HEXFRED®
Ultrafast Soft Recovery Diode, 140 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

Pb-free
RoHS COMPLIANT

DESCRIPTION / APPLICATIONS

The dual diode series configuration VS-HFA140FA120 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.

PRIMARY CHARACTERISTICS	
V_R	1200 V
V_F (typical)	2.8 V
t_{rr} (typical)	48 ns
$I_{F(DC)}$ at T_C, per module	140 A at 74 °C
$I_{F(AV)}$ at T_C, per module	140 A at 46 °C
Package	SOT-227

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 = 74 °C	70	A
	per module			140	
Single pulse forward current		I_{FSM}	T_J = 25 °C	350	
Maximum power dissipation, per leg		P_D	T_C = 25 °C	357	W
			T_C = 100 °C	143	
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, per leg	V_{FM}	I_F = 60 A	-	2.8	4.0	
		I_F = 120 A	-	3.6	5.3	
		I_F = 60 A, T_J = 125 °C	-	2.7	-	
		I_F = 60 A, T_J = 150 °C	-	2.65	-	
Reverse leakage current, per leg	I_{RM}	V_R = V_R rated	-	2.0	75	μA
		T_J = 125 °C, V_R = V_R rated	-	1.6	5	mA
		T_J = 150 °C, V_R = V_R rated	-	5	10	

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time, per leg	t_{rr}	I_F = 1 A; dI_F/dt = 200 A/μs; V_R = 30 V		-	48	-	ns
		T_J = 25 °C	I_F = 50 A dI_F/dt = - 200 A/μs V_R = 200 V	-	145	-	
		T_J = 125 °C		-	218	-	
Peak recovery current, per leg	I_{RRM}	T_J = 25 °C		-	13	-	A
		T_J = 125 °C		-	18	-	
Reverse recovery charge, per leg	Q_{rr}	T_J = 25 °C		-	910	-	nC
		T_J = 125 °C		-	1920	-	
Junction capacitance, per leg	C_T	V_R = 1200 V		-	27	-	pF

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Junction to case, single leg conducting	R_{thJC}		-	-	0.35	°C/W
Junction to case, both legs conducting			-	-	0.175	
Case to heatsink	R_{thCS}	Flat, greased surface	-	0.05	-	
Weight			-	30	-	g
Mounting torque		Torque to terminal	-	-	1.1 (9.7)	Nm (lbf.in)
		Torque to heatsink	-	-	1.8 (15.9)	Nm (lbf.in)
Case style			SOT-227			

