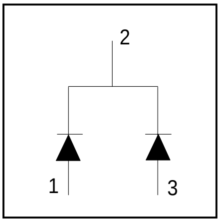
Bulletin PD -2.337 rev. C 05/01

International
IOR Rectifier

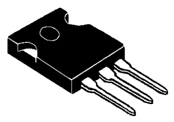
HFA50PA60C

HEXFRED™

Ultrafast, Soft Recovery Diode



V_R = 600V
V_F(typ.)* = 1.3V
$I_{F(AV)}$ = 25A
Q_{rr} (typ.)= 112nC
I_{RRM}(typ.) = 4.5A
t_{rr}(typ.) = 23ns
$di_{(rec)M}/dt$ (typ.)* = 160A/µs



TO-247AC

Features

- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low I_{RRM}
- Very Low Q_{rr}
- Specified at Operating Conditions

Benefits

- Reduced RFI and EMI
- Reduced Power Loss in Diode and Switching Transistor
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

Description

International Rectifier's HFA50PA60C is a state of the art center tap ultra fast recovery diode. Employing the latest in epitaxial construction and advanced processing techniques it features a superb combination of characteristics which result in performance which is unsurpassed by any rectifier previously available. With basic ratings of 600 volts and 25 amps per Leg continuous current, the HFA50PA60C is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultra fast recovery time, the HEXFRED product line features extremely low values of peak recovery current (I_{RRM}) and does not exhibit any tendency to "snap-off" during the t_b portion of recovery. The HEXFRED features combine to offer designers a rectifier with lower noise and significantly lower switching losses in both the diode and the switching transistor. These HEXFRED advantages can help to significantly reduce snubbing, component count and heatsink sizes. The HEXFRED HFA50PA60C is ideally suited for applications in power supplies and power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.

Absolute Maximum Ratings (per Leg)

	Parameter	Max.	Units
V_R	Cathode-to-Anode Voltage	600	V
I_F @ T_C = 25°C	Continuous Forward Current		A
I_F @ T_C = 100°C	Continuous Forward Current	25	
I_{FSM}	Single Pulse Forward Current	225	
I_{FRM}	Maximum Repetitive Forward Current	100	
P_D @ T_C = 25°C	Maximum Power Dissipation	150	W
P_D @ T_C = 100°C	Maximum Power Dissipation	60	
T_J	Operating Junction and	-55 to +150	C
T_{STG}	Storage Temperature Range		

* 125°C

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	600	——	——	V	I_R = 100µA
V_{FM}	Max Forward Voltage	——	1.3	1.7	V	I_F = 25A See Fig. 1
		——	1.5	2.0		I_F = 50A
		——	1.3	1.7		I_F = 25A, T_J = 125°C
I_{RM}	Max Reverse Leakage Current	——	1.5	20	µA	V_R = V_R Rated See Fig. 2
		——	600	2000		T_J = 125°C, V_R = 0.8 x V_R Rated
C_T	Junction Capacitance	——	55	100	pF	V_R = 200V See Fig. 3
L_S	Series Inductance	——	12	——	nH	Measured lead to lead 5mm from package body

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

	Parameter	Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	——	23	——	ns	I_F = 1.0A, di_f/dt = 200A/µs, V_R = 30V	
t_{rr1}	See Fig. 5, 10	——	50	75		T_J = 25°C	I_F = 25A V_R = 200V di_f/dt = 200A/µs
t_{rr2}		——	105	160		T_J = 125°C	
I_{RRM1}	Peak Recovery Current	——	4.5	10	A	T_J = 25°C	
I_{RRM2}	See Fig. 6	——	8.0	15		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge	——	112	375	nC	T_J = 25°C	
Q_{rr2}	See Fig. 7	——	420	1200		T_J = 125°C	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	——	250	——	A/µs	T_J = 25°C	
$di_{(rec)M}/dt2$	During t_b See Fig. 8	——	160	——		T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameter	Min	Typ	Max	Units
T_{lead}①	Lead Temperature	——	——	300	°C
R_{thJC}	Junction-to-Case, Single Leg Conducting	——	——	0.83	K/W
	Junction-to-Case, Both Legs Conducting	——	——	0.42	
R_{thJA}②	Thermal Resistance, Junction to Ambient	——	——	40	
R_{thCS}③	Thermal Resistance, Case to Heat Sink	——	0.25	——	
Wt	Weight	——	6.0	——	g
		——	0.21	——	(oz)
	Mounting Torque	6.0	——	12	Kg-cm
		5.0	——	10	lbf•in

