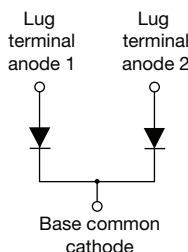


HEXFRED® Ultrafast Soft Recovery Diode, 240 A


TO-244


FEATURES

- Very low Q_{rr} and t_{rr}
- UL approved file E222165 
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

BENEFITS

- Reduced RFI and EMI
- Reduced snubbing

DESCRIPTION / APPLICATIONS

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_F/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.

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	240 A
V_R	400 V
$I_{F(DC)}$ at T_C	197 A at 100 °C
Package	TO-244
Circuit configuration	Two diodes common cathode

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		400	V
Continuous forward current	I_F	$T_C = 25\text{ °C}$	395	A
		$T_C = 100\text{ °C}$	197	
Single pulse forward current	I_{FSM}	Limited by junction temperature	900	
Non-repetitive avalanche energy	E_{AS}	$L = 100\text{ }\mu\text{H}$, duty cycle limited by maximum T_J	1.4	mJ
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	658	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 μA		400	-	-	V
Maximum forward voltage	V _{FM}	I _F = 120 A	See fig. 1	-	1.1	1.47	
		I _F = 240 A		-	1.3	1.5	
		I _F = 120 A, T _J = 125 °C		-	1.0	1.2	
Maximum reverse leakage current	I _{RM}	T _J = 125 °C, V _R = 400 V	See fig. 2	-	660	5000	μA
Junction capacitance	C _T	V _R = 200 V	See fig. 3	-	280	380	pF
Series inductance	L _S	From top of terminal hole to mounting plane		-	6.0	-	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}	$I_F = 1.0\text{ A}$, $dI_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	50	-	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	-	77	120	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	290	440	
Peak recovery current See fig. 6	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	7.5	14	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	16	30	
Reverse recovery charge See fig. 7	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	290	780	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	2300	6300	
Peak rate of recovery current See fig. 8	$dI_{(rec)M}/dt$	$T_J = 25\text{ }^{\circ}\text{C}$	-	320	-	A/ μs
		$T_J = 125\text{ }^{\circ}\text{C}$	-	270	-	

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	$^{\circ}\text{C}/\text{W}$
		-	-	0.095	
Typical thermal resistance, case to heatsink	R_{thCS}	-	0.10	-	$^{\circ}\text{C}/\text{W}$
Weight		-	68	-	g
		-	2.4	-	oz.
Mounting torque ⁽¹⁾	center hole	30 (3.4)	-	40 (4.6)	lbf · in (N · m)
		12 (1.4)	-	18 (2.1)	
Terminal torque		30 (3.4)	-	40 (4.6)	
Vertical pull		-	-	80	
2" lever pull		-	-	35	lbf · in

