

International IOR Rectifier HEXFRED™

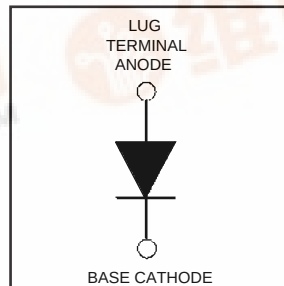
PD -2.465 rev. B 03/99

HFA135NH40

Ultrafast, Soft Recovery Diode

Features

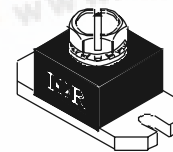
- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters



$V_R = 400V$
$V_F(\text{typ.})^{\textcircled{3}} = 1V$
$I_{F(AV)} = 135A$
$Q_{rr}(\text{typ.}) = 290nC$
$I_{RRM}(\text{typ.}) = 7.5A$
$t_{rr}(\text{typ.}) = 50ns$
$di_{(rec)M}/dt(\text{typ.})^{\textcircled{3}} = 270A/\mu s$

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/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.



HALF-PAK

Absolute Maximum Ratings (per Leg)

	Parameter	Max.	Units
V_R	Cathode-to-Anode Voltage	400	V
$I_F @ T_C = 25^\circ C$	Continuous Forward Current	244	A
$I_F @ T_C = 100^\circ C$	Continuous Forward Current	122	
I_{FSM}	Single Pulse Forward Current ^①	900	
E_{AS}	Non-Repetitive Avalanche Energy ^②	1.4	mJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	460	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	185	
T_J	Operating Junction and	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range		

Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
R_{thJC}	Junction-to-Case	—	—	0.27	$^\circ C/W$
R_{thCS}	Case-to-Sink, Flat, Greased Surface	—	0.15	—	K/W
Wt	Weight	—	26 (0.9)	—	g (oz)
	Mounting Torque ^④	15 (1.7)	—	25 (2.8)	lbf·in
	Terminal Torque	30 (3.4)	—	40 (4.6)	(N·m)
	Vertical Pull	—	—	35	lbf·in
	2 inch Lever Pull	—	—	35	

Note: ^① Limited by junction temperature
^② $L = 100\mu H$, duty cycle limited by max T_J
^③ $125^\circ C$

