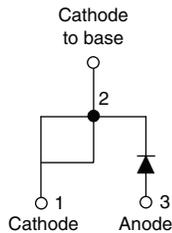


HEXFRED®

Ultrafast Soft Recovery Diode, 16 A



TO-247AC modified



FEATURES

- Ultrafast and ultrasoft recovery
- Very low I_{RRM} and Q_{rr}
- Designed and qualified according to JEDEC®-JESD47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



BENEFITS

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

DESCRIPTION

VS-HFA16PB120... 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 VS-HFA16PB120... 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 VS-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.

PRODUCT SUMMARY

Package	TO-247AC modified (2 pins)
$I_{F(AV)}$	16 A
V_R	1200 V
V_F at I_F	2.3 V
t_{rr} typ.	30 ns
T_J max.	150 °C
Diode variation	Single die

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



ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ 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}	$I_F = 16\text{ A}$	See fig. 1	-	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}	$V_R = V_R$ rated		-	0.75	20	μA
		$T_J = 125\text{ }^\circ\text{C}, V_R = 0.8 \times V_R$ 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

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time See fig. 5, 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}	$T_J = 25\text{ }^\circ\text{C}$	See fig. 5, 10	-	90	135	
	t_{rr2}	$T_J = 125\text{ }^\circ\text{C}$		-	164	245	
Peak recovery current See fig. 6	I_{RRM1}	$T_J = 25\text{ }^\circ\text{C}$		See fig. 5, 10	-	5.8	10
	I_{RRM2}	$T_J = 125\text{ }^\circ\text{C}$	-		8.3	15	
Reverse recovery charge See fig. 7	Q_{rr1}	$T_J = 25\text{ }^\circ\text{C}$	See fig. 5, 10		-	260	675
	Q_{rr2}	$T_J = 125\text{ }^\circ\text{C}$		-	680	1838	
Peak rate of fall of recovery current during t_b See fig. 8	$di_{(rec)M}/dt1$	$T_J = 25\text{ }^\circ\text{C}$		See fig. 5, 10	-	120	-
	$di_{(rec)M}/dt2$	$T_J = 125\text{ }^\circ\text{C}$	-		76	-	

THERMAL - MECHANICAL SPECIFICATIONS							
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-247AC modified (JEDEC)		HFA16PB120			

