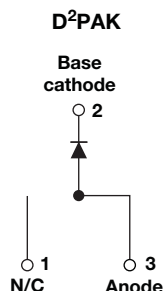


HEXFRED® Ultrafast Soft Recovery Diode, 25 A



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 260 °C
- AEC-Q101 qualified
- 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-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 (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-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.

PRODUCT SUMMARY

Package	TO-263AB (D ² PAK)
$I_{F(AV)}$	25 A
V_R	600 V
V_F at I_F	1.7 V
t_{rr} (typ.)	23 ns
T_J max.	150 °C
Diode variation	Single die

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Maximum continuous forward current	I_F	$T_C = 100\text{ °C}$	25	A
Single pulse forward current	I_{FSM}		225	
Maximum repetitive forward current	I_{FRM}		100	
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	125	W
		$T_C = 100\text{ °C}$	50	
Operating junction and storage temperature range	T_J, T_{Stg}		- 55 to + 150	°C

**ELECTRICAL SPECIFICATIONS** ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V_{BR}	$I_R = 100\text{ }\mu\text{A}$	600	-	-	
Maximum forward voltage	V_{FM}	$I_F = 25\text{ A}$	-	1.3	1.7	V
		$I_F = 50\text{ A}$	-	1.5	2.0	
		$I_F = 25\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$	-	1.3	1.7	
Maximum reverse leakage current	I_{RM}	$V_R = V_R\text{ rated}$	-	1.5	20	μA
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = 0.8 \times V_R\text{ rated}$	-	600	2000	
Junction capacitance	C_T	$V_R = 200\text{ V}$	-	55	100	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time See fig. 5	t_{rr}	$I_F = 1.0\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	23	-	ns
	t_{rr1}	$T_J = 25\text{ }^{\circ}\text{C}$	-	50	75	
	t_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$	-	105	160	
Peak recovery current See fig. 6	I_{RRM1}	$T_J = 25\text{ }^{\circ}\text{C}$	-	4.5	10	A
	I_{RRM2}	$T_J = 125\text{ }^{\circ}\text{C}$	-	8.0	15	
Reverse recovery charge See fig. 7	Q_{rr1}	$T_J = 25\text{ }^{\circ}\text{C}$	-	112	375	nC
	Q_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$	-	420	1200	
Peak rate of fall recovery current during t_b See fig. 8	$dI_{(rec)M}/dt1$	$T_J = 25\text{ }^{\circ}\text{C}$	-	250	-	$\text{A}/\mu\text{s}$
	$dI_{(rec)M}/dt2$	$T_J = 125\text{ }^{\circ}\text{C}$	-	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	$^{\circ}\text{C}$
Thermal resistance, junction to case	R_{thJC}		-	-	1.0	K/W
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	80	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Marking device		Case style D ² PAK	HFA25TB60S			

