HEXFRED®,
Ultrafast Soft Recovery Diode, 8 A

D²PAK (TO-263AB)

Base cathode

○ **2**

○ **1**   ○ **3**
N/C   **Anode**
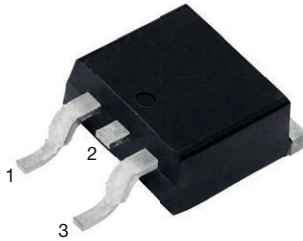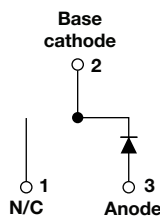
FEATURES

- 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.vishay.com/doc?99912

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-HFA08TB120S 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 8 A continuous current, the VS-HFA08TB120S 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-HFA08TB120S 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.

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	8 A
V_R	1200 V
V_F at I_F	2.4 V
t_{rr} (typ.)	28 ns
T_J max.	150 °C
Package	D²PAK (TO-263AB)
Circuit configuration	Single

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 °C	8	A
Single pulse forward current	I_{FSM}		130	
Maximum repetitive forward current	I_{FRM}		32	
Maximum power dissipation	P_D	T_C = 25 °C	73.5	W
		T_C = 100 °C	29	
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	1200	-	-	V
Maximum forward voltage	V$_{FM}$	I$_F$ = 8.0 A	-	2.6	3.3	
		I$_F$ = 16 A	-	3.4	4.3	
		I$_F$ = 8.0 A, T$_J$ = 125 °C	-	2.4	3.1	
Maximum reverse leakage current	I$_{RM}$	V$_R$ = V$_R$ rated	-	0.31	10	µA
		T$_J$ = 125 °C, V$_R$ = 0.8 x V$_R$ rated	-	135	1000	
Junction capacitance	C$_T$	V$_R$ = 200 V	-	11	20	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		-	28	-	ns
	t$_{rr1}$	T$_J$ = 25 °C	I$_F$ = 8.0 A dI$_F$/dt = 200 A/µs V$_R$ = 200 V	-	63	95	
	t$_{rr2}$	T$_J$ = 125 °C		-	106	160	
Peak recovery current	I$_{RRM1}$	T$_J$ = 25 °C		-	4.5	8.0	A
	I$_{RRM2}$	T$_J$ = 125 °C		-	6.2	11	
Reverse recovery charge	Q$_{rr1}$	T$_J$ = 25 °C		-	140	380	nC
	Q$_{rr2}$	T$_J$ = 125 °C		-	335	880	
Peak rate of fall of recovery current during t$_b$	dI$_{(rec)M}$/dt1	T$_J$ = 25 °C		-	133	-	A/µs
	dI$_{(rec)M}$/dt2	T$_J$ = 125 °C		-	85	-	

THERMAL - MECHANICAL SPECIFICATIONS

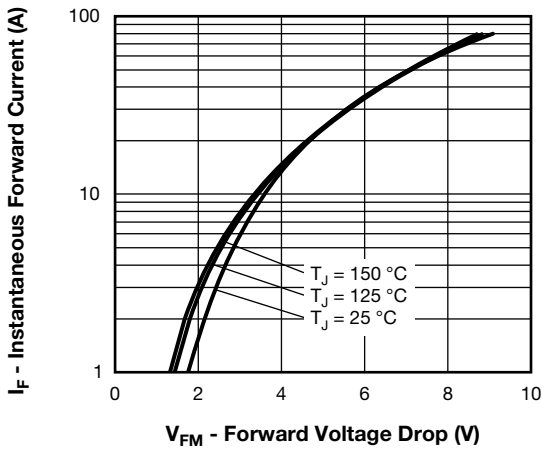| PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Lead temperature	T$_{lead}$	0.063" from case (1.6 mm) for 10 s	-	-	300	°C
Thermal resistance, junction to case	R$_{thJC}$		-	-	1.7	K/W
Thermal resistance, junction to ambient	R$_{thJA}$	Typical socket mount	-	-	40	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Marking device		Case style D^{2}PAK (TO-263AB)		HFA08TB120S		