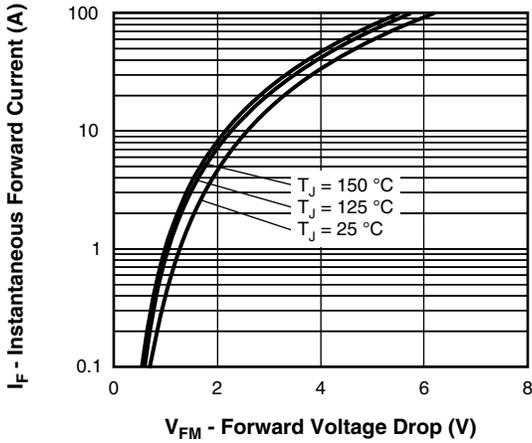


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

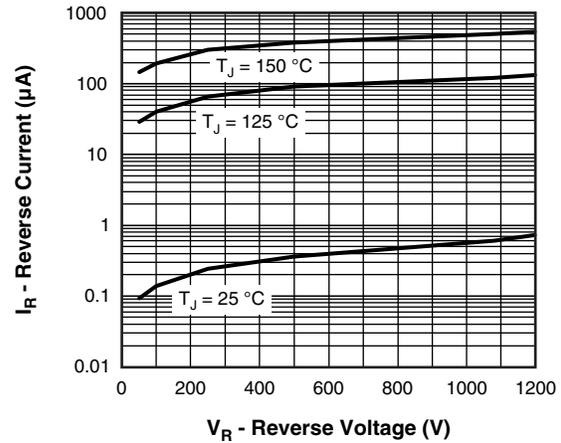


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

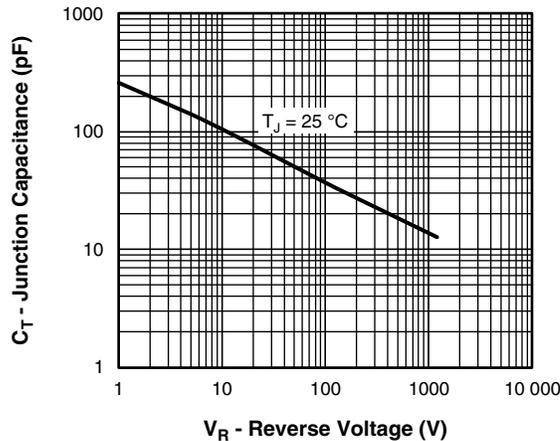


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

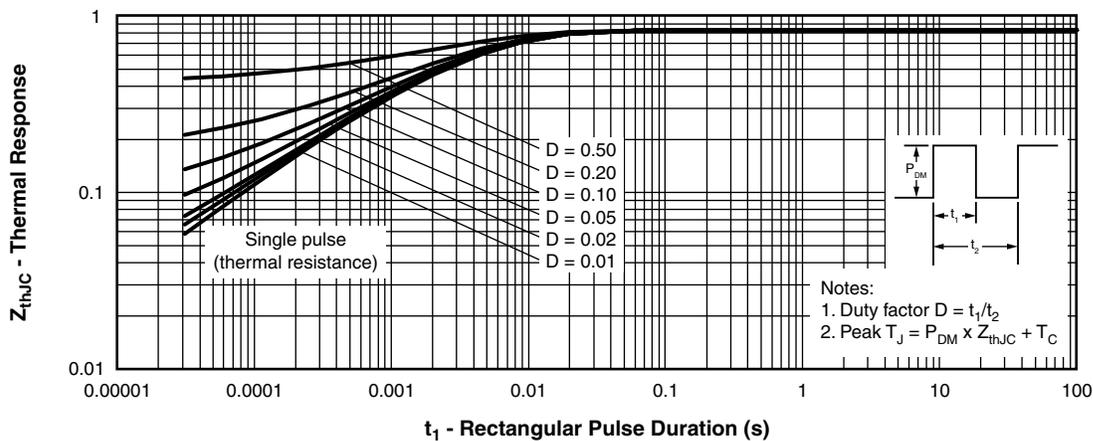


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

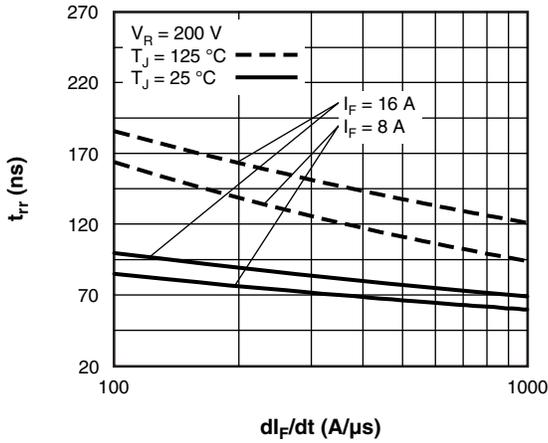


Fig. 5 - Typical Reverse Recovery Time vs. di_F/dt (Per Leg)

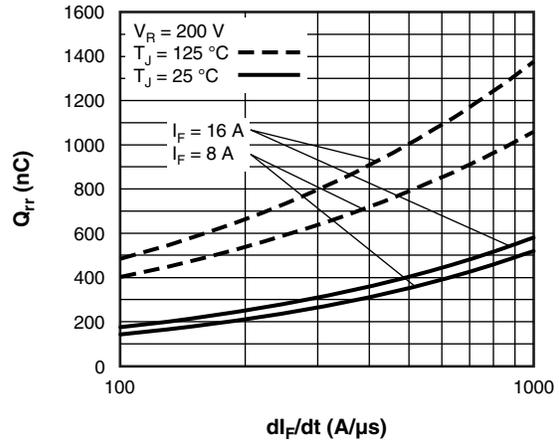


Fig. 7 - Typical Stored Charge vs. di_F/dt (Per Leg)