^④ 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. Module

HFA135NH40

PD-2.465 rev. B 03/99

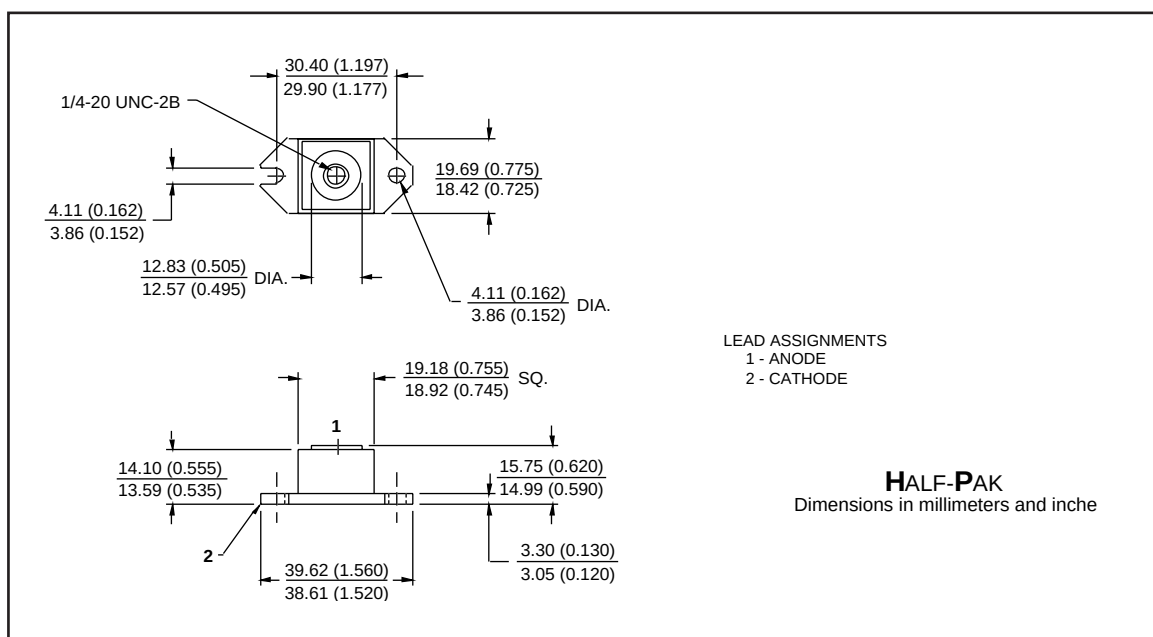
International
IOR Rectifier

Electrical Characteristics (per Leg) @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR} Cathode Anode Breakdown Voltage	400	—	—	V	$I_R = 100\mu\text{A}$
V_{FM} Max Forward Voltage See Fig. 1	—	1.1	1.3	V	$I_F = 135\text{A}$
	—	1.4	1.6		$I_F = 270\text{A}$
	—	1.0	1.2		$I_F = 135\text{A}, T_J = 125^\circ\text{C}$
I_{RM} Max Reverse Leakage Current See Fig. 2	—	1.5	9.0	μA	$V_R = V_R \text{ Rated}$
	—	2.3	12	mA	$T_J = 125^\circ\text{C}, V_R = 320\text{V}$
C_T Junction Capacitance See Fig. 3	—	280	380	pF	$V_R = 200\text{V}$
L_S Series Inductance	—	6.0	—	nH	From top of terminal hole to mounting plane

Dynamic Recovery Characteristics (per Leg) @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Test Conditions
t_{rr} Reverse Recovery Time	—	50	—	ns	$I_F = 1.0\text{A}, di_F/dt = 200\text{A}/\mu\text{s}, V_R = 30\text{V}$
t_{rr1} See Fig. 5	—	77	120		$T_J = 25^\circ\text{C}$
t_{rr2}	—	290	440		$T_J = 125^\circ\text{C}$
I_{RRM1} Peak Recovery Current	—	7.5	14	A	$T_J = 25^\circ\text{C}$
I_{RRM2} See Fig. 6	—	16	30		$T_J = 125^\circ\text{C}$
Q_{rr1} Reverse Recovery Charge	—	290	780	nC	$T_J = 25^\circ\text{C}$
Q_{rr2} See Fig. 7	—	2300	6300		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt1$ Peak Rate of Fall of Recovery Current	—	320	—	$\text{A}/\mu\text{s}$	$T_J = 25^\circ\text{C}$
$di_{(rec)M}/dt2$ During t_b See Fig. 8	—	270	—		$T_J = 125^\circ\text{C}$



