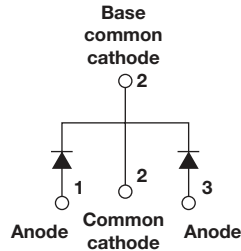


HEXFRED®

Ultrafast Soft Recovery Diode, 2 x 8 A


D²PAK

FEATURES

- Ultrafast recovery
- Ultrasoft recovery
- Very low I_{RRM}
- Very low Q_{rr}
- Specified at operating conditions
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- AEC-Q101 qualified


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-HFA16TA60CS 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-HFA16TA60CS 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-HFA16TA60CS 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	
V_R	600 V
V_F at 8 A at 25 °C	1.7 V
$I_{F(AV)}$	2 x 8 A
t_{rr} (typical)	18 ns
T_J (maximum)	150 °C
Q_{rr}	65 nC
$di_{(rec)M}/dt$	240 A/ μ s

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Maximum continuous forward current	I_F	$T_C = 100\text{ °C}$	8	A
			16	
Single pulse forward current	I_{FSM}		60	
Maximum repetitive forward current	I_{FRM}		24	
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	36	W
		$T_C = 100\text{ °C}$	14	
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}	$I_F = 8.0\text{ A}$	-	1.4	1.7	
		$I_F = 16\text{ A}$	-	1.7	2.1	
		$I_F = 8.0\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	1.4	1.7	
Maximum reverse leakage current	I_{RM}	$V_R = V_R\text{ rated}$	-	0.3	5.0	μA
		$T_J = 125\text{ }^\circ\text{C}, V_R = 0.8 \times V_R\text{ rated}$	-	100	500	
Junction capacitance	C_T	$V_R = 200\text{ V}$	-	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, 6 and 16	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}	$T_J = 25\text{ }^\circ\text{C}$	-	37	55	
	t_{rr2}	$T_J = 125\text{ }^\circ\text{C}$	-	55	90	
Peak recovery current See fig. 7 and 8	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. 9 and 10	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 of recovery current during t_b See fig. 11 & 12	$dI_{(rec)M}/dt1$	$T_J = 25\text{ }^\circ\text{C}$	-	240	-	$\text{A}/\mu\text{s}$
	$dI_{(rec)M}/dt2$	$T_J = 125\text{ }^\circ\text{C}$	-	210	-	

THERMAL - MECHANICAL SPECIFICATIONS						
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	K/W
Junction to case, both legs conducting			-	-	1.75	
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	80	
Weight			-	2	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style D ² PAK	HFA16TA60CS			



