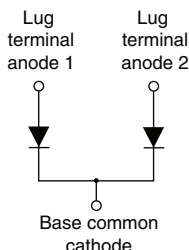


HEXFRED® Ultrafast Soft Recovery Diode, 167 A



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 (maximum)	167 A
V_R	600 V
$I_{F(DC)}$ at T_C	84 A at 100 °C
Package	TO-244
Circuit configuration	Two diodes common cathode

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current	I_F	$T_C = 25\text{ °C}$	167	A
		$T_C = 100\text{ °C}$	84	
Single pulse forward current	I_{FSM}	Limited by junction temperature	400	
Non-repetitive avalanche energy	E_{AS}	$L = 100\text{ }\mu\text{H}$, duty cycle limited by maximum T_J	330	μJ
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	310	W
		$T_C = 100\text{ °C}$	132	
Operating junction and storage temperature range	T_J, T_{Stg}		-55 to +150	°C

ELECTRICAL SPECIFICATIONS PER LEG ($T_J = 25\text{ °C}$ 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}	$I_F = 70\text{ A}$	-	1.37	1.89	
		$I_F = 140\text{ A}$	-	1.58	2.1	
		$I_F = 70\text{ A}, T_J = 125\text{ °C}$	-	1.29	1.54	
Maximum reverse leakage current	I_{RM}	$T_J = 125\text{ °C}, V_R = 480\text{ V}$	See fig. 2	1.2	4	mA
Junction capacitance	C_T	$V_R = 200\text{ V}$	See fig. 3	140	250	pF
Series inductance	L_S	From top of terminal hole to mounting plane	-	7.0	-	nH



DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time (fig. 5)	t_{rr}	$I_F = 1.0\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	33	-	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	-	80	120	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	140	220	
Peak recovery current (fig. 6)	I_{RRM}	$T_J = 25\text{ }^{\circ}\text{C}$	-	8.5	15	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	14	25	
Reverse recovery charge (fig. 7)	Q_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$	-	340	900	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	980	2300	
Peak rate of recovery current (fig. 8)	$di_{(rec)M}/dt$	$T_J = 25\text{ }^{\circ}\text{C}$	-	300	-	A/ μs
		$T_J = 125\text{ }^{\circ}\text{C}$	-	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)	lbf · in (N · m)
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 of burrs or other protrusions. Apply a thin even film of thermal grease to mounting surface. Gradually tighten each mounting bolt in 5 - 10 lbf · in steps until desired or maximum torque limits are reached

