International
IOR Rectifier

HFA135NH40PbF

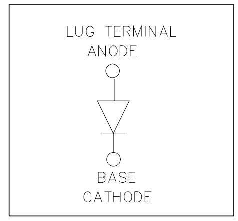
HEXFRED™ Ultrafast, Soft Recovery Diode

Features

- Very Low Qrr and trr
- Lead-Free

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/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

Parameters		Max	Units
V_R	Cathode-to-Anode Voltage	400	V
I_F @ T_C = 25°C	Continuous Forward Current	275	A
I_F @ T_C = 100°C	Continuous Forward Current	138	
I_{FSM}	Single Pulse Forward Current ①	900	
E_{AS}	Non-Repetitive Avalanche Energy ②	1.4	mJ
P_D @ T_C = 25°C	Maximum Power Dissipation	463	W
P_D @ T_C = 100°C	Maximum Power Dissipation	185	
T_J, T_{STG}	Operating Junction and Storage Temperature Range	- 55 to 150	°C

Case Styles

HALF-PAK (D-67)

① Limited by junction temperature
② L = 100µH, duty cycle limited by max T_J

Electrical Characteristics (per Leg) @ T_J = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions	
V_{BR}	Cathode Anode Breakdown Voltage,	400	-	-	V	I_R = 100µA	
V_{FM}	Max. Forward Voltage	-	1.06	1.65	V	I_F = 135A	See Fig. 1
		-	1.2	2.0	V	I_F = 270A	
		-	0.96	1.58	V	I_F = 135A, T_J = 125°C	
I_{RM}	Max. Reverse Leakage Current	-	-	3	mA	T_J = 125°C, V_R = 400V	See Fig. 2
C_T	Junction Capacitance	-	280	380	pF	V_R = 200V	See Fig. 3
L_S	Series Inductance	-	6.0	-	nH	From top of terminal hole to mounting plane	

Dynamic Recovery Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions		
t_{rr}	Reverse Recovery Time	-	77	120	ns	T_J = 25°C	See Fig. 5	I_F = 135A V_R = 200V di_F /dt = 200A/µs
		-	280	440		T_J = 125°C		
I_{RRM}	Peak Recovery Current	-	7.5	14	A	T_J = 25°C	See Fig. 6	
		-	15	30		T_J = 125°C		
Q_{rr}	Reverse Recovery Charge	-	150	780	nC	T_J = 25°C	See Fig. 7	
		-	2800	6300		T_J = 125°C		
$di_{(rec)M}$ /d/t		-	350	-	A/µs	T_J = 25°C	See Fig. 8	
		-	300	-		T_J = 125°C		

Thermal-Mechanical Specifications

	Parameters		Values	Units	Conditions
T_J	Max. Junction Temperature Range		-55 to 150	°C	
T_{stg}	Max. Storage Temperature Range		-55 to 150	°C	
R_{thJC}	Max. Thermal Resistance Junction to Case		0.27	°C/W	DC operation * See Fig. 4
R_{thCS}	Typical Thermal Resistance, Case to Heatsink		0.05	°C/W	Mounting surface, smooth and greased
wt	Approximate Weight		30 (1.06)	g (oz.)	
T	Mounting Torque	Min.	3 (26.5)	Nm (lbf-in)	Non-lubricated threads
		Max.	4 (35.4)		
	Terminal Torque	Min.	3.4 (30)		
		Max.	5 (44.2)		
	Case Style		HALF PAK Module		