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

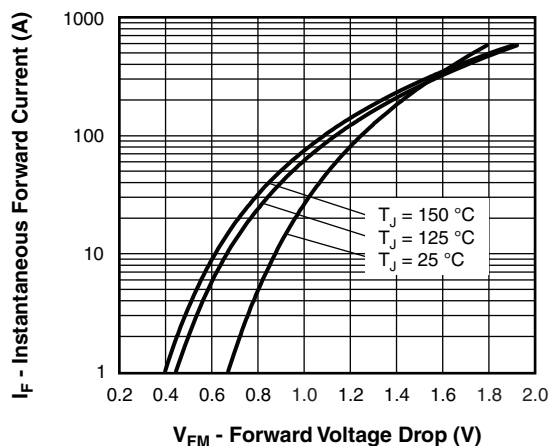


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

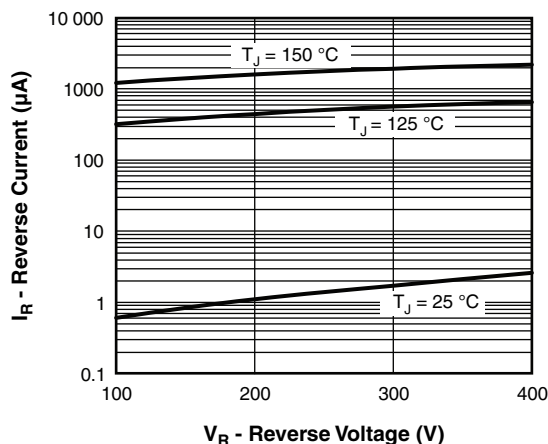


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

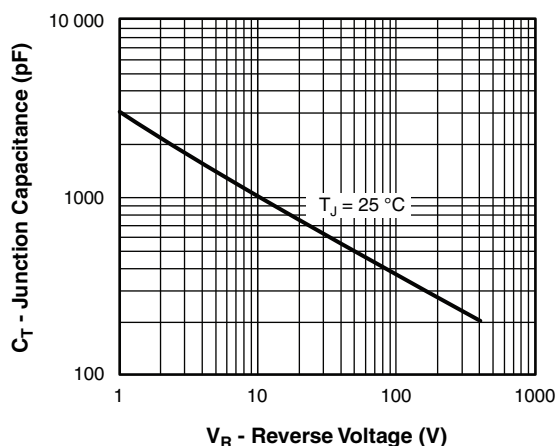


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

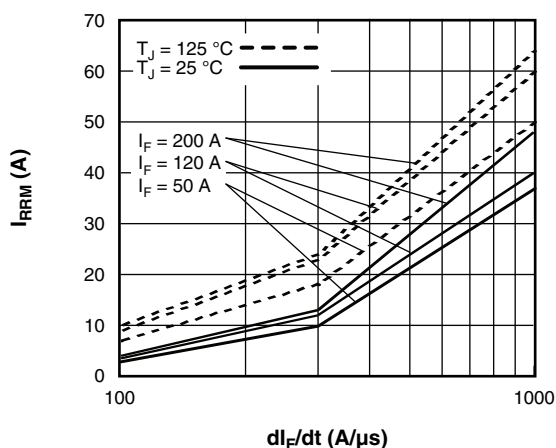


Fig. 6 - Typical Recovery Current vs. dI_F/dt (Per Leg)

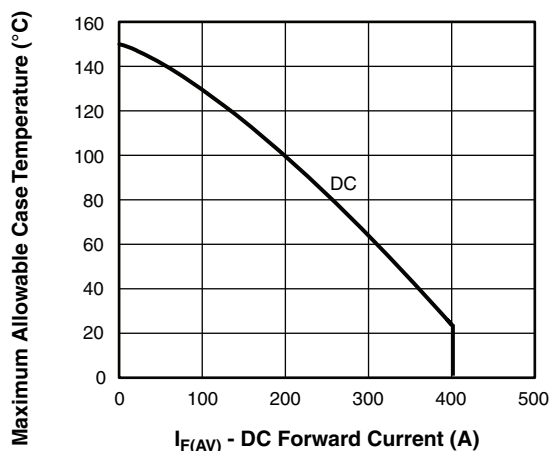


Fig. 4 - Maximum Allowable Case Temperature vs. DC Forward Current (Per Leg)

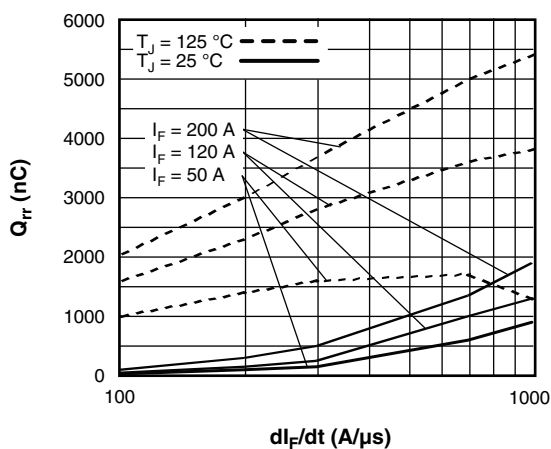


Fig. 7 - Typical Stored Charge vs. dI_F/dt (Per Leg)

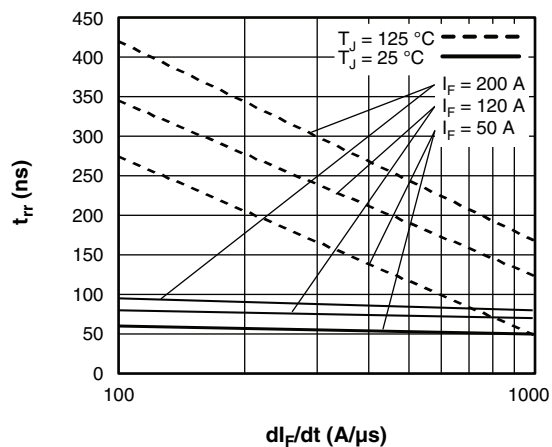


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt (Per Leg)

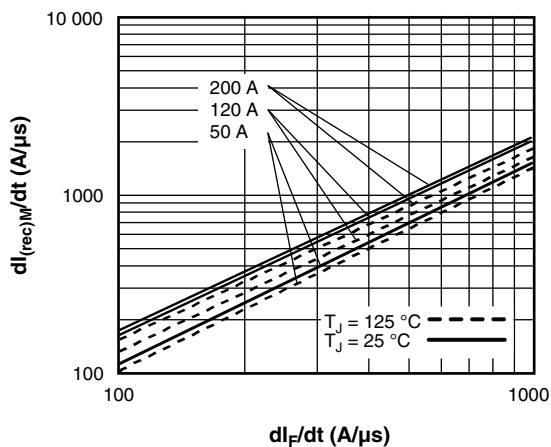


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt (Per Leg)

