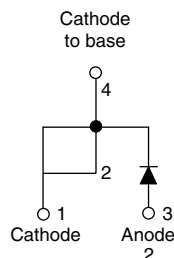


HEXFRED® Ultrafast Soft Recovery Diode, 25 A



TO-247AC modified

FEATURES

- Ultrafast and ultrasoft recovery
- Very low I_{RRM} and Q_{rr}
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified for industrial level



RoHS
COMPLIANT

BENEFITS

- Reduced RFI and EMI
- Reduced power loss in diode and switching transistor
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

DESCRIPTION

VS-HFA25PB60PbF 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-HFA25PB60PbF 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-HFA25PB60PbF 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-247AC modified (2 pins)
$I_{F(AV)}$	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	$T_C = 25\text{ °C}$	151	W
		$T_C = 100\text{ °C}$	60	
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	-	-	V
Maximum forward voltage	V_{FM}	$I_F = 25\text{ A}$	-	1.3	1.7	
		$I_F = 50\text{ A}$	-	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}	$V_R = V_R$ rated	-	1.5	20	μA
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = 0.8 \times V_R$ 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	-	12	-	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, 10	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, 10	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, 10	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 of recovery current during t_b See fig. 8, 10	$dI_{(rec)M}/dt1$	$T_J = 25\text{ }^{\circ}\text{C}$	-	250	-	A/ μs
	$dI_{(rec)M}/dt2$	$T_J = 125\text{ }^{\circ}\text{C}$	-	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}		-	-	0.83	K/W
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	40	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.25	-	
Weight			-	6.0	-	g
			-	0.21	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-247AC modified (JEDEC)	HFA25PB60			

