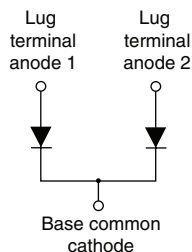


HEXFRED® Ultrafast Soft Recovery Diode, 280 A



TO-244



FEATURES

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

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.


RoHS
COMPLIANT

PRODUCT SUMMARY

$I_{F(AV)}$	280 A
V_R	600 V
$I_{F(DC)}$ at T_C	149 A at 100 °C

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current	I_F	$T_C = 25\text{ °C}$	292	A
		$T_C = 100\text{ °C}$	149	
Single pulse forward current	I_{FSM}	Limited by junction temperature	600	
Non-repetitive avalanche energy	E_{AS}	$L = 100\text{ }\mu\text{H}$, duty cycle limited by maximum T_J	2.2	mJ
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	657	W
		$T_C = 100\text{ °C}$	263	
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}	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Maximum forward voltage	V_{FM}	$I_F = 105\text{ A}$	-	1.33	1.8	
		$I_F = 210\text{ A}$	-	1.53	2.1	
		$I_F = 105\text{ A}, T_J = 125\text{ °C}$	-	1.22	1.64	
Maximum reverse leakage current	I_{RM}	$T_J = 125\text{ °C}, V_R = 600\text{ V}$	-	2.4	8	mA
Junction capacitance	C_T	$V_R = 200\text{ V}$	-	280	400	pF
Series inductance	L_S	From top of terminal hole to mounting plane	-	5.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time See fig. 5	t_{rr}	$I_F = 1.0\text{ A}$, $dI_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	39	-	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	-	92	140	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	180	270	
Peak recovery current See fig. 6	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	9.3	17	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	16	30	
Reverse recovery charge See fig. 7	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	490	1200	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	1400	4000	
Peak rate of recovery current See fig. 8	$dl_{(rec)M}/dt$	$T_J = 25\text{ }^{\circ}\text{C}$	-	290	-	A/ μs
		$T_J = 125\text{ }^{\circ}\text{C}$	-	200	-	

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}	- 55	-	150	$^{\circ}\text{C}$
Thermal resistance, junction to case	R_{thJC}	-	-	0.19	$^{\circ}\text{C}/\text{W}$ K/W
		-	-	0.095	
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)
	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 of burrs or other protrusions. Apply a thin even film of thermal grease to mounting surface. Gradually tighten each mounting bolt in 5 to 10 lbf · in steps until desired or maximum torque limits are reached.

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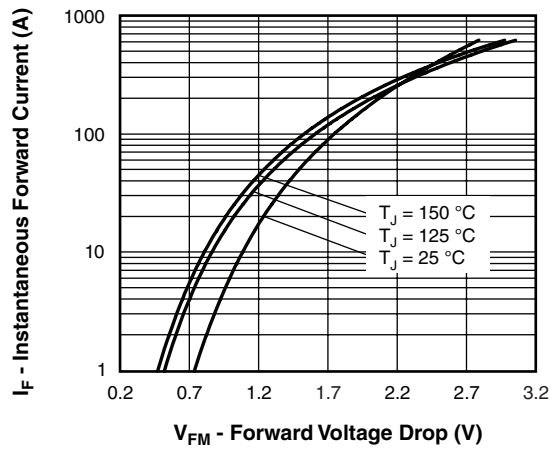


