HEXFRED®
Ultrafast Soft Recovery Diode, 210 A

HALF-PAK (D-67)

FEATURES

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

Pb-free

RoHS COMPLIANT

BENEFITS

- Reduced RFI and EMI
- Reduced snubbing

PRODUCT SUMMARY	
I_F (maximum)	210 A
V_R	400 V
$I_{F(DC)}$ at T_C	106 A at 100 °C
Package	HALF-PAK (D-67)
Circuit	Single diode

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_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	VALUES	UNITS
Cathode to anode voltage	V_R		400	V
Continuous forward current	I_F	T_C = 25 °C	210	A
		T_C = 100 °C	106	
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	1.4	mJ
Maximum power dissipation	P_D	T_C = 25 °C	329	W
		T_C = 100 °C	132	
Operating junction and storage temperature range	T_J, T_{Stg}		-55 to +150	°C

ELECTRICAL SPECIFICATIONS (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		400	-	-	V
Maximum forward voltage	V_{FM}	I_F = 90 A	See fig. 1	-	1.06	1.45	
		I_F = 180 A		-	1.2	1.67	
		I_F = 90 A, T_J = 125 °C		-	0.96	1.23	
Maximum reverse leakage current	I_{RM}	T_J = 125 °C, V_R = 400 V	See fig. 2	-	0.6	2	mA
Junction capacitance	C_T	V_R = 200 V	See fig. 3	-	180	260	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}	T_J = 25 °C	I_F = 90 A dI_F/dt = 200 A/µs V_R = 200 V	-	90	140	ns
		T_J = 125 °C		-	158	240	
Peak recovery current See fig. 6	I_{RRM}	T_J = 25 °C		-	9	17	A
		T_J = 125 °C		-	15	30	
Reverse recovery charge See fig. 7	Q_{rr}	T_J = 25 °C		-	420	1100	nC
		T_J = 125 °C		-	1200	3200	
Peak rate of recovery current See fig. 8	$dI_{(rec)M}/dt$	T_J = 25 °C		-	370	-	A/µs
		T_J = 125 °C		-	270	-	

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range		T_J, T_{Stg}		-55 to 150	°C
Maximum thermal resistance, junction to case		R_{thJC}	DC operation See fig. 4	0.38	°C/W
Typical thermal resistance, case to heatsink		R_{thCS}	Mounting surface, flat, smooth and greased	0.05	
Approximate weight				30	g
				1.06	oz.
Mounting torque	minimum		Non-lubricated threads	3 (26.5)	N · m (lbf · in)
	maximum			4 (35.4)	
Terminal torque	minimum			3.4 (30)	
	maximum			5 (44.2)	
Case style			HALF-PAK module		