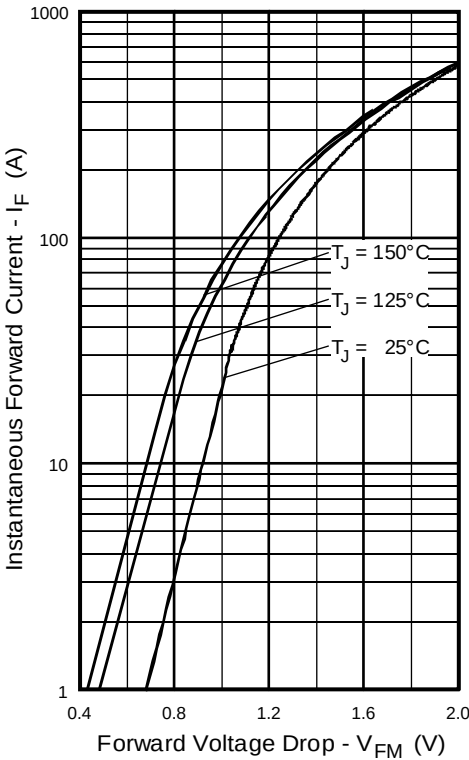


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

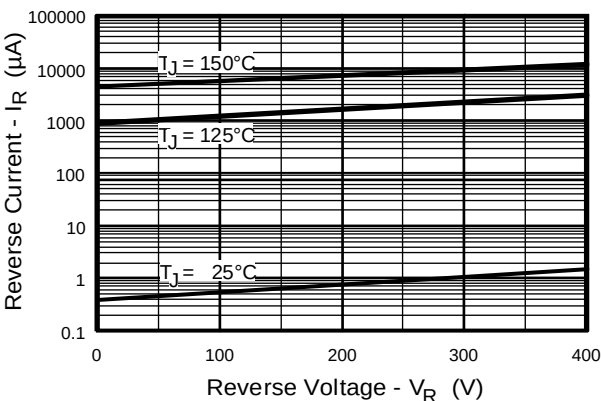


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

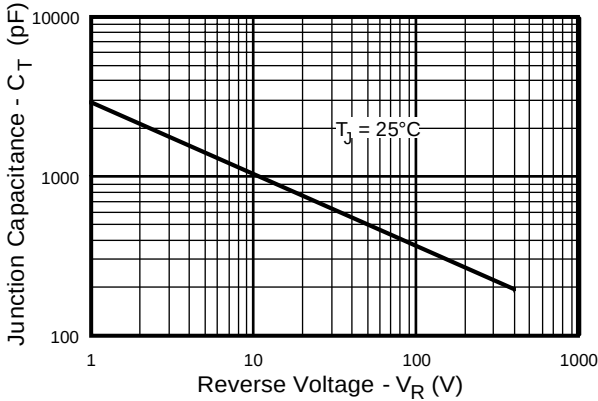


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

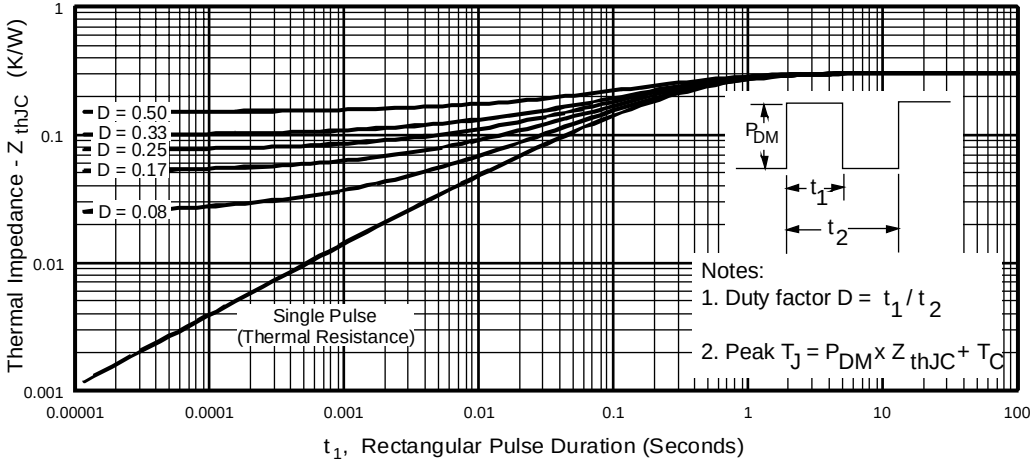


