

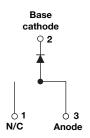
HALOGEN

FREE

HEXFRED® Ultrafast Soft Recovery Diode, 25 A



D²PAK (TO-263AB)



PRIMARY CHARACTERISTICS								
I _{F(AV)}	25 A							
V_{R}	600 V							
V _F at I _F	1.3 V							
t _{rr} (typ.)	23 ns							
T _J max.	150 °C							
Package	D ² PAK (TO-263AB)							
Circuit configuration	Single							

FEATURES

- Ultrafast and ultrasoft recovery
- Very low I_{RRM} and Q_{rr}
- · Specified at operating conditions
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Material categorization: for definitions of compliance please see www.vishav.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-HFA25TB60S 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 25 A continuous current, the VS-HFA25TB60S 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 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-HFA25TB60S 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	25							
Single pulse forward current	I _{FSM}		225	Α						
Maximum repetitive forward current	I _{FRM}		100							
Maximum power dissipation	В	T _C = 25 °C	125	W						
Maximum power dissipation	P_{D}	T _C = 100 °C	50]						
Operating junction and storage temperature range	T _J , T _{Stg}		-55 to +150	°C						





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	-	-				
Maximum forward voltage	V_{FM}	I _F = 25 A		-	1.3	1.7	V		
		I _F = 50 A	See fig. 1	-	1.5	2.0			
		I _F = 25 A, T _J = 125 °C		-	1.3	1.7			
Maximum reverse	1	V _R = V _R rated	See fig. 2	-	1.5	20	μΑ		
leakage current	I _{RM}	$T_J = 125$ °C, $V_R = 0.8 \times V_R$ rated	See lig. 2	-	600	2000			
Junction capacitance	C _T	V _R = 200 V See fig. 3		-	55	100	pF		
Series inductance	L _S	Measured lead to lead 5 mm from pa	-	8.0	-	nH			

DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified)									
PARAMETER	SYMBOL	TEST CO	MIN.	TYP.	MAX.	UNITS			
	t _{rr}	$I_F = 1.0 \text{ A}, dI_F/dt = 200$	A/ μ s, $V_R = 30 \text{ V}$	-	23	-	ns		
Reverse recovery time See fig. 5	t _{rr1}	T _J = 25 °C		-	50	75			
occ lig. o	t _{rr2}	T _J = 125 °C	I _F = 25 A	-	105	160			
Peak recovery current	I _{RRM1}	T _J = 25 °C		-	4.5	10	A nC A/μs		
See fig. 6	I _{RRM2}	T _J = 125 °C		-	8.0	15			
Reverse recovery charge	Q _{rr1}	T _J = 25 °C	dl _F /dt = 200 A/μs V _B = 200 V	-	112	375			
See fig. 7	Q _{rr2}	T _J = 125 °C	V _R = 200 V	-	420	1200			
Peak rate of fall 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	-			

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}		-	-	1.0	K/W				
Thermal resistance, junction-to-ambient	R _{thJA}	Typical socket mount	-	-	80	I IVVV				
Weight			-	2.0	-	g				
vveigni			-	0.07		oz.				
Marking device		Case style D ² PAK (TO-263AB)		HFA25TB60S						