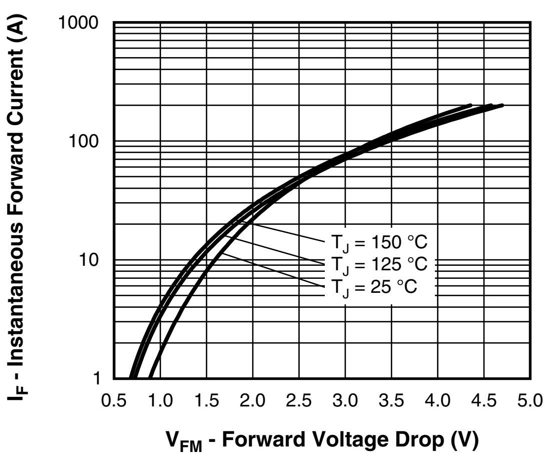


Fig. 1 - Typical Forward Voltage Drop Characteristics

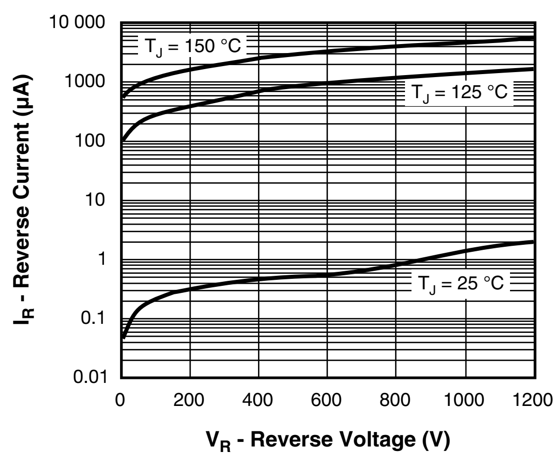


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

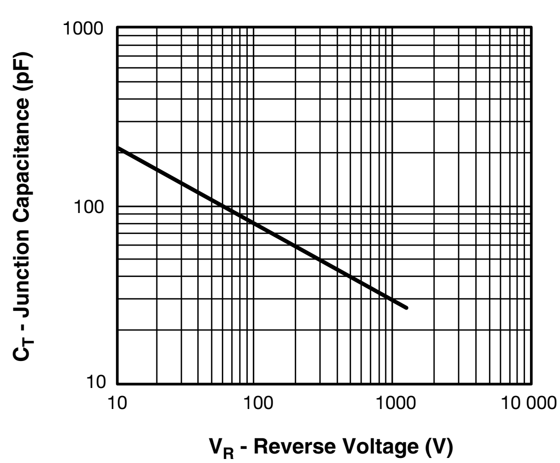


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

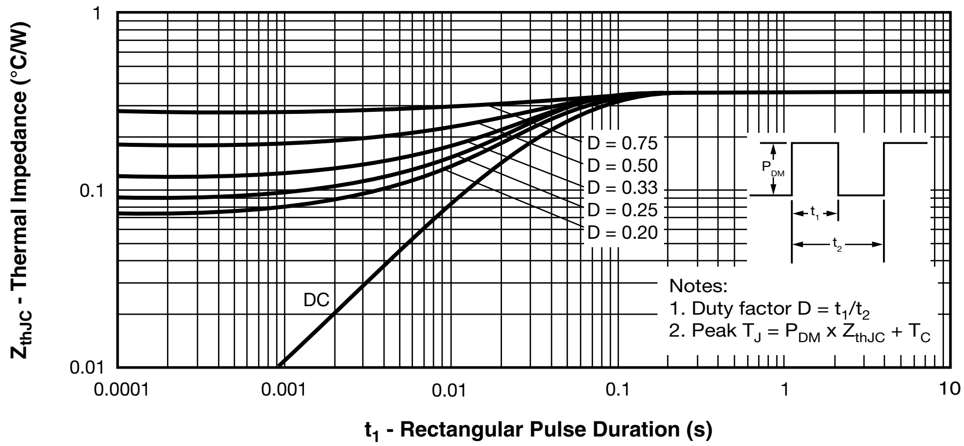


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

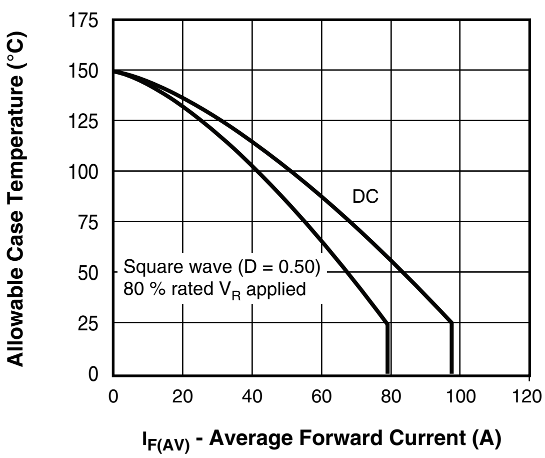


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

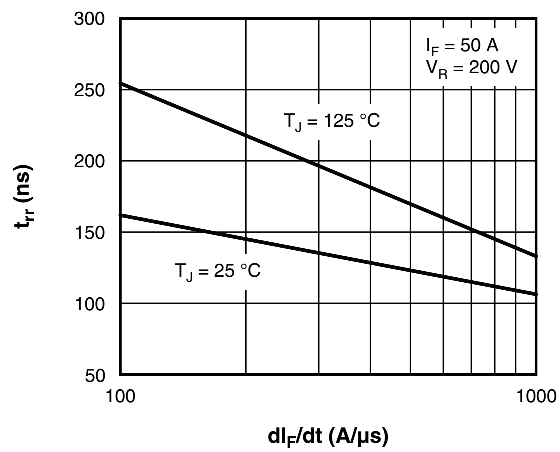


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

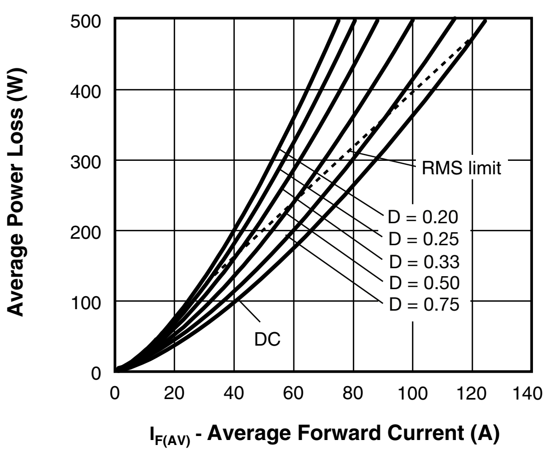


Fig. 6 - Forward Power Loss Characteristics

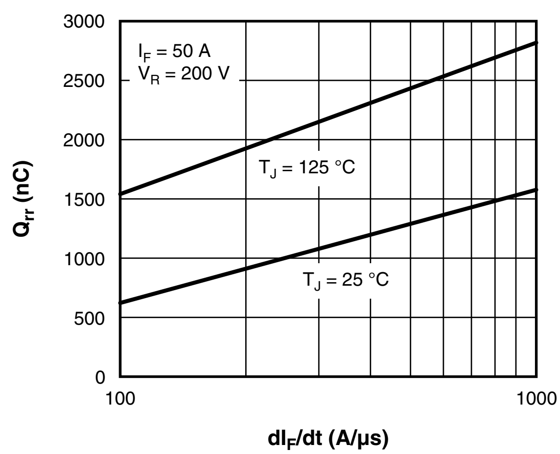


Fig. 8 - Typical Stored Charge vs. dI_F/dt

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

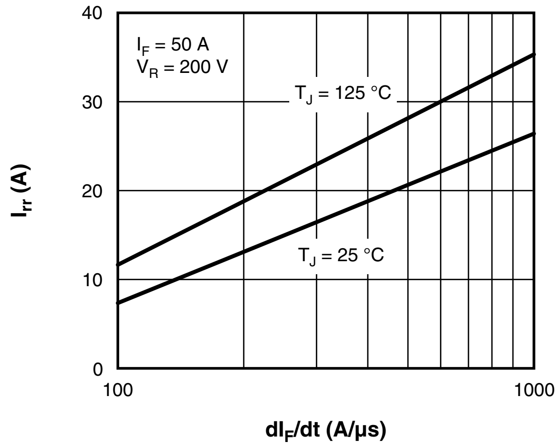


Fig. 9 - Typical Peak Recovery Current vs. dI_F/dt

