International
IOR Rectifier

PD - 2.606

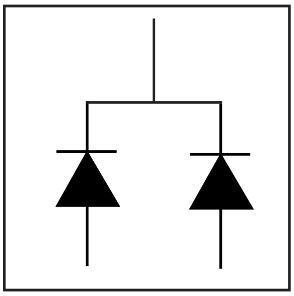
HFA16PA60C

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



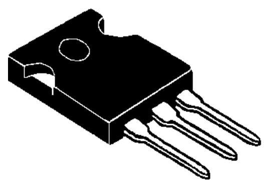
V_R = 600V

V_F = 1.7V

Q_{rr} * = 65nC

$di_{(rec)M}/dt$ * = 240A/µs

* 125°C



TO-247AC

Description
International Rectifier's HFA16PA60C 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 8 amps per Leg continuous current, the HFA16PA60C 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 HFA16PA60C 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 (per Leg)	8	
I_{FSM}	Single Pulse Forward Current	60	
I_{FRM}	Maximum Repetitive Forward Current	24	
I_{AR} ①	Maximum Repetitive Avalanche Current	0.5	
P_D @ T_C = 25°C	Maximum Power Dissipation	36	W
P_D @ T_C = 100°C	Maximum Power Dissipation	14	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°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		1.4	1.7	V	I_F = 8A	See Fig. 1
		---	1.7	2.1		I_F = 16A	
			1.4	1.7		I_F = 8A, T_J = 125°C	
I_{RM}	Max Reverse Leakage Current		0.3	5	µA	V_R = V_R Rated	See Fig. 2
			100	500		T_J = 125°C, V_R = 0.8 x V_R Rated	
C_T	Junction Capacitance	---	10	25	pF	V_R = 200V	See Fig. 3
L_S	Series Inductance	---	8.0	---	nH	Measured lead to lead 5mm from package body	

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	---	18	---	ns	I_F = 1.0A, di_f/dt = 200A/µs, V_R = 30V	
t_{rr1}	See Fig. 5, 6 & 16	---	37	55		T_J = 25°C	
t_{rr2}		---	55	90		T_J = 125°C	I_F = 8A
I_{RRM1}	Peak Recovery Current	---	3.5	5.0	A	T_J = 25°C	
I_{RRM2}	See Fig. 7& 8	---	4.5	8.0		T_J = 125°C	V_R = 200V
Q_{rr1}	Reverse Recovery Charge	---	65	138	nC	T_J = 25°C	
Q_{rr2}	See Fig. 9 & 10	---	124	360		T_J = 125°C	di_f/dt = 200A/µs
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	---	240	---	A/µs	T_J = 25°C	
$di_{(rec)M}/dt2$	During t_b See Fig. 11 & 12	---	210	---		T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
T_{lead}②	Lead Temperature	----	----	300	°C
$R_{\theta JC}$	Junction-to-Case, Single Leg Conducting	----	----	3.5	K/W
	Junction-to-Case, Both Legs Conducting	----	----	1.75	
$R_{\theta JA}$③	Thermal Resistance, Junction to Ambient	----	----	40	
$R_{\theta CS}$④	Thermal Resistance, Case to Heat Sink	----	0.25	----	
Wt	Weight	----	6	----	g
		----	0.21	----	(oz)
	Mounting Torque	6	----	12	Kg-cm
		5	----	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

