International
IOR Rectifier

PD -2.338

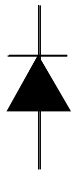
HFA25PB60

HEXFRED™

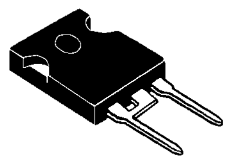
Ultrafast, Soft Recovery Diode

Features
- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low I_{RRM}
- Very Low Q_{rr}
- Guaranteed Avalanche
- 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



V_R = 600V
V_F(typ.)* = 1.3V
$I_{F(AV)}$ = 25A
Q_{rr} (typ.)= 112nC
I_{RRM} = 10A
t_{rr}(typ.) = 23ns
$di_{(rec)M}/dt$ (typ.) = 250A/µs



TO-247AC (Modified)

Description
International Rectifier's HFA25PB60 is a state of the art 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 continuous current, the HFA25PB60 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 HFA25PB60 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

	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	
I_{AS}①	Maximum Single Pulse Avalanche Current	2.0	
P_D @ T_C = 25°C	Maximum Power Dissipation	151	W
P_D @ T_C = 100°C	Maximum Power Dissipation	60	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	C

* 125°C

4/9/97

Electrical Characteristics @ 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, 6 & 16	–––	50	75		T_J = 25°C	I_F = 25A
t_{rr2}		–––	105	160		T_J = 125°C	
I_{RRM1}	Peak Recovery Current	–––	4.5	10	A	T_J = 25°C	V_R = 200V
I_{RRM2}	See Fig. 7& 8	–––	8.0	15		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge	–––	112	375	nC	T_J = 25°C	di_f/dt = 200A/µs
Q_{rr2}	See Fig. 9 & 10	–––	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. 11 & 12	–––	160	–––		T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
T_{lead}②	Lead Temperature	––––	––––	300	°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	––––	––––	0.83	K/W
$R_{\theta JA}$③	Thermal Resistance, Junction to Ambient	––––	––––	40	
$R_{\theta CS}$④	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 L=100µH, duty cycle limited by max T_J
② 0.063 in. from Case (1.6mm) for 10 sec
③ Typical Socket Mount
④ Mounting Surface, Flat, Smooth and Greased