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

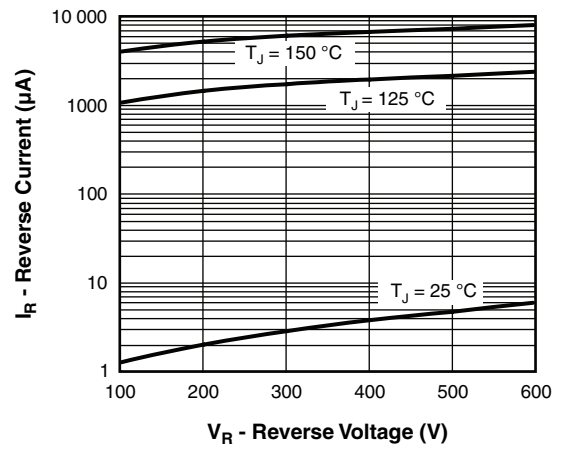


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

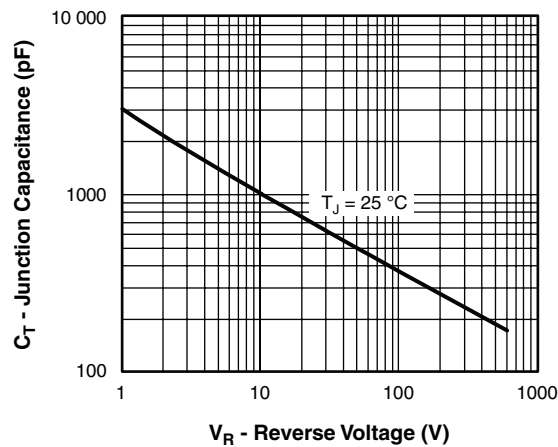


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

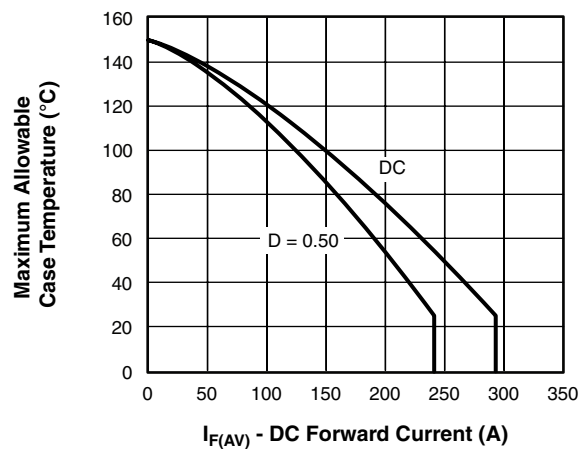
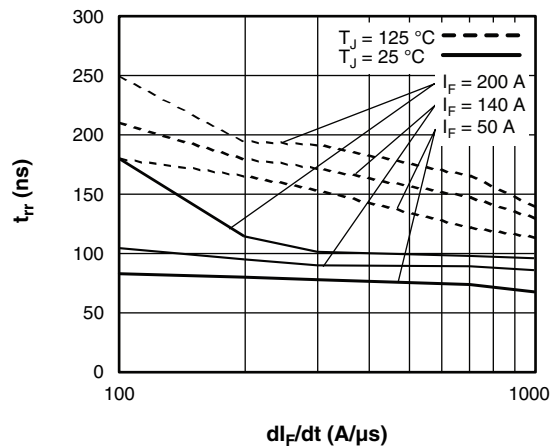
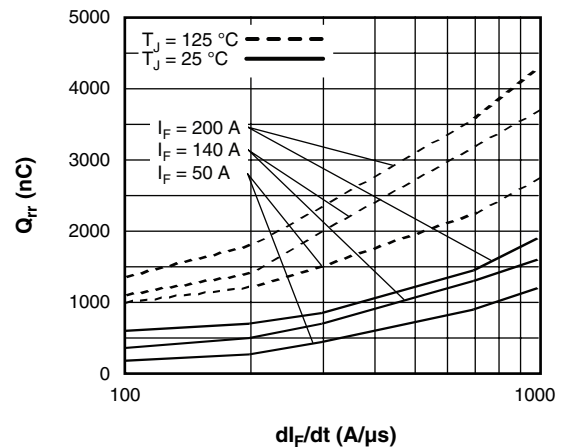
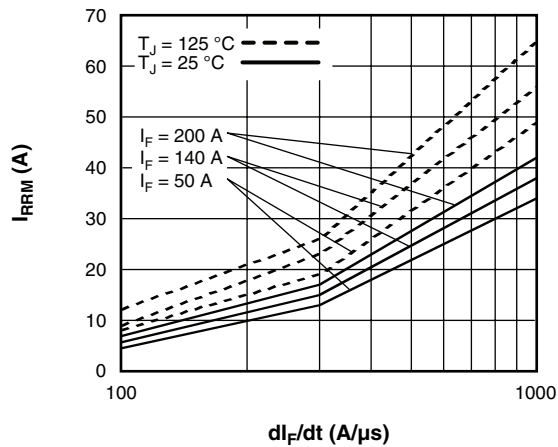
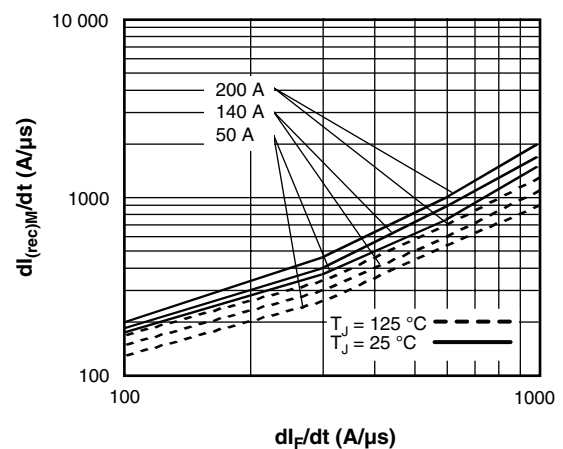
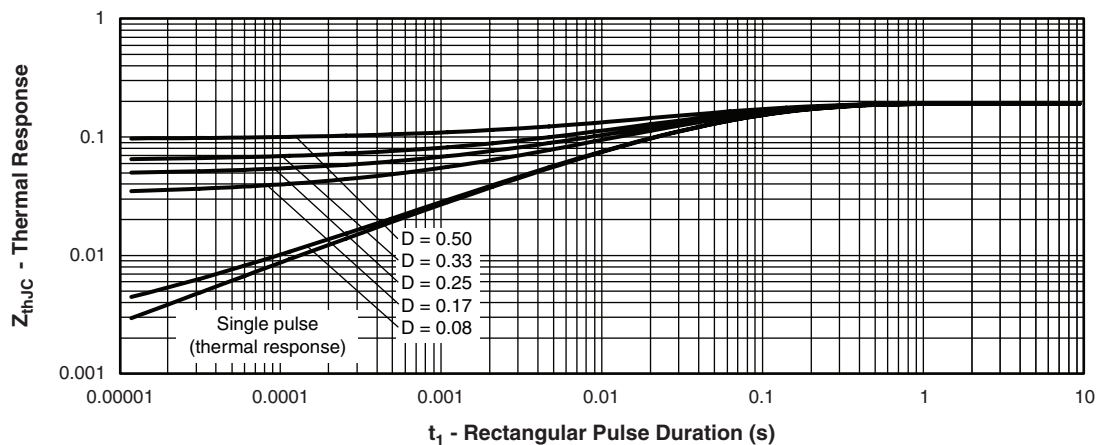


