International Rectifier

30CPU04PbF

ULTRAFAST RECTIFIER

Features

- Ultrafast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Lead-Free

t_{rr} = 60ns
$I_{F(AV)}$ = 30Amp
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.

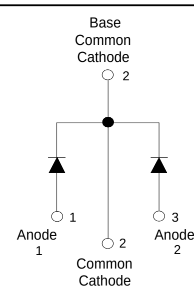
Absolute Maximum Ratings

	Parameters		Max	Units
V_{RRM}	Peak Repetitive Peak Reverse Voltage		400	V
$I_{F(AV)}$	Average Rectified Forward Current	Per Leg	15	A
	Total Device (Rated V_R), T_C = 149°C	Total Device	30	
I_{FSM}	Non Repetitive Peak Surge Current, @ 25°C	Per Leg	200	
I_{FRM}	Peak Repetitive Forward Current (Rated V_R, Square wave, 20 KHz), T_C = 149°C	Per Leg	30	
T_J, T_{STG}	Operating Junction and Storage Temperatures		- 65 to 175	°C

Case Styles

30CPU04PbF

TO247AC



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	-	1.17	1.25	V	I_F = 15A
		-	0.93	1.12	V	I_F = 15A, T_J = 150°C
I_R	Reverse Leakage Current	-	0.3	10	μA	V_R = V_R Rated
		-	30	500	μA	T_J = 150°C, V_R = V_R Rated
C_T	Junction Capacitance	-	28	-	pF	V_R = 400V
L_S	Series Inductance	-	12	-	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	-	36	60	ns	I_F = 1.0A, di_F/dt = 50A/μs, V_R = 30V	
		-	46	-		T_J = 25°C	I_F = 15A V_R = 200V di_F/dt = 200A/μs
			80			T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	3.6	-	A	T_J = 25°C	
		-	8.7	-		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	84	-	nC	T_J = 25°C	
			-	345	-	T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameters		Min	Typ	Max	Units
T_J	Max. Junction Temperature Range		-	-	175	°C
T_{Stg}	Max. Storage Temperature Range		- 65	-	175	
R_{thJC}	Thermal Resistance, Junction to Case	Per Leg	-	0.8	1.5	°C/W
R_{thJA} ①	Thermal Resistance, Junction to Ambient	Per Leg	-	-	40	
R_{thCS} ②	Thermal Resistance, Case to Heatsink		-	0.4	-	
Wt	Weight		-	6.0	-	g
			-	0.21	-	(oz)
	Mounting Torque		6.0	-	12	Kg-cm
			5.0	-	10	lbf.in