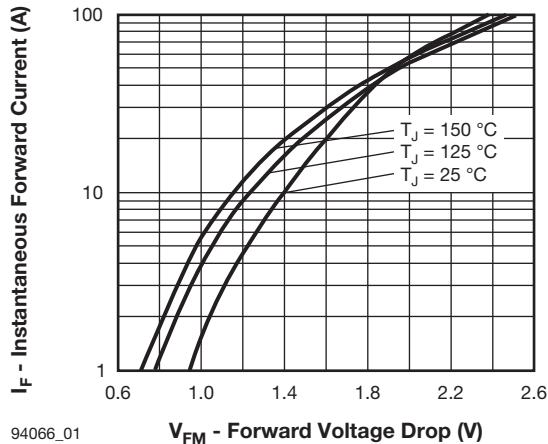


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

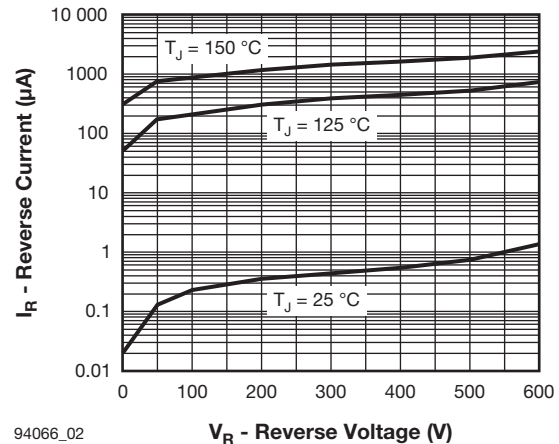


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

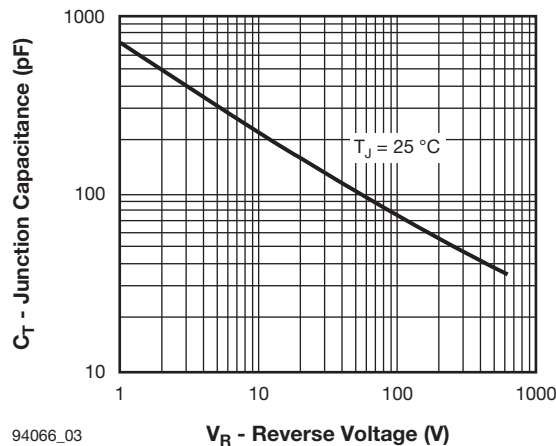


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

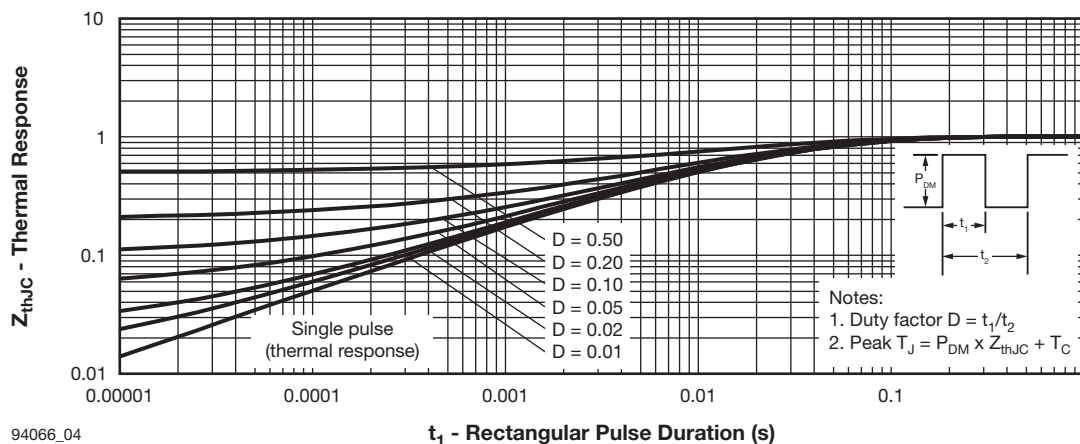
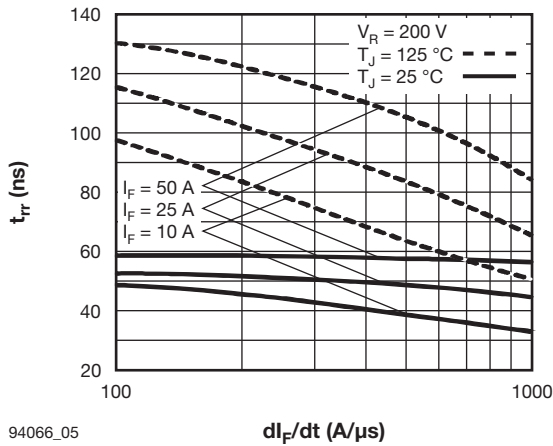
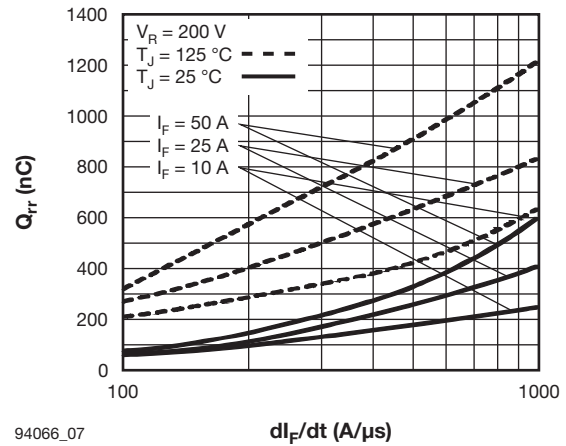


