

International IOR Rectifier

8ETU04PbF

Ultrafast Rectifier

Features

- Ultrafast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Lead-Free ("PbF" data sheet)

$t_{rr} = 60ns$
$I_{F(AV)} = 8Amp$
$V_R = 400V$

Description/ Applications

International Rectifier's FRED.. series are the state of the art Ultra fast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultra fast recovery time.

The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in the output rectification stage of SMPS, UPS, DC-DC converters as well as free-wheeling diode in low voltage inverters and chopper motor drives.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

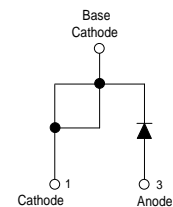
Absolute Maximum Ratings

Parameters	Max	Units
V_{RRM} Peak Repetitive Peak Reverse Voltage	400	V
$I_{F(AV)}$ Average Rectified Forward Current, $T_C = 155^\circ C$	8	A
I_{FSM} Non Repetitive Peak Surge Current, $T_C = 25^\circ C$	100	
I_{FRM} Peak Repetitive Forward Current	16	
T_J, T_{STG} Operating Junction and Storage Temperatures	- 65 to 175	$^\circ C$

Case Styles



TO-220AC



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

Parameters	Min	Typ	Max	Units	Test Conditions
V _{BR} , V _r Breakdown Voltage, Blocking Voltage	400	-	-	V	I _R = 100μA
V _F Forward Voltage	-	1.19	1.3	V	I _F = 8A
	-	0.94	1.0	V	I _F = 8A, T _J = 150°C
I _R Reverse Leakage Current	-	0.2	10	μA	V _R = V _R Rated
	-	20	500	μA	T _J = 150°C, V _R = V _R Rated
C _T Junction Capacitance	-	14	-	pF	V _R = 400V
L _S Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from package body

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

Parameters	Min	Typ	Max	Units	Test Conditions
t _{rr} Reverse Recovery Time	-	35	60	ns	I _F = 1.0A, di _F /dt = 50A/μA, V _R = 30V
	-	43	-		T _J = 25°C
	-	67	-		T _J = 125°C
I _{RRM} Peak Recovery Current	-	2.8	-	A	T _J = 25°C
	-	6.3	-		T _J = 125°C
Q _{rr} Reverse Recovery Charge	-	60	-	nC	T _J = 25°C
	-	210	-		T _J = 125°C

I_F = 8A
V_R = 200V
di_F/dt = 200A/μs

Thermal - Mechanical Characteristics

Parameters	Min	Typ	Max	Units
R _{thJC} Thermal Resistance, Junction to Case	-	1.8	2	°C/W
R _{thJA} ^① Thermal Resistance, Junction to Ambient	-	-	50	
R _{thCS} ^② Thermal Resistance, Case to Heatsink	-	0.5	-	
Wt Weight	-	2.0	-	g
	-	0.07	-	(oz)
Mounting Torque	6.0	-	12	Kg-cm
	5.0	-	10	lbf.in
Marking Device	8ETU04			