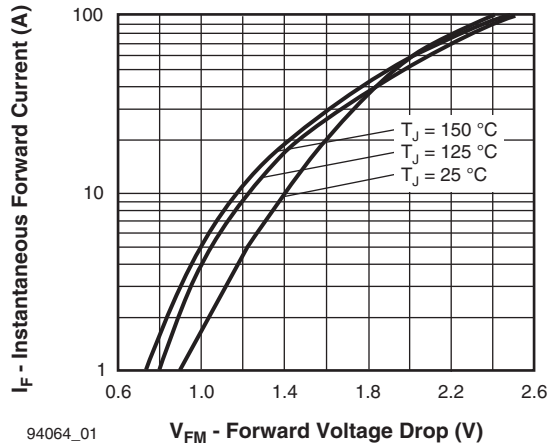


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

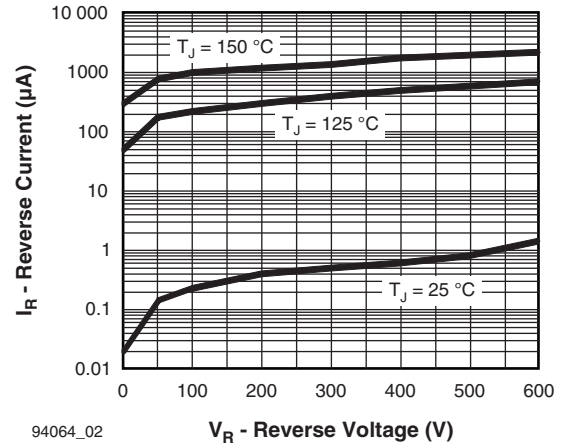


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

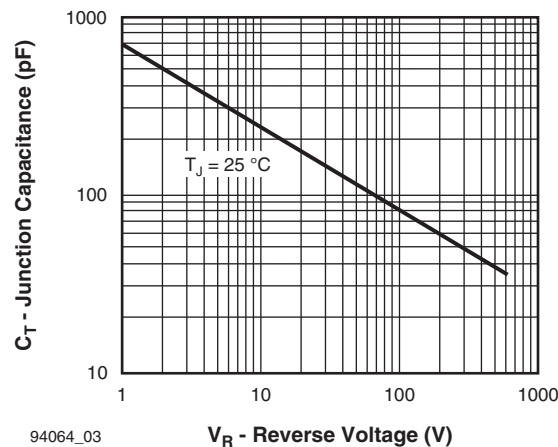


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

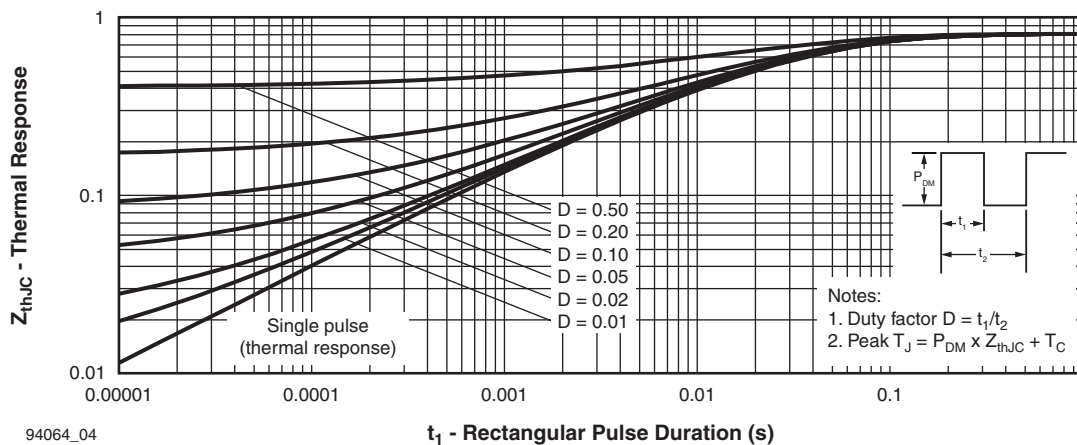


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

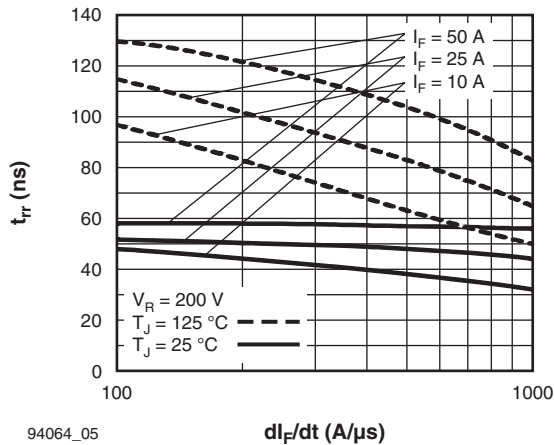


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt

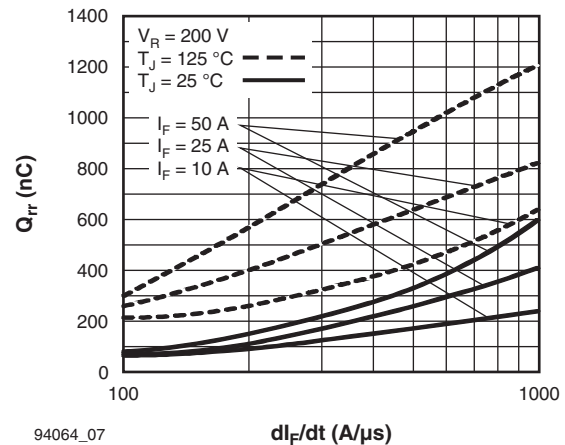


Fig. 7 - Typical Stored Charge vs. dI_F/dt

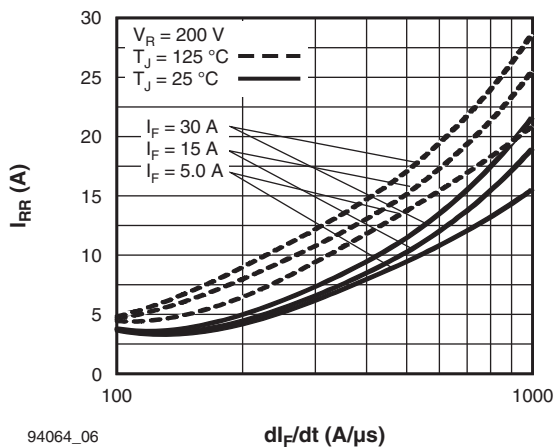


Fig. 6 - Typical Recovery Current vs. dI_F/dt

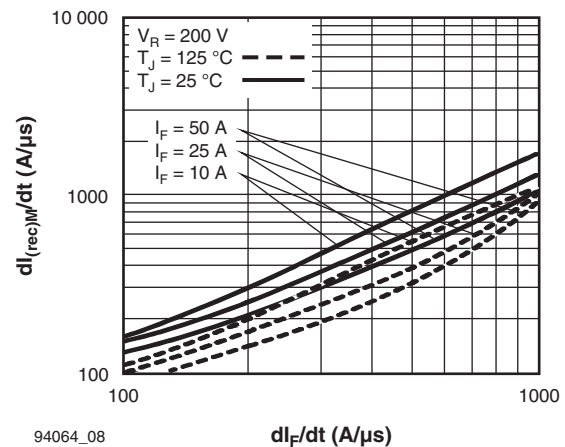


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt

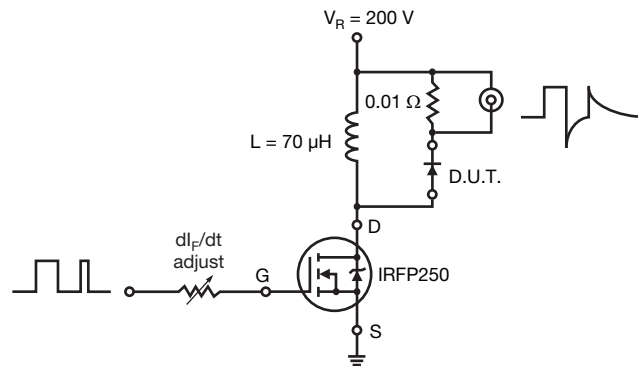


