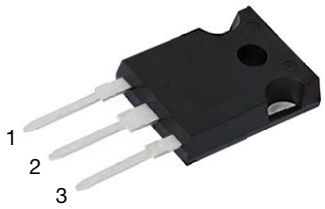
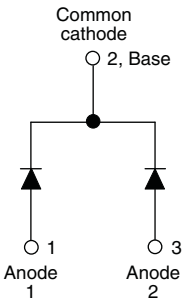
HEXFRED®
Ultrafast Soft Recovery Diode, 2 x 6 A



TO-247AC 3L



FEATURES

- Ultrafast and ultrasoft recovery
- Very low I_{RRM} and Q_{rr}
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT
HALOGEN FREE

BENEFITS

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

DESCRIPTION

VS-HFA12PA120C... is a state of the art center tap 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. The VS-HFA12PA120C... has basic ratings of 1200 V and 6 A per leg continuous current. 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-HFA12PA120C... is ideally suited for applications in power supplies and power conversion systems (such as inverters, converters, UPS systems, and power factor correction circuits), motor drives, and many other similar applications where high speed, high efficiency is needed.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 x 6 A
V_R	1200 V
V_F at I_F	2.4 V
t_{rr} typ.	26 ns
T_J max.	150 °C
Package	TO-247AC 3L
Circuit configuration	Common cathode

ABSOLUTE MAXIMUM RATINGS					
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage		V_R		1200	V
Maximum continuous forward current	per leg	I_F	T_C = 100 °C	6	A
	per device			12	
Single pulse forward current		I_{FSM}	t_p = 10 ms	80	
Maximum repetitive forward current		I_{FRM}		24	
Maximum power dissipation		P_D	T_C = 25 °C	62.5	W
			T_C = 100 °C	25	
Operating junction and storage temperature range		T_J, T_{Stg}		-55 to +150	°C

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ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Cathode to anode breakdown voltage	V_{BR}	I_R = 100 µA	1200	-	-	V
Maximum forward voltage	V_{FM}	I_F = 6 A	-	2.7	3.0	
		I_F = 12 A	-	3.5	3.9	
		I_F = 6 A, T_J = 125 °C	-	2.4	2.8	
Maximum reverse leakage current	I_{RM}	V_R = V_R rated	-	0.26	5.0	µA
		T_J = 125 °C, V_R = 0.8 x V_R rated	-	110	500	
Junction capacitance	C_T	V_R = 200 V	-	9.0	14	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 1.0 A, dI_F/dt = 200 A/µs, V_R = 30 V		-	26	-	ns
	t_{rr1}	T_J = 25 °C	I_F = 6 A dI_F/dt = 200 A/µs V_R = 200 V	-	53	80	
	t_{rr2}	T_J = 125 °C		-	87	130	
Peak recovery current	I_{RRM1}	T_J = 25 °C		-	4.4	8.0	A
	I_{RRM2}	T_J = 125 °C		-	5.0	9.0	
Reverse recovery charge	Q_{rr1}	T_J = 25 °C		-	116	320	nC
	Q_{rr2}	T_J = 125 °C		-	233	585	
Peak rate of fall of recovery current during t_b	$dI_{(rec)M}/dt1$	T_J = 25 °C		-	180	-	A/µs
	$dI_{(rec)M}/dt2$	T_J = 125 °C		-	100	-	

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	°C
Thermal resistance, junction to case	R_{thJC}		-	-	2.0	K/W
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	40	
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 3L	HFA12PA120C			

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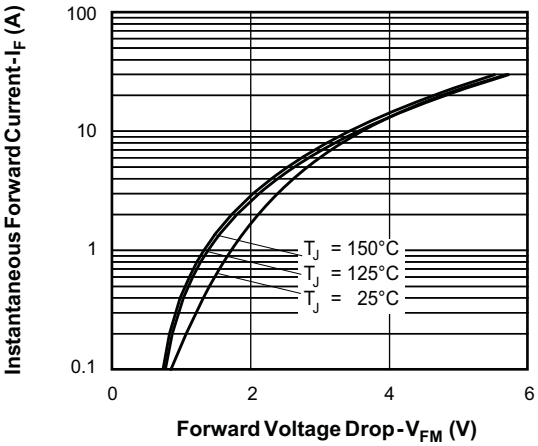