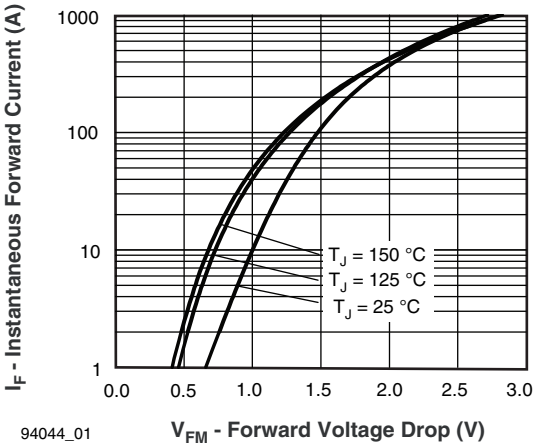


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

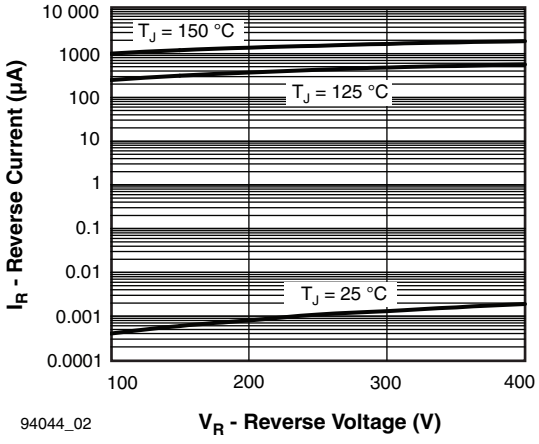


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

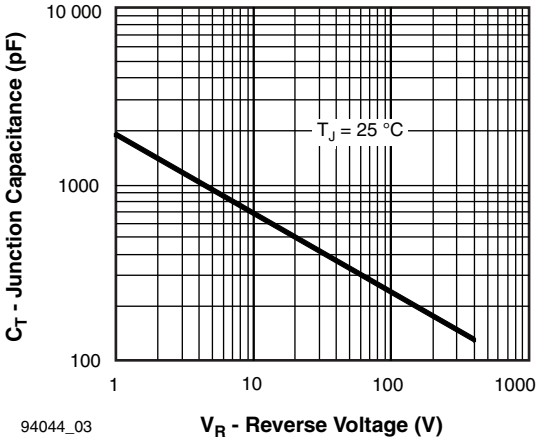


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

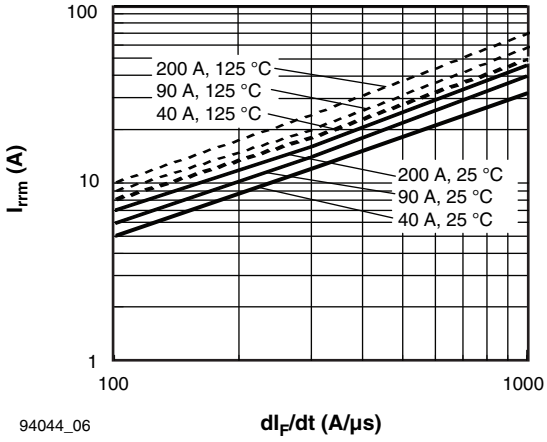


Fig. 6 - Typical Recovery Current vs. dI_F/dt

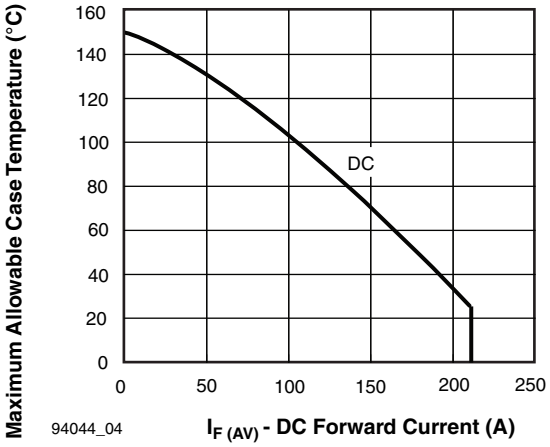


Fig. 4 - Maximum Allowable Case Temperature vs. DC Forward Current

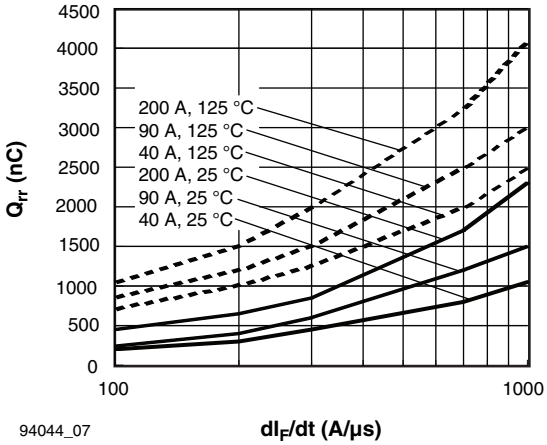


