HEXFRED® Ultrafast Soft Recovery Diode, 60 A

SOT-227

FEATURES

- Fast recovery time characteristic
- Electrically isolated base plate
- Large creepage distance between terminal
- Simplified mechanical designs, rapid assembly
- UL approved file E78996
- Designed for industrial level
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

PRODUCT SUMMARY	
V_R	600 V
V_F (typical) at 125 °C	1.4 V
Q_{rr} (typical)	270 nC
I_{RRM} (typical)	7.0 A
t_{rr} (typical)	65 ns
$dI_{(rec)M}/dt$ (typical) at 125 °C	270 A/µs
$I_{F(DC)}$ at T_C	40 A at 100 °C
Package	SOT-227
Circuit configuration	Two separate diodes

DESCRIPTION

This SOT-227 modules with HEXFRED® rectifier are available in two basic configurations. They are the antiparallel and the parallel configurations. The antiparallel configuration (VS-HFA120EA60) is used for simple series rectifier and high voltage application. The parallel configuration (VS-HFA120FA60) is used for simple parallel rectifier and high current application. The semiconductor in the SOT-227 package is isolated from the copper base plate, allowing for common heatsinks and compact assemblies to be built. These modules are intended for general applications such as power supplies, battery chargers, electronic welders, motor control, DC chopper, and inverters.

ABSOLUTE MAXIMUM RATINGS PER LEG

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current	I_F	T_C = 25 °C	75	A
		T_C = 100 °C	40	
Single pulse forward current	I_{FSM}	T_J = 25 °C	800	
Maximum repetitive forward current	I_{FRM}	Rated V_R, square wave, 20 kHz, T_C = 60 °C	180	
RMS isolation voltage, any terminal to case	V_{ISOL}	t = 1 minute	2500	V
Maximum power dissipation	P_D	T_C = 25 °C	180	W
		T_C = 100 °C	71	
Operating junction and storage temperature range	T_J, T_{Stg}		- 55 to 150	°C

ELECTRICAL SPECIFICATIONS PER LEG (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		600	-	-	V
Maximum forward voltage	V_{FM}	I_F = 60 A	See fig. 1	-	1.5	1.7	
		I_F = 120 A		-	1.9	2.1	
		I_F = 60 A, T_J = 125 °C		-	1.4	1.6	
Maximum reverse leakage current	I_{RM}	V_R = V_R rated	See fig. 2	-	2.5	20	µA
		T_J = 125 °C, V_R = 0.8 x V_R rated		-	130	2000	
Junction capacitance	C_T	V_R = 200 V	See fig. 3	-	120	170	pF

DYNAMIC RECOVERY CHARACTERISTICS PER LEG (T_J = 25 °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 A, dI_F/dt = 200 A/µs, V_R = 30 V		-	34	-	ns
	t_{rr1}	T_J = 25 °C	I_F = 60 A dI_F/dt = 200 A/µs V_R = 200 V	-	65	98	
	t_{rr2}	T_J = 125 °C		-	130	200	
Peak recovery current See fig. 7 and 8	I_{RRM1}	T_J = 25 °C		-	7.0	13	A
	I_{RRM2}	T_J = 125 °C		-	13	23	
Reverse recovery charge See fig. 9 and 10	Q_{rr1}	T_J = 25 °C		-	270	410	nC
	Q_{rr2}	T_J = 125 °C		-	490	740	
Peak rate of recovery current during t_b See fig. 11 and 12	$dI_{(rec)M}/dt1$	T_J = 25 °C		-	350	-	A/µs
	$dI_{(rec)M}/dt2$	T_J = 125 °C		-	270	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Junction to case, single leg conducting	R_{thJC}		-	-	0.70	°C/W
Junction to case, both legs conducting			-	-	0.35	
Case to heatsink	R_{thCS}	Flat, greased surface	-	0.05	-	
Weight			-	30	-	g
Mounting torque			-	-	1.3	Nm
Case style			SOT-227			