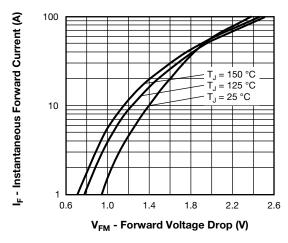


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

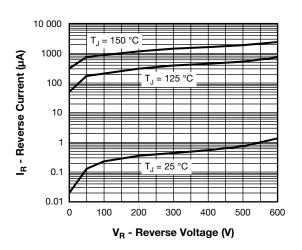


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

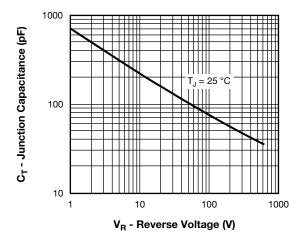


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

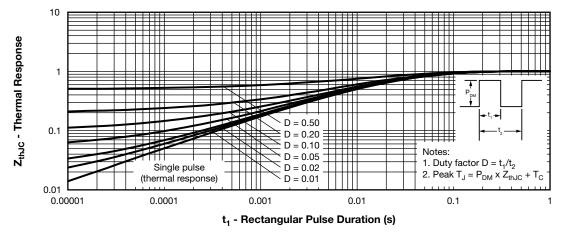


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics



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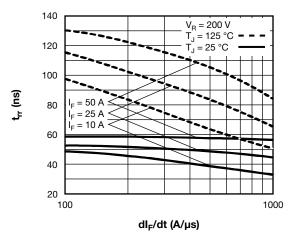


Fig. 5 - Typical Reverse Recovery Time vs. dl_F/dt

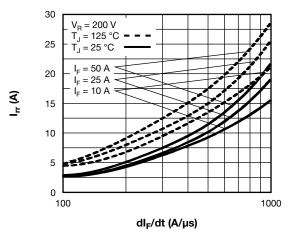


Fig. 6 - Typical Recovery Current vs. dl_F/dt

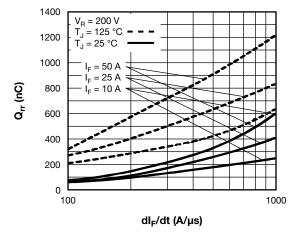


Fig. 7 - Typical Stored Charge vs. dl_F/dt

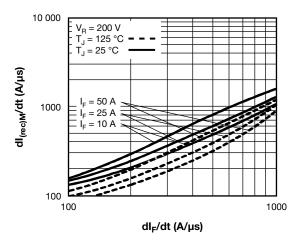
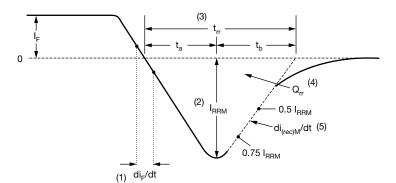


Fig. 8 - Typical dI_{(rec)M}/dt vs. dI_F/dt

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- (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 $\rm l_F$ to point where a line passing through 0.75 $\rm l_{RRM}$ and 0.50 $\rm l_{RRM}$ extrapolated to zero current.
- (4) \mathbf{Q}_{rr} area under curve defined by \mathbf{t}_{rr} and \mathbf{I}_{RRM}

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

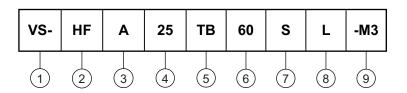
(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - HEXFRED® family

Process designator: A = electron irradiated

4 - Current rating (25 = 25 A)

Package outline (TB = TO-220, 2 leads)

6 - Voltage rating (60 = 600 V)

7 - $S = D^2PAK (TO-263AB)$

8 - • None = tube

• L = tape and reel (left oriented)

• R = tape and reel (right oriented)

9 - Environmental digit:

-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)								
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION						
VS-HFA25TB60S-M3	50	Antistatic plastic tube						
VS-HFA25TB60SR-M3	800	13" diameter reel						
VS-HFA25TB60SL-M3	800	13" diameter reel						

LINKS TO RELATED DOCUMENTS							
Dimensions	www.vishay.com/doc?96164						
Part marking information	www.vishay.com/doc?95444						
Packaging information	www.vishay.com/doc?96424						



D²PAK

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	NOTES	SYMBOL	MILLIM	ETERS	INC	HES	NOTES
STWIBOL	MIN.	MAX.	MIN.	MAX.	NOTES		STWBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	4.06	4.83	0.160	0.190			D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010			Е	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039			E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4		е	2.54 BSC 0.100 BSC		BSC		
b2	1.14	1.78	0.045	0.070			Н	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4		L	1.78	2.79	0.070	0.110	
С	0.38	0.74	0.015	0.029			L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4		L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065			L3	0.25	BSC	0.010	BSC	
D	8.51	9.65	0.335	0.380	2		L4	4.78	5.28	0.188	0.208	

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) 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 outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inches
- (7) Outline conforms to JEDEC® outline TO-263AB

Revision: 13-Jul-17 Document Number: 96164



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