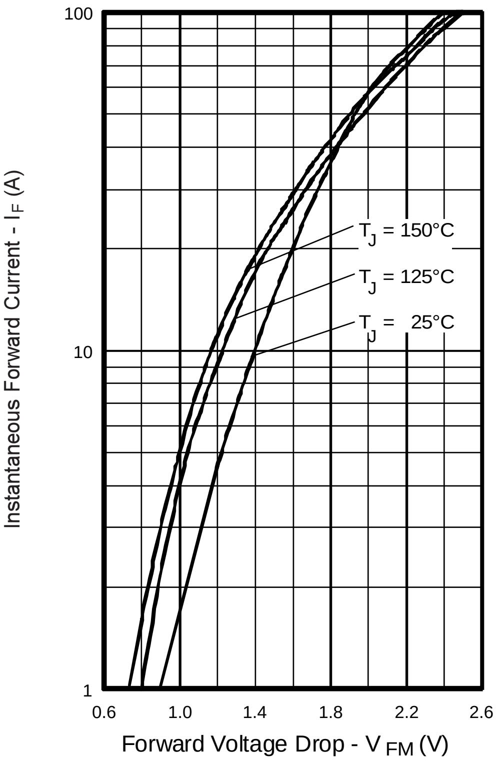


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

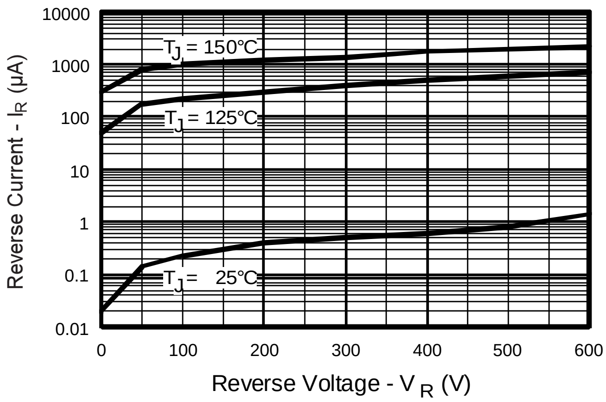


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

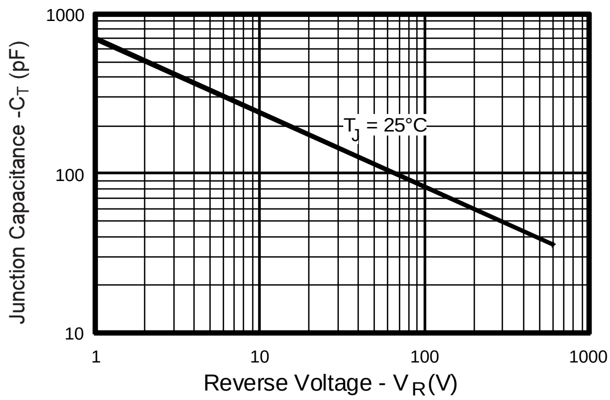


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

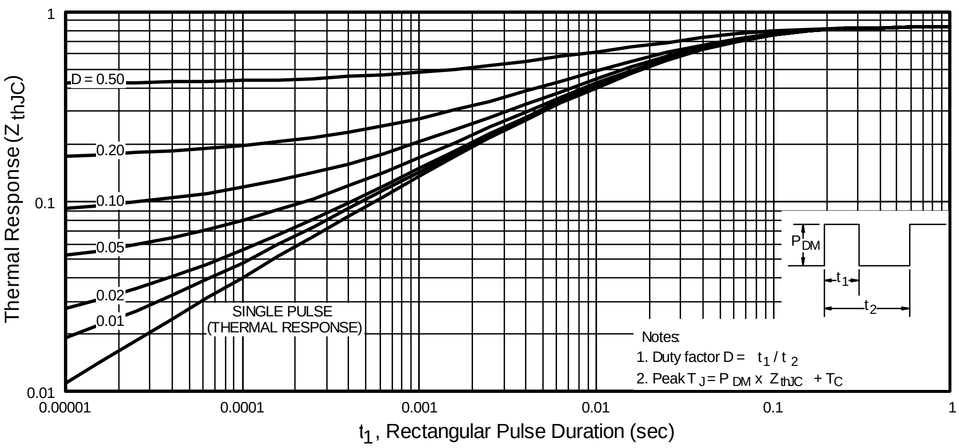


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics

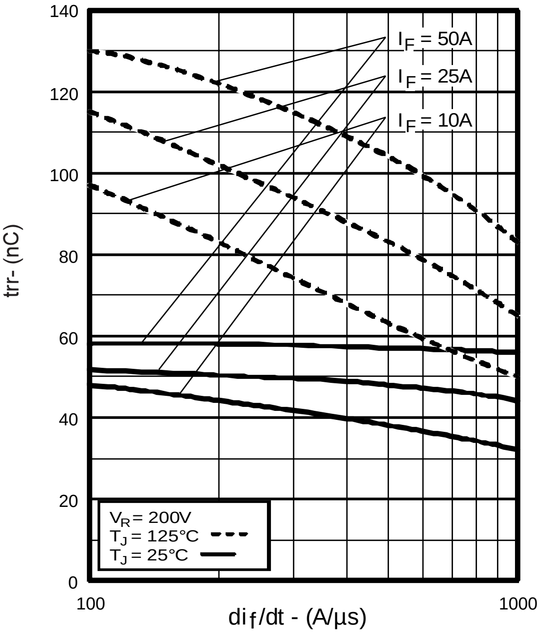


