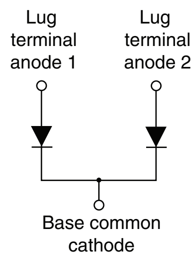
HEXFRED®
Ultrafast Soft Recovery Diode, 167 A

TO-244



PRODUCT SUMMARY	
I_F (maximum)	167 A
V_R	600 V
$I_{F(DC)}$ at T_C	84 A at 100 °C

FEATURES

- Very low Q_{rr} and t_{rr}
- Lead (Pb)-free
- Designed and qualified for industrial level

Pb-free
RoHS
COMPLIANT

BENEFITS

- Reduced RFI and EMI
- Reduced snubbing

DESCRIPTION

HEXFRED® diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. An extensive characterization of the recovery behavior for different values of current, temperature and dI/dt simplifies the calculations of losses in the operating conditions. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for power converters, motors drives and other applications where switching losses are significant portion of the total losses.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current	I_F	T_C = 25 °C	167	A
		T_C = 100 °C	84	
Single pulse forward current	I_{FSM}	Limited by junction temperature	400	
Non-repetitive avalanche energy	E_{AS}	L = 100 µH, duty cycle limited by maximum T_J	330	µJ
Maximum power dissipation	P_D	T_C = 25 °C	310	W
		T_C = 100 °C	132	
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 = 70 A	See fig. 1	-	1.37	1.89	
		I_F = 140 A		-	1.58	2.1	
		I_F = 70 A, T_J = 125 °C		-	1.29	1.54	
Maximum reverse leakage current	I_{RM}	T_J = 125 °C, V_R = 480 V	See fig. 2	-	1.2	4	mA
Junction capacitance	C_T	V_R = 200 V	See fig. 3	-	140	250	pF
Series inductance	L_S	From top of terminal hole to mounting plane		-	7.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time See fig. 5	t_{rr}	I_F = 1.0 A, dI_F/dt = 200 A/µs, V_R = 30 V		-	33	-	ns
		T_J = 25 °C	I_F = 70 A dI_F/dt = 200 A/µs V_R = 200 V	-	80	120	
		T_J = 125 °C		-	140	220	
Peak recovery current See fig. 6	I_{RRM}	T_J = 25 °C		-	8.5	15	A
		T_J = 125 °C		-	14	25	
Reverse recovery charge See fig. 7	Q_{rr}	T_J = 25 °C		-	340	900	nC
		T_J = 125 °C		-	980	2300	
Peak rate of recovery current See fig. 8	$dI_{(rec)M}/dt$	T_J = 25 °C		-	300	-	A/µs
		T_J = 125 °C		-	220	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER		**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Maximum junction and storage temperature range		T_J, T_{Stg}	- 55	-	150	°C
Thermal resistance, junction to case	per leg	R_{thJC}	-	-	0.38	°C/W K/W
	per module		-	-	0.19	
Typical thermal resistance, case to heatsink		R_{thCS}	-	0.10	-	
Weight			-	68	-	g
			-	2.4	-	oz.
Mounting torque [(1)]			30 (3.4)	-	40 (4.6)	N · m (lbf · in)
Mounting torque center hole			12 (1.4)	-	18 (2.1)	
Terminal torque			30 (3.4)	-	40 (4.6)	
Vertical pull			-	-	80	lbf · in
2" lever pull			-	-	35	

Note

(1) Mounting surface must be smooth, flat, free or burrs or other protrusions. Apply a thin even film or thermal grease to mounting surface. Gradually tighten each mounting bolt in 5 - 10 lbf · in steps until desired or maximum torque limits are reached

