PD-20376A

International
IOR Rectifier

HFA40HF120

FRED

Ultrafast, Soft Recovery Diode

V_R = 1200V

V_F = 3.1V

Q_{rr} = 510nC

$di_{(rec)M}/dt$ = 350A/µs

Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetic
- Surface Mount

Description

These Ultrafast,soft recovery diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. An extensive characterization of the recovery behavior for different values of current, temperature and di/dt simplifies the calculations of losses in the operating conditions. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for power converters, motors drives and other applications where switching losses are significant portion of the total losses.

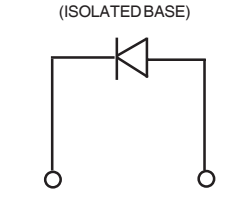
Absolute Maximum Ratings

	Parameter	Max.	Units
V_R	Cathode to Anode Voltage	1200	V
$I_{F(AV)}$	Continuous Forward Current, ① T_C = 100°C	11	A
I_{FSM}	Single Pulse Forward Current, ② T_C = 25°C	190	
P_D @ T_C = 25°C	Maximum Power Dissipation	83	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

Note: ① D.C. = 50% rect. wave
② 1/2 sine wave, 60 Hz , