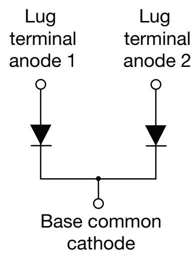
HEXFRED®
Ultrafast Soft Recovery Diode, 210 A

TO-244



PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	210 A
V_R	600 V
$I_{F(DC)}$ at T_C	120 A at 100 °C
Package	TO-244
Circuit configuration	Two diodes common cathode

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.

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 °C	235	A
		T_C = 100 °C	120	
Single pulse forward current	I_{FSM}	Limited by junction temperature	600	
Non-repetitive avalanche energy	E_{AS}	L = 100 µH, duty cycle limited by maximum T_J	2.2	mJ
Maximum power dissipation	P_D	T_C = 25 °C	463	W
		T_C = 100 °C	185	
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 = 105 A	See fig. 1	-	1.38	1.9	
		I_F = 210 A		-	1.6	2.25	
		I_F = 105 A, T_J = 125 °C		-	1.3	1.56	
Maximum reverse leakage current	I_{RM}	T_J = 125 °C, V_R = 480 V	See fig. 2	-	1.8	6.0	mA
Junction capacitance	C_T	V_R = 200 V	See fig. 3	-	200	300	pF
Series inductance	L_S	From top of terminal hole to mounting plane		-	6.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time (fig. 5)	t_{rr}	I_F = 1.0 A, dI_F/dt = 200 A/μs, V_R = 30 V		-	35	-	ns
		T_J = 25 °C	I_F = 105 A dI_F/dt = 200 A/μs V_R = 200 V	-	90	140	
		T_J = 125 °C		-	160	240	
Peak recovery current (fig. 6)	I_{RRM}	T_J = 25 °C		-	10	18	A
		T_J = 125 °C		-	15	30	
Reverse recovery charge (fig. 7)	Q_{rr}	T_J = 25 °C		-	450	1300	nC
		T_J = 125 °C		-	1200	3600	
Peak rate of recovery current (fig. 8)	$dI_{(rec)M}/dt$	T_J = 25 °C		-	310	-	A/μs
		T_J = 125 °C		-	240	-	

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}	-	-	0.27	°C/W K/W
	per module		-	-	0.135	
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 or 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

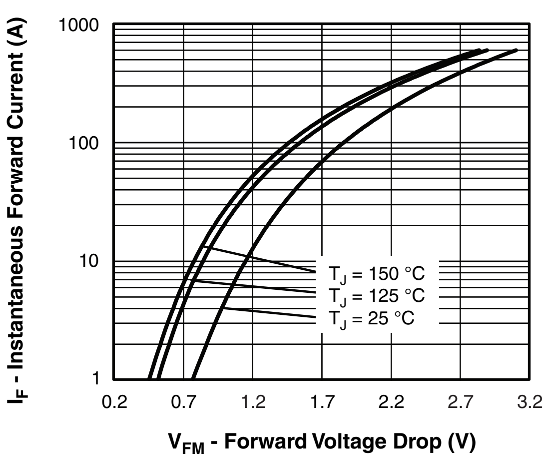


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (Per Leg)

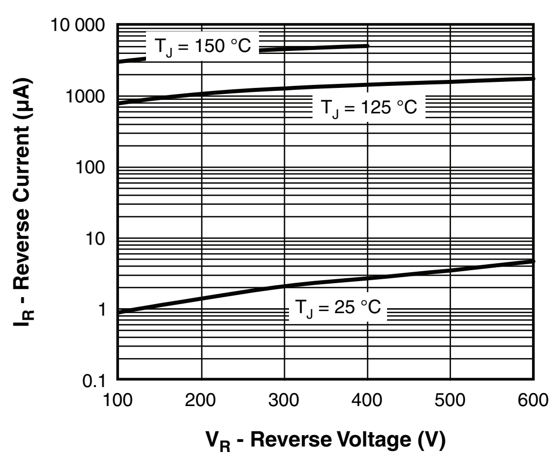


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Leg)