Fig. 5 - Typical Reverse Recovery vs. di_f/dt

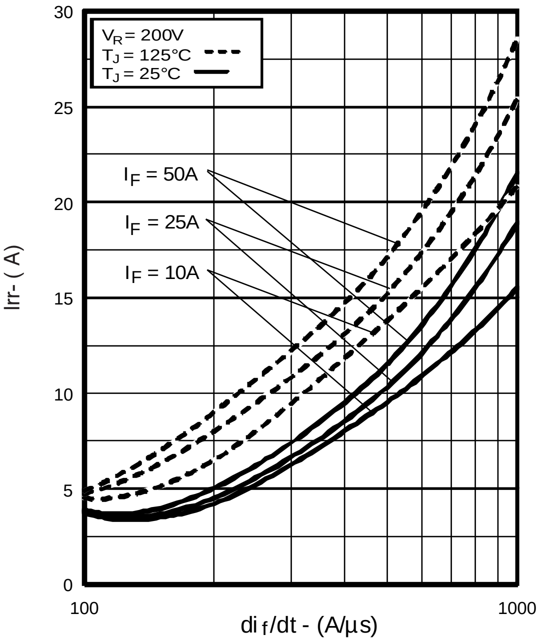


Fig. 6 - Typical Recovery Current vs. di_f/dt

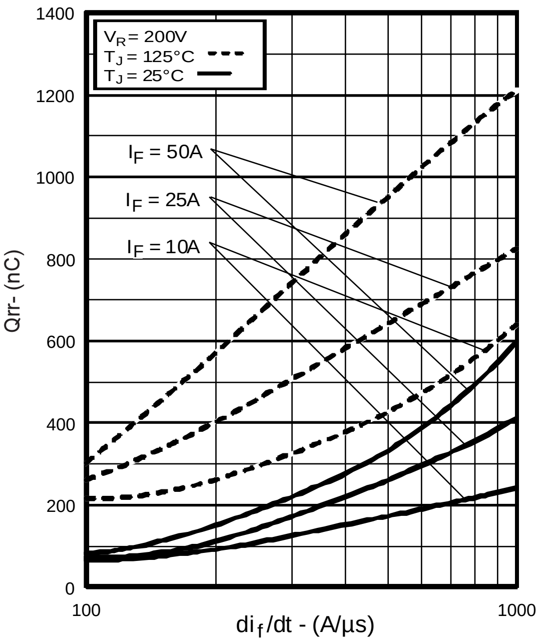


Fig. 7 - Typical Stored Charge vs. di_f/dt

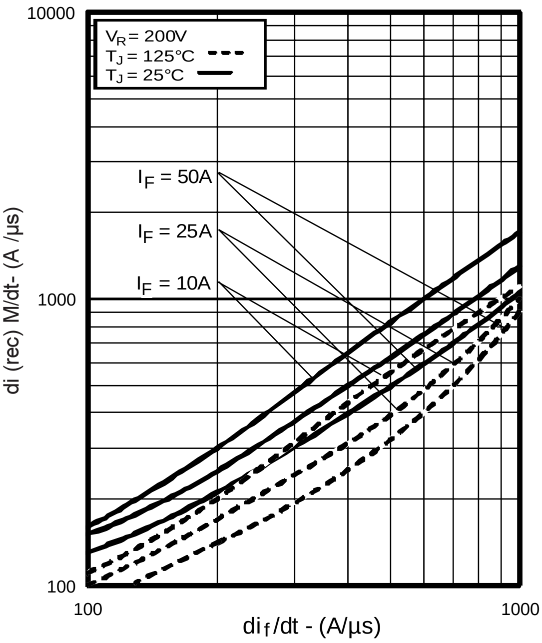


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt

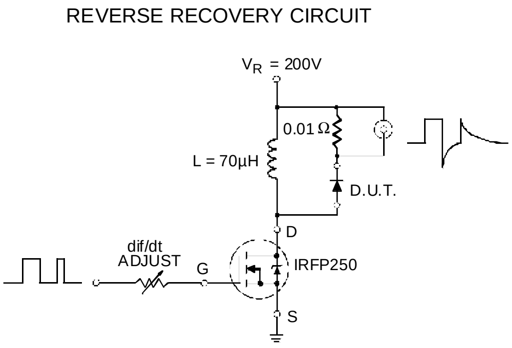
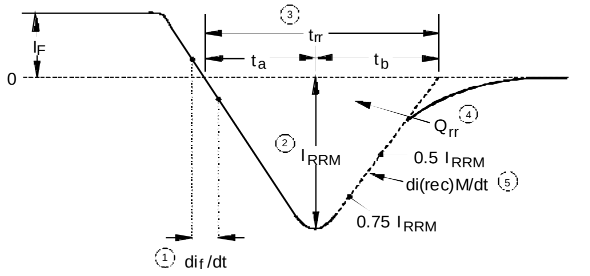