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

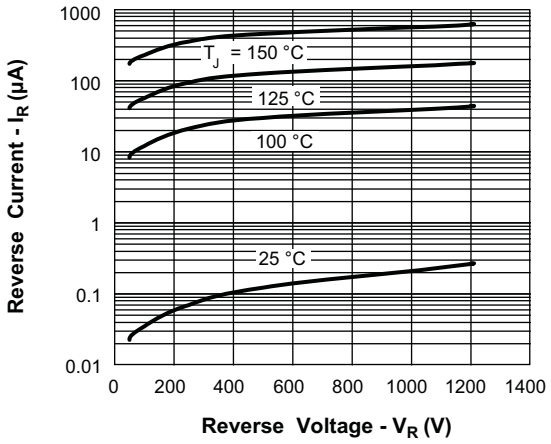


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

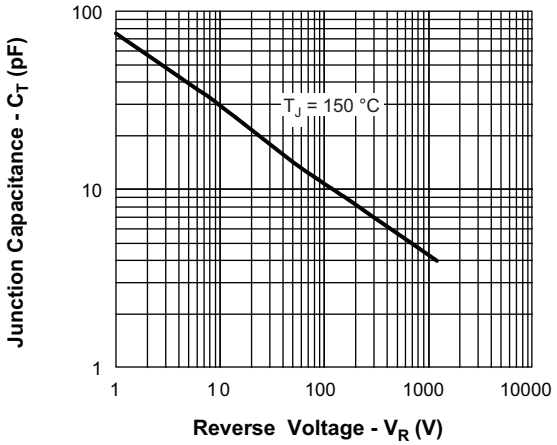


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

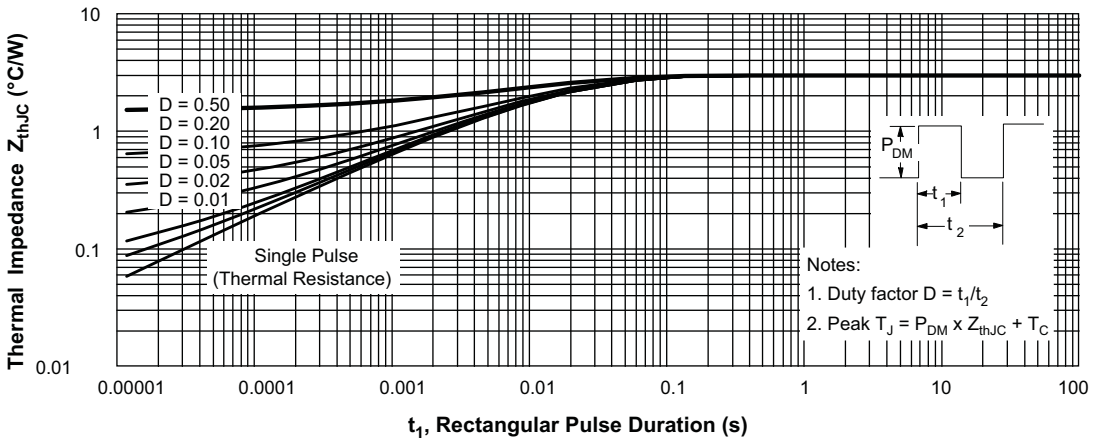


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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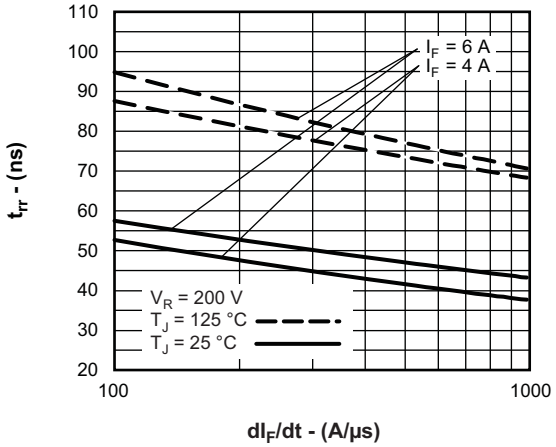