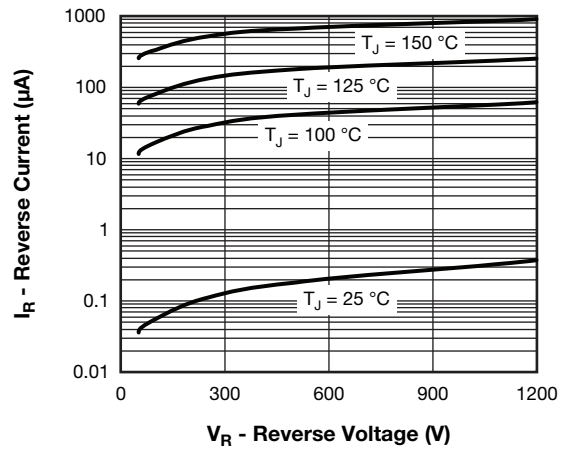Fig. 1 - Maximum Forward Voltage Drop Characteristics

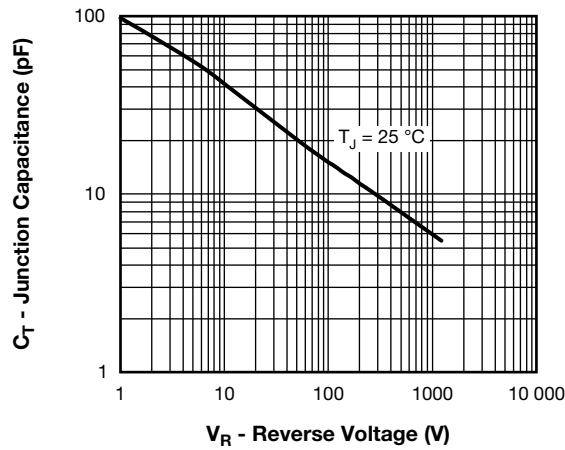Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

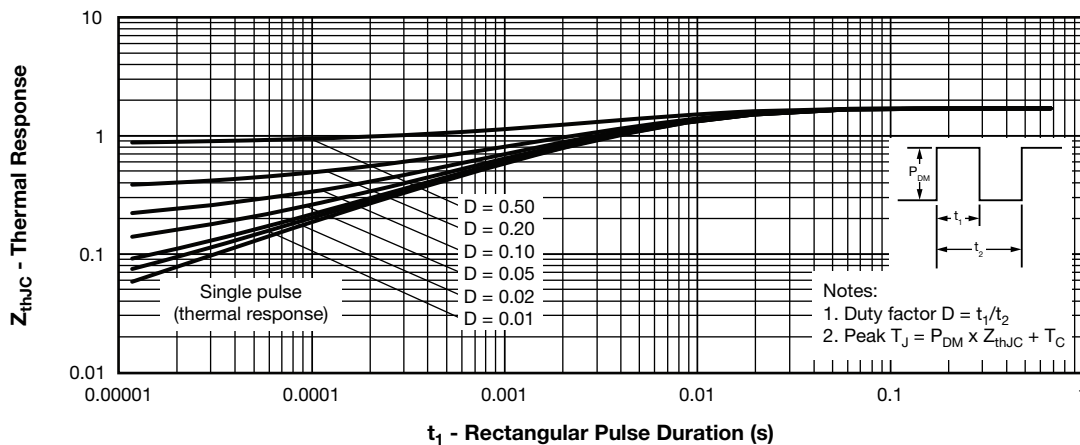Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

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

Notes:
1. Duty factor D = t_1/t_2
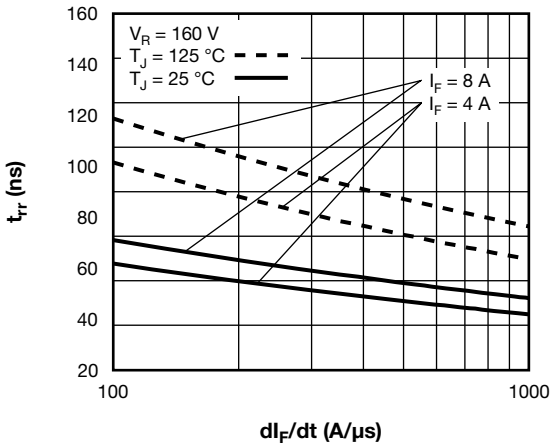2. Peak T_J = P_{DM} x Z_{thJC} + T_C