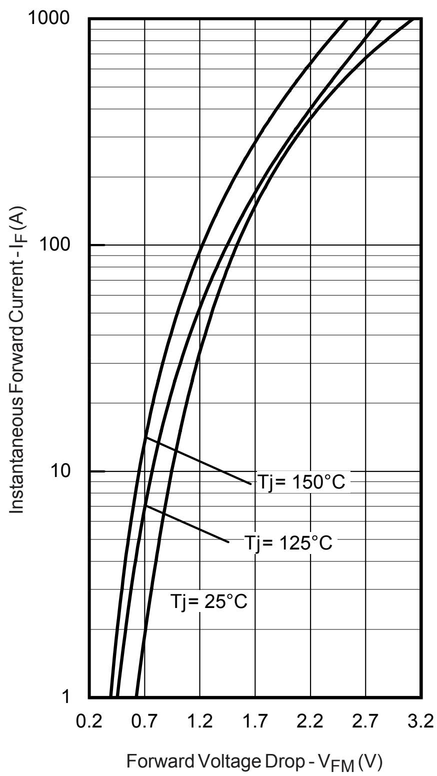


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

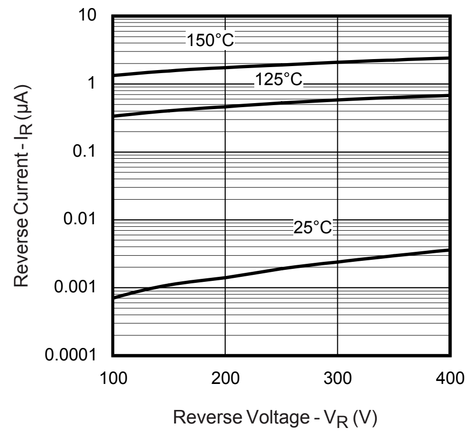


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

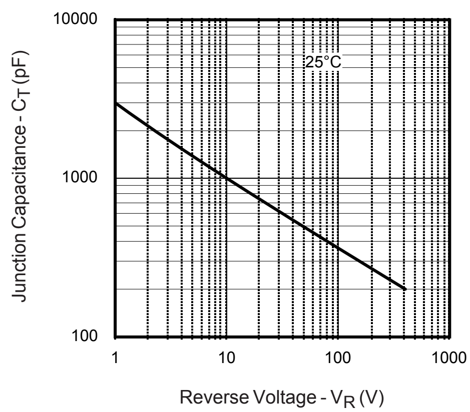


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

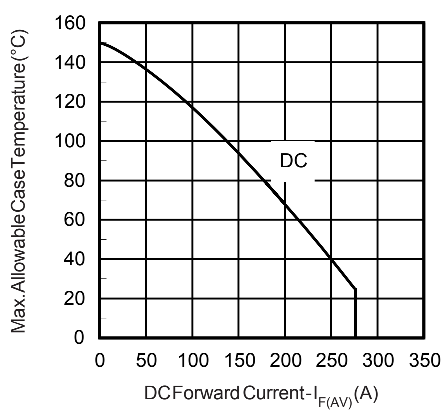


Fig. 4 - Max. Allowable Case Temperature Vs. DC Forward Current

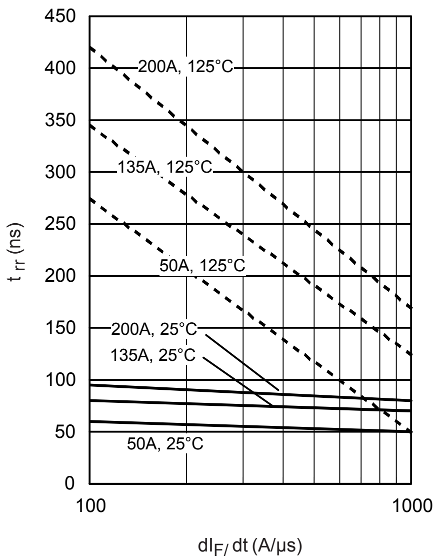


Fig. 5 - Typical Reverse Recovery vs. di_f/dt

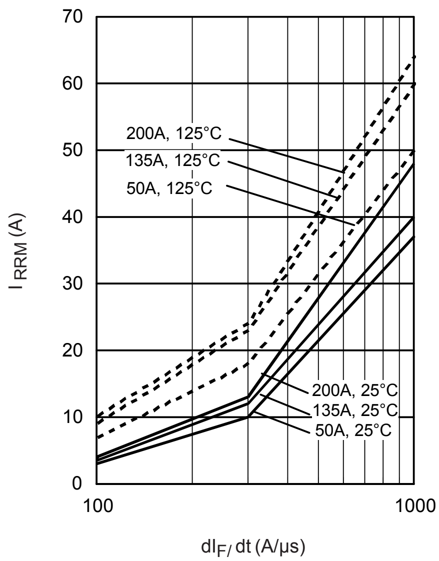


Fig. 6 - Typical Recovery Current vs. di_f/dt

