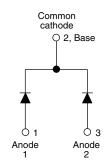


HEXFRED® Ultrafast Soft Recovery Diode, 2 x 15 A



TO-247AC 3L



PRIMARY CHARACTERISTICS						
I _{F(AV)}	2 x 15 A					
V_{R}	600 V					
V _F at I _F	1.2 V					
t _{rr} typ.	19 ns					
T _J max.	150 °C					
Package	TO-247AC 3L					
Circuit configuration	Common cathode					

FEATURES

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



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-HFA30PA60C... 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. With basic ratings of 600 V and 15 A per leg continuous current, the VS-HFA30PA60C... 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 tb 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-HFA30PA60C... 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.

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS		
Cathode to anode voltage	V_{R}		600	V		
Maximum continuous forward current per leg		T _C = 100 °C	15	^		
per device	I _F		30			
Single pulse forward current	I _{FSM}	t _p = 10 ms	150	Α		
Maximum repetitive forward current	I _{FRM}		60			
Maximum navvar discination	P _D	T _C = 25 °C	74	W		
Maximum power dissipation		T _C = 100 °C	29] vv		
Operating junction and storage temperature range	T _J , T _{Stg}		-55 to +150	°C		

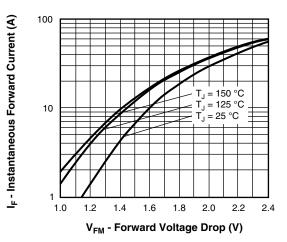


ELECTRICAL SPECIFICATIONS PER LEG (T _J = 25 °C unless otherwise specified)								
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS		
Cathode to anode breakdown voltage	V_{BR}	I _R = 100 μA		600	-	-		
Maximum forward voltage	V _{FM}	I _F = 15 A	See fig. 1	-	1.3	1.7	V	
		I _F = 30 A		-	1.5	2.0		
		I _F = 15 A, T _J = 125 °C		-	1.2	1.6		
Maximum reverse		V _R = V _R rated	Coo fig. 0	-	1.0	10		
leakage current	I_{RM} I_{RM} $T_J = 125 ^{\circ}\text{C}, V_R = 0.8 \text{x} \text{V}_R \text{rated}$ See fig. 2		See lig. 2	-	400	1000	μA	
Junction capacitance	Ст	V _R = 200 V See fig. 3		-	25	50	pF	
Series inductance	L _S	Measured lead to lead 5 mm from p	ackage body	-	12	-	nH	

DYNAMIC RECOVERY CHARACTERISTICS PER LEG (T _J = 25 °C unless otherwise specified)								
PARAMETER	SYMBOL	TEST CONDITIONS			TYP.	MAX.	UNITS	
	t _{rr}	$I_F = 1.0 \text{ A}, dI_F/dt = 200 \text{ A}$	A/μs, V _R = 30 V	-	19	-		
Reverse recovery time See fig. 5, 10	t _{rr1}	T _J = 25 °C	I _F = 15 A dI _F /dt = 200 A/μs V _R = 200 V	-	42	60	ns	
000 lig. 0, 10	t _{rr2}	T _J = 125 °C		-	70	120		
Peak recovery current	I _{RRM1}	T _J = 25 °C		-	4.0	6.0	nC A/us	
See fig. 6	I _{RRM2}	T _J = 125 °C		-	6.5	10		
Reverse recovery charge	Q _{rr1}	T _J = 25 °C		-	80	180		
See fig. 7	Q _{rr2}	T _J = 125 °C		-	220	600		
Peak rate of fall of recovery current during t _b See fig. 8	dI _{(rec)M} /dt1	T _J = 25 °C		-	250	-		
	dI _{(rec)M} /dt2	T _J = 125 °C		-	160	-	Ανμδ	

THERMAL-MECHANICAL SPECIFICATIONS PER LEG							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Lead temperature	T _{lead}	0.063" from case (1.6 mm) for 10 s	-	-	300	°C	
Junction to case, single leg conduction	R _{thJC}		-	-	1.7		
Junction to case, both legs conducting	PthJC		-	-	0.85	K/W	
Thermal resistance, junction to ambient	R _{thJA}	Typical socket mount	-	-	40	N/W	
Thermal resistance, case to heatsink	R _{thCS}	Mounting surface, flat, smooth, and greased	-	0.25	-		
Woight			-	6.0	-	g	
Weight			-	0.21	-	oz.	
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)	
Marking device		Case style TO-247AC 3L	HFA30PA60C				