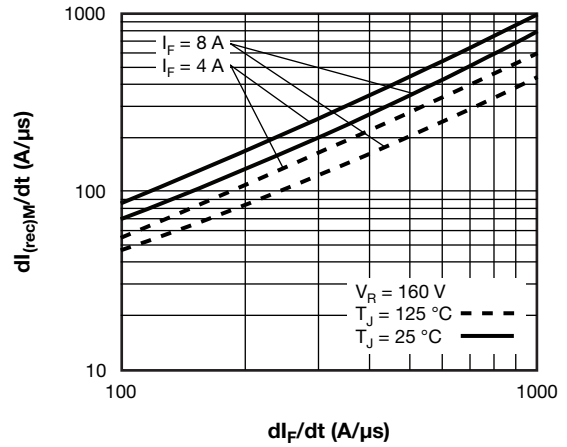Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt

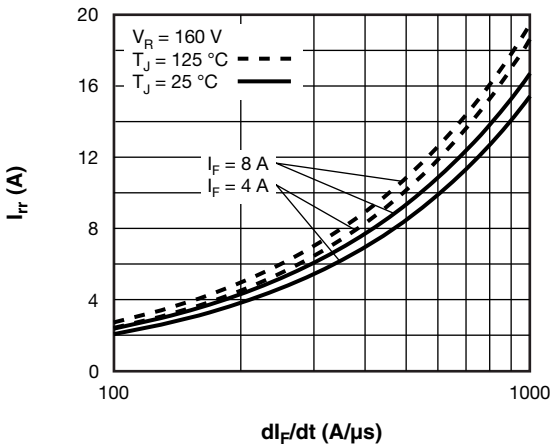
Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt

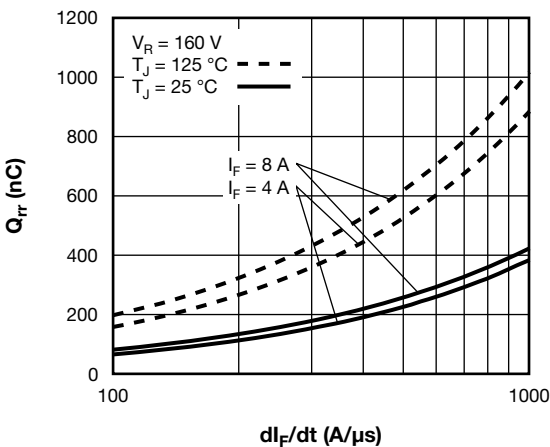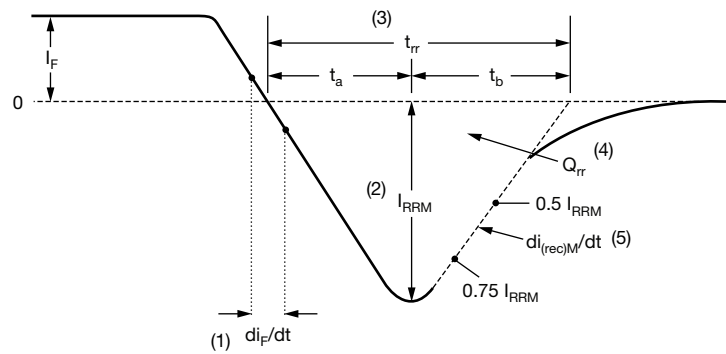Fig. 6 - Typical Recovery Current vs. dI_F/dt

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

(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

ORDERING INFORMATION TABLE

Device code	VS-	HF	A	08	TB	120	S	L	-M3
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

1 - Vishay Semiconductors product

2 - HEXFRED® family

3 - Process designator: A = electron irradiated

4 - Current rating (08 = 8 A)

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

6 - Voltage rating (120 = 1200 V)

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

8 - • None = tube (50 pieces)

    • 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)

