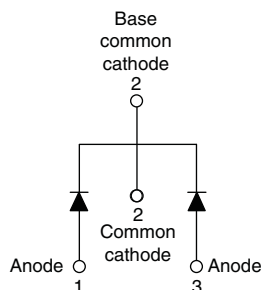


HEXFRED® Ultrafast Soft Recovery Diode, 2 x 8 A


TO-220AB


FEATURES

- Ultrafast and ultrasoft recovery
- Very low I_{RRM} and Q_{rr}
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)



RoHS
COMPLIANT
HALOGEN
FREE
Available

BENEFITS

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

DESCRIPTION

VS-HFA16TA60C... is a state of the art center tap 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 8 A per leg continuous current, the VS-HFA16TA60C... 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-HFA16TA60C... 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-220AB
$I_{F(AV)}$	2 x 8 A
V_R	600 V
V_F at I_F	1.7 V
t_{rr} typ.	18 ns
T_J max.	150 °C
Diode variation	Common cathode

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Maximum continuous forward current — per leg per device	I_F	$T_C = 100\text{ °C}$	8 16	A
Single pulse forward current	I_{FSM}		60	
Maximum repetitive forward current	I_{FRM}		24	
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$ $T_C = 100\text{ °C}$	36 14	W
Operating junction and storage temperature range	T_J, T_{Stg}		- 55 to + 150	°C



ELECTRICAL SPECIFICATIONS PER LEG ($T_J = 25\text{ }^{\circ}\text{C}$ 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}	$I_F = 8\text{ A}$	See fig. 1	-	1.4	1.7
		$I_F = 16\text{ A}$		-	1.7	2.1
		$I_F = 8\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$		-	1.4	1.7
Maximum reverse leakage current	I_{RM}	$V_R = V_R\text{ rated}$	See fig. 2	-	0.3	5.0
		$T_J = 125\text{ }^{\circ}\text{C}, V_R = 0.8 \times V_R\text{ rated}$		-	100	500 μA
Junction capacitance	C_T	$V_R = 200\text{ V}$	See fig. 3	-	10	25 pF
Series inductance	L_S	Measured lead to lead 5 mm from package body		-	8.0	- nH

DYNAMIC RECOVERY CHARACTERISTICS PER LEG ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNITS
Reverse recovery time See fig. 5 and 10	t_{rr}	$I_F = 1.0\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$		-	18	- ns
	t_{rr1}	$T_J = 25\text{ }^{\circ}\text{C}$	$I_F = 8.0\text{ A}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	-	37	55
	t_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$		-	55	90
Peak recovery current See fig. 6	I_{RRM1}	$T_J = 25\text{ }^{\circ}\text{C}$		-	3.5	5.0 A
	I_{RRM2}	$T_J = 125\text{ }^{\circ}\text{C}$		-	4.5	8.0
Reverse recovery charge See fig. 7	Q_{rr1}	$T_J = 25\text{ }^{\circ}\text{C}$		-	65	138 nC
	Q_{rr2}	$T_J = 125\text{ }^{\circ}\text{C}$		-	124	360
Peak rate of fall recovery current during t_b See fig. 8	$dI_{(rec)M}/dt1$	$T_J = 25\text{ }^{\circ}\text{C}$		-	240	- $\text{A}/\mu\text{s}$
	$dI_{(rec)M}/dt2$	$T_J = 125\text{ }^{\circ}\text{C}$		-	210	-

THERMAL - MECHANICAL SPECIFICATIONS PER LEG						
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNITS
Lead temperature	T_{lead}	0.063" from case (1.6 mm) for 10 s		-	-	300 $^{\circ}\text{C}$
Junction to case, single leg conducting	R_{thJC}			-	-	3.5
Junction to case, both legs conducting				-	-	1.75
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount		-	-	80 K/W
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased		-	0.5	-
Weight				-	2.0	- g
				-	0.07	- oz.
Mounting torque				6.0 (5.0)	-	12 (10) $\text{kgf} \cdot \text{cm}$ ($\text{lbf} \cdot \text{in}$)
Marking device		Case style TO-220AB		HFA16TA60C		