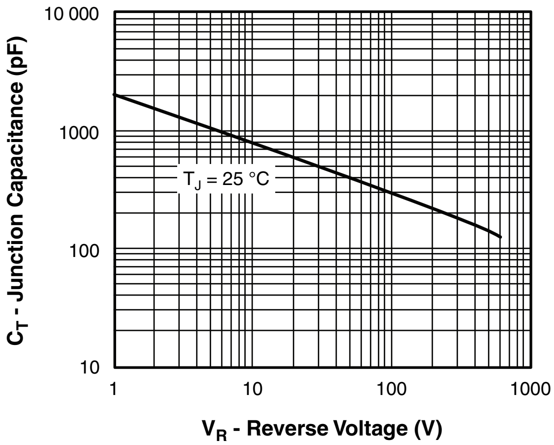


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

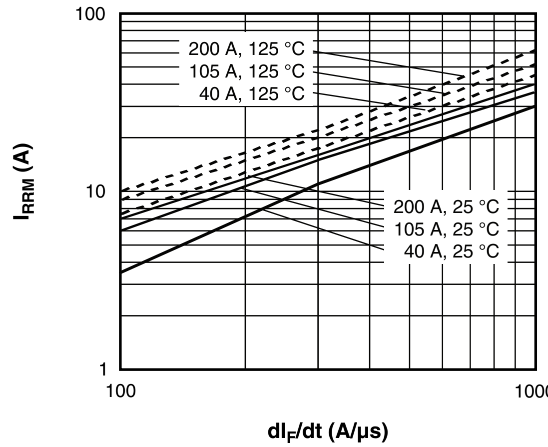


Fig. 6 - - Typical Recovery Current vs. dI_F/dt (Per Leg)

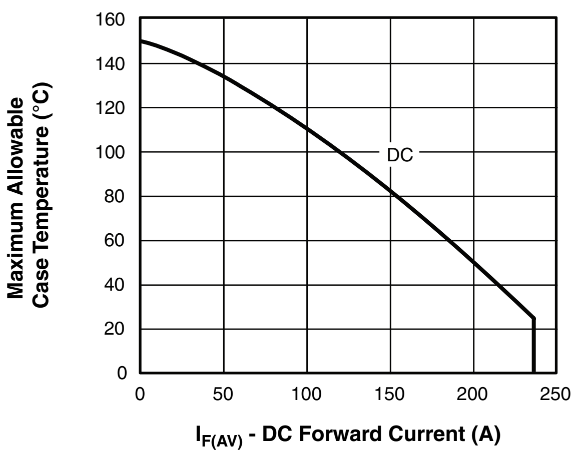


Fig. 4 - Maximum Allowable Case Temperature vs. DC Forward Current (Per Leg)

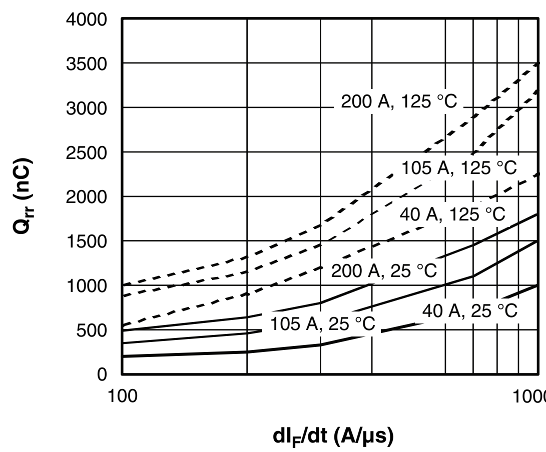


Fig. 7 - - Typical Stored Charge vs. dI_F/dt (Per Leg)

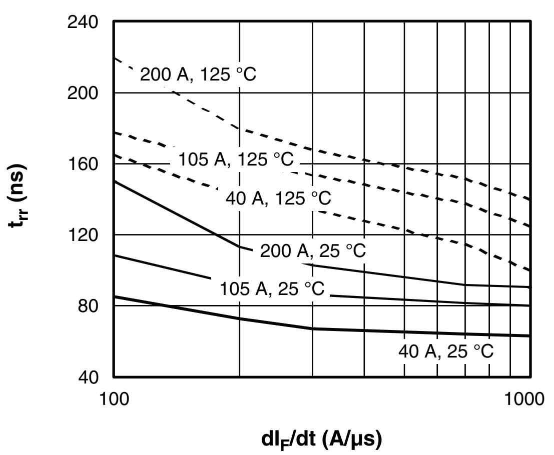


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt (Per Leg)