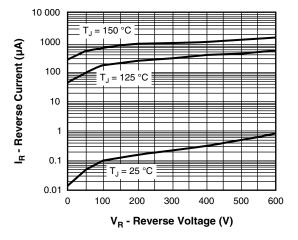


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

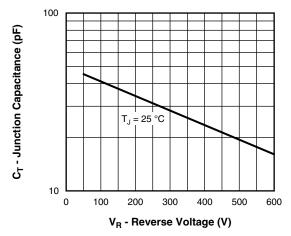


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

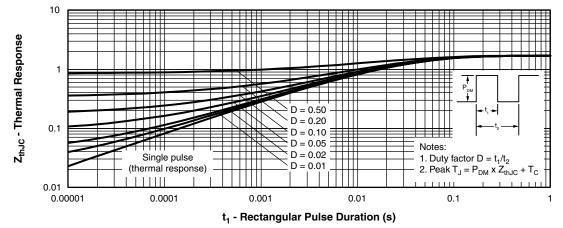


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

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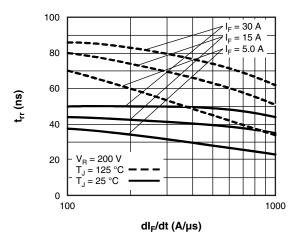


Fig. 5 - Typical Reverse Recovery Time vs. dl_E/dt (Per Leg)

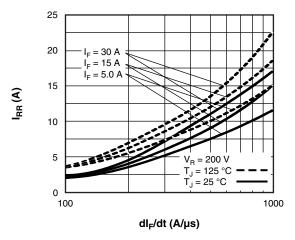


Fig. 6 - Typical Recovery Current vs. dl_F/dt (Per Leg)

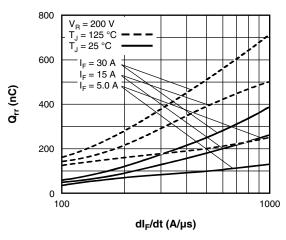


Fig. 7 - Typical Stored Charge vs. dl_E/dt (Per Leg)

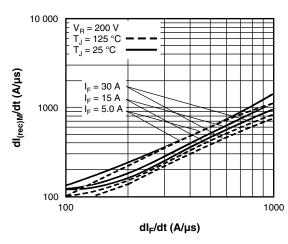
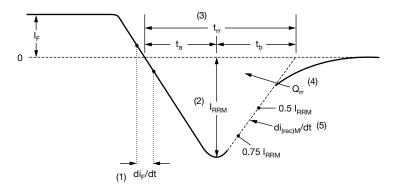


Fig. 8 - Typical dl_{(rec)M}/dt vs. dl_F/dt (Per Leg)



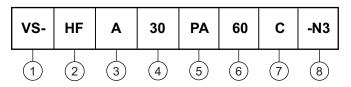
- di_F/dt rate of change of current through zero crossing
- (2) I_{RRM} peak reverse recovery current
- (3) t_{rr} reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.
- (4) $\mathbf{Q}_{\rm rr}$ area under curve defined by $\mathbf{t}_{\rm rr}$ and $\mathbf{I}_{\rm RRM}$
 - $Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$
- (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



ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - HEXFRED® family

Electron irradiated

- Current rating (30 = 30 A)

5 - PA = TO-247AC, 3 pins

Voltage rating: (60 = 600 V)

- Circuit configuration
C = common cathode

8 - Environmental digit:

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

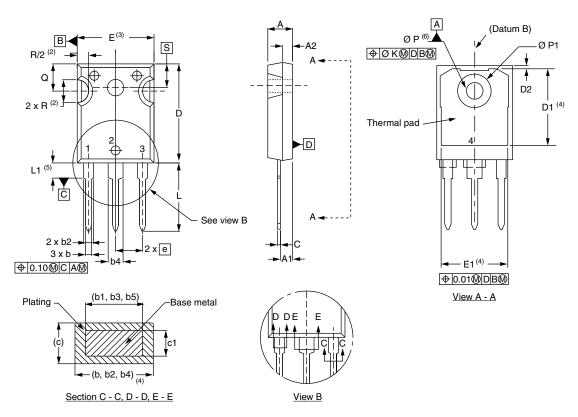
ORDERING INFORMATION (Example)							
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION				
VS-HFA30PA60C-N3	25	500	Antistatic plastic tube				

LINKS TO RELATED DOCUMENTS					
Dimensions	www.vishay.com/doc?96138				
Part marking information	www.vishay.com/doc?95007				
SPICE model	www.vishay.com/doc?96777				



TO-247AC 3L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIN	IETERS	S INCHES		NOTES
STWIBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	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	
С	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		INC	NOTES	
OTIVIDOL	MIN.	MAX.	MIN.	MAX.	NOTES
D2	0.51	1.35	0.020	0.053	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
е	5.46	BSC	0.215	BSC	
ØK	0.2	254	0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
ØΡ	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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