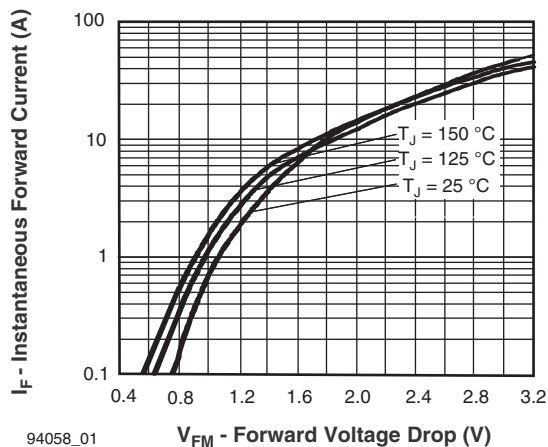


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

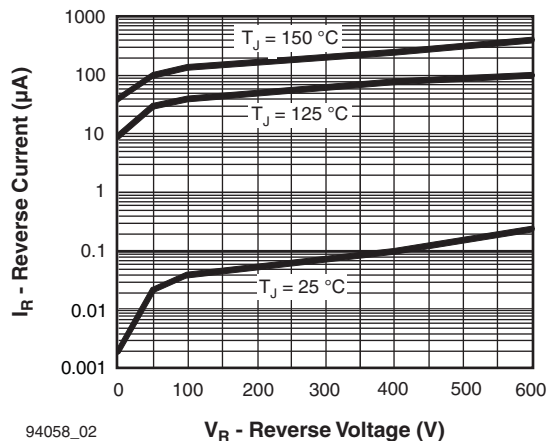


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

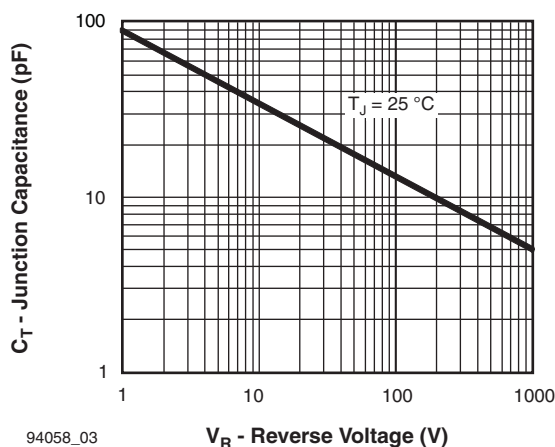


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

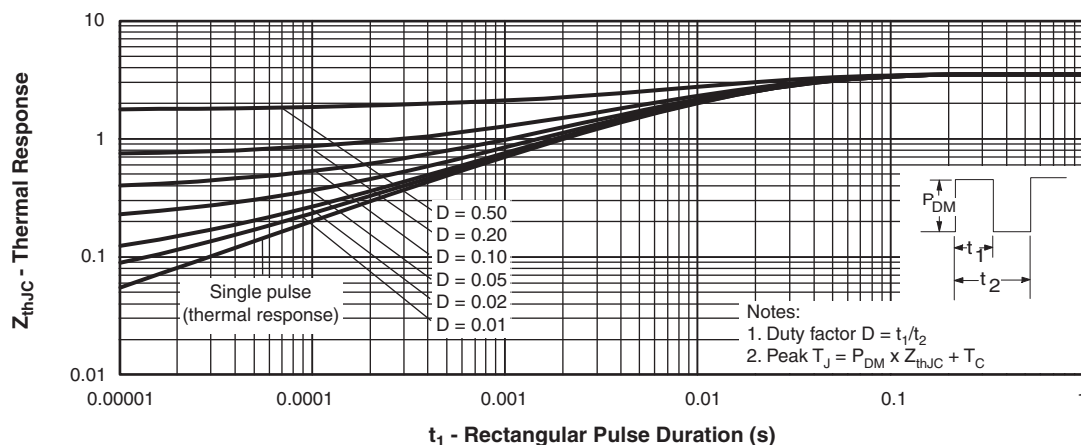


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

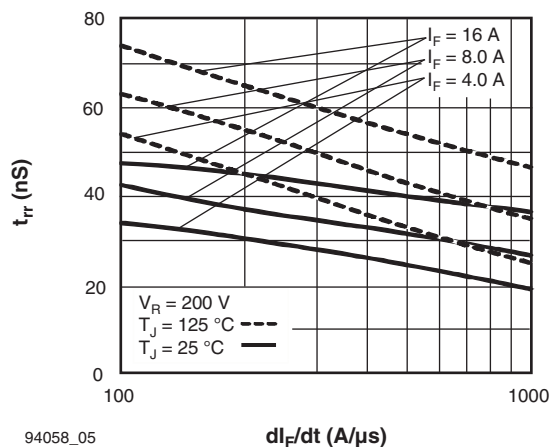


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt
(Per Leg)

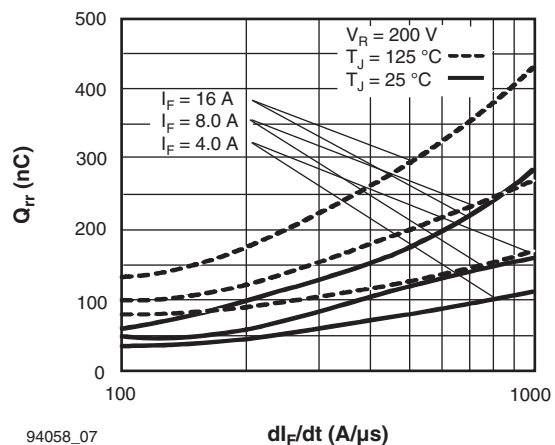


Fig. 7 - Typical Stored Charge vs. dI_F/dt
(Per Leg)