Fig. 9 - Reverse Recovery Parameter Test Circuit



1. dif/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

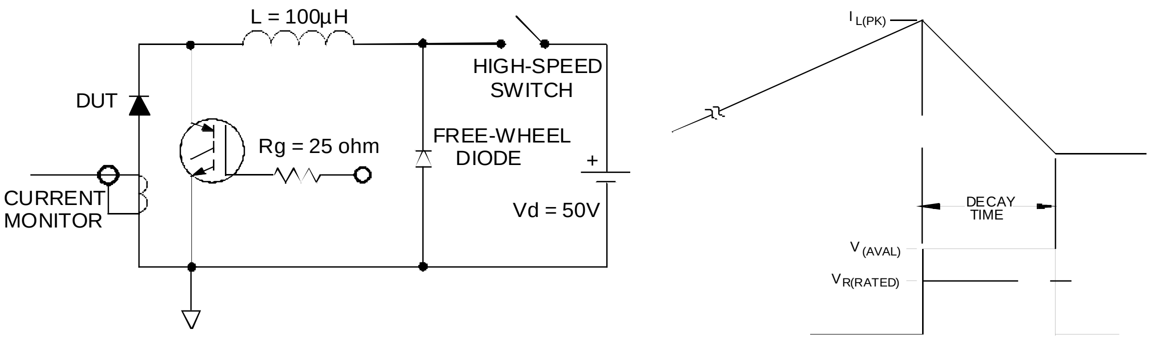
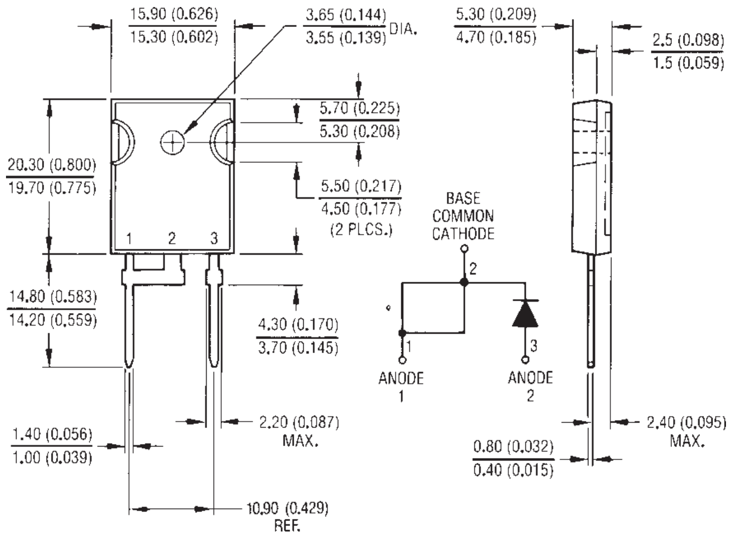


Fig. 11 - Avalanche Test Circuit and Waveforms



Conforms to JEDEC Outline TO-247AC MODIFIED
Dimensions in millimeters and inches

International
IOR Rectifier

WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331
EUROPEAN HEADQUARTERS: Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: ++ 44 1883 732020
IR CANADA: 7321 Victoria Park Ave., Suite 201, Markham, Ontario L3R 2Z8, Tel: (905) 475 1897
IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 6172 96590
IR ITALY: Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111
IR FAR EAST: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo Japan 171 Tel: 81 3 3983 0086
IR SOUTHEAST ASIA: 315 Outram Road, #10-02 Tan Boon Liat Building, Singapore 0316 Tel: 65 221 8371
http://www.irf.com/ Data and specifications subject to change without notice. 4/97