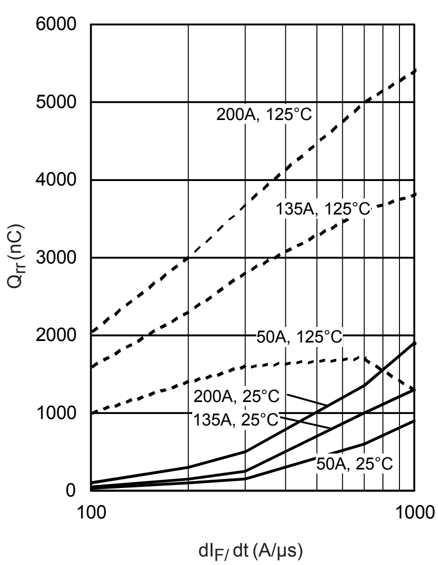


Fig. 7 - Typical Stored Charge vs. di_f/dt

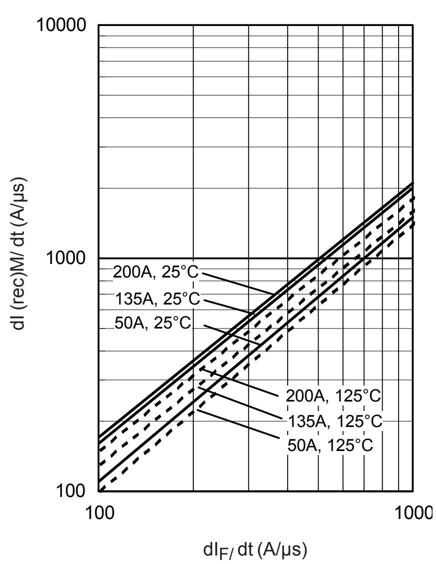


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt

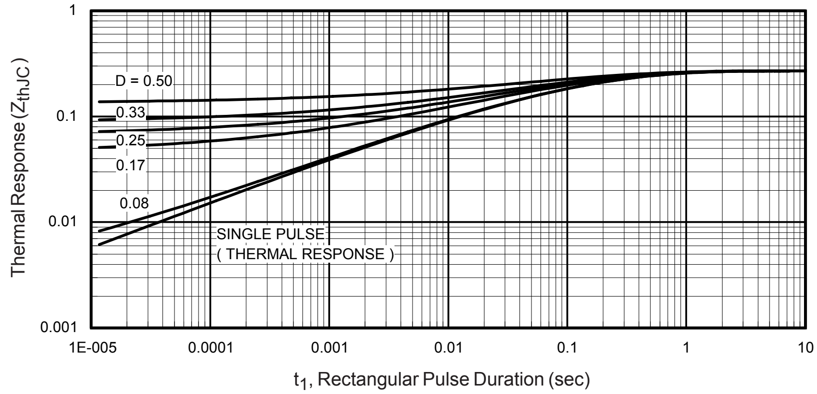


Fig. 9 - Maximum Thermal Impedance Z_{thJC} Characteristics

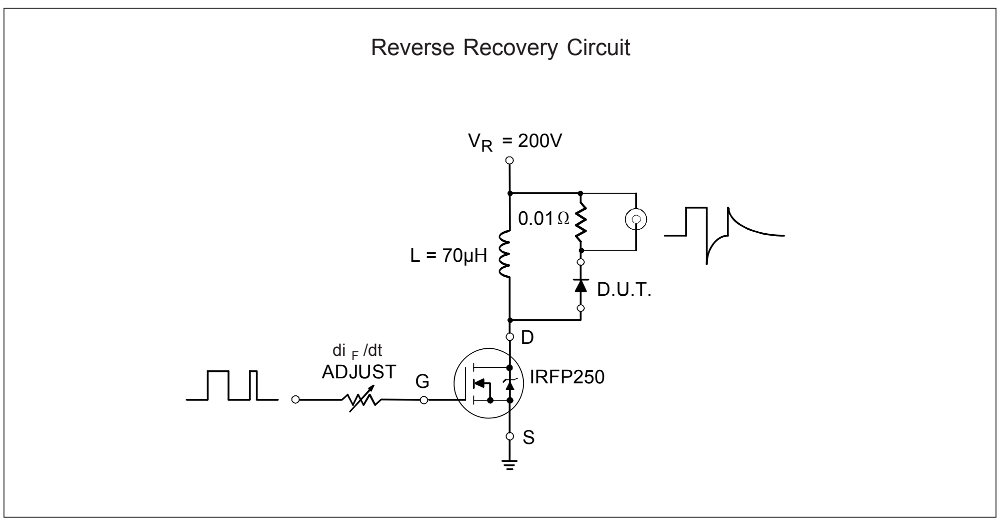
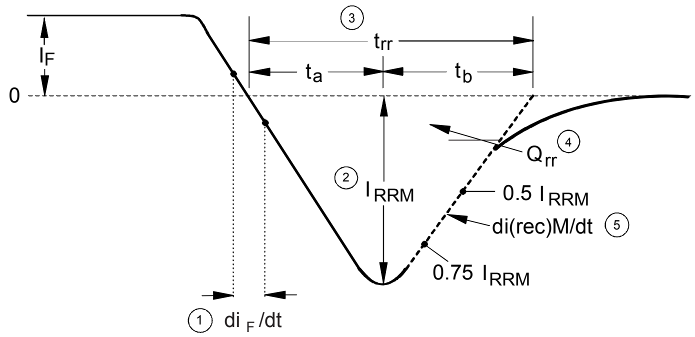


Fig. 10 - Reverse Recovery Parameter Test Circuit



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

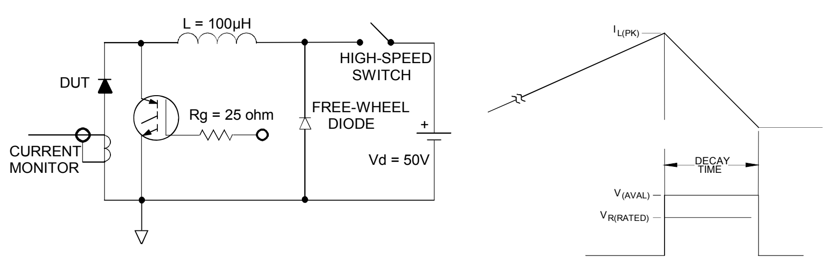