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

HFA135NH40

PD-2.465 rev. B 03/99

International
IOR Rectifier

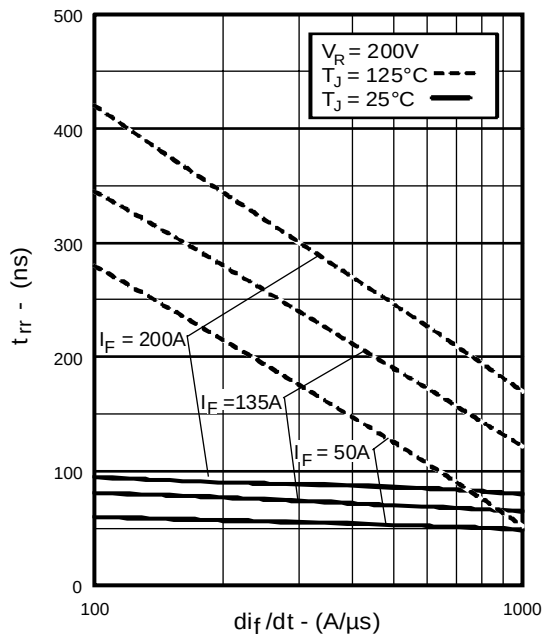


Fig. 5 - Typical Reverse Recovery vs. di_f/dt

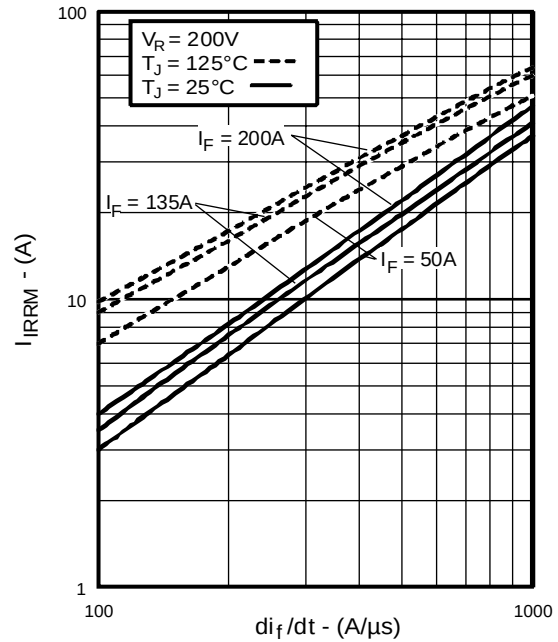


Fig. 6 - Typical Recovery Current vs. di_f/dt

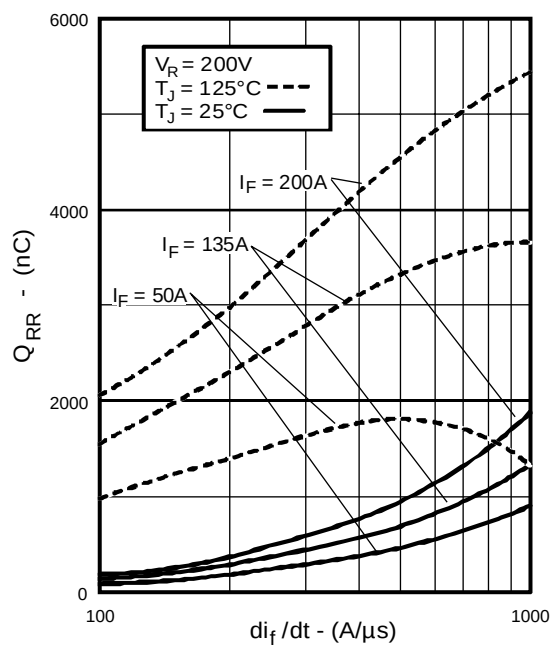


Fig. 7 - Typical Stored Charge vs. di_f/dt