① 0.063 in. from Case (1.6mm) for 10 sec
② Typical Socket Mount
③ Mounting Surface, Flat, Smooth and Greased

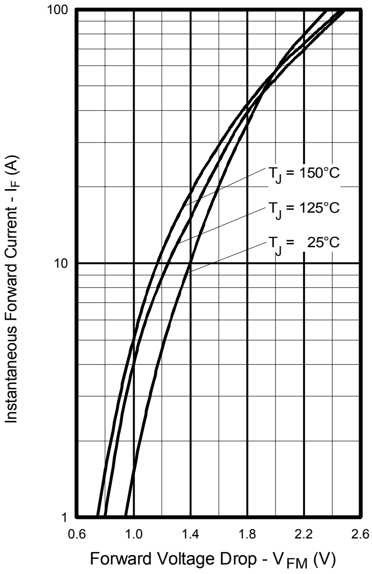


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

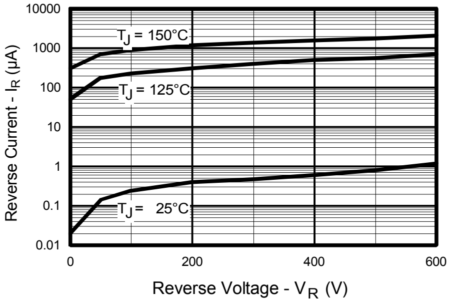


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

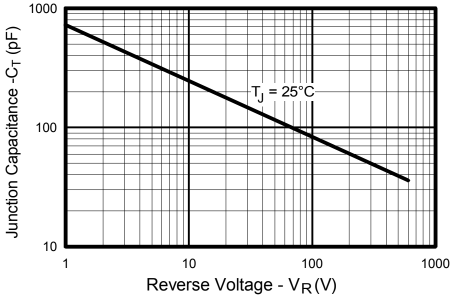


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

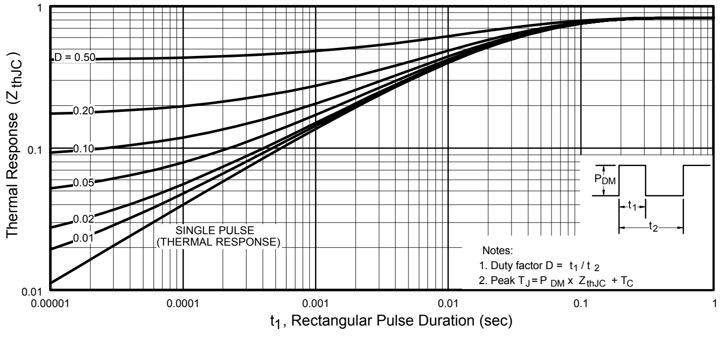


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics, (per Leg)

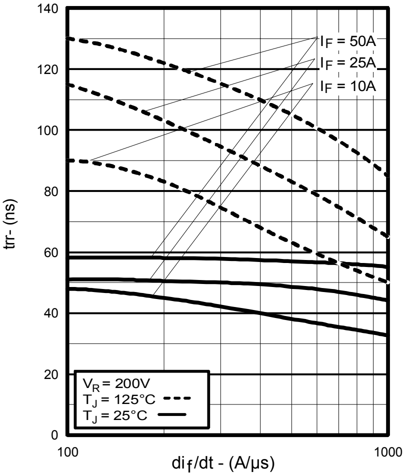


Fig. 5 - Typical Reverse Recovery Time vs. di$_f$/dt, (per Leg)

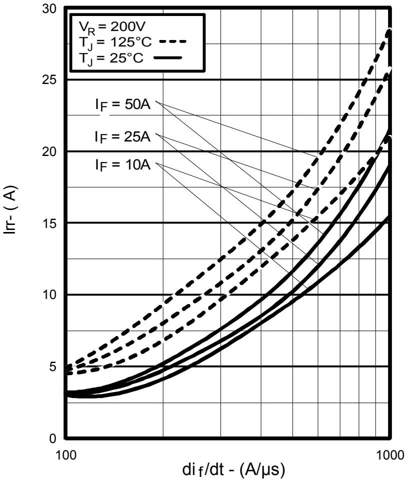


Fig. 6 - Typical Recovery Current vs. di$_f$/dt, (per Leg)