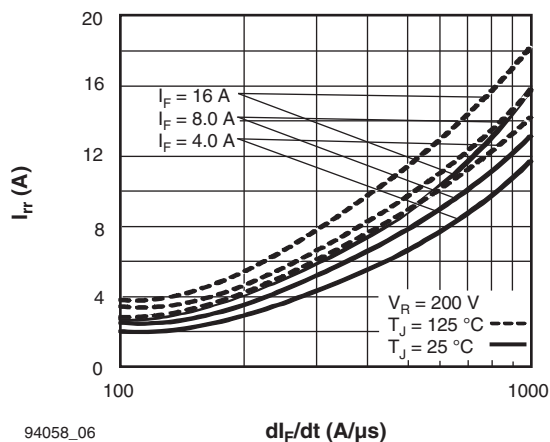


Fig. 6 - Typical Recovery Current vs. dI_F/dt
(Per Leg)

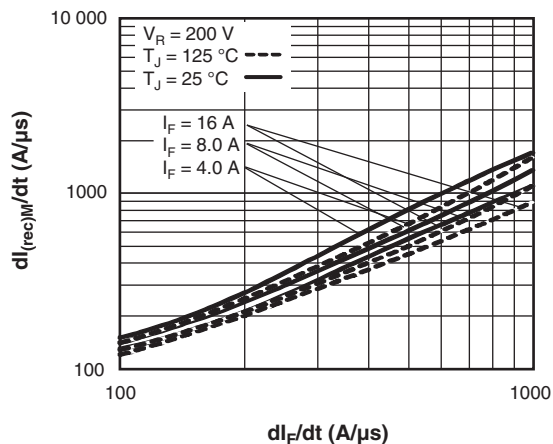


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt
(Per Leg)

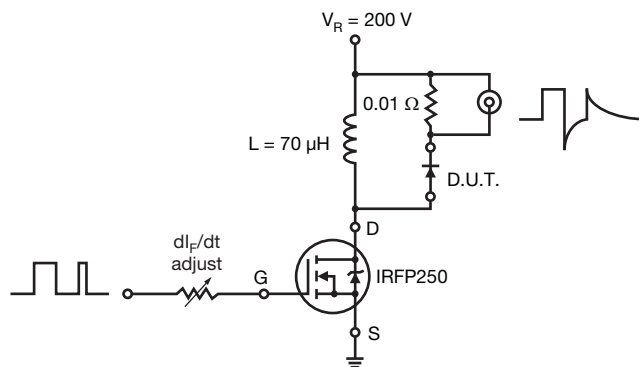


Fig. 9 - Reverse Recovery Parameter Test Circuit

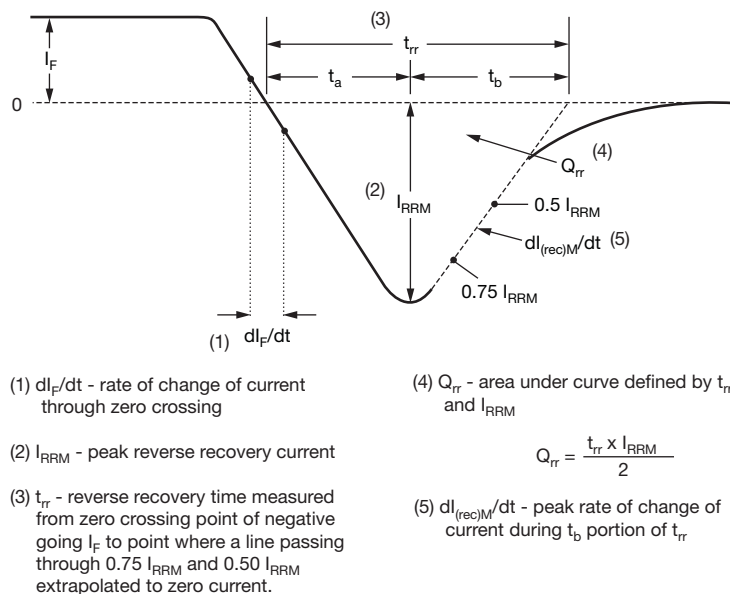


Fig. 10 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

Device code	VS-	HF	A	16	TA	60	C	PbF
	1	2	3	4	5	6	7	8

- 1** - Vishay Semiconductors product
- 2** - HEXFRED® family
- 3** - Electron irradiated
- 4** - Current rating (16 = 16 A)
- 5** - Package:
TA = TO-220AB
- 6** - Voltage rating (60 = 600 V)
- 7** - Circuit configuration:
C = Common cathode
- 8** - Environmental digit:
PbF = Lead (Pb)-free and RoHS compliant
-N3 = Halogen-free, RoHS compliant and totally lead (Pb)-free