Fig. 4 - Maximum Allowable Case Temperature vs. DC Forward Current (Per Leg)

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 (Per Leg)

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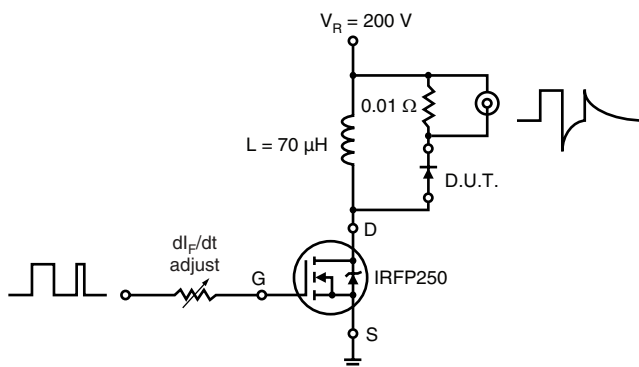
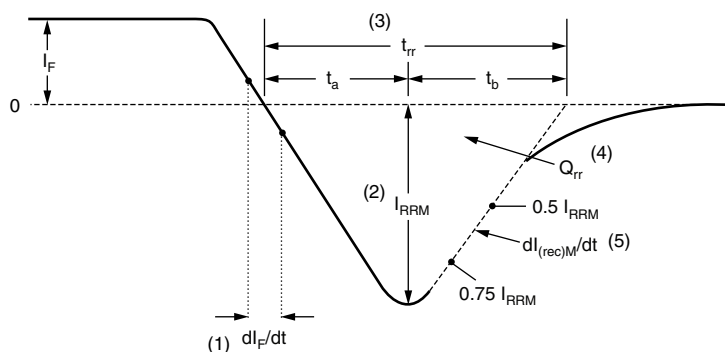


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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_{BRM}