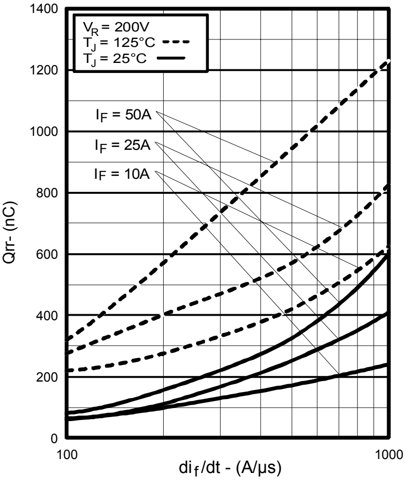


Fig. 7 - Typical Stored Charge vs. di$_f$/dt, (per Leg)

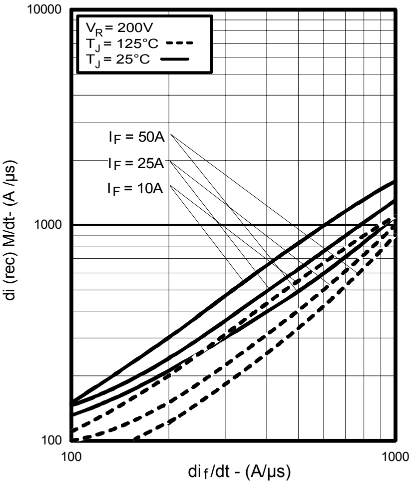


Fig. 8 - Typical di$_{(rec)M}$/dt vs. di$_f$/dt, (per Leg)

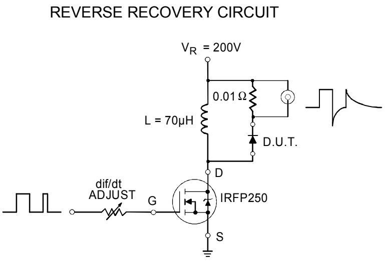
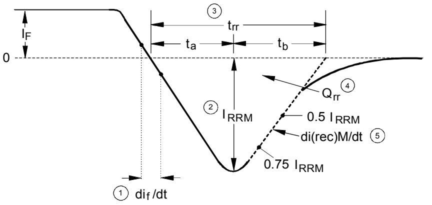


Fig. 9 - Reverse Recovery Parameter Test Circuit



1. di_f/dt - Rate of change of current through zero crossing

2. I_{RRM} - Peak reverse recovery current

3. trr - 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. 10 - Reverse Recovery Waveform and Definitions

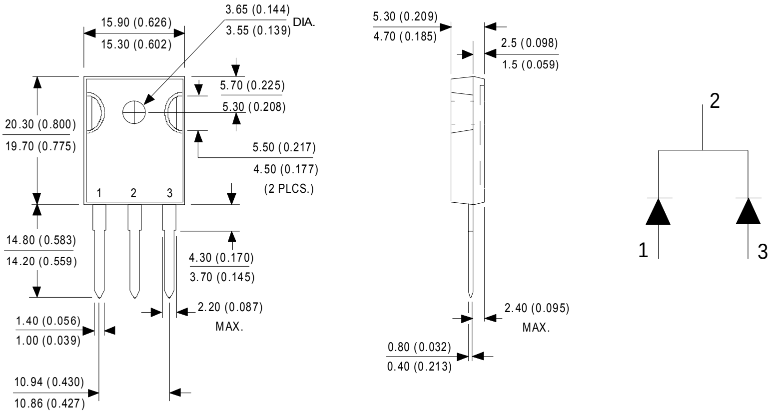
Ordering Information Table

Device Code

HF	A	50	PA	60	C
①	②	③	④	⑤	⑥

1	-	Hexfred Family		
2	-	Process Designator	A	= subs. elec. irrad.
			B	= subs. Platinum
3	-	Current Rating	(50	= 50A)
4	-	Package Outline	(PA	= TO-247, 3 pins)
5	-	Voltage Rating	(60	= 600V)
6	-	Configuration	(C	= Center Tap Common Cathode)

Outline Table



Conforms to JEDEC Outline TO-247AC

Dimensions in millimeters and inches

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

International
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