HEXFRED®
Ultrafast Soft Recovery
Diode, 167 A

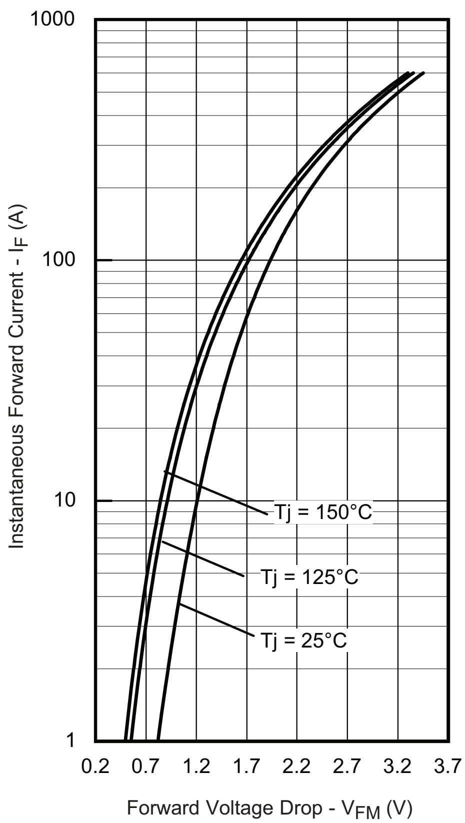


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

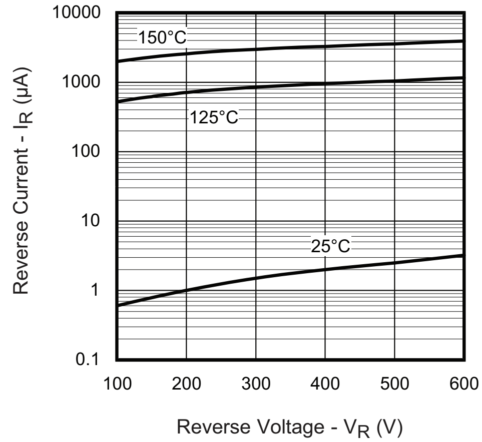


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

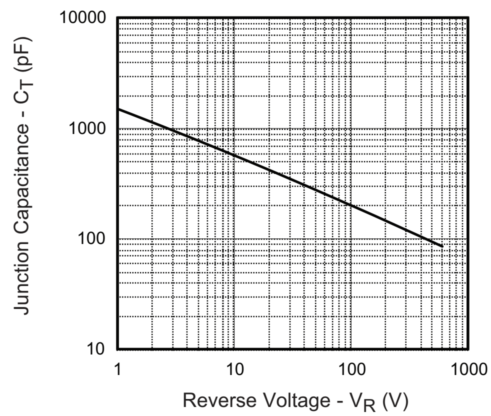


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

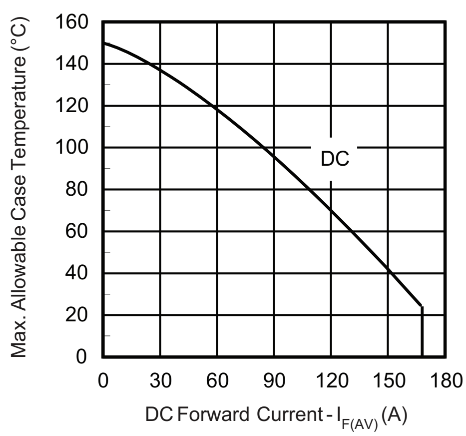


Fig. 4 - Maximum Allowable Case Temperature vs. DC Forward Current (Per Leg)

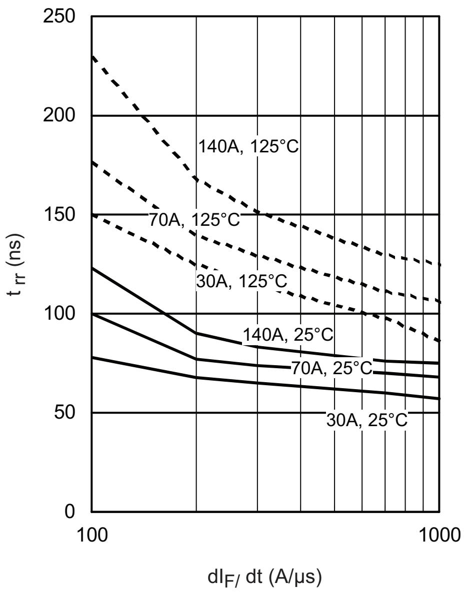


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt
(Per Leg)