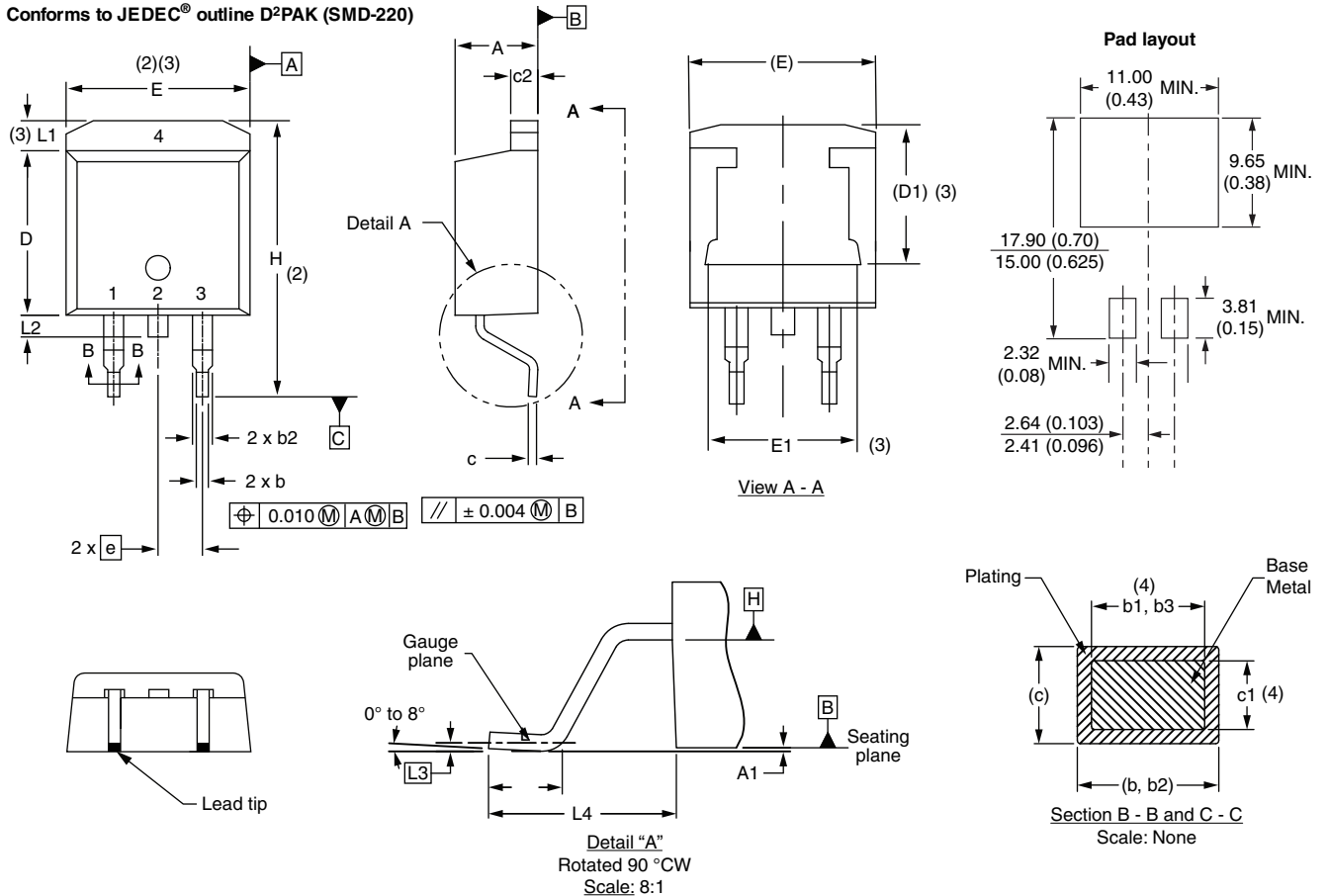| PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-HFA08TB120S-M3	50	Antistatic plastic tube
VS-HFA08TB120SR-M3	800	13" diameter reel
VS-HFA08TB120SL-M3	800	13" diameter reel

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

Conforms to JEDEC® outline D²PAK (SMD-220)

Detail A

View A - A

Pad layout

11.00 (0.43) MIN.
9.65 (0.38) MIN.
17.90 (0.70) / 15.00 (0.625)
3.81 (0.15) MIN.
2.32 (0.08) MIN.
2.64 (0.103) / 2.41 (0.096)

Lead tip

Gauge plane

0° to 8°

L3

L4

Detail "A"
Rotated 90 °CW
Scale: 8:1

H

B

Seating plane

A1

Plating

Base Metal

b1, b3

(c)

c1 (4)

(b, b2)

Section B - B and C - C
Scale: None

⊕ 0.010 Ⓜ A Ⓜ B

// ± 0.004 Ⓜ B

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
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

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