① Typical Socket Mount
② Mounting Surface, Flat, Smooth and Greased

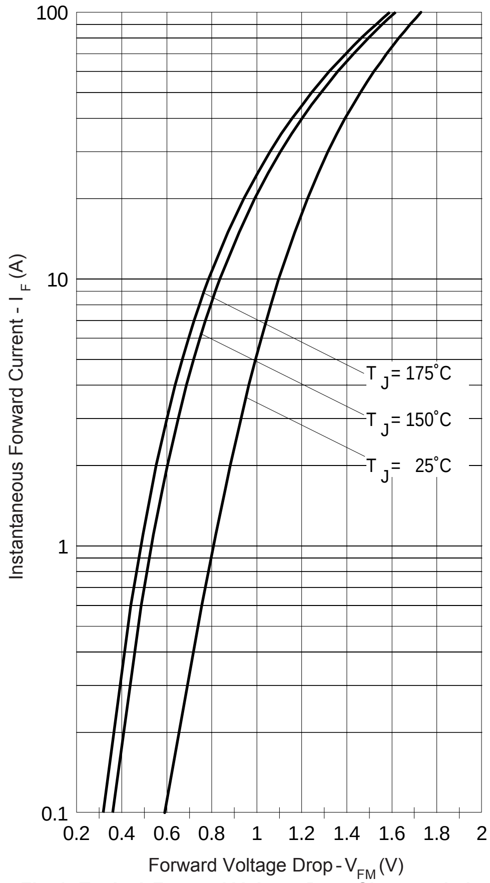


Fig. 1 - Typical Forward Voltage Drop Characteristics

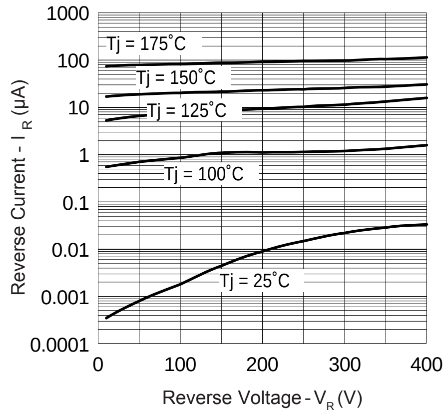


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

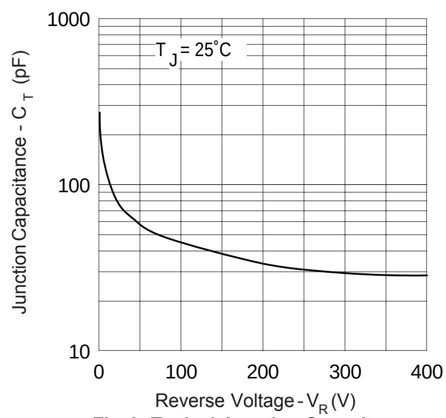


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

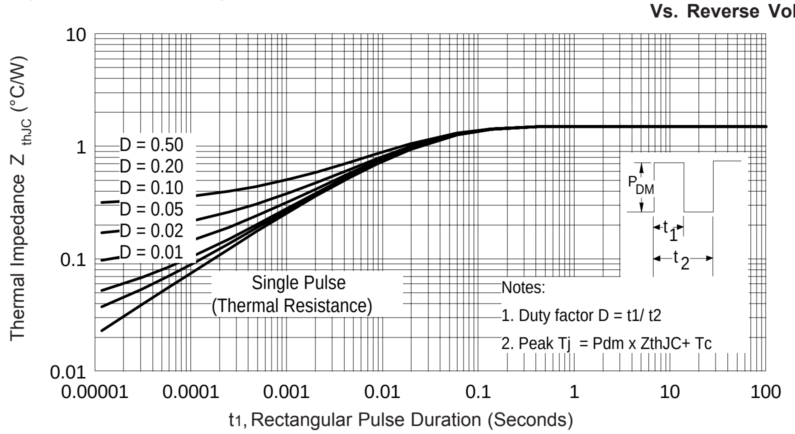


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

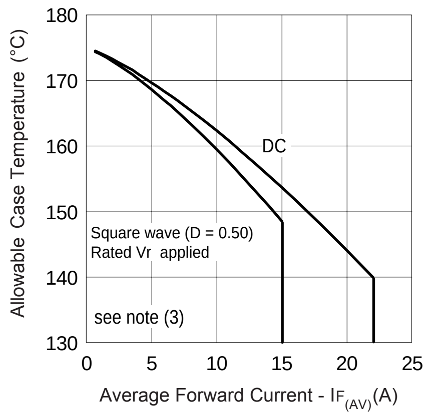


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

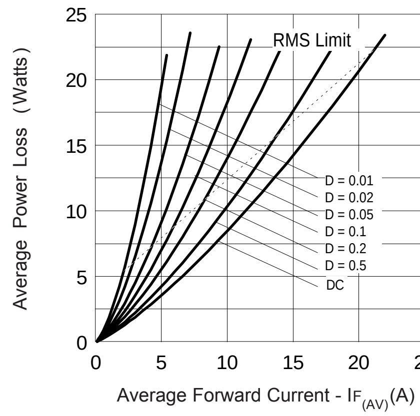


Fig. 6 - Forward Power Loss Characteristics

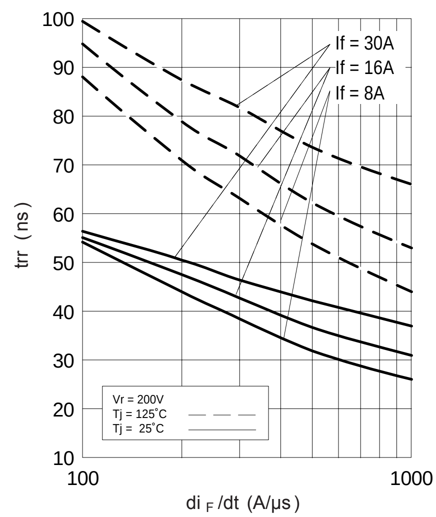


Fig. 7 - Typical Reverse Recovery vs. di $_F$ /dt

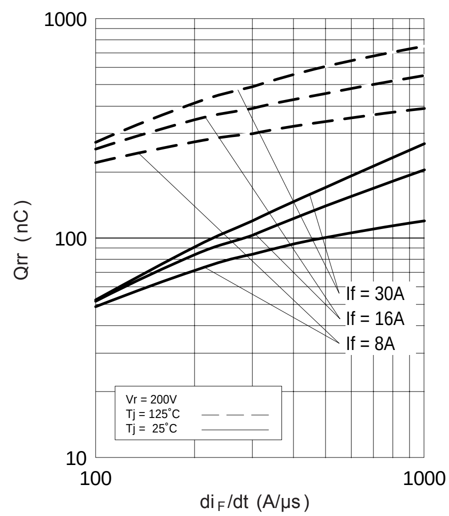


Fig. 8 - Typical Stored Charge vs. di $_F$ /dt

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

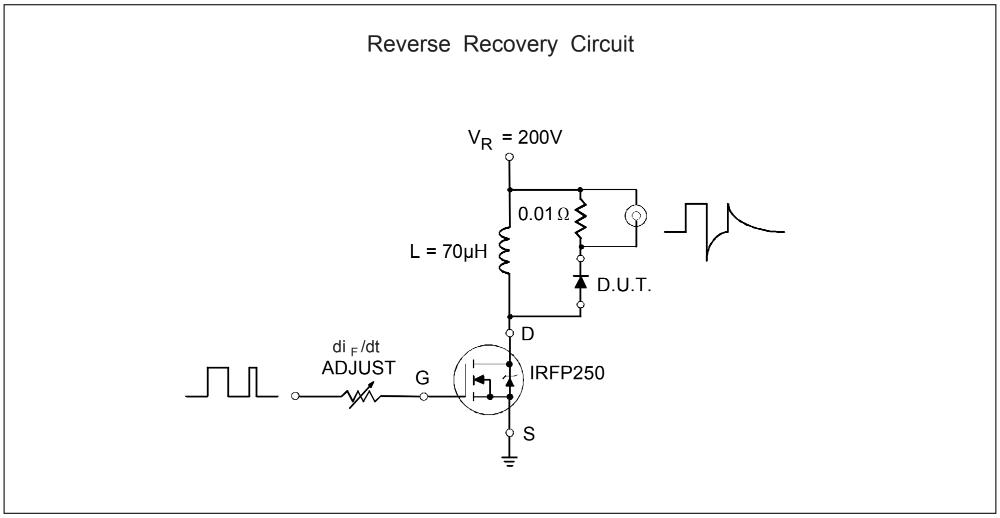
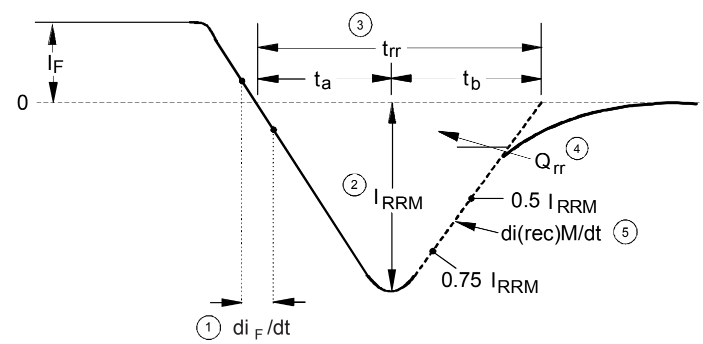


Fig. 9- Reverse Recovery Parameter Test Circuit



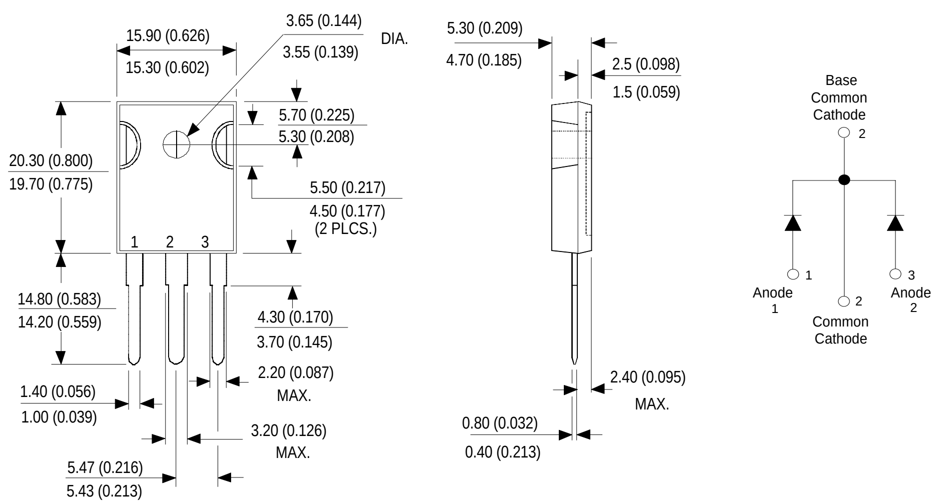
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - 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

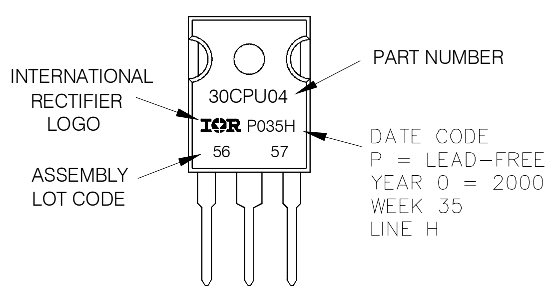
Outline Table



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

Marking Information

EXAMPLE: THIS IS A 30CPU04
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2000
IN THE ASSEMBLY LINE "H"



Ordering Information Table

Device Code	30	C	P	U	04	PbF
	1	2	3	4	5	6

1	-	Current Rating	(30 = 30A)
2	-	Common Cathode	
3	-	TO-247AC	
4	-	Ultrafast Recovery	
5	-	Voltage Rating	(04 = 400V)
6	-	Lead-Free	

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 IOR Rectifier
IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
04/04

Notice

The products described herein were acquired by Vishay Intertechnology, Inc., as part of its acquisition of International Rectifier's Power Control Systems (PCS) business, which closed in April 2007. Specifications of the products displayed herein are pending review by Vishay and are subject to the terms and conditions shown below.

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.

International Rectifier®, IR®, the IR logo, HEXFET®, HEXSense®, HEXDIP®, DOL®, INTERO®, and POWIRTRAIN® are registered trademarks of International Rectifier Corporation in the U.S. and other countries. All other product names noted herein may be trademarks of their respective owners.