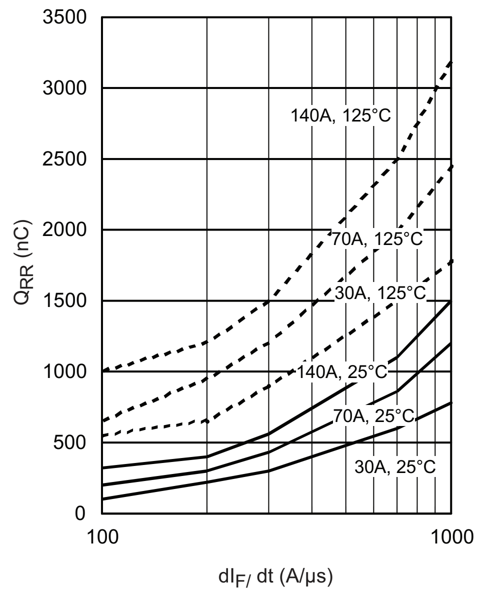


Fig. 7 - Typical Stored Charge vs. dI_F/dt
(Per Leg)

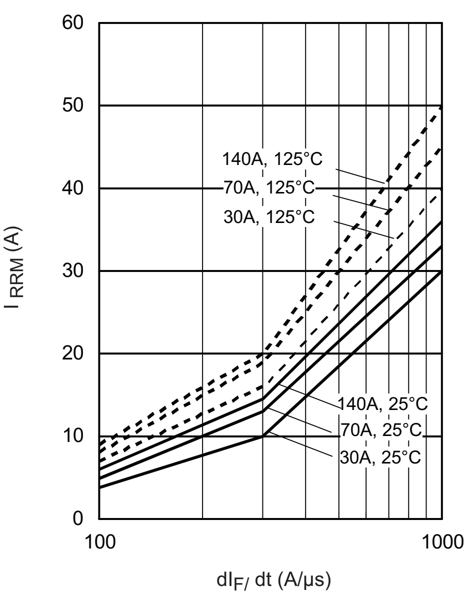


Fig. 6 - Typical Recovery Current vs. dI_F/dt
(Per Leg)

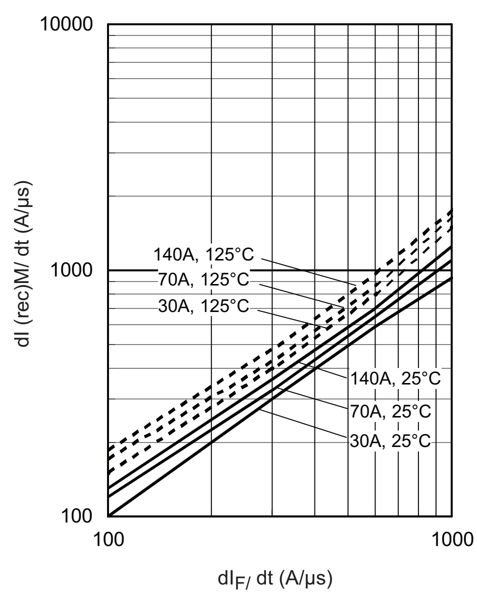


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt
(Per Leg)

