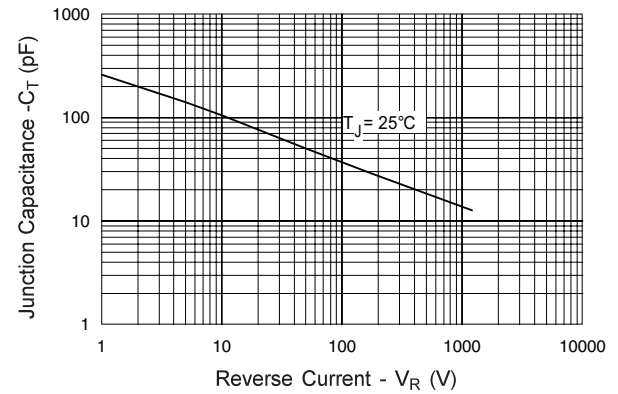


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

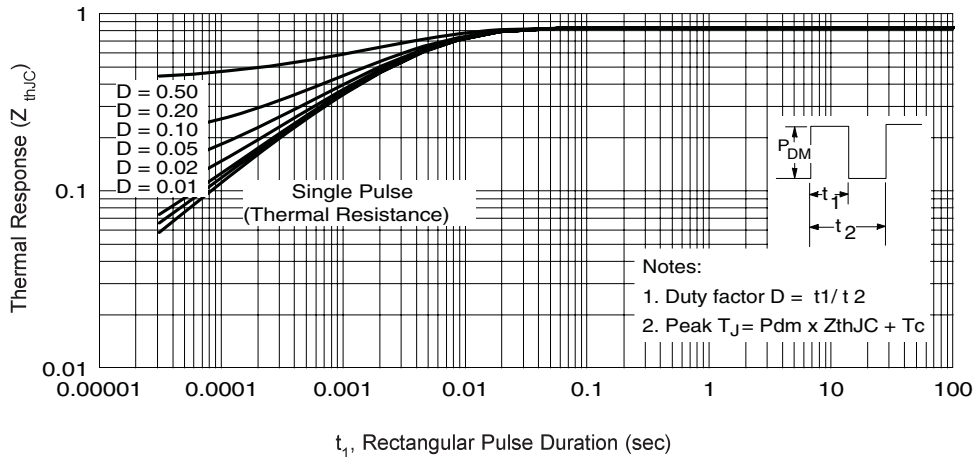


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

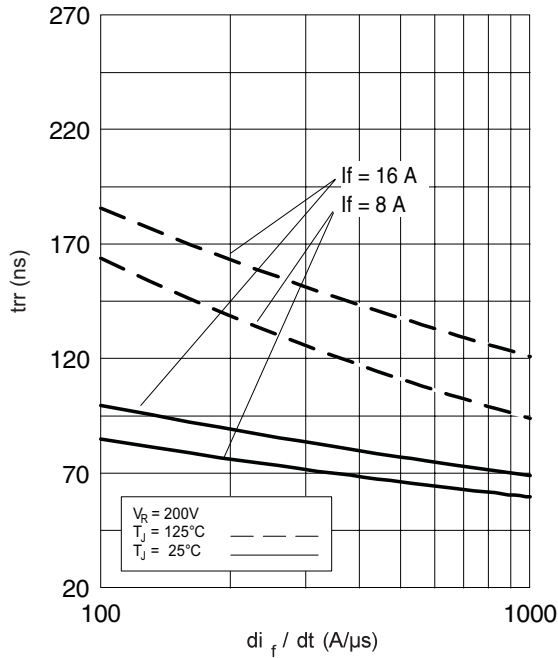


Fig. 5 - Typical Reverse Recovery Time vs.  $di_F/dt$  (Per Leg)

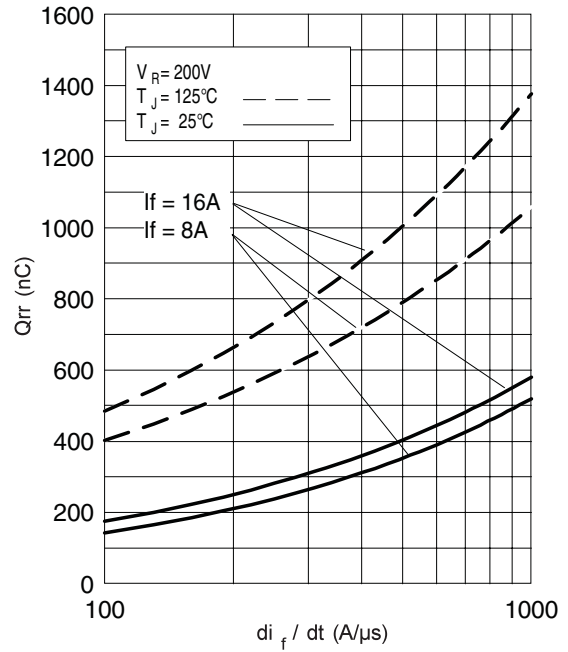


Fig. 7 - Typical Stored Charge vs.  $di_F/dt$  (Per Leg)

