HEXFRED®
Ultrafast Soft Recovery Diode, 120 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
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level

RoHS COMPLIANT

DESCRIPTION/APPLICATIONS

The dual diode series configuration (HFA120FA120P) 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.

PRODUCT SUMMARY

V_R	1200 V
V_F (typical)	2.8 V
t_{rr} (typical)	145 ns
$I_{F(DC)}$ at T_C per leg	60 A at 86 °C
$I_{F(AV)}$ at T_C per leg	60 A at 62 °C

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 = 86 °C	60	A
	per module			120	
Single pulse forward current		I_{FSM}	T_J = 25 °C	350	
Maximum repetitive forward current		I_{FRM}	Rated V_R, square wave, 20 kHz, T_C = 60 °C	130	
Maximum power dissipation		P_D	T_C = 25 °C	337	W
			T_C = 100 °C	135	
RMS isolation voltage		V_{ISOL}	Any terminal to case, t = 1 minute	2500	V
Operating junction and storage temperature range		T_J, T_{Stg}		- 55 to + 150	°C

ELECTRICAL SPECIFICATIONS (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	1200	-	-	V
Forward voltage	V_{FM}	I_F = 60 A	-	2.8	4.0	V
		I_F = 120 A	-	3.6	5.3	
		I_F = 60 A, T_J = 125 °C	-	2.7	-	
Reverse leakage current	I_{RM}	V_R = V_R rated	-	2.0	75	µA
		T_J = 150 °C, V_R = V_R rated	-	2.7	10	mA

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DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	T_J = 25 °C	I_F = 50 A dI_F/dt = - 200 A/µs V_R = 200 V	-	145	-	ns
		T_J = 125 °C		-	218	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	13	-	A
		T_J = 125 °C		-	18	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	910	-	nC
		T_J = 125 °C		-	1920	-	

THERMAL - MECHANICAL SPECIFICATIONS

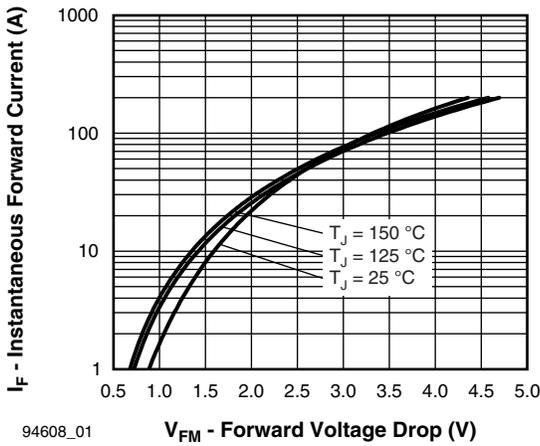| PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Junction to case, single leg conducting	R_{thJC}		-	-	0.37	°C/W
Junction to case, both legs conducting			-	-	0.185	
Case to heatsink	R_{thCS}	Flat, greased and surface	-	0.05	-	
Weight			-	30	-	g
Mounting torque			-	1.3	-	Nm

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Fig. 1 - Typical Forward Voltage Drop Characteristics