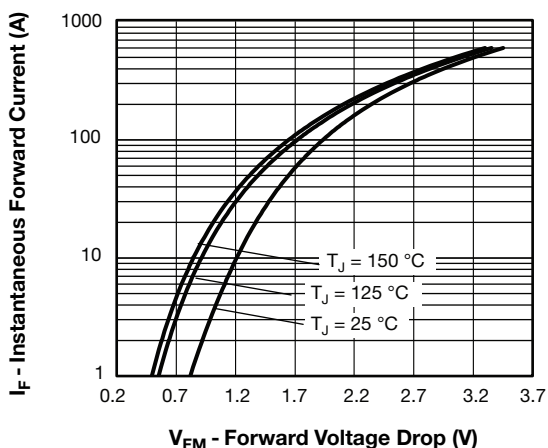


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

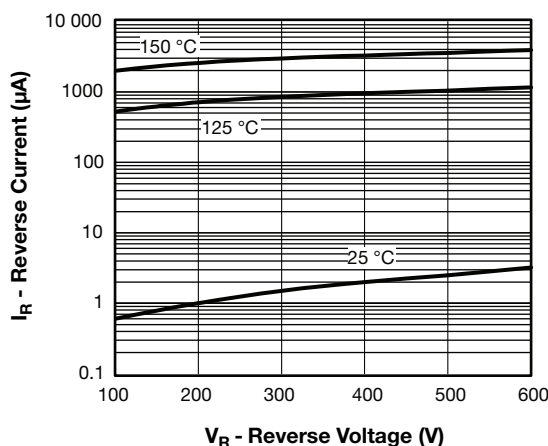


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

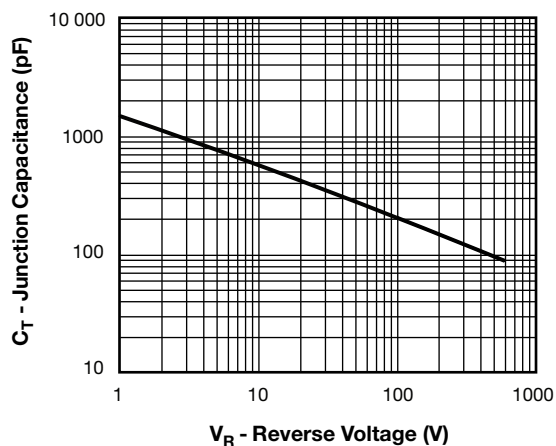


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

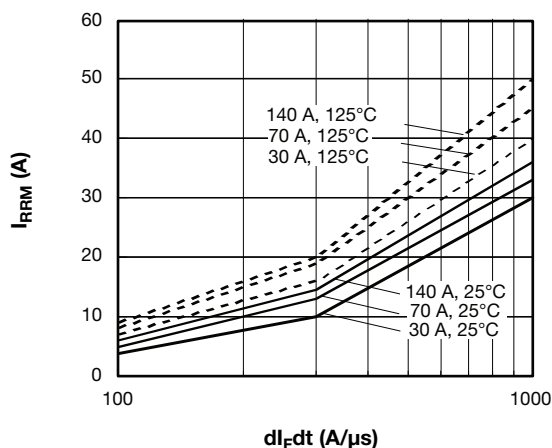


Fig. 6 - Typical Recovery Current vs. dI_F/dt (Per Leg)

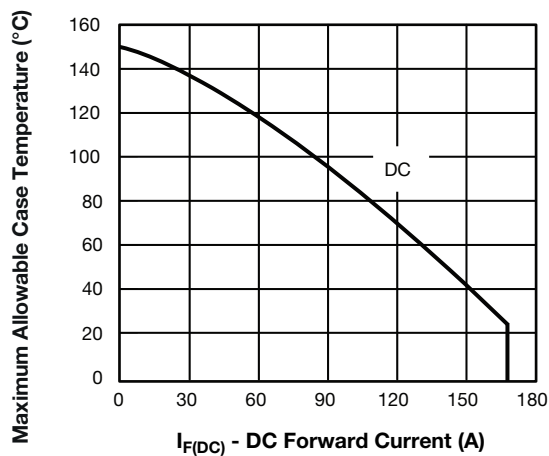


Fig. 4 - Maximum Allowable Case Temperature vs. DC Forward Current (Per Leg)

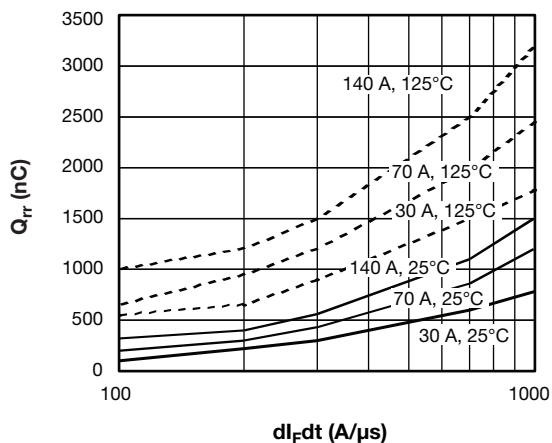


Fig. 7 - Typical Stored Charge vs. dI_F/dt (Per Leg)

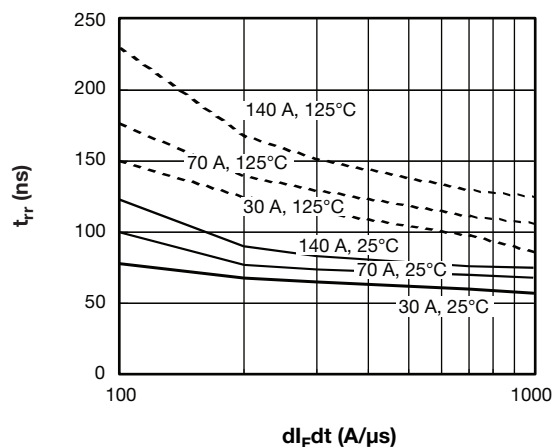


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt (Per Leg)

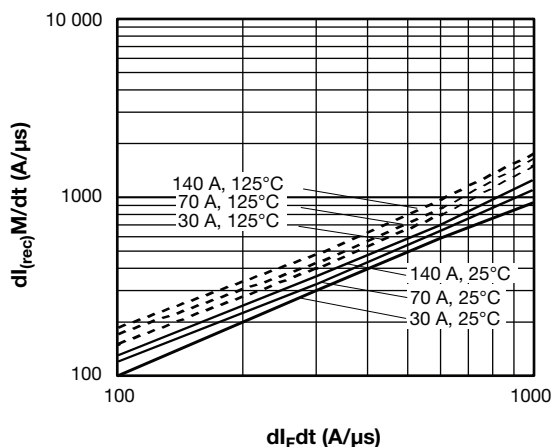


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt (Per Leg)