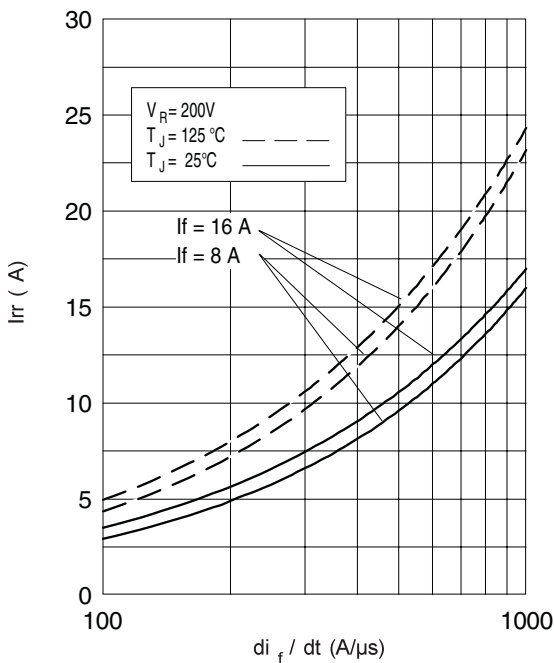


Fig. 6 - Typical Recovery Current vs.  $di_F/dt$  (Per Leg)

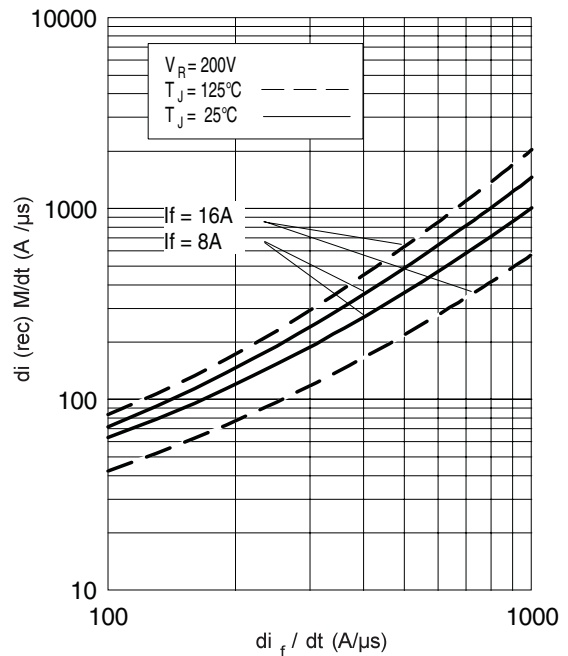


Fig. 8 - Typical  $dI_{(rec)}M/dt$  vs.  $di_F/dt$  (Per Leg)

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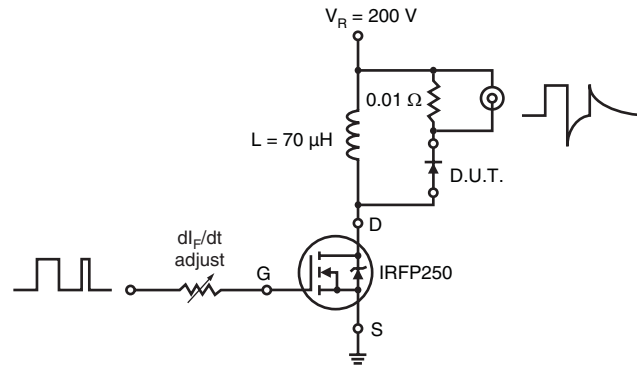
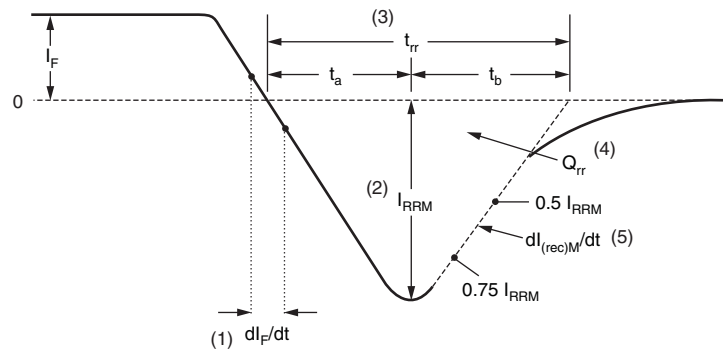


Fig. 9 - Reverse Recovery Parameter Test Circuit



- (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)  $dl_{(rec)M}/dt$  - peak rate of change of current during  $t_b$  portion of  $t_{rr}$

Fig. 10 - Reverse Recovery Waveform and Definitions

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?95221">http://www.vishay.com/doc?95221</a>
Part marking information	<a href="http://www.vishay.com/doc?95224">http://www.vishay.com/doc?95224</a>



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