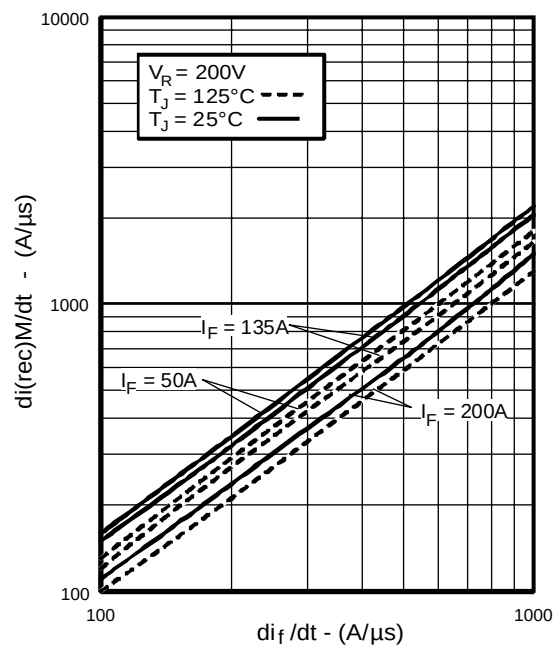


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt

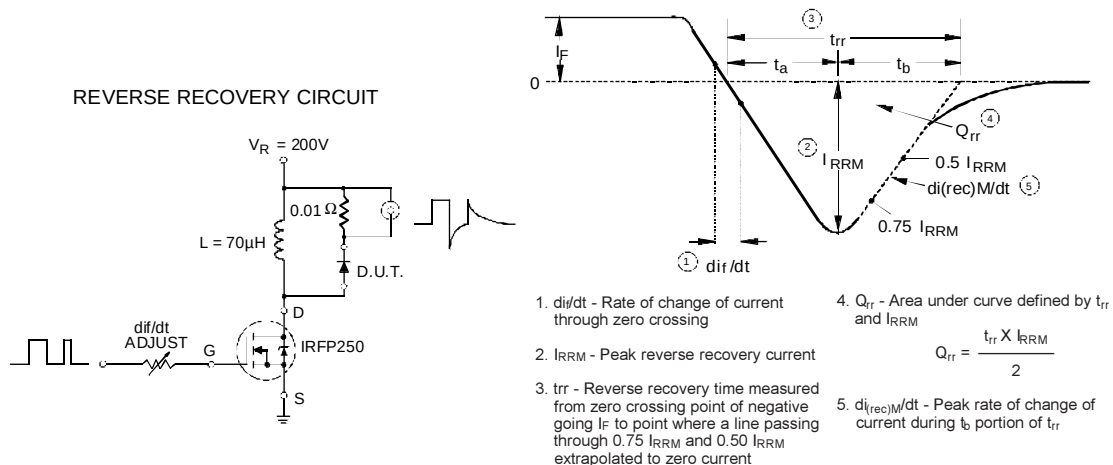


Fig. 9 - Reverse Recovery Parameter Test Circuit

Fig. 10 - Reverse Recovery Waveform and Definitions

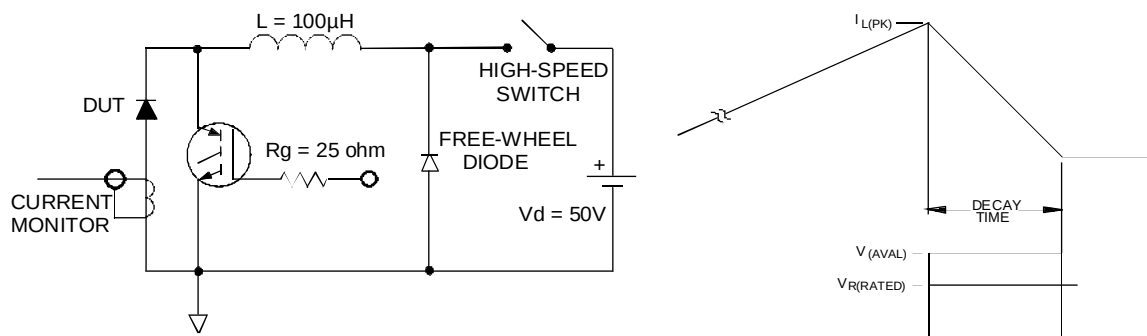


Fig. 11 - Avalanche Test Circuit and Waveforms