

# HEXFRED®

## Ultrafast Soft Recovery Diode, 70 A



SOT-227

**FEATURES**

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


**RoHS**  
COMPLIANT

PRODUCT SUMMARY	
$V_R$	1200 V
$V_F$ (typical)	2.3 V
$t_{rr}$ (typical)	51 ns
$I_{F(AV)}$ per module at $T_C$	70 A at 94 °C
Package	SOT-227

**DESCRIPTION/APPLICATIONS**

The dual diode series configuration (VS-HFA70FA120) is used for output rectification or freewheeling/clamping operation and high voltage 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 HV power supplies, electronic welders, motor control and inverters.

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	$V_R$		1200	V
Continuous forward current per leg	$I_F$	$T_C = 110\text{ °C}$	35	A
Single pulse forward current per leg	$I_{FSM}$	$T_J = 25\text{ °C}$	380	
Maximum power dissipation per module	$P_D$	$T_C = 110\text{ °C}$	174	W
RMS isolation voltage	$V_{ISOL}$	Any terminal to case, $t = 1\text{ min}$	2500	V
Operating junction and storage temperature range	$T_J, T_{Stg}$		- 55 to 150	°C

ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	$V_{BR}$	$I_R = 100\text{ }\mu\text{A}$	1200	-	-	V
Forward voltage	$V_{FM}$	$I_F = 30\text{ A}$	-	2.30	3.00	
		$I_F = 60\text{ A}$	-	2.89	3.80	
		$I_F = 30\text{ A}, T_J = 125\text{ °C}$	-	2.14	2.44	
		$I_F = 60\text{ A}, T_J = 125\text{ °C}$	-	2.82	3.27	
Reverse leakage current	$I_{RM}$	$V_R = V_R$ rated	-	1.2	75	$\mu\text{A}$
		$T_J = 125\text{ °C}, V_R = V_R$ rated	-	1.0	-	mA
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	2.7	10	



DYNAMIC RECOVERY CHARACTERISTICS (T <sub>J</sub> = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t <sub>rr</sub>	T <sub>J</sub> = 25 °C	I <sub>F</sub> = 1 A dI <sub>F</sub> /dt = 200 A/μs V <sub>R</sub> = 30 V	-	51	-	ns
		T <sub>J</sub> = 25 °C	I <sub>F</sub> = 50 A dI <sub>F</sub> /dt = - 200 A/μs V <sub>R</sub> = 200 V	-	134	-	
		T <sub>J</sub> = 125 °C		-	204	-	
Peak recovery current	I <sub>RRM</sub>	T <sub>J</sub> = 25 °C	I <sub>F</sub> = 50 A dI <sub>F</sub> /dt = - 200 A/μs V <sub>R</sub> = 200 V	-	12	-	A
		T <sub>J</sub> = 125 °C		-	18	-	
Reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C	I <sub>F</sub> = 50 A dI <sub>F</sub> /dt = - 200 A/μs V <sub>R</sub> = 200 V	-	790	-	nC
		T <sub>J</sub> = 125 °C		-	1770	-	
Junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 1200 V		-	24	-	pF

THERMAL - MECHANICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Junction to case, single leg conducting	R <sub>thJC</sub>			-	-	0.46	°C/W
Junction to case, both legs conducting				-	-	0.23	
Case to heatsink	R <sub>thCS</sub>	Flat, greased surface		-	0.10	-	
Weight				-	30	-	g
Mounting torque				-	-	1.3	Nm
Case style				SOT-227			

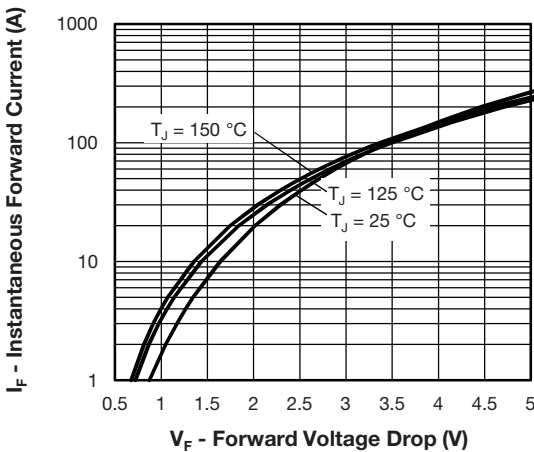


Fig. 1 - Typical Forward Voltage Drop Characteristics (Per Leg)