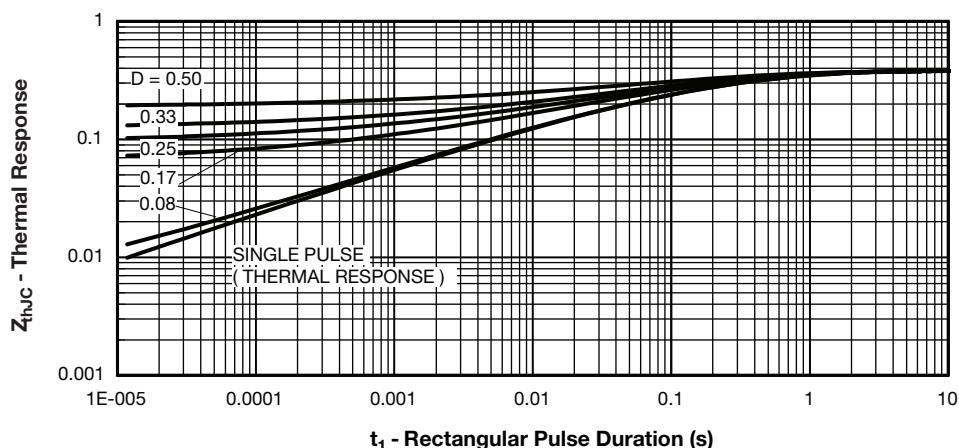


Fig. 9 - Maximum Thermal Impedance Z_{thJC} Characteristics

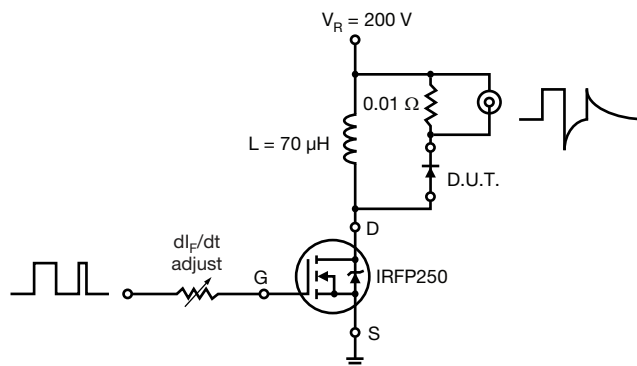


Fig. 10 - Reverse Recovery Parameter Test Circuit

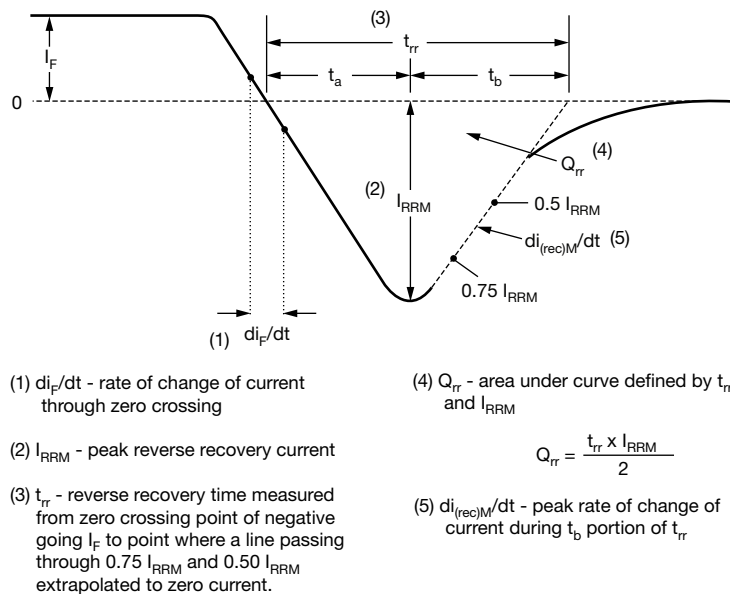


Fig. 11 - Reverse Recovery Waveform and Definitions

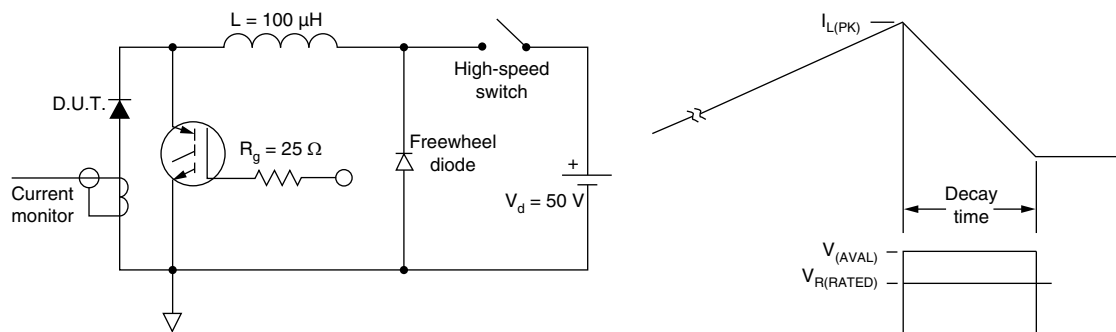


Fig. 12 - Avalanche Test Circuit and Waveforms

ORDERING INFORMATION TABLE