ORDERING INFORMATION (Example)

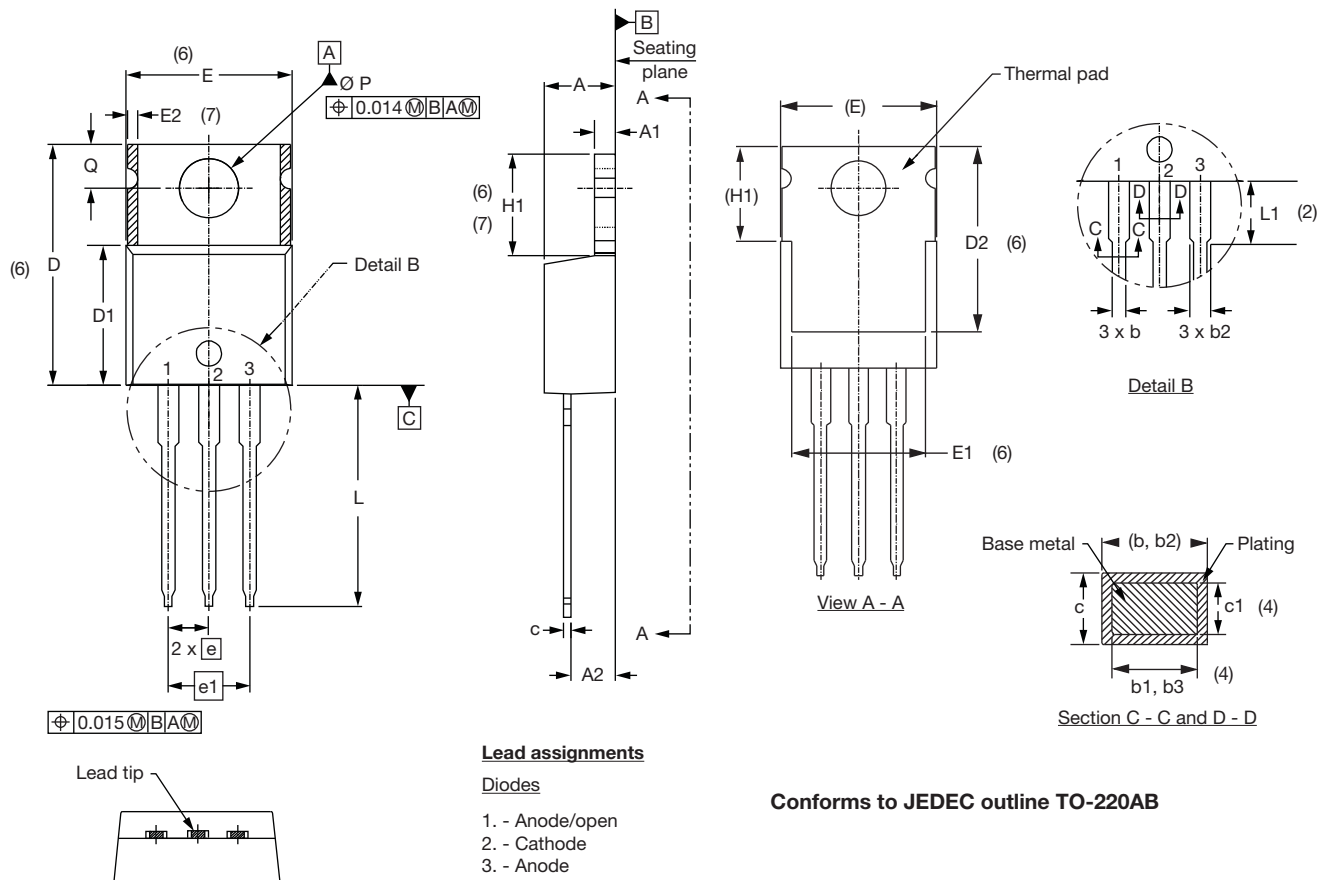
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-HFA16TA60CPbF	50	1000	Antistatic plastic tube
VS-HFA16TA60C-N3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS

Dimensions		www.vishay.com/doc?95222
Part marking information	TO-220ABPbF	www.vishay.com/doc?95225
	TO-220AB-N3	www.vishay.com/doc?95028

TO-220AB

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.56	2.92	0.101	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E	10.11	10.51	0.398	0.414	3, 6
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
Ø P	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	
θ	90° to 93°		90° to 93°		

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1 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
- (4) Dimension b1, b3 and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Dimensions E2 x H1 define a zone where stamping and singulation irregularities are allowed
- (8) Outline conforms to JEDEC TO-220, except A2 (maximum) and D2 (minimum) where dimensions are derived from the actual package outline



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