

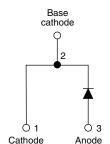
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Vishay Semiconductors

HEXFRED® Ultrafast Soft Recovery Diode, 15 A



TO-247AC 2L



PRIMARY CHARACTERISTICS				
I _{F(AV)} 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 2L			
Circuit configuration	Single			

FEATURES

- Ultrafast and ultrasoft recovery
- Very low I_{RBM} and Q_{rr}
- Designed and qualified according to JEDEC®-JESD 47





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-HFA15PB60... 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 600 V and 15 A continuous current, the VS-HFA15PB60... 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 (IRRM) 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-HFA15PB60... 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	I _F	T _C = 100 °C	15		
Single pulse forward current	I _{FSM}	t _p = 10 ms	150	Α	
Maximum repetitive forward current	I _{FRM}		60		
Maximum navvar dissination	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	



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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		600	-	-	
		I _F = 15 A		-	1.3	1.7	V
Maximum forward voltage V _{FM}	V_{FM}	I _F = 30 A	See fig. 1	-	1.5	2.0	
		I _F = 15 A, T _J = 125 °C		-	1.2	1.6	
Maximum reverse		V _R = V _R rated	Cooffe O	-	1.0	10	
leakage current		$T_J = 125 ^{\circ}\text{C}, V_R = 0.8 ^{\circ}\text{X} V_R ^{\circ}\text{rated}$	See fig. 2		400	1000	μΑ
Junction capacitance	C _T	V _R = 200 V	See fig. 3	-	25	50	pF
Series inductance	L _S	Measured lead to lead 5 mm from package body - 12		12	-	nΗ	

DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
	t _{rr}	t_{rr} $I_F = 1.0 \text{ A}, dI_F/dt = 200 \text{ A/}\mu\text{s}, V_R = 30 \text{ V}$		-	19	-	
Reverse recovery time See fig. 5, 10	t _{rr1}	T _J = 25 °C	$I_F = 15 \text{ A}$ $dI_F/dt = 200 \text{ A/}\mu\text{s}$ $V_R = 200 \text{ V}$	-	42	60	ns
Occ lig. 5, 10	t _{rr2}	T _J = 125 °C		-	74	120	
Peak recovery current See fig. 6	I _{RRM1}	T _J = 25 °C		-	4.0	6.0	A nC
	I _{RRM2}	T _J = 125 °C		-	6.5	10	
Reverse recovery charge See fig. 7	Q _{rr1}	T _J = 25 °C		-	80	180	
	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		-	188	-	- A/µs
	dI _{(rec)M} /dt2	T _J = 125 °C		-	160	- 1	Ανμδ

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	L TEST CONDITIONS		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}		-	-	1.7	
Thermal resistance, junction to ambient	R _{thJA}	Typical socket mount	-	-	40	K/W
Thermal resistance, case to heatsink	R _{thCS}	Mounting surface, flat, smooth and greased	-	0.25	-	
Weight			-	6.0	-	g
vveigni			-	0.21	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-247AC 2L	HFA15PB60			

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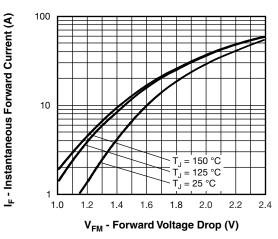


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

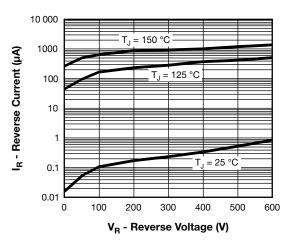


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

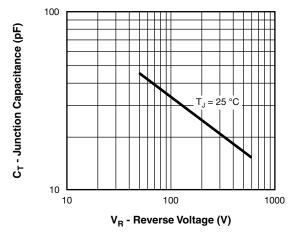


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

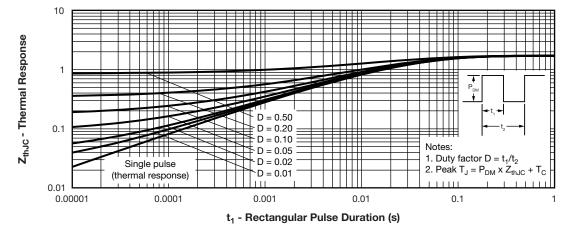


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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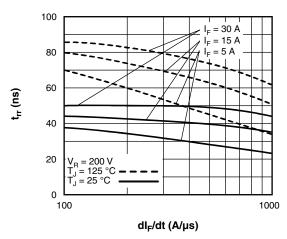


Fig. 5 - Typical Reverse Recovery Time vs. dl_E/dt

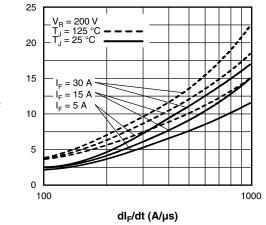


Fig. 6 - Typical Recovery Current vs. dl_F/dt

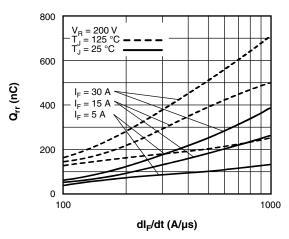


Fig. 7 - Typical Stored Charge vs. dl_F/dt

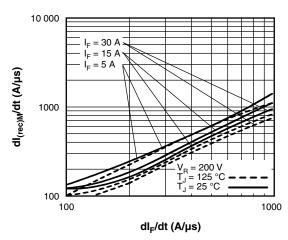
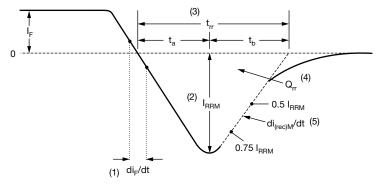


Fig. 8 - Typical dI_{(rec)M}/dt vs. dI_F/dt



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

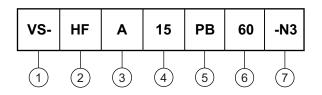
Fig. 9 - Reverse Recovery Waveform and Definitions



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ORDERING INFORMATION TABLE

Device code



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- HEXFRED® family

3 - Electron irradiated

Current rating (15 = 15 A)

5 - PB = TO-247AC, 2 pins

6 - Voltage rating: (60 = 600 V)

7 - Environmental digit:

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

ORDERING INFO	RMATION (Example)		
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA15PB60-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS			
Dimensions <u>www.vishay.com/doc?96144</u>			
Part marking information	www.vishay.com/doc?95648		



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