① Typical Socket Mount

② Mounting Surface, Flat, Smooth and Greased

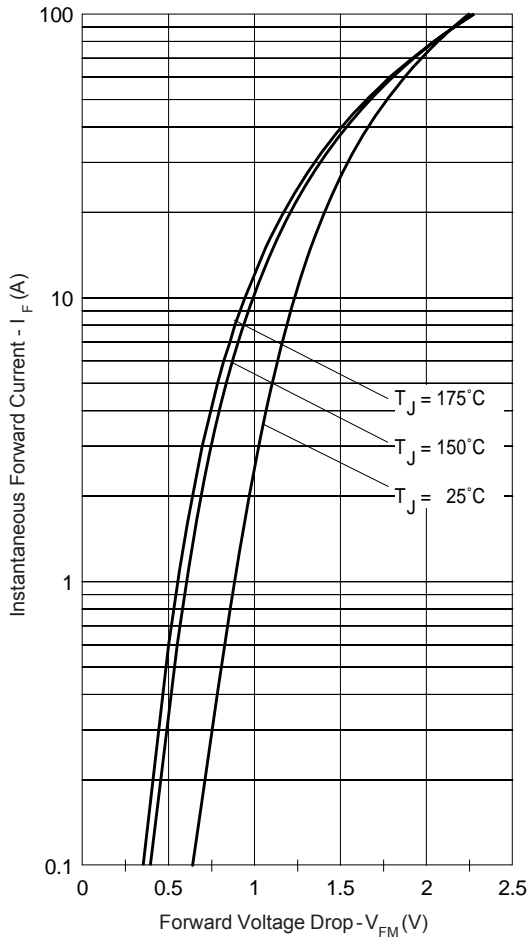


Fig. 1 - Typical Forward Voltage Drop Characteristics

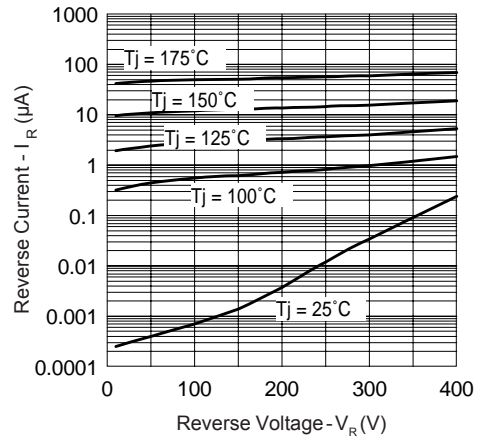


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

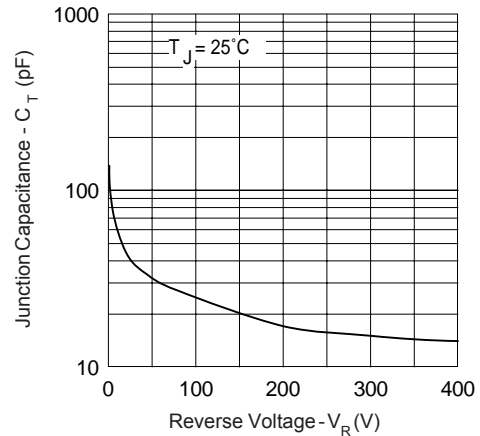


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

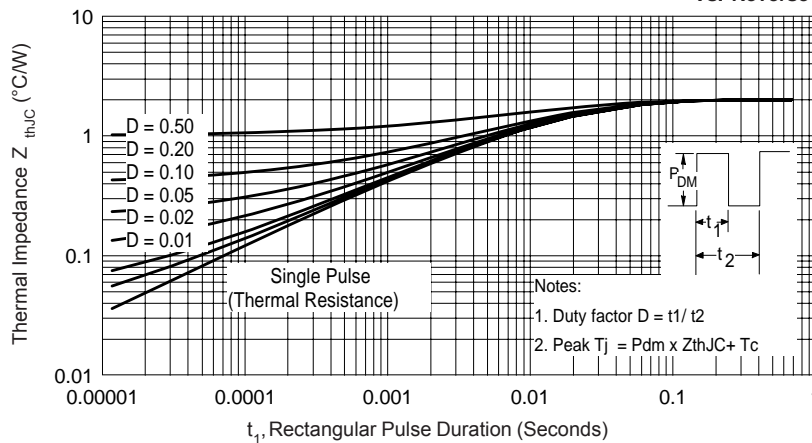


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

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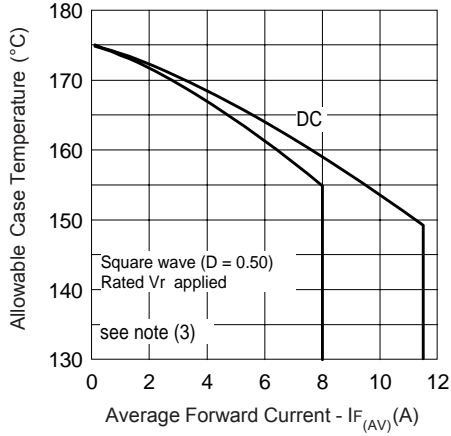