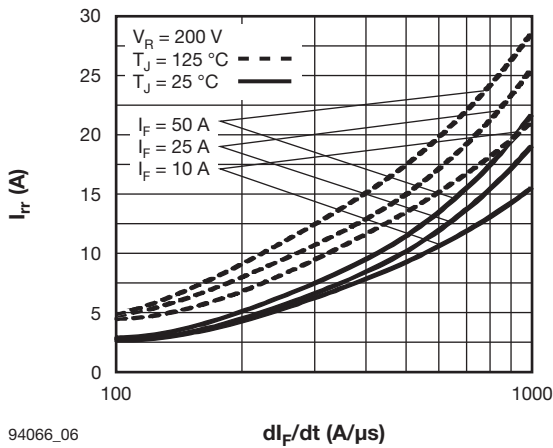
Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics



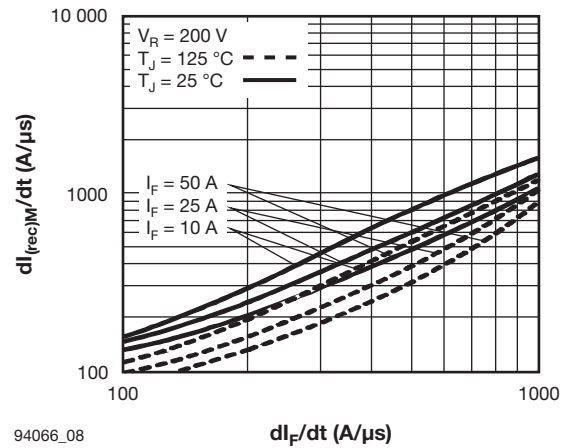
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Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt


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


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


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

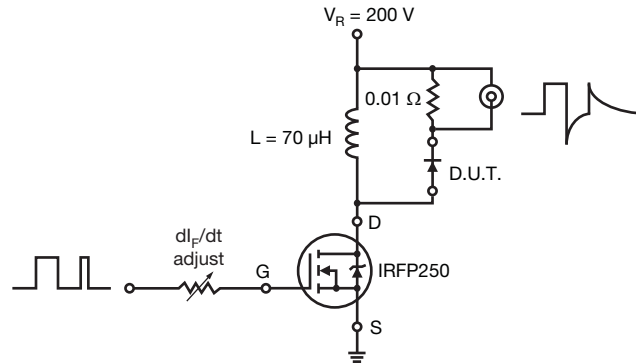


Fig. 9 - Reverse Recovery Parameter Test Circuit

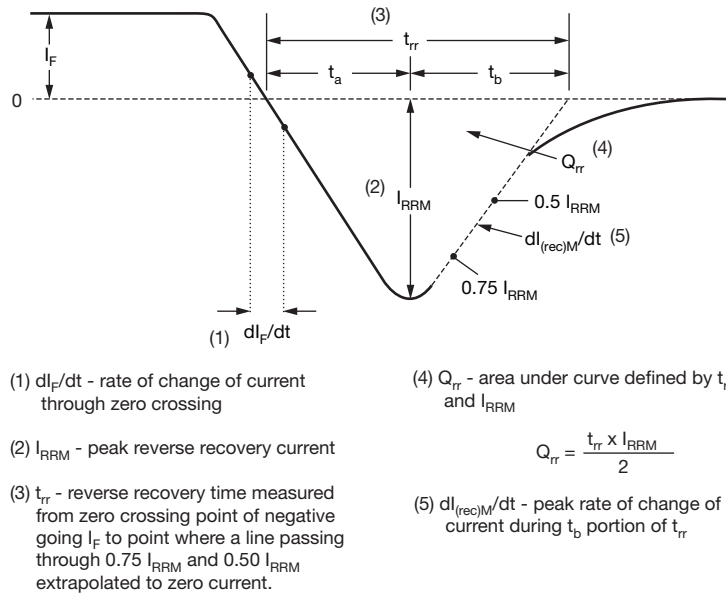


Fig. 10 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

Device code	VS-	HF	A	25	TB	60	S	TRL	PbF
	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 (25 = 25 A) |
| 5 | - | Package outline (TB = TO-220, 2 leads) |
| 6 | - | Voltage rating (60 = 600 V) |
| 7 | - | S = D ² PAK |
| 8 | - | <ul style="list-style-type: none">• None = Tube• TRL = Tape and reel (left oriented)• TRR = Tape and reel (right oriented) |
| 9 | - | <ul style="list-style-type: none">• PbF = Lead (Pb)-free• P = Lead (Pb)-free (for D²PAK TRR and TRL) |

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95046
Part marking information	www.vishay.com/doc?95054
Packaging information	www.vishay.com/doc?95032

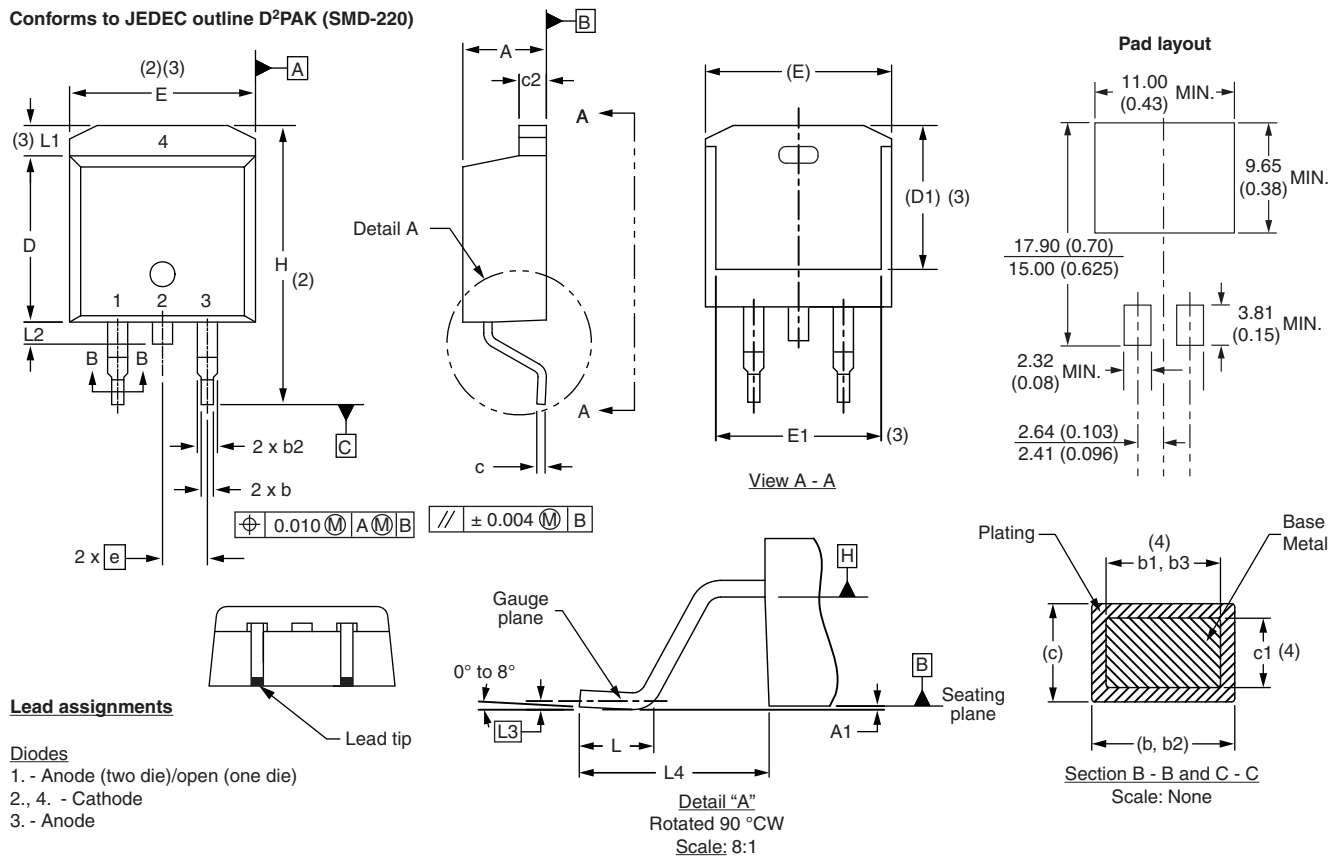
ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA25TB60SPBF	50	1000	Antistatic plastic tube
VS-HFA25TB60STRRP	800	800	13" diameter reel
VS-HFA25TB60STRLP	800	800	13" diameter reel

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



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: inch
- (7) Outline conforms to JEDEC outline TO-263AB



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