94608_02
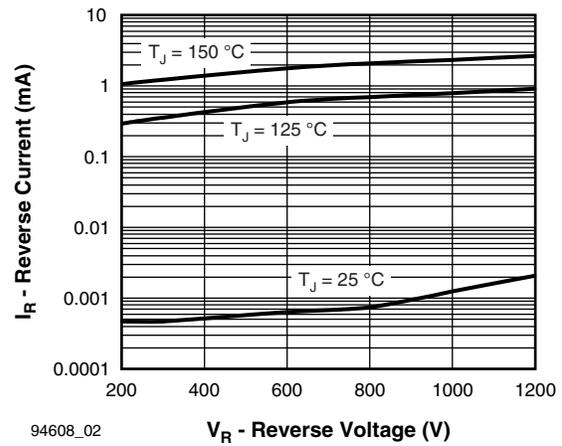
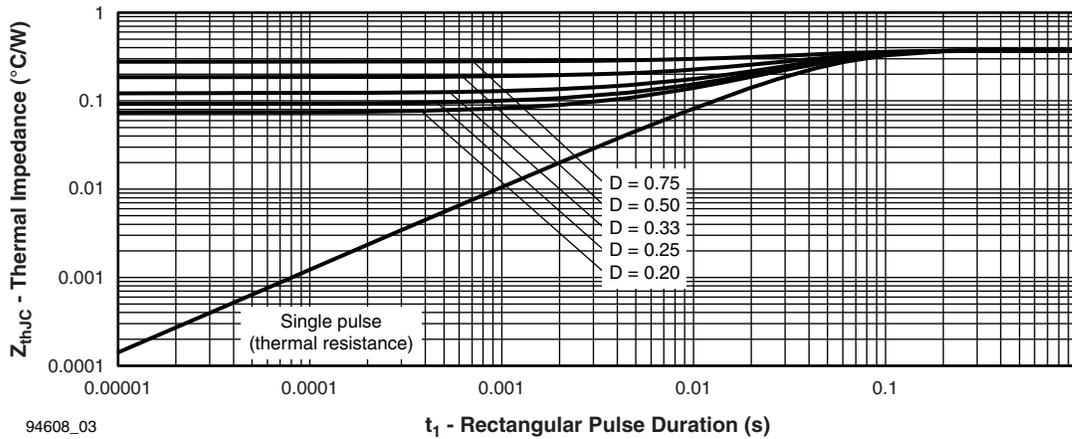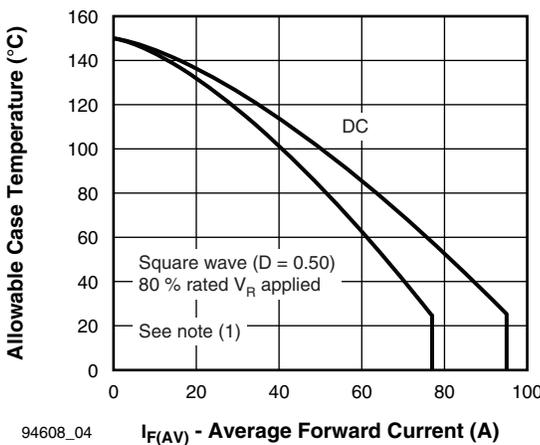Fig. 2 - Typical Values of Reverse Current vs.
Reverse Voltage

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Fig. 3 - Maximum Thermal Impedance Z_{thJC} Characteristics

94608_04

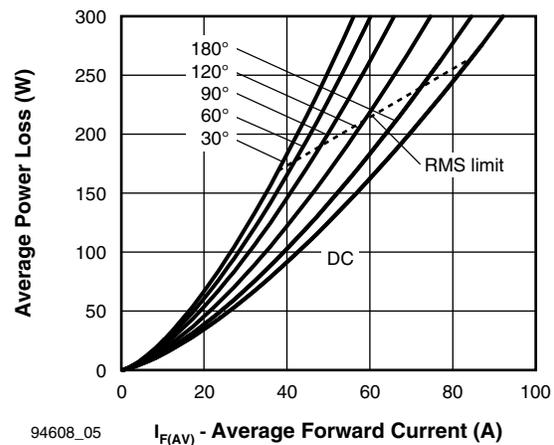Fig. 4 - Maximum Allowable Case Temperature vs.
Average Forward Current
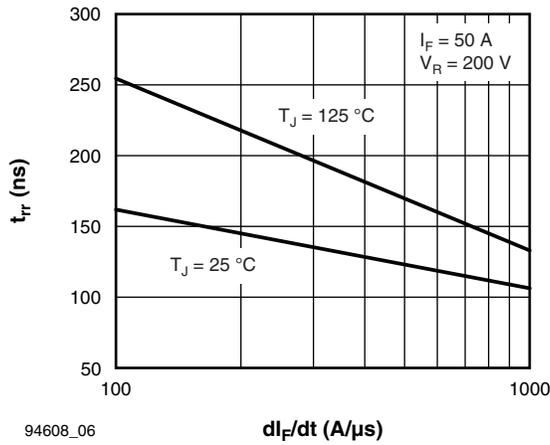

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Fig. 5 - Forward Power Loss Characteristics

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Fig. 6 - Typical Reverse Recovery Time vs. dI$_F$/dt
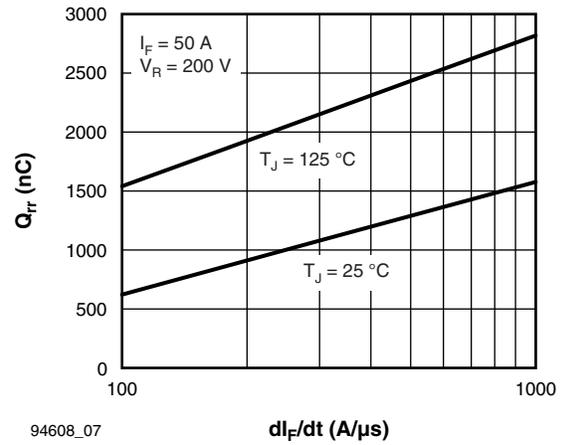