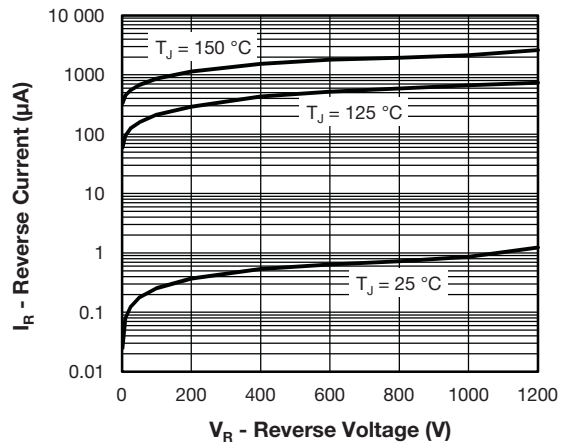


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

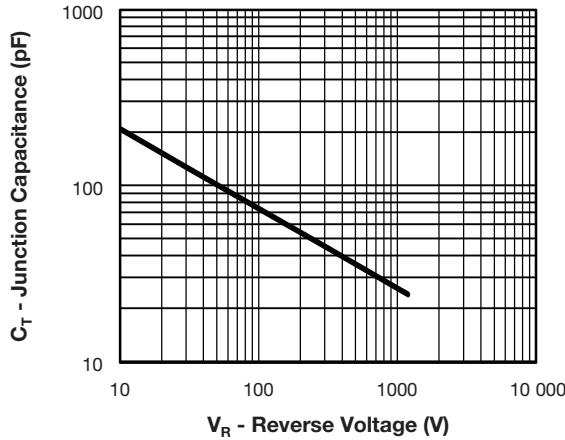


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

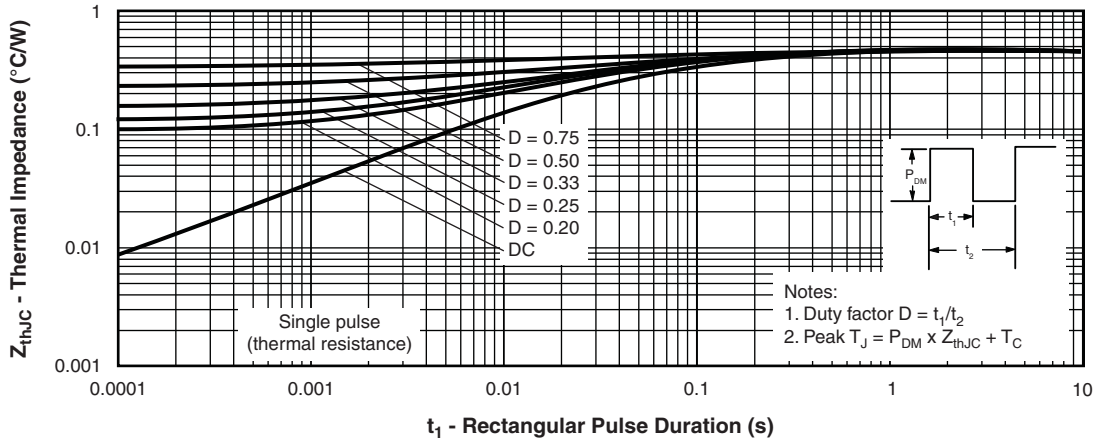


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

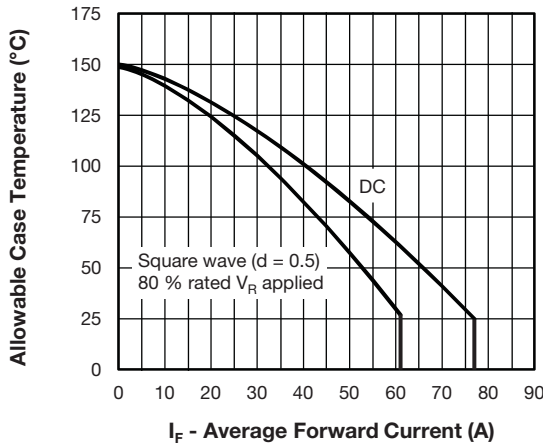


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

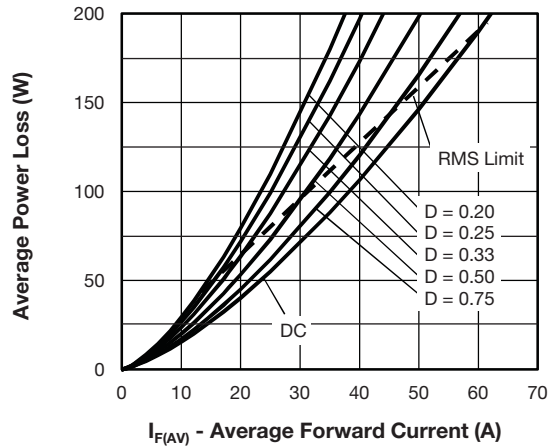


Fig. 6 - Forward Power Losses Characteristics (Per Leg)