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

(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

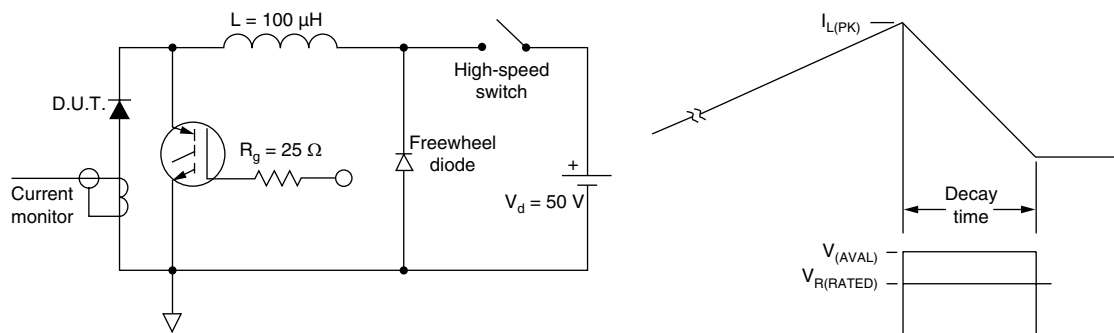


Fig. 12 - Avalanche Test Circuit and Waveforms

HFA280NJ60CPbF

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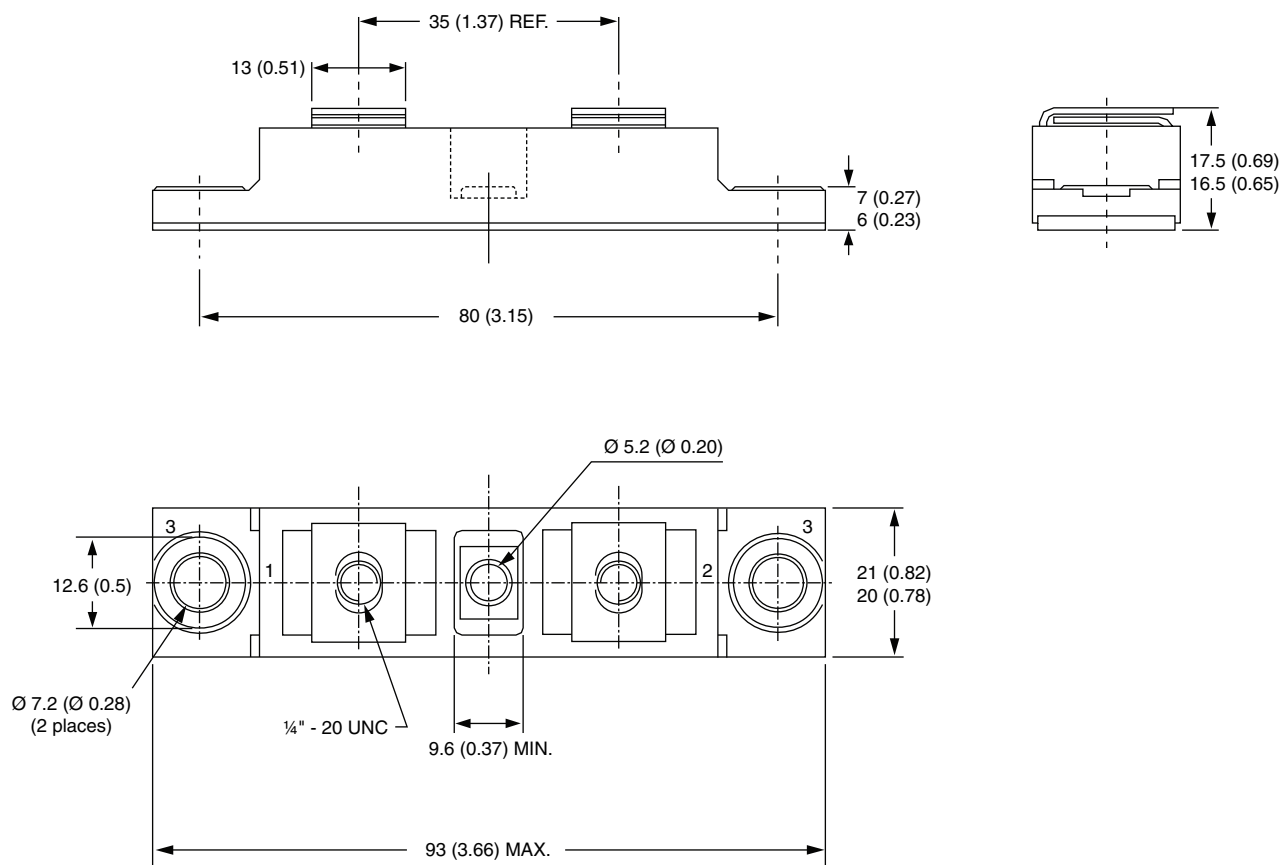
ORDERING INFORMATION TABLE

Device code	HFA	280	NJ	60	C	PbF
	1	2	3	4	5	6
1	- HEXFRED® family, electron irradiated					
2	- Average current rating					
3	- NJ = TO-224					
4	- Voltage rating (600 V)					
5	- C = Common cathode					
6	- Lead (Pb)-free					

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

TO-244

DIMENSIONS in millimeters (inches)





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