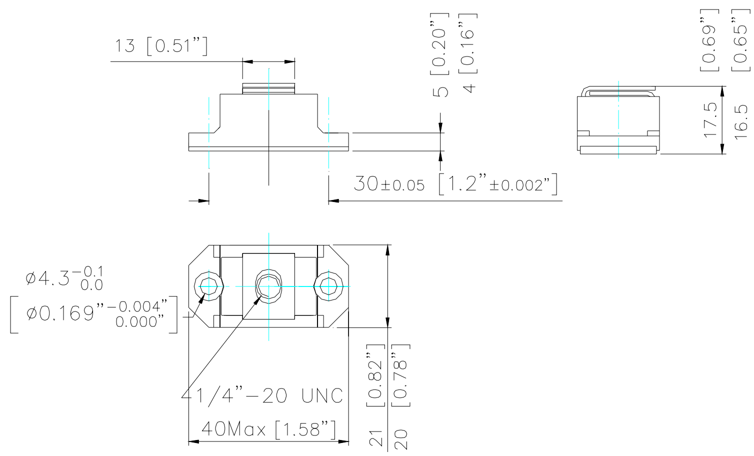


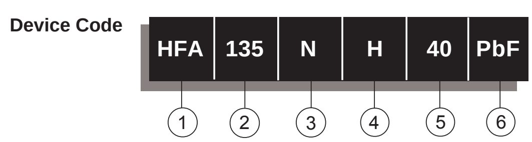
Fig. 12 - Avalanche Test Circuit and Waveforms

Outline Table



HALF-PAK (D-67)
Dimensions in millimeters and (inches)

Ordering Information Table



1 - International Rectifier
2 - Average Current Rating
3 - N = Not Isolated
4 - H = Half-pack
5 - Voltage Rating (400V)
6 - Lead-Free

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level and Lead-Free.
Qualification Standards can be found on IR's Web site.

International IOR Rectifier

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