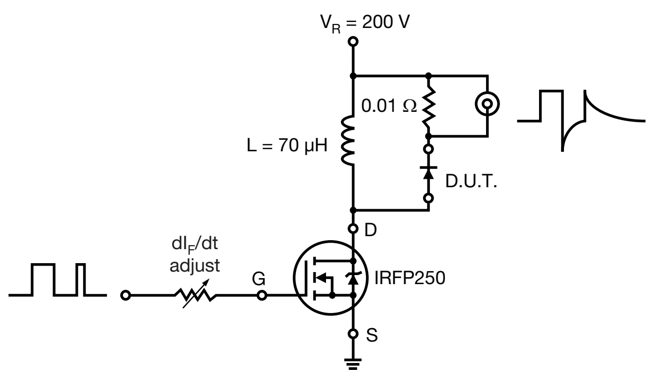
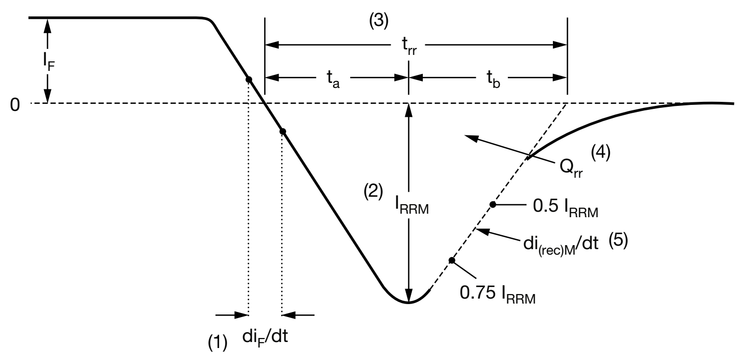


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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}

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

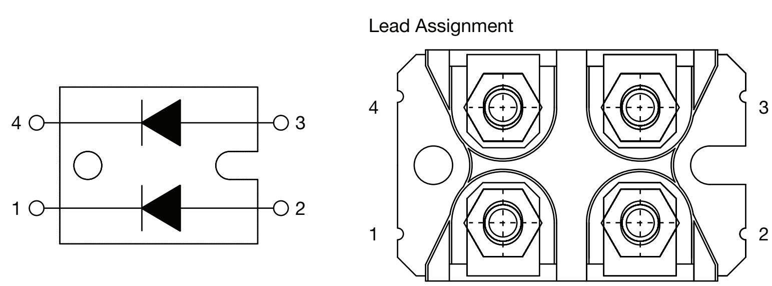
(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 11 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code	VS-	HF	A	140	F	A	120
	1	2	3	4	5	6	7

1 - Vishay Semiconductors product
2 - HEXFRED® family
3 - Process designator (A = electron irradiated)
4 - Average current (140 = 140 A)
5 - Circuit configuration (two 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**
Two separate diodes, parallel pin-out	F	

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95423
Part marking information	www.vishay.com/doc?95425

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