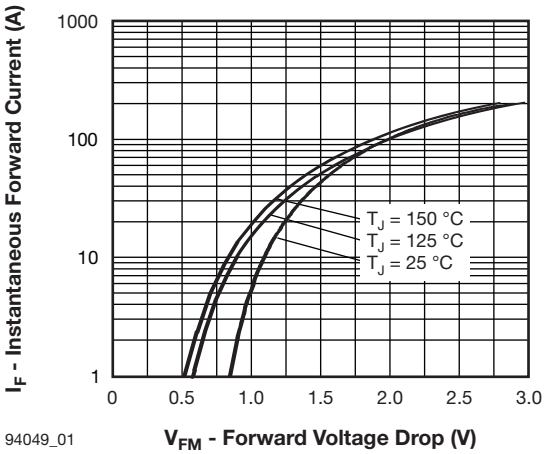


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

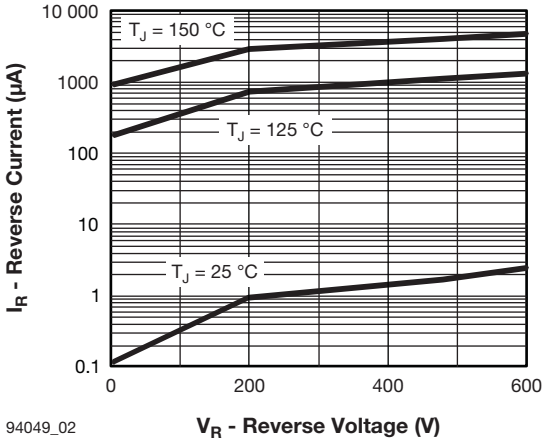


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

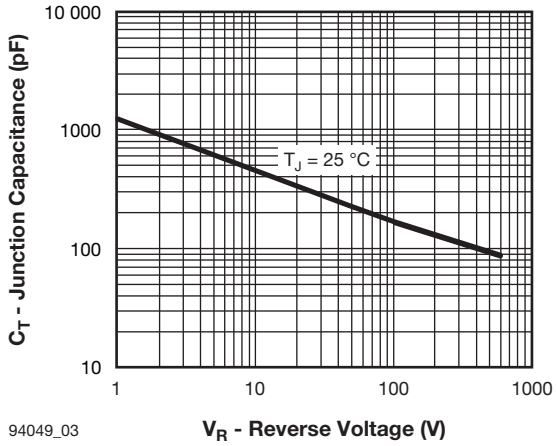


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

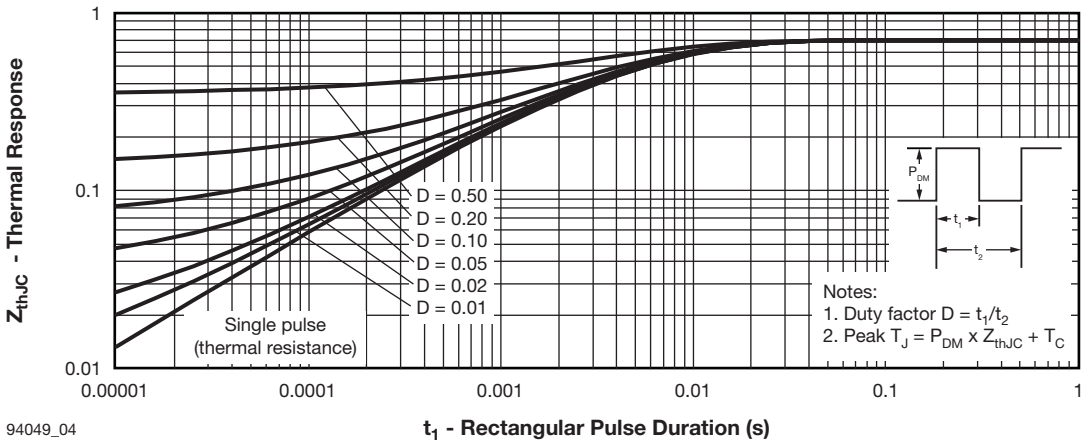


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

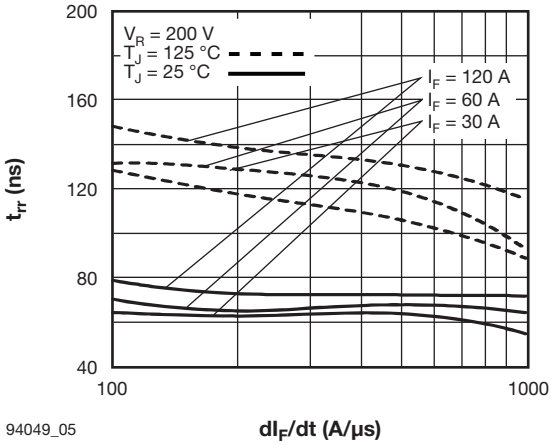


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt (Per Leg)