HEXFRED®
Ultrafast Soft Recovery Diode, 2 x 8 A

Vishay High Power Products

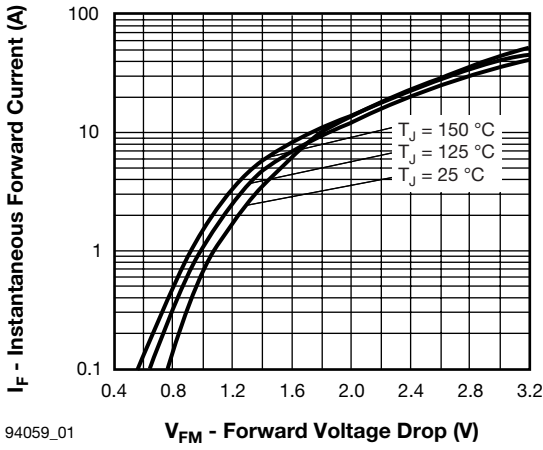


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

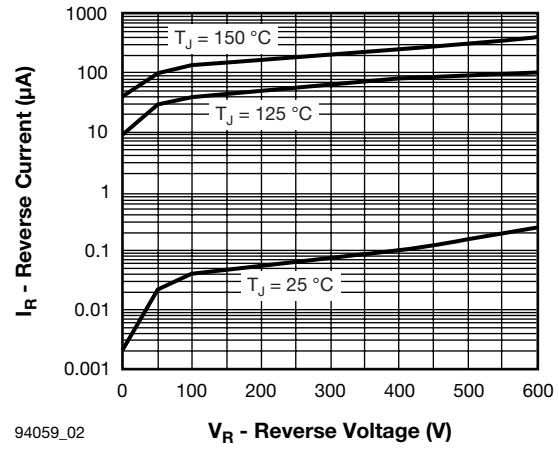


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

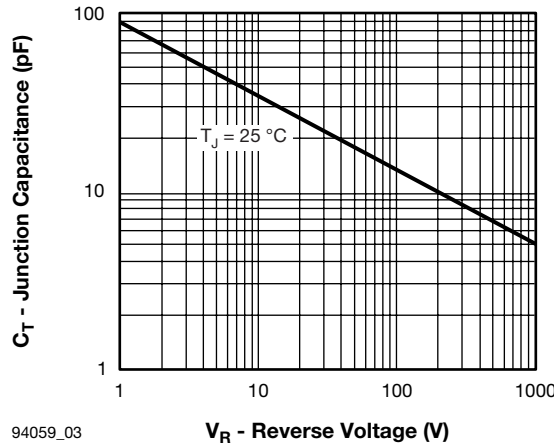


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

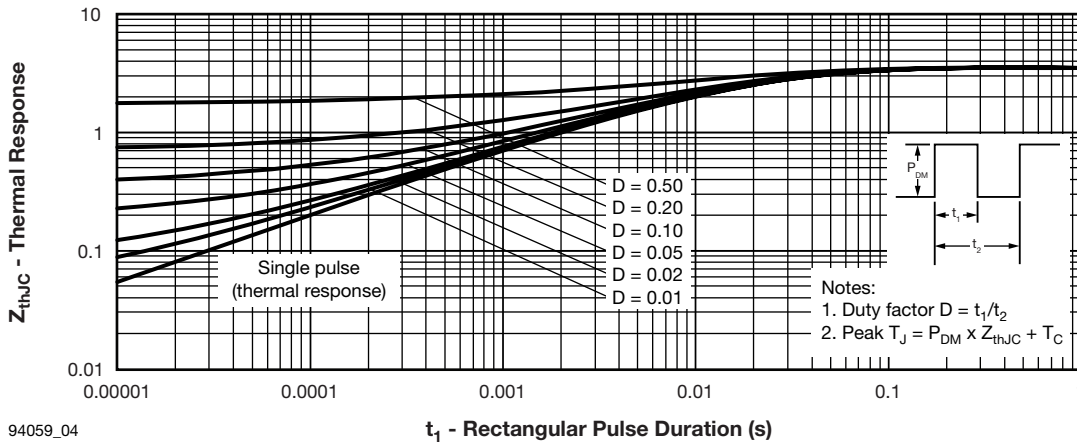
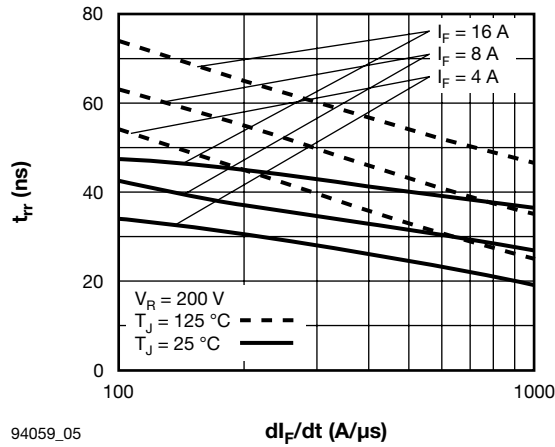
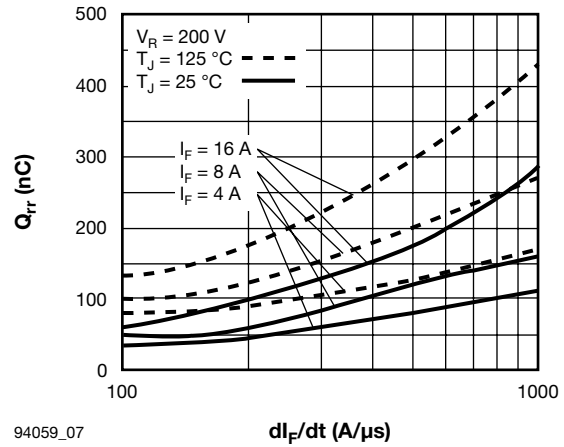


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)