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt

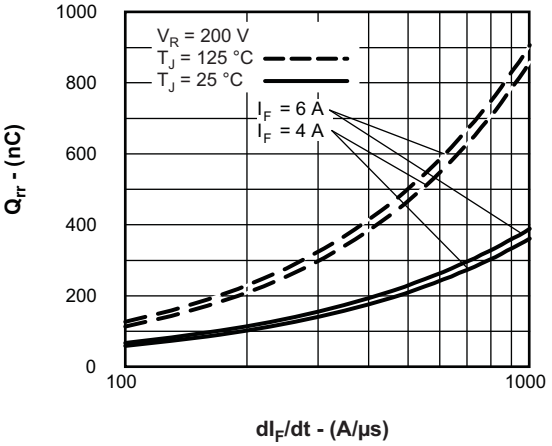


Fig. 7 - Typical Stored Charge vs. dI_F/dt

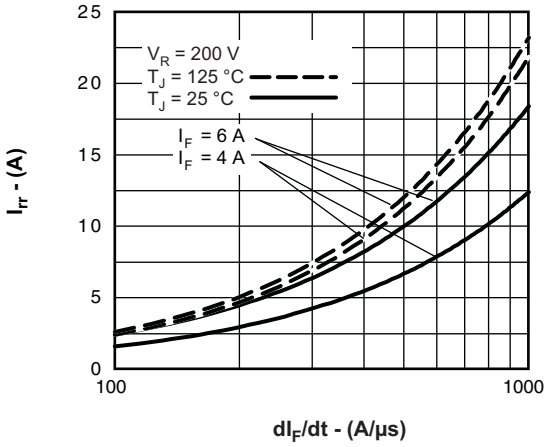


Fig. 6 - Typical Recovery Current vs. dI_F/dt

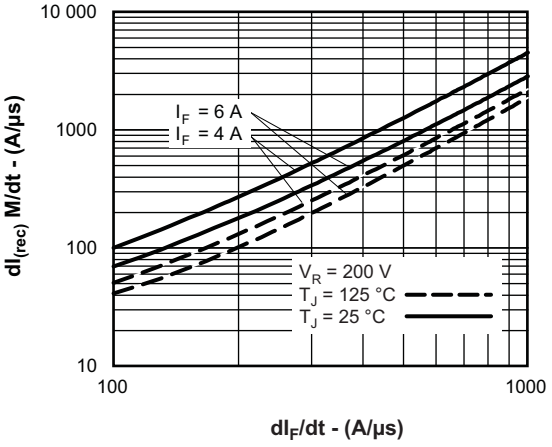
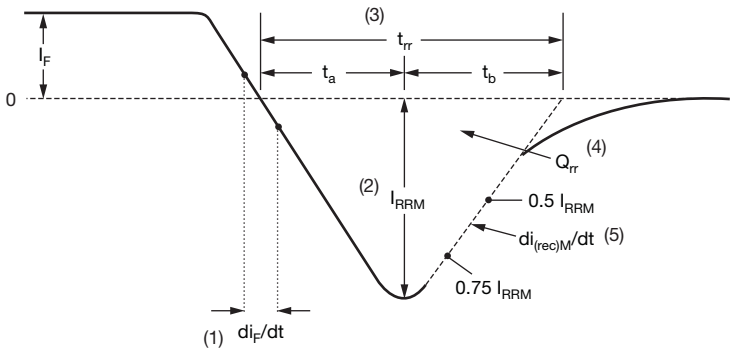