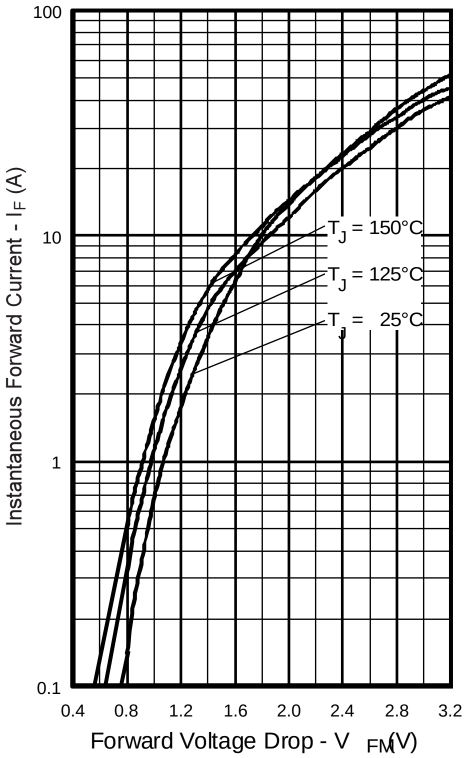


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

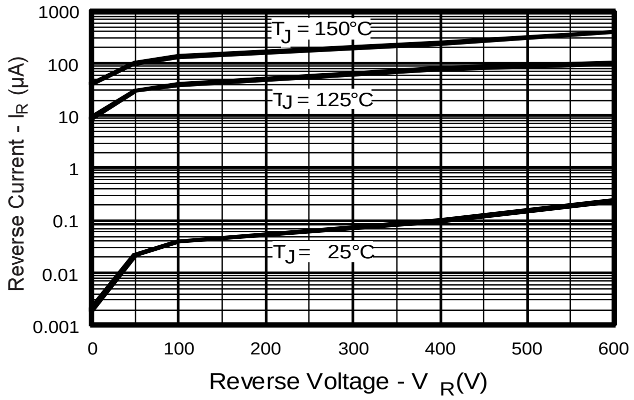


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

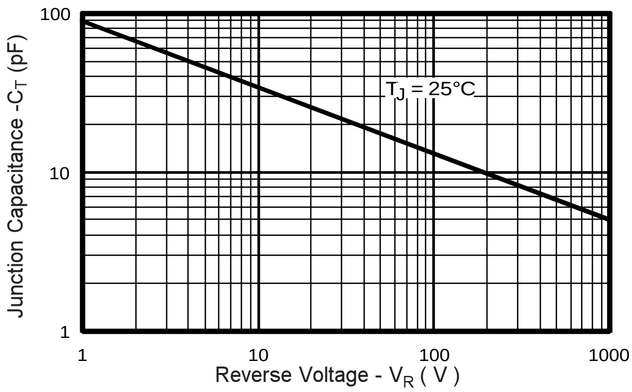


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

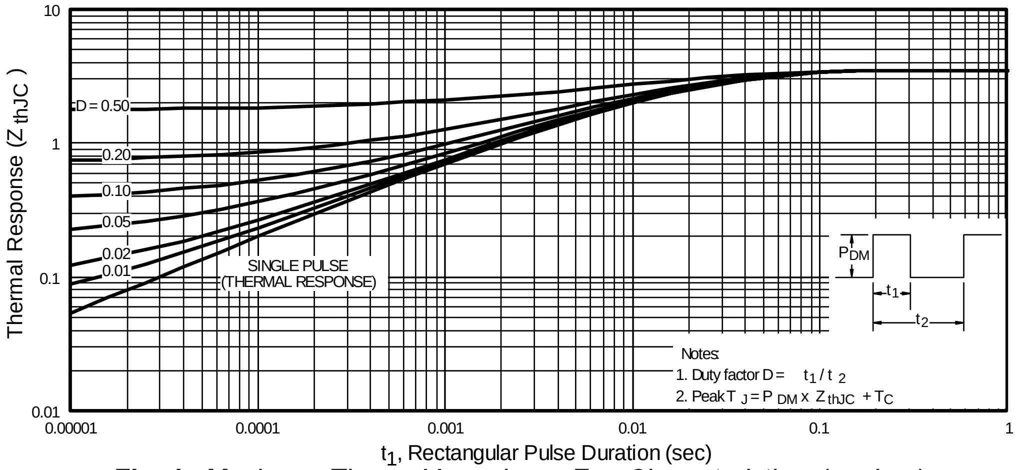


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics, (per Leg)

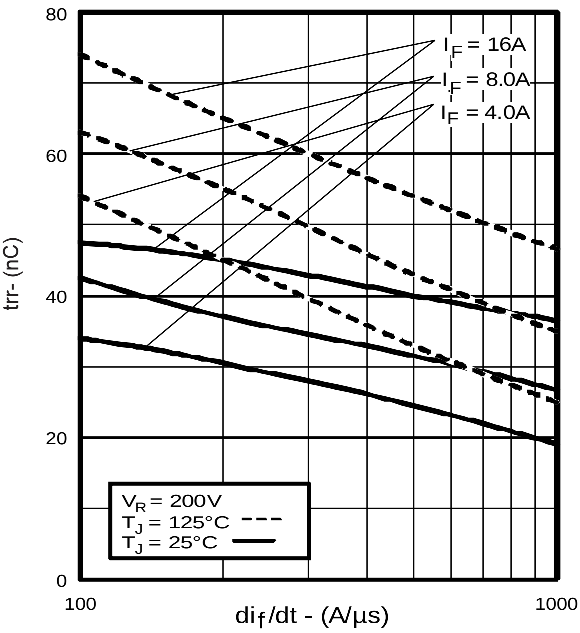


Fig. 5 - Typical Reverse Recovery vs. di_f/dt, (per Leg)