Device code	VS-	HFA	140	NJ	60	C	PbF
	1	2	3	4	5	6	7

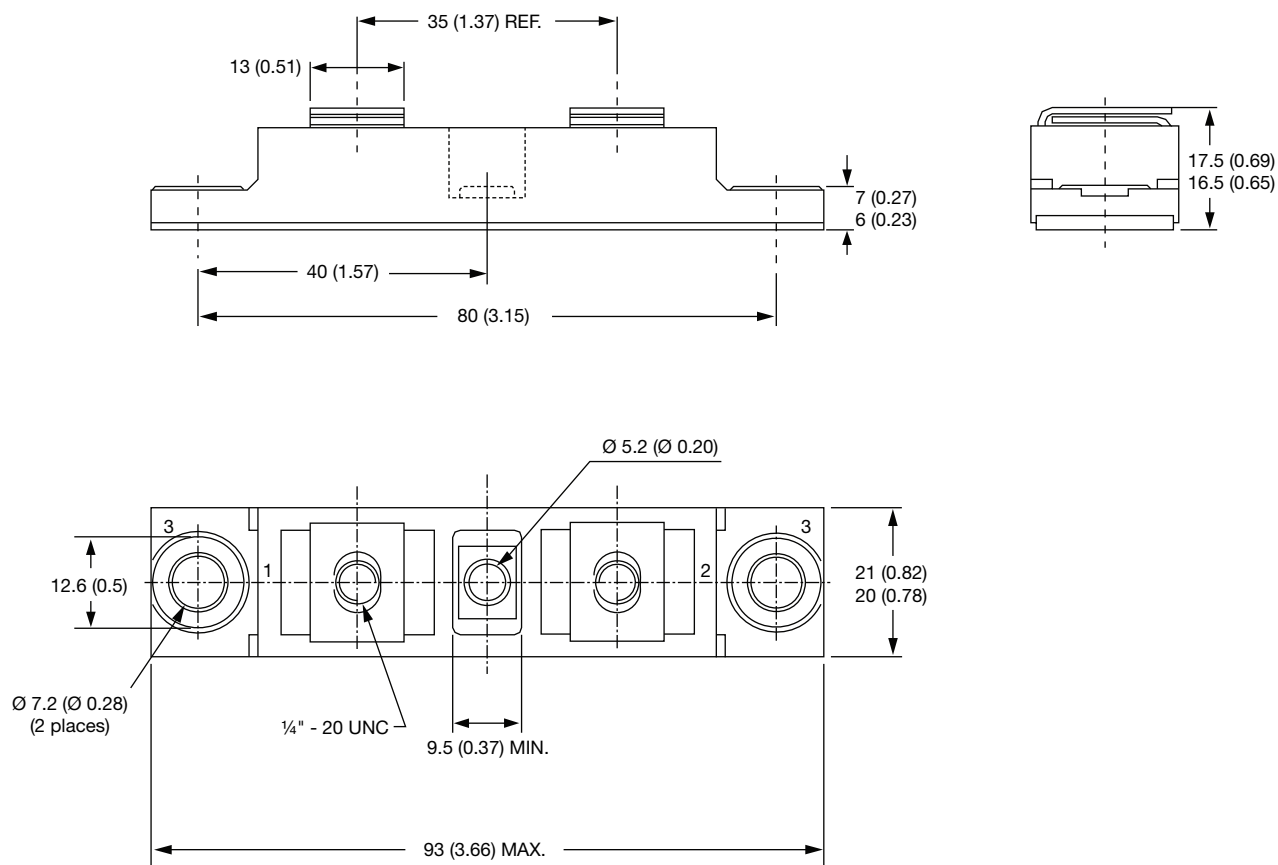
1	-	Vishay Semiconductors product
2	-	HEXFRED® family
3	-	Average current rating
4	-	NJ = TO-244
5	-	Voltage rating (600 V)
6	-	C = two diodes common cathode
7	-	Lead (Pb)-free

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



TO-244

DIMENSIONS in millimeters (inches)





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