Fig. 7 - Typical Stored Charge vs. dI_F/dt

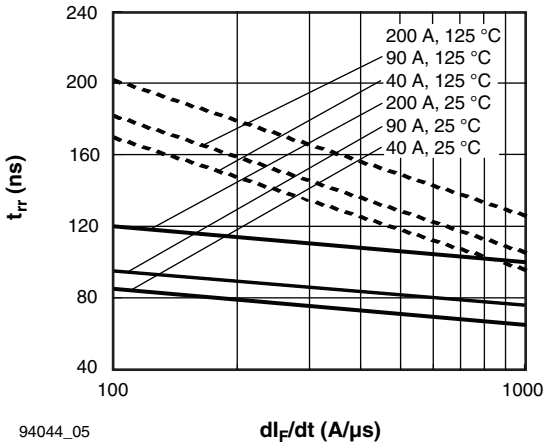


Fig. 5 - Typical Reverse Recovery Time vs. dI_F/dt

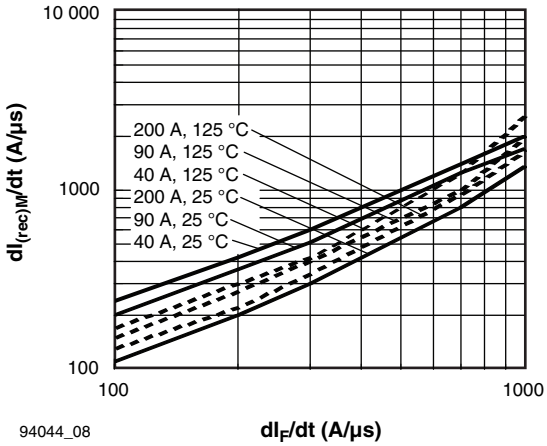


Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. dI_F/dt

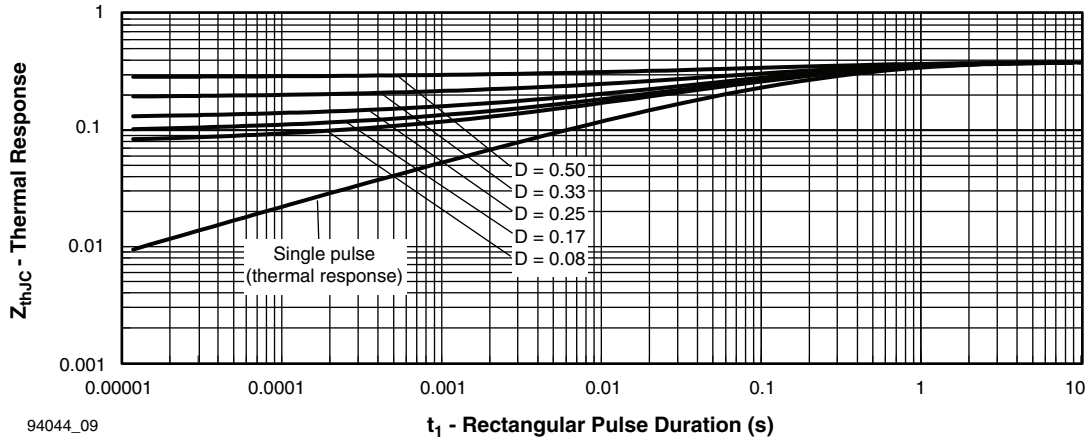


Fig. 9 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

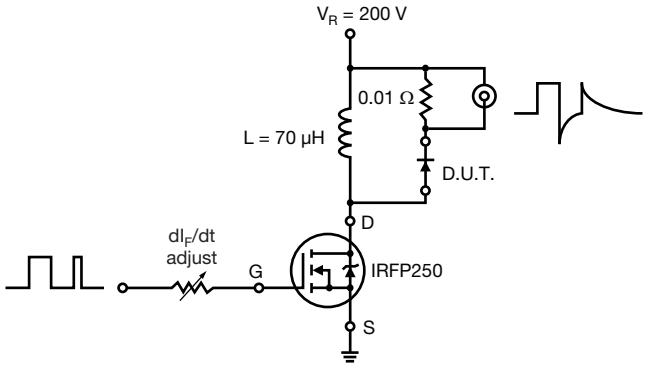
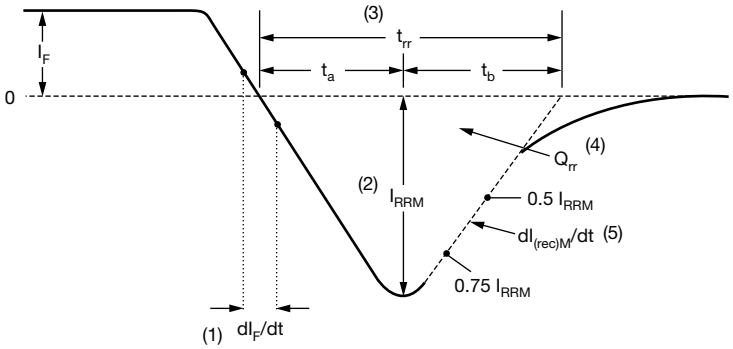


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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