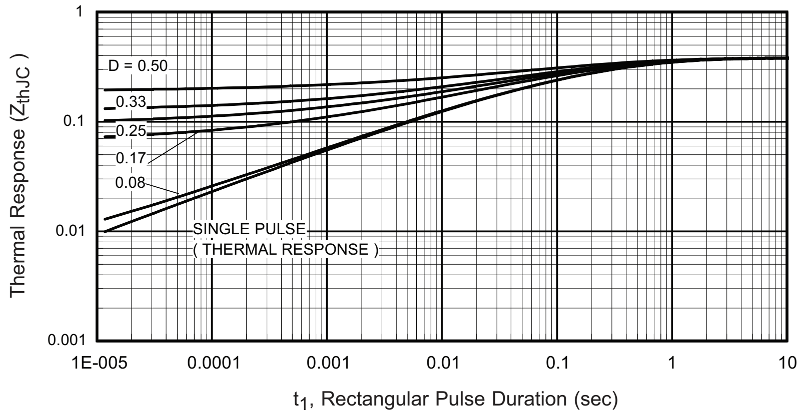


Fig. 9 - Maximum Thermal Impedance Z_{thJC} Characteristics

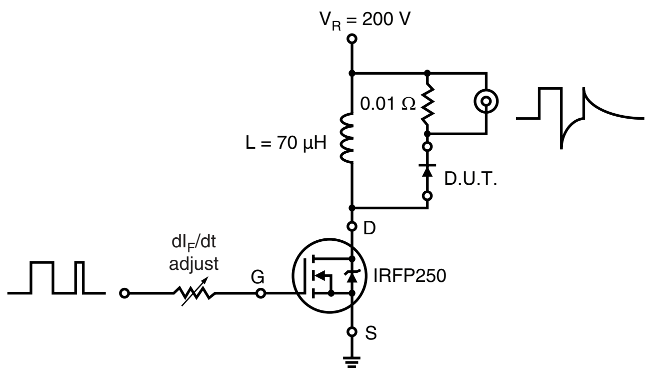
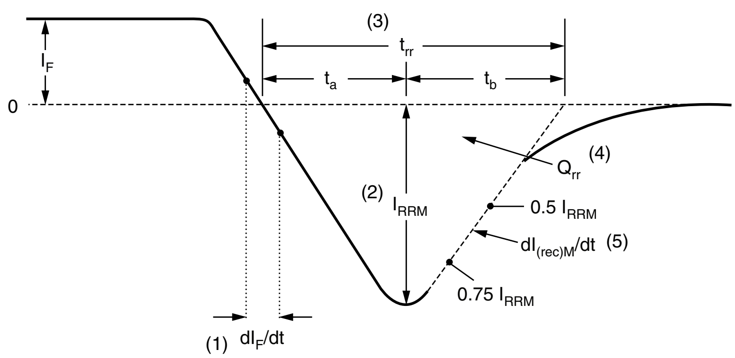


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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

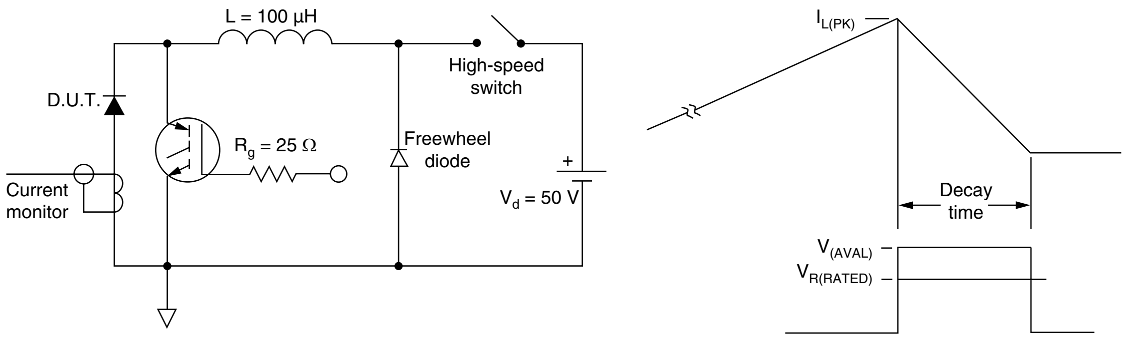


Fig. 12 - Avalanche Test Circuit and Waveforms

ORDERING INFORMATION TABLE

Device code	HFA	140	NJ	60	C	PbF
	1	2	3	4	5	6

- **1** - HEXFRED® family
- **2** - Average current rating
- **3** - NJ = TO-244
- **4** - Voltage rating (600 V)
- **5** - C = Common cathode
- **6** - Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95021

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.