Fig. 9 - Reverse Recovery Parameter Test Circuit

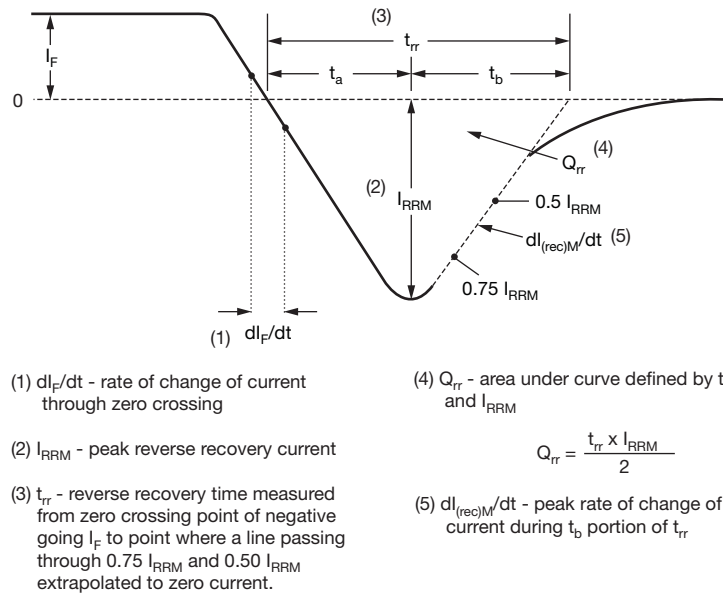


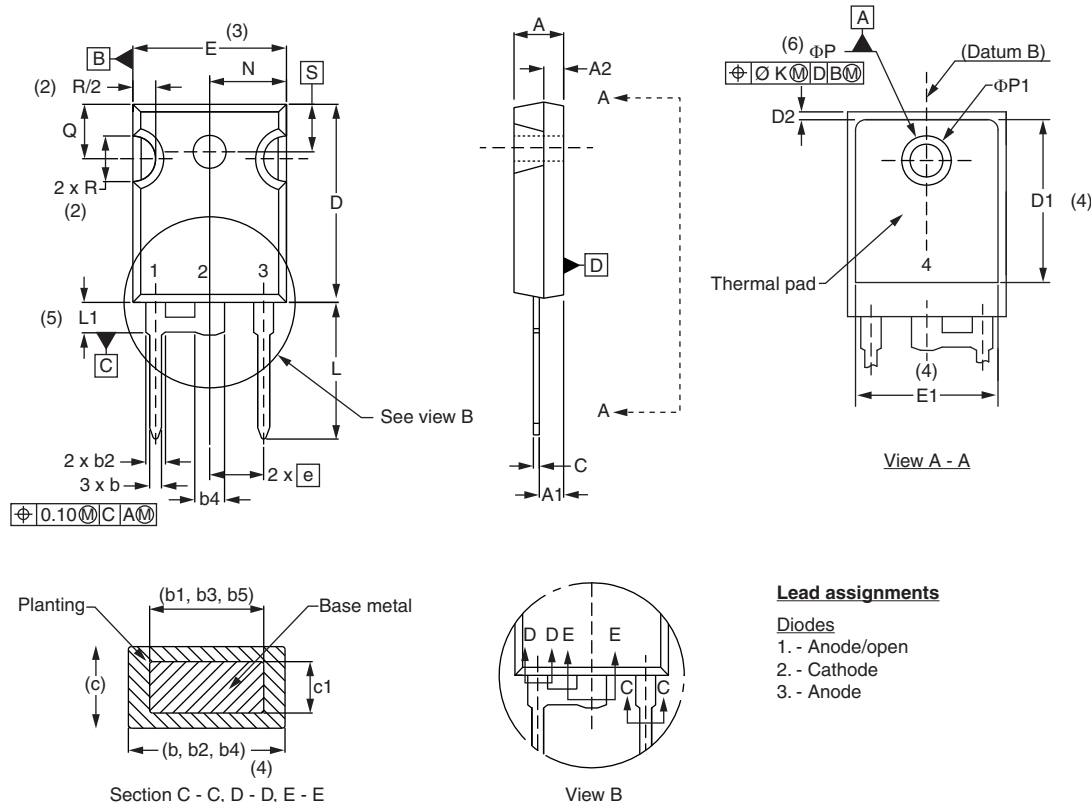
Fig. 1 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	VS-	HF	A	25	PB	60	PbF
	1	2	3	4	5	6	7

- | | | |
|---|---|-------------------------------|
| 1 | - | Vishay Semiconductors product |
| 2 | - | HEXFRED® family |
| 3 | - | Electron irradiated |
| 4 | - | Current rating (25 = 25 A) |
| 5 | - | PB = TO-247AC modified |
| 6 | - | Voltage rating: (60 = 600 V) |
| 7 | - | PbF = Lead (Pb)-free |

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95253
Part marking information	www.vishay.com/doc?95255

**DIMENSIONS** in millimeters and inches

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
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	2.37	0.065	0.094	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.86	0.015	0.034	
c1	0.38	0.76	0.015	0.030	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.30	0.020	0.051	
E	15.29	15.87	0.602	0.625	3
E1	13.72	-	0.540	-	
e	5.46 BSC		0.215 BSC		
ΦK	2.54		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
N	7.62 BSC		0.3		
ΦP	3.56	3.66	0.14	0.144	
$\Phi P1$	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	1.78	0.216	
S	5.51 BSC		0.217 BSC		

Notes

- Dimensioning and tolerance per ASME Y14.5M-1994
- Contour of slot optional
- 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
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- ΦP 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")
- Outline conforms to JEDEC outline TO-247 with exception of dimension c



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