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

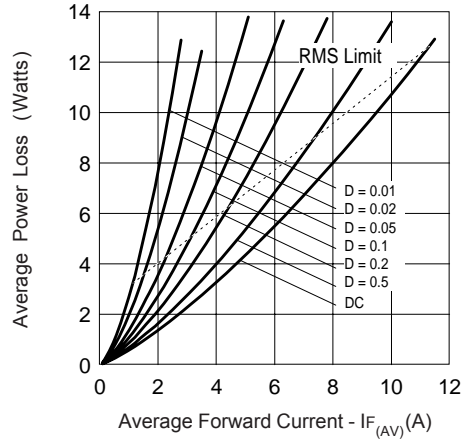


Fig. 6 - Forward Power Loss Characteristics

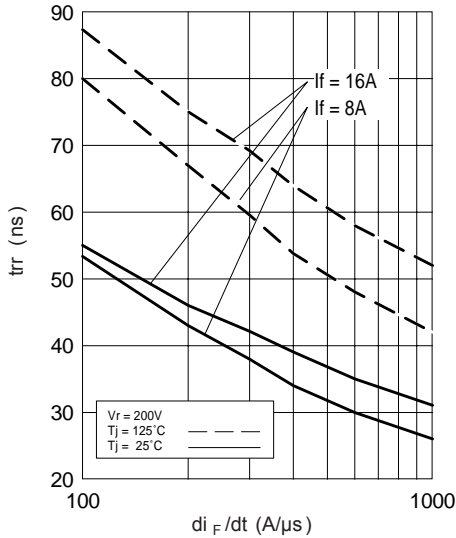


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

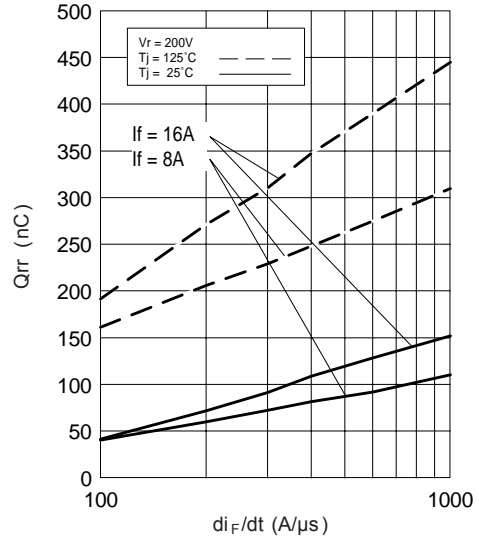


Fig. 8 - Typical Stored Charge vs. di_F/dt

(3) Formula used: $T_c = T_j - (Pd + Pd_{REV}) \times R_{thJC}$;
 $Pd = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$ (see Fig. 6);
 $Pd_{REV} = \text{Inverse Power Loss} = V_{R1} \times I_R (1 - D)$; $I_R @ V_{R1} = \text{rated } V_R$