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt



(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}

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

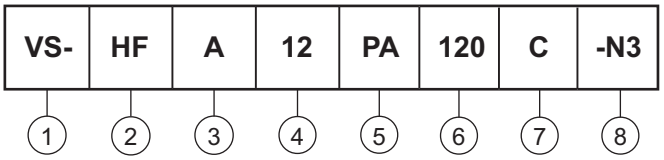
(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions

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ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product
2 - HEXFRED® family
3 - Electron irradiated
4 - Current rating (12 = 12 A)
5 - PA = TO-247AC, 3 pins
6 - Voltage rating: (120 = 1200 V)
7 - Circuit configuration
C = common cathode
8 - Environmental digit:
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

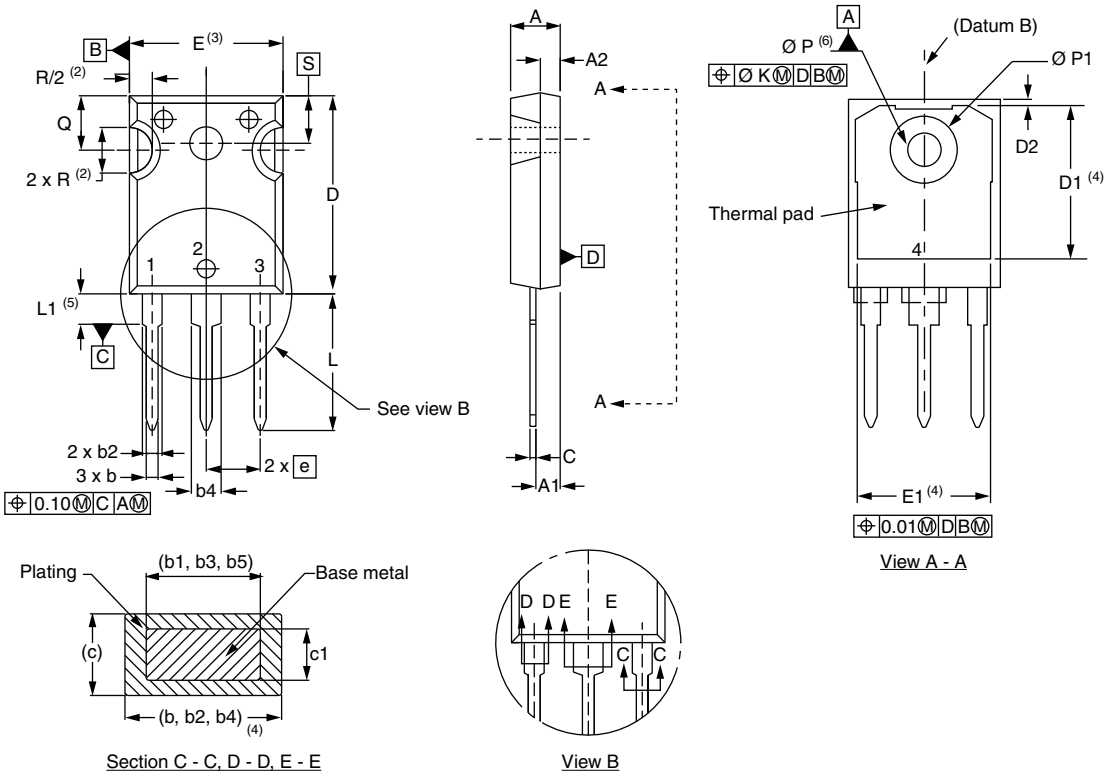
ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-HFA12PA120C-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96138
Part marking information	www.vishay.com/doc?95007

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TO-247AC 3L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.17	1.37	0.046	0.054	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.35	0.020	0.053	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
Ø K	0.254		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
Ø P	3.56	3.66	0.14	0.144	
Ø P1	-	7.39	-	0.291	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

Notes

(1) Dimensioning and tolerancing per ASME Y14.5M-1994

(2) Contour of slot optional

(3) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body

(4) Thermal pad contour optional with dimensions D1 and E1

(5) Lead finish uncontrolled in L1

(6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")

(7) Outline conforms to JEDEC® outline TO-247 with exception of dimension Q

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