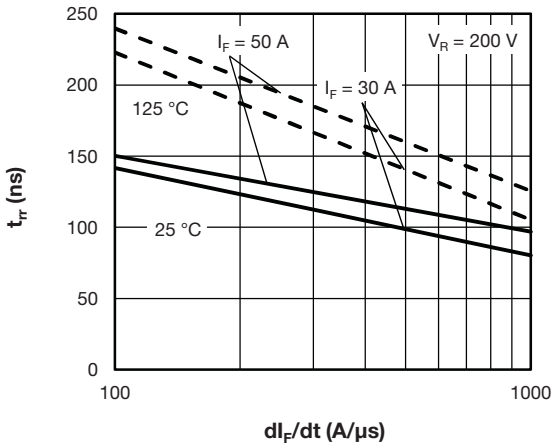


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

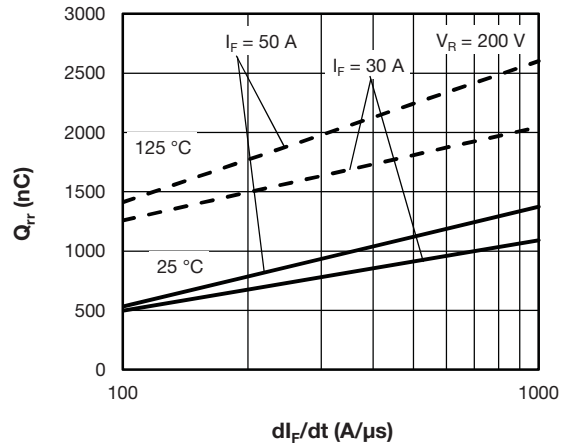


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

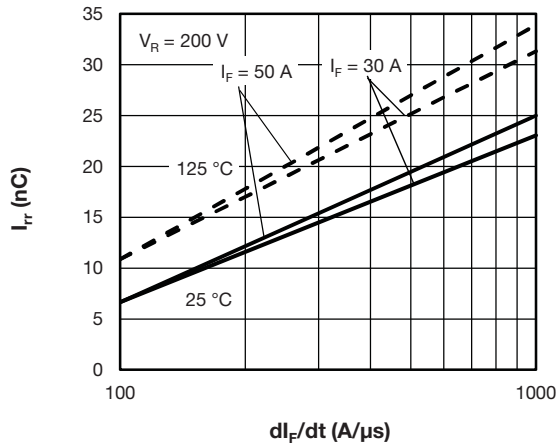


Fig. 9 - Typical Reverse Recovery Current vs.  $di_F/dt$

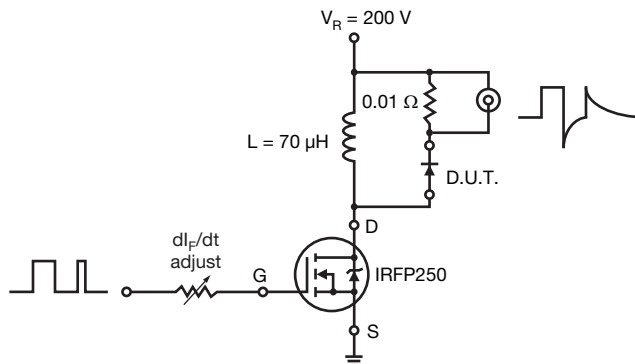
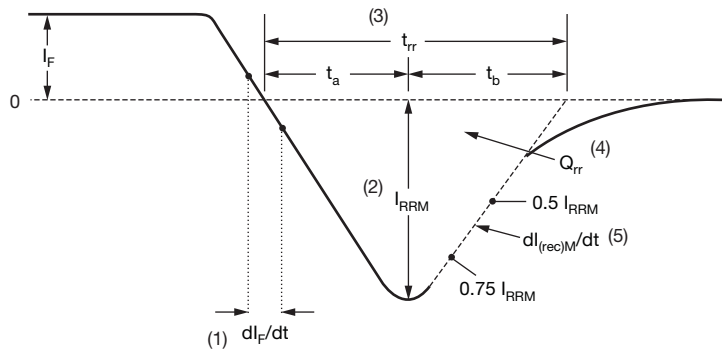


Fig. 10 - Reverse Recovery Parameter Test Circuit



- (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  $I_{RRM}$
- (5)  $dI_{(rec)M}/dt$  - peak rate of change of current during  $t_b$  portion of  $t_{rr}$

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

Fig. 11 - Reverse Recovery Waveform and Definitions

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>HF</b>	<b>A</b>	<b>70</b>	<b>F</b>	<b>A</b>	<b>120</b>
	1	2	3	4	5	6	7

- 1** - Vishay Semiconductors product
- 2** - HEXFRED® family
- 3** - Process designator (A = electron irradiated)
- 4** - Current rating (70 = 70 A)
- 5** - Circuit configuration (2 separate diodes, parallel pin-out)
- 6** - Package indicator (SOT-227 standard insulated base)
- 7** - Voltage rating (120 = 1200 V)

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
2 separate diodes, parallel pin-out	F	 



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Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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