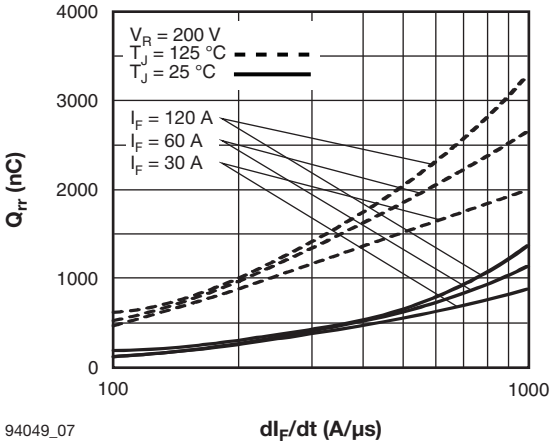


Fig. 7 - Typical Stored Charge vs. dI_F/dt (Per Leg)

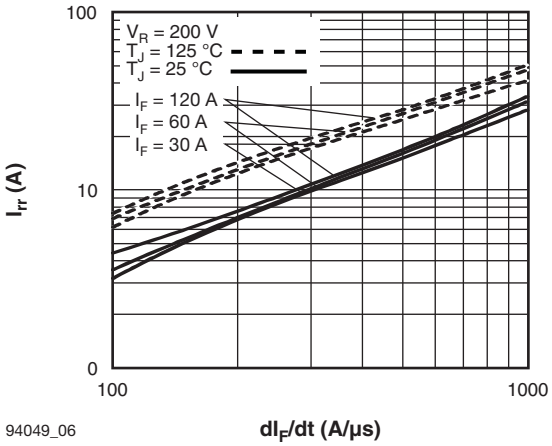


Fig. 6 - Typical Recovery Current vs. dI_F/dt (Per Leg)

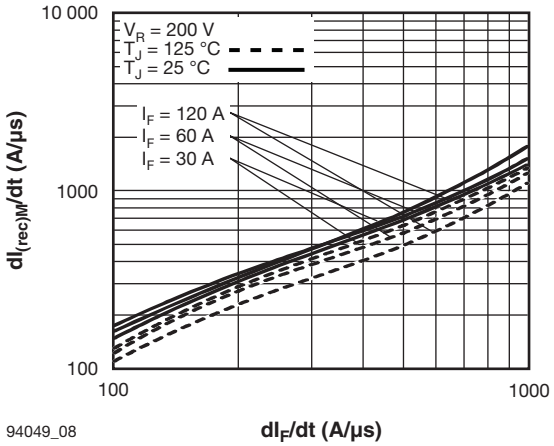


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt (Per Leg)

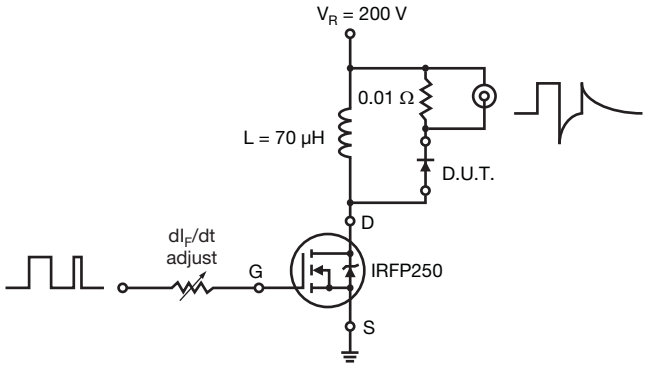
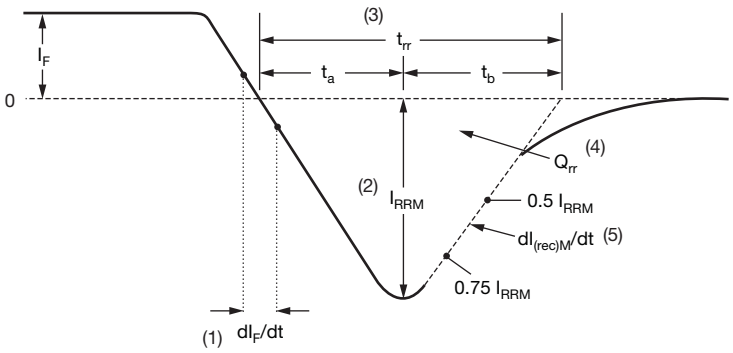