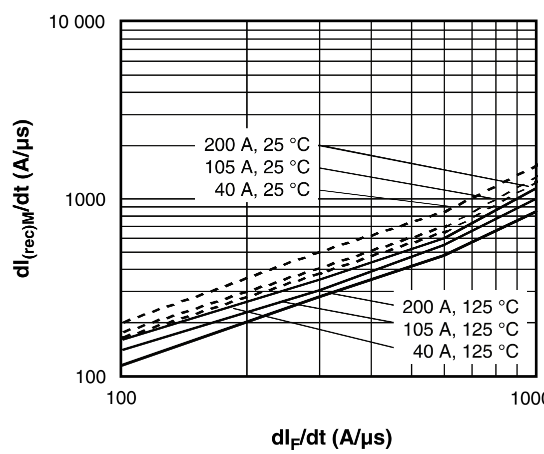


Fig. 8 - - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt (Per Leg)

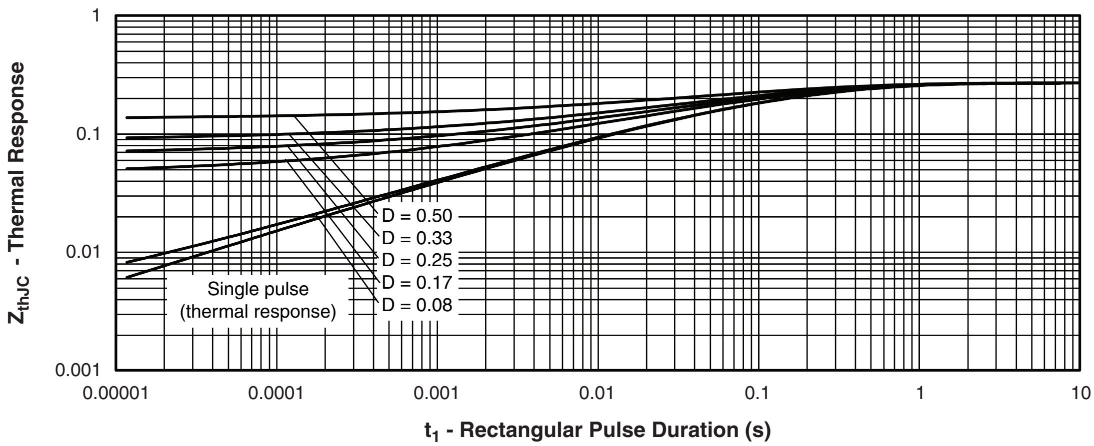


Fig. 9 - - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

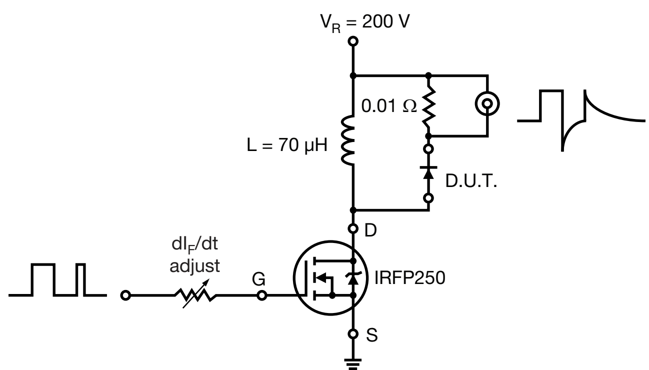
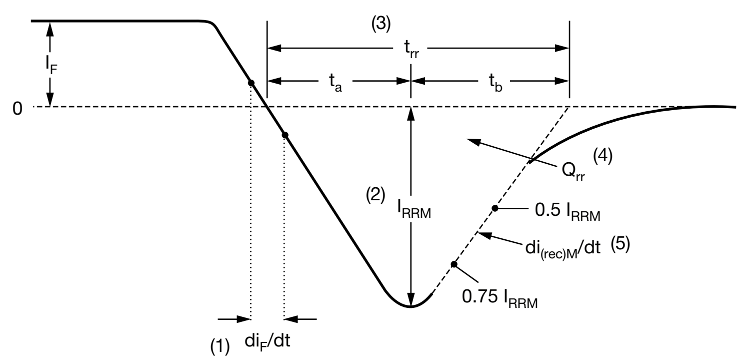