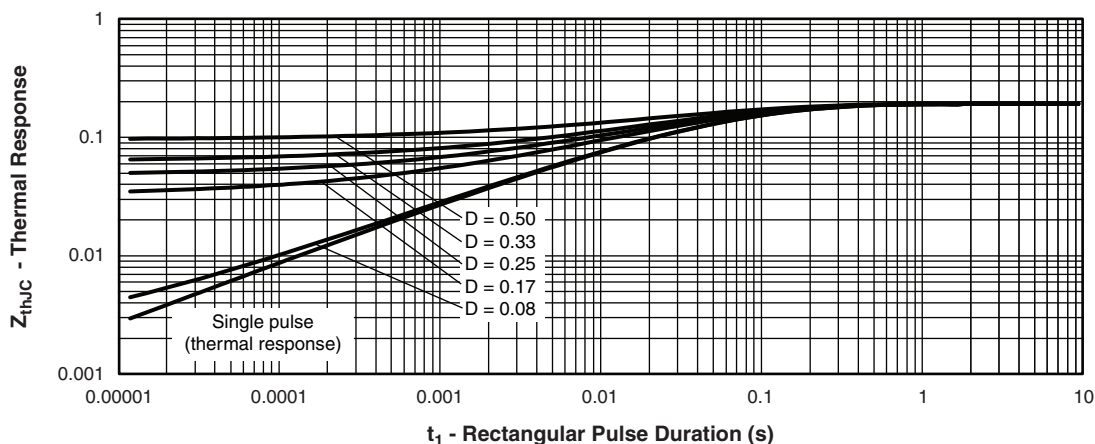


Fig. 9 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

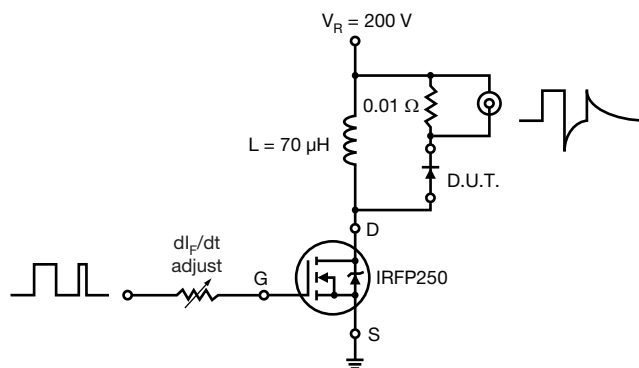


Fig. 10 - Reverse Recovery Parameter Test Circuit

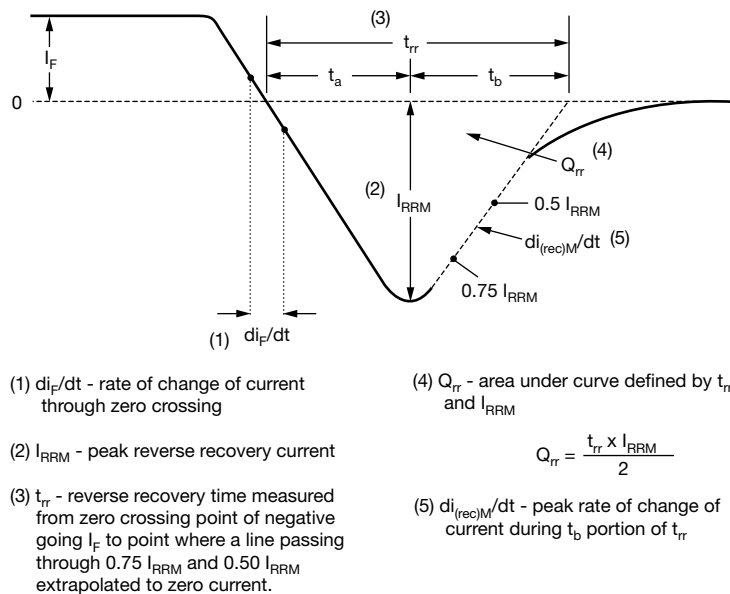


Fig. 11 - Reverse Recovery Waveform and Definitions

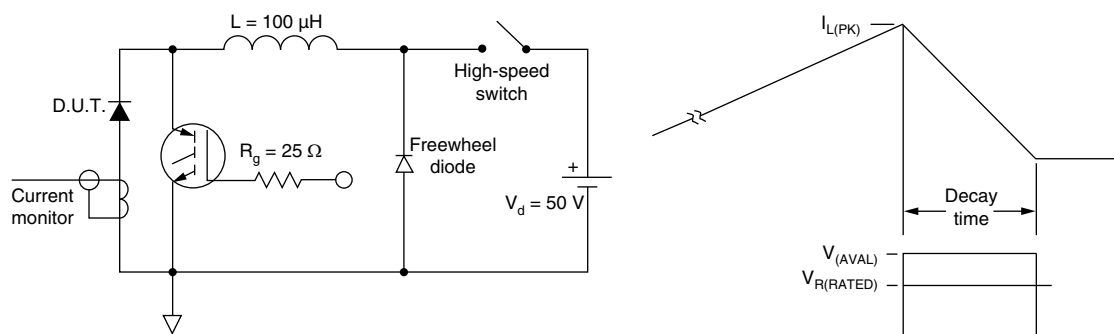


Fig. 12 - Avalanche Test Circuit and Waveforms

ORDERING INFORMATION TABLE

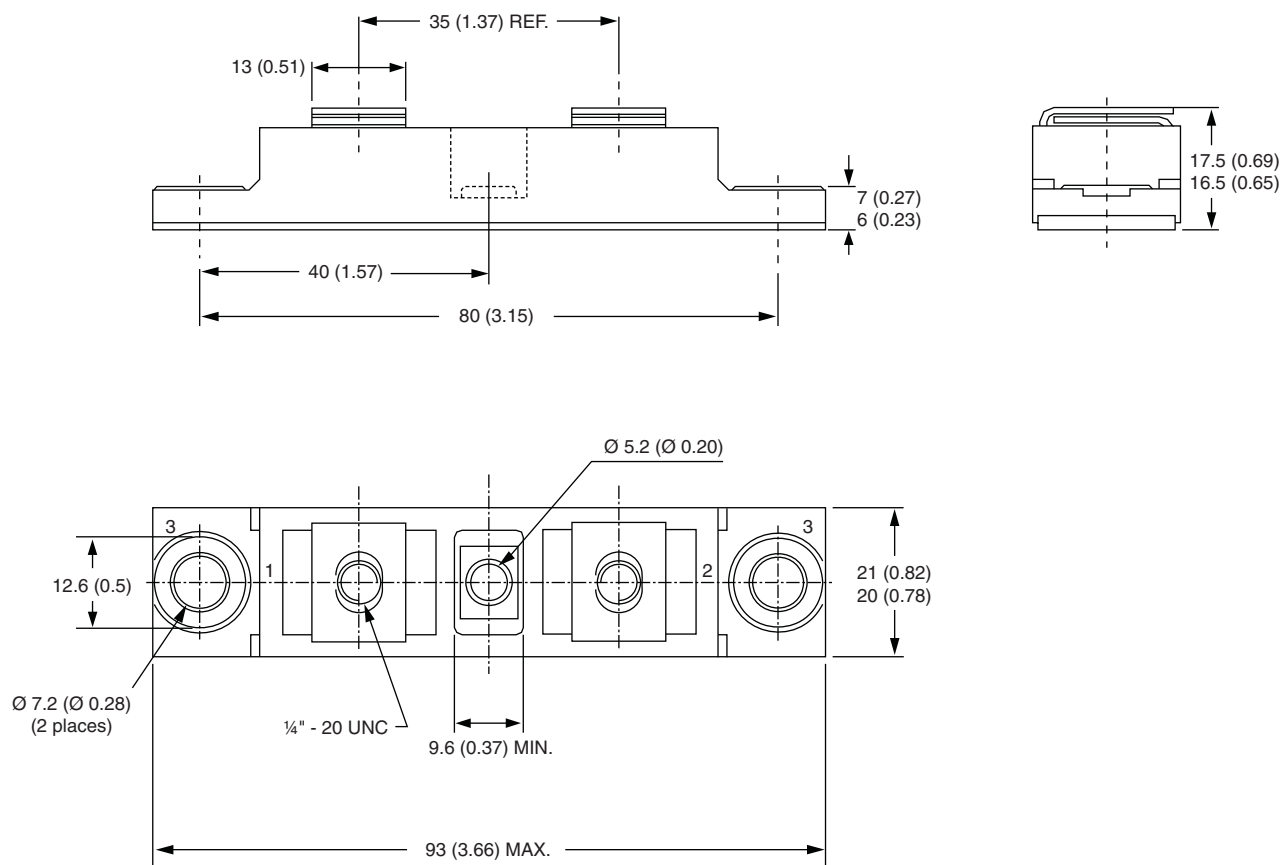
Device code	VS-	HFA	240	NJ	40	C	PbF
	1	2	3	4	5	6	7
1	Vishay Semiconductors product						
2	HEXFRED® family, electron irradiated						
3	Average current rating						
4	NJ = TO-244						
5	Voltage rating (400 V)						
6	C = two diodes common cathode						
7	Lead (Pb)-free						

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



TO-244

DIMENSIONS in millimeters (inches)





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