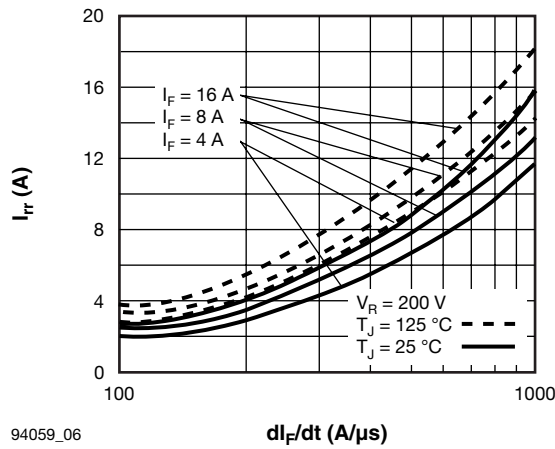
94059_05

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



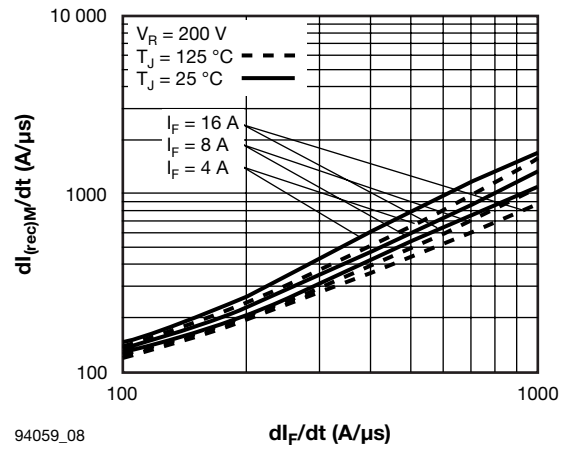
94059_07

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



94059_06

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



94059_08

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

HEXFRED®
 Ultrafast Soft Recovery Diode, 2 x 8 A

Vishay High Power Products

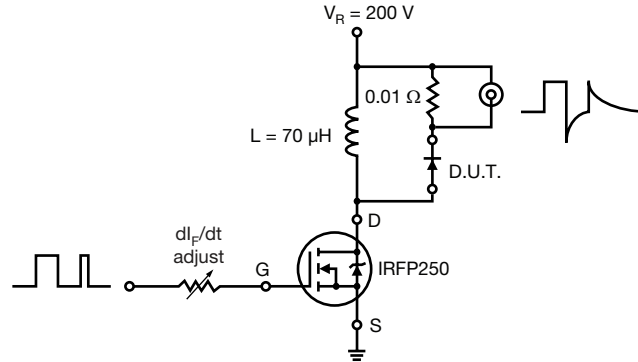
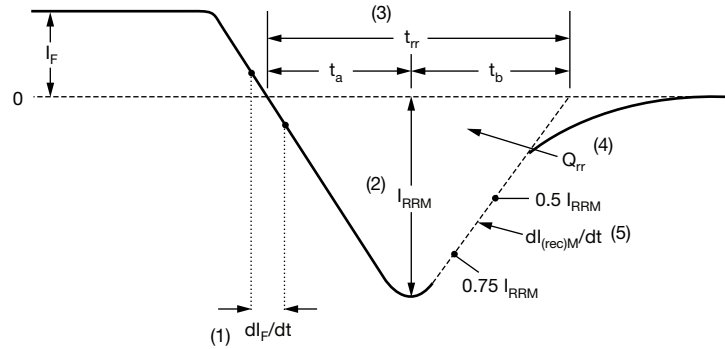


Fig. 9 - Reverse Recovery Parameter Test Circuit


 (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. 10 - Reverse Recovery Waveform and Definitions

VS-HFA16TA60CSPbF



Vishay High Power Products

HEXFRED®
Ultrafast Soft Recovery Diode, 2 x 8 A

ORDERING INFORMATION TABLE

Device code	VS-	HF	A	16	TA	60	C	S	TRL	PbF
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

- 1** - HPP product suffix
- 2** - HEXFRED® family
- 3** - Process designator: A = Electron irradiated
- 4** - Current rating (16 = 16 A)
- 5** - Package outline (TA = TO-220, 3 leads)
- 6** - Voltage rating (60 = 600 V)
- 7** - Circuit configuration (C = Common cathode)
- 8** - S = D²PAK
- 9** -
 - None = Tube (50 pieces)
 - TRL = Tape and reel (left oriented)
 - TRR = Tape and reel (right oriented)
- 10** - PbF = Lead (Pb)-free

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



Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.