Fig. 10 - - Reverse Recovery Parameter Test Circuit



(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

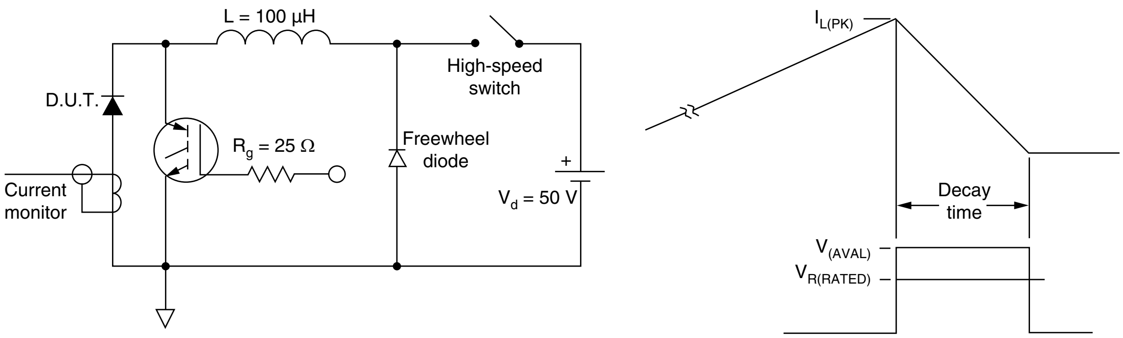


Fig. 12 - Avalanche Test Circuit and Waveforms

ORDERING INFORMATION TABLE

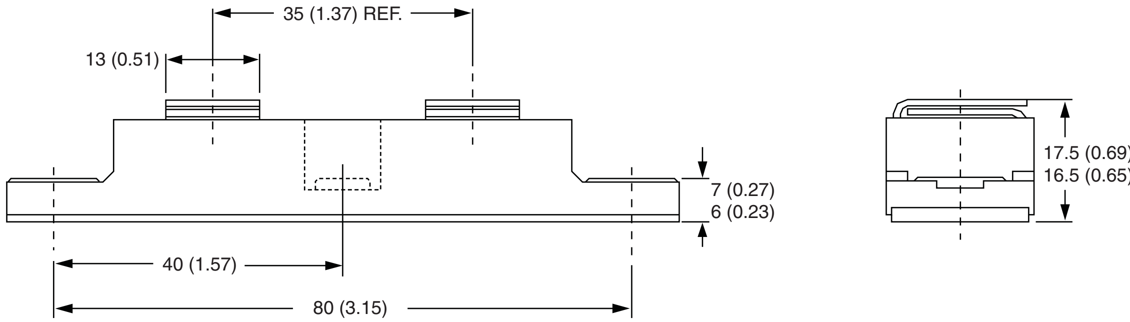
Device code	VS-	HFA	210	NJ	60	C	PbF
	1	2	3	4	5	6	7

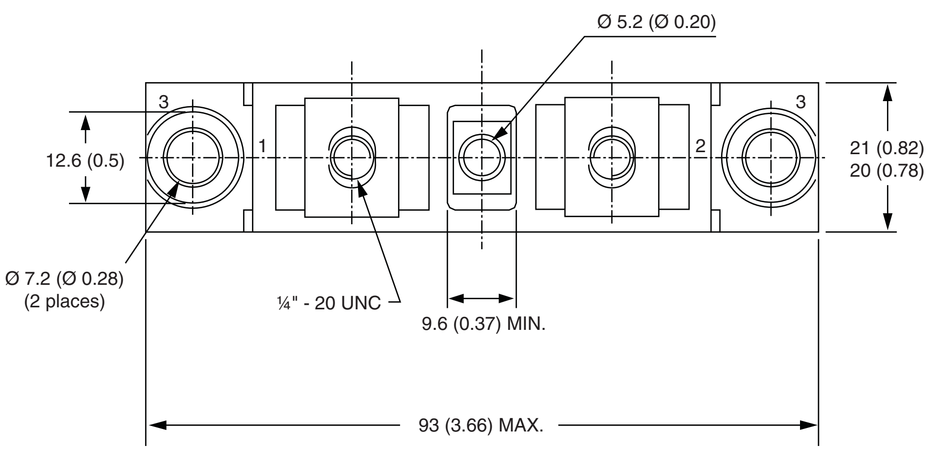
1 - Vishay Semiconductors product
2 - HEXFRED® family, electron irradiated
3 - Average current rating
4 - NJ = TO-244
5 - Voltage rating (60 = 600 V)
6 - C = two diodes common cathode
7 - Lead (Pb)-free

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

TO-244

DIMENSIONS in millimeters (inches)





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