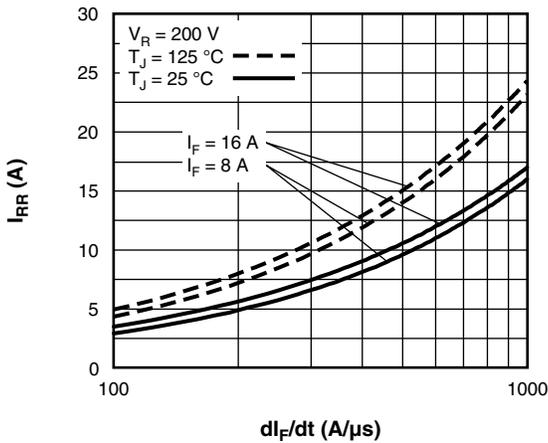


Fig. 6 - Typical Recovery Current vs. di_F/dt (Per Leg)

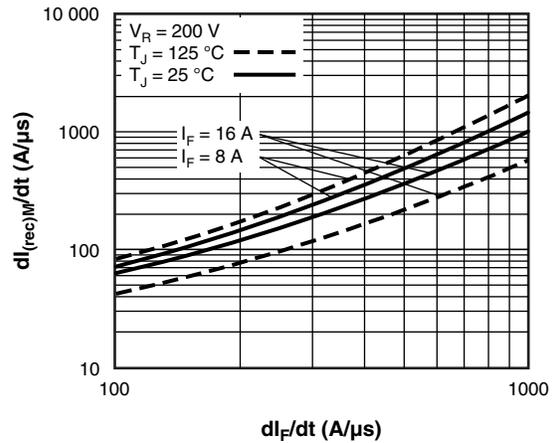


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_F/dt (Per Leg)

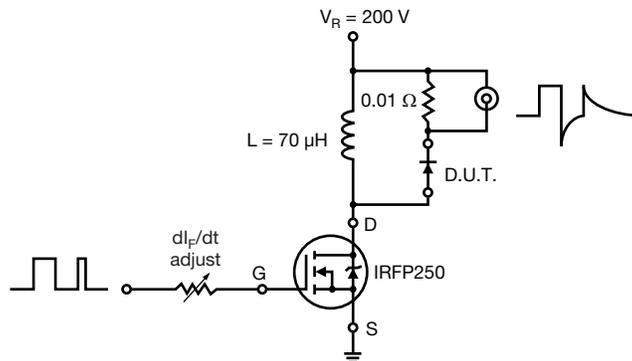
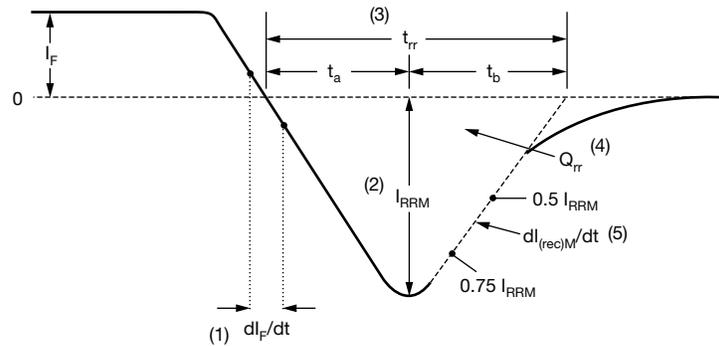


Fig. 9 - Reverse Recovery Parameter Test Circuit



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

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

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

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

(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.

(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	VS-	HF	A	16	PB	120	PbF
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - HEXFRED® family
- 3** - Electron irradiated
- 4** - Current rating (16 = 16 A)
- 5** - PB = TO-247AC modified
- 6** - Voltage rating: (120 = 1200 V)
- 7** - Environmental digit:

PbF = lead (Pb)-free and RoHS-compliant

-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA16PB120PbF	25	500	Antistatic plastic tube
VS-HFA16PB120-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95541
Part marking information	TO-247AC modified PbF www.vishay.com/doc?95255
	TO-247AC modified -N3 www.vishay.com/doc?95442
SPIICE model	www.vishay.com/doc?95672



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