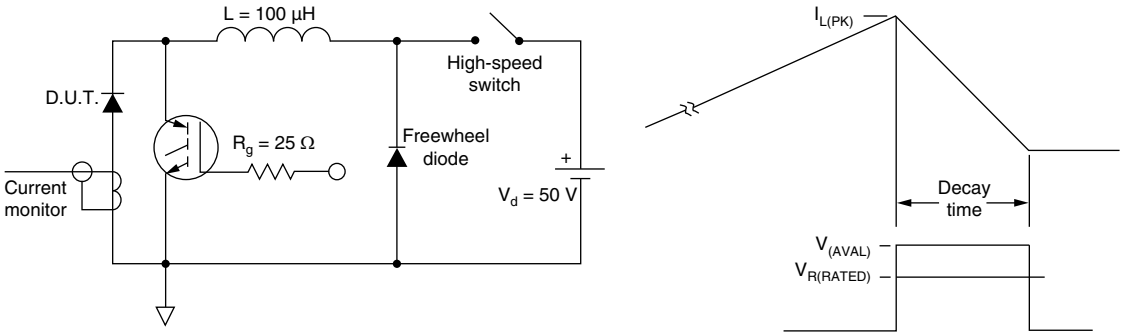


Fig. 12 - Avalanche Test Circuit and Waveforms

ORDERING INFORMATION TABLE

Device code

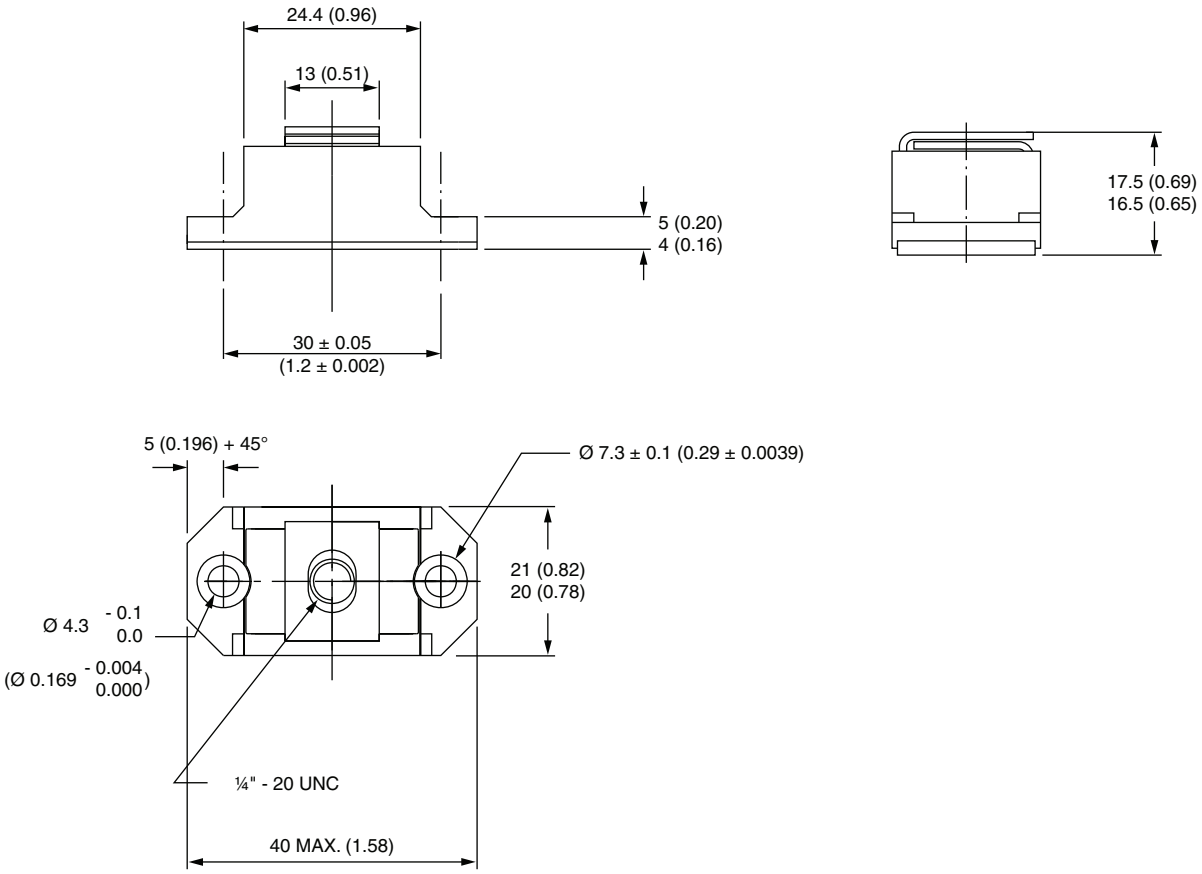
VS-	HFA	90	N	H	40	PbF
1	2	3	4	5	6	7

1	-	Vishay Semiconductors product
2	-	HEXFRED® family
3	-	Average current rating
4	-	N = Not isolated
5	-	H = HALF-PAK
6	-	Voltage rating (400 V)
7	-	Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95020

D-67 HALF-PAK

DIMENSIONS in millimeters (inches)



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