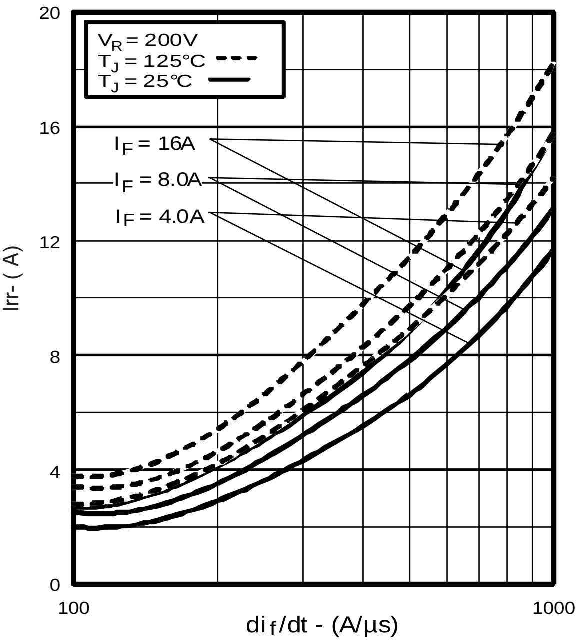


Fig. 6 - Typical Recovery Current vs. di_f/dt, (per Leg)

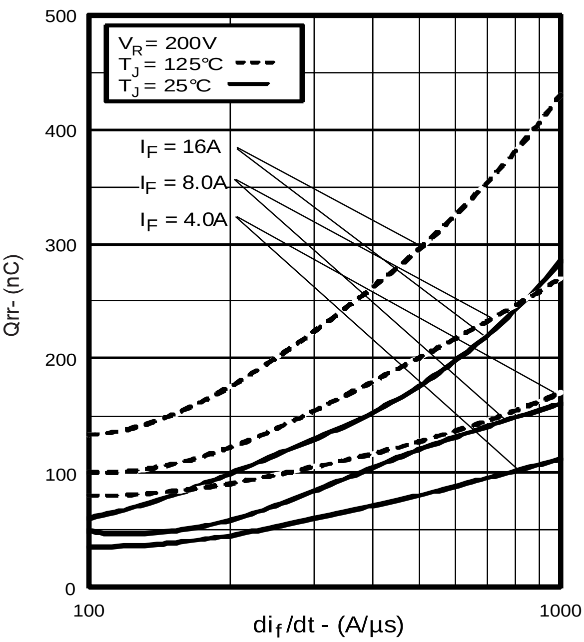


Fig. 7 - Typical Stored Charge vs. di_f/dt, (per Leg)

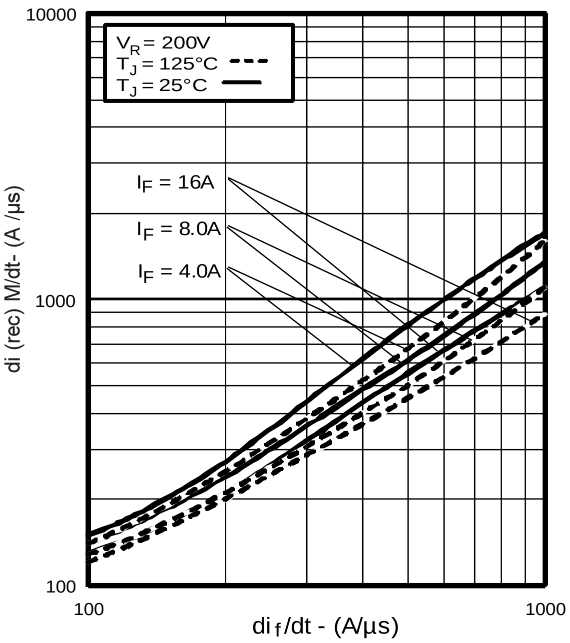


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt, (per Leg)

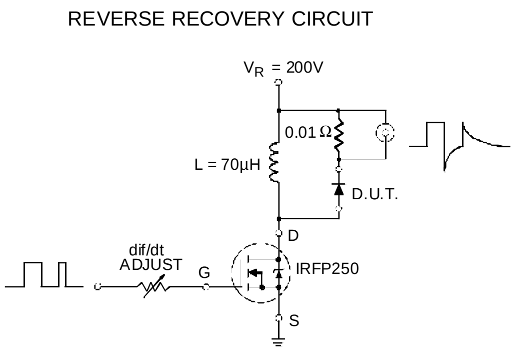
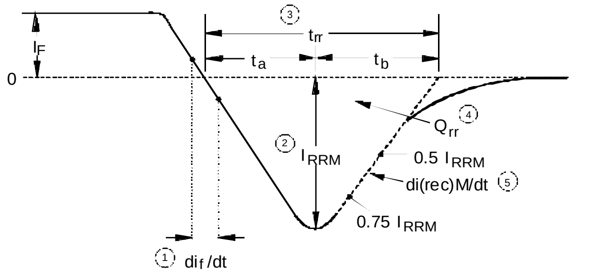


Fig. 9 - Reverse Recovery Parameter Test Circuit



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

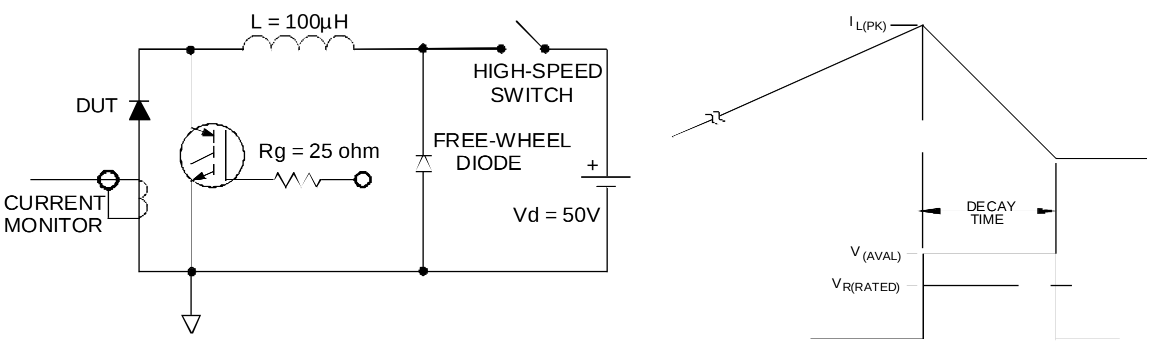
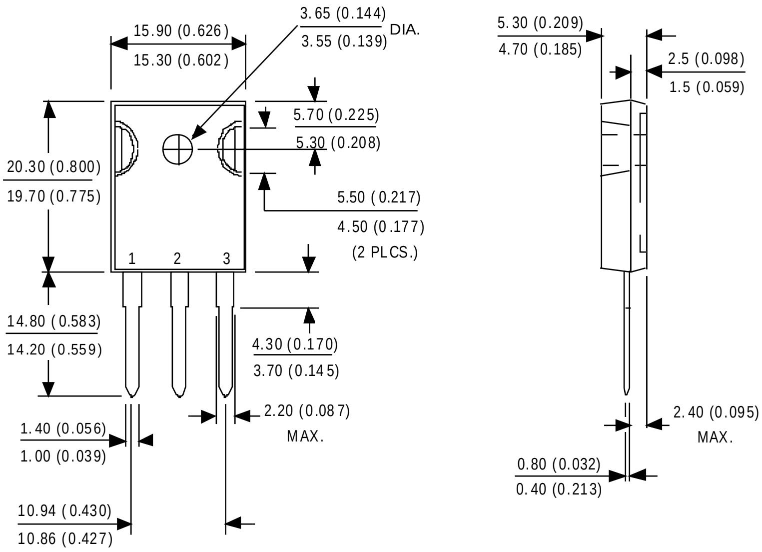


Fig. 11 - Avalanche Test Circuit and Waveforms



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

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