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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

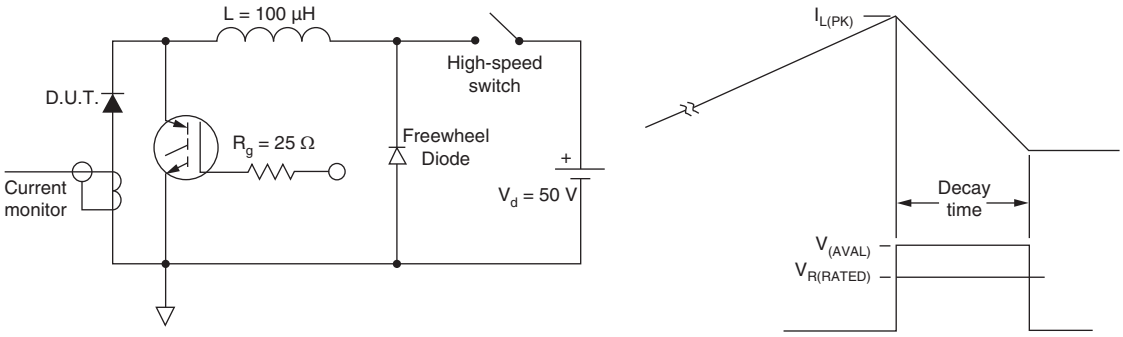
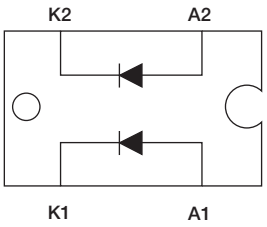


Fig. 11 - Avalanche Test Circuit and Waveforms

CIRCUIT CONFIGURATION



ORDERING INFORMATION TABLE

Device code

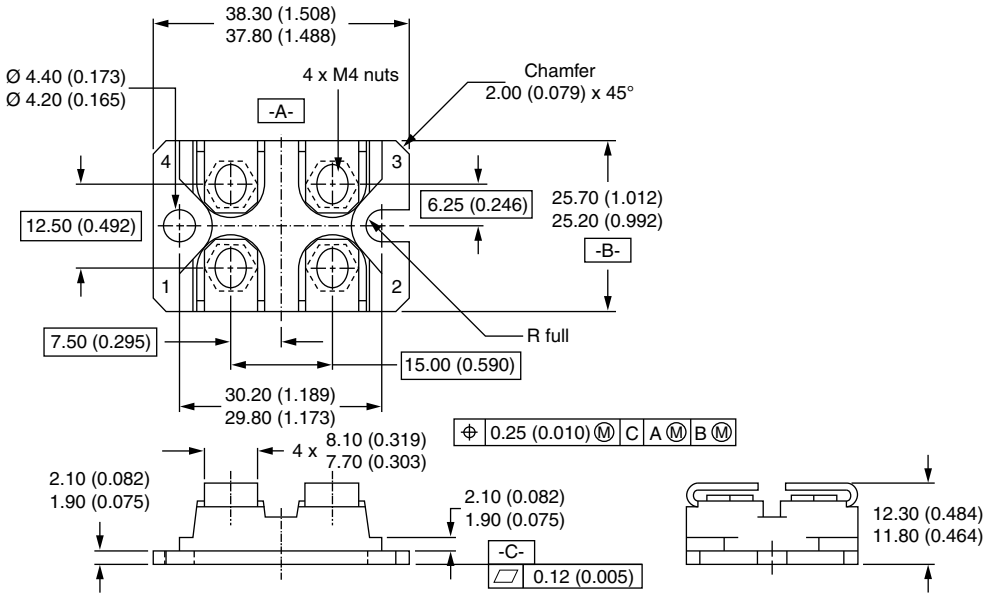
VS-	HF	A	120	FA	60	P
1	2	3	4	5	6	7

1	-	Vishay Semiconductors product
2	-	HEXFRED® family
3	-	Process: A electron irradiated
4	-	Current rating (120 = 120 A)
5	-	Package indicator (SOT-227)
6	-	Voltage rating (60 = 600 V)
7	-	P = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95036
Packaging information	www.vishay.com/doc?95037

SOT-227

DIMENSIONS in millimeters (inches)



Notes

- Dimensioning and tolerancing per ANSI Y14.5M-1982
- Controlling dimension: millimeter

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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 in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

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

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.