94608_07
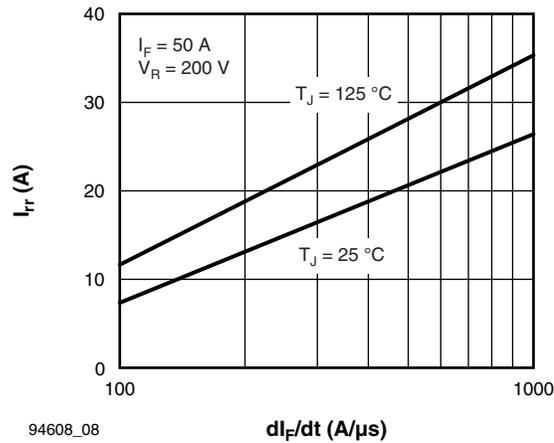
Fig. 7 - Typical Stored Charge vs. dI$_F$/dt

94608_08

Fig. 8 - Typical Peak Recovery Current vs. dI$_F$/dt

Note

[1] Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 5);
Pd_{REV} = Inverse power loss = $V_{R1} \times I_R$ (1 - D); I_R at V_{R1} = Rated V_R

V_R = 200 V

0.01 Ω

L = 70 µH

D.U.T.

D

dI_F/dt adjust

G   IRFP250

S
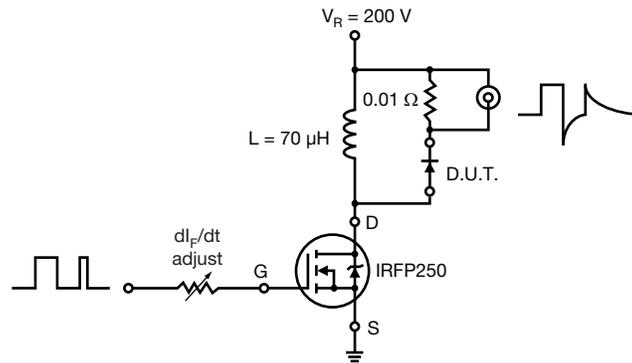
Fig. 9 - Reverse Recovery Parameter Test Circuit

I_F

0

(3)
t_{rr}

t_a t_b

(2) I_{RRM}

Q_{rr} (4)

0.5 I_{RRM}

$dI_{(rec)M}/dt$ (5)
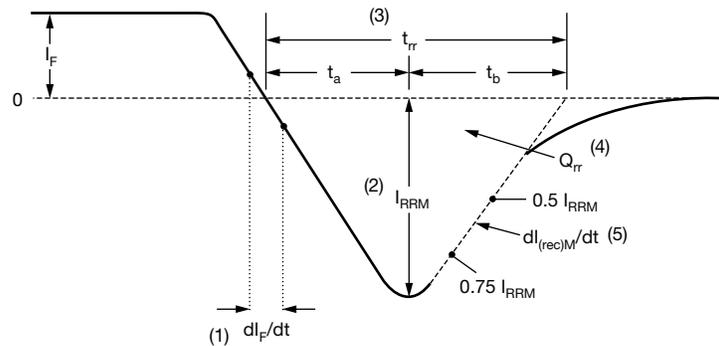
0.75 I_{RRM}

(1) dI_F/dt

(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}

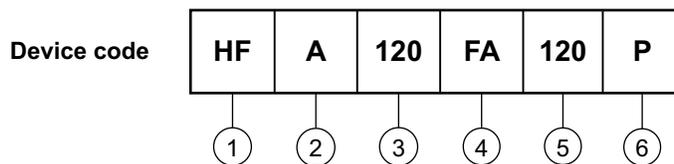Fig. 10 - Reverse Recovery Waveform and Definitions

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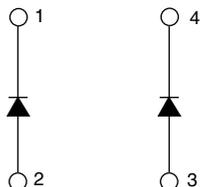## ORDERING INFORMATION TABLE

Device code	HF	A	120	FA	120	P
	1	2	3	4	5	6

1	-	HEXFRED® family
2	-	Process designator (A = Electron irradiated)
3	-	Average current (120 = 120 A)
4	-	Package outline (FA = SOT-227)
5	-	Voltage rating (120 = 1200 V)
6	-	P = Lead (Pb)-free

CIRCUIT CONFIGURATION

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

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