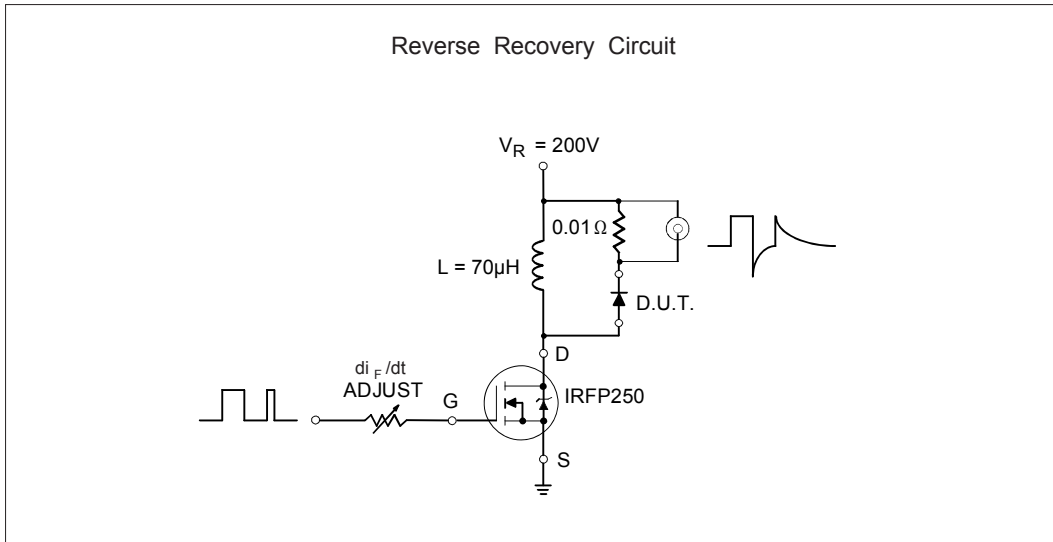


Fig. 9- Reverse Recovery Parameter Test Circuit

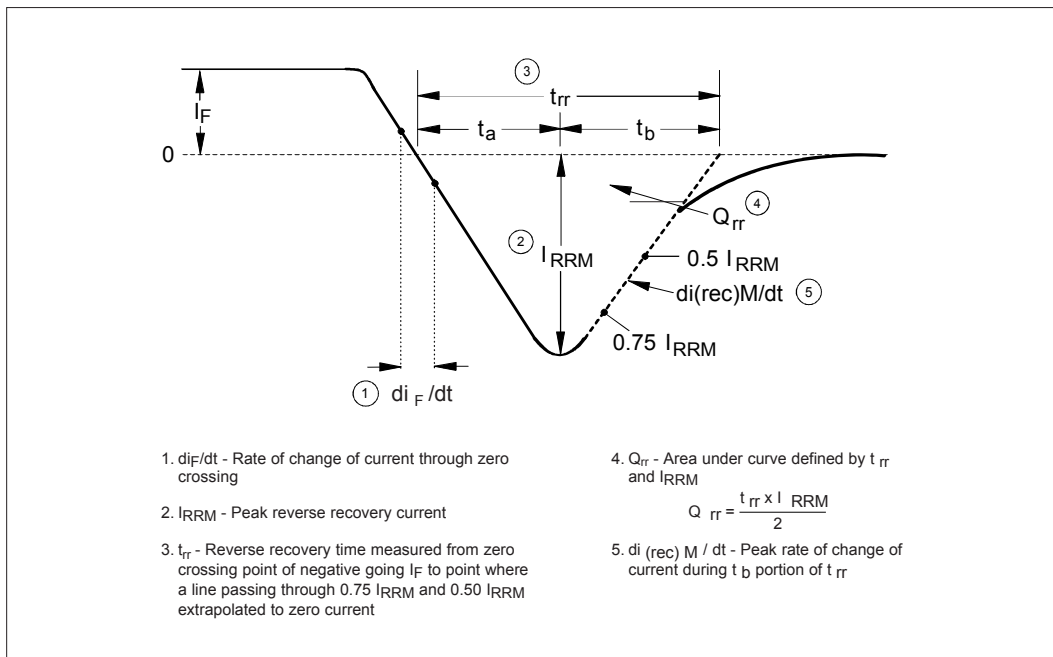


Fig. 10 - Reverse Recovery Waveform and Definitions

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Outline Table

NOTES:

- 1.- DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
- 2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
- 3.- LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
- 4.- DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- 5.- DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
- 6.- CONTROLLING DIMENSION : INCHES.
- 7.- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E1,D2 & E1
- 8.- DIMENSION E2 & H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
- 9.- OUTLINE CONFORMS TO JEDEC TO-220, D2 (min) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	5
b1	0.38	0.97	.015	.038	
b2	1.14	1.78	.045	.070	5
b3	1.14	1.73	.045	.068	
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	11.68	12.88	.460	.507	7
E	9.65	10.67	.380	.420	4,7
E1	6.86	8.89	.270	.350	7
E2	-	0.76	-	.030	8
e	2.54 BSC	-	.100 BSC	-	
e1	4.08 BSC	-	.200 BSC	-	
H1	5.84	6.86	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	-	6.35	-	.250	3
L3	1.78	2.13	.070	.084	
L4	0.76	1.27	.030	.050	3
Q	3.53	3.73	.139	.147	
Q	2.54	3.05	.100	.120	

LEAD ASSIGNMENTS
 0-05C
 1-2- CATHODE
 3- ANODE

Conforms to JEDEC Outline TO-220AC
 Dimensions in millimeters and (inches)

Part Marking Information

IRXC Assembly Line

EXAMPLE: THIS IS A 8ETU04
 LOT CODE 1789
 ASSEMBLED ON WW 19, 2001
 IN THE ASSEMBLY LINE "C"

Note: "P" in the beginning of date code indicates "Lead-Free"

IRMX Assembly Line

EXAMPLE: THIS IS A 8ETU04
 LOT CODE 1789
 ASSEMBLED ON WW 19, 2001
 IN THE ASSEMBLY LINE "C"

Note: "P" in assembly line position indicates "Lead-Free"

Ordering Information Table

Device Code	
8	E
T	U
04	PbF
①	②
③	④
⑤	⑥

1	-	Current Rating (8 = 8A)
2	-	E = Single Diode
3	-	Package T = TO-220
4	-	U = UltraFast Recovery
5	-	Voltage Rating (04 = 400V)
6	-	• none = Standard Production • PbF = Lead-Free

Tube Standard Pack Quantity : 50 pieces

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
IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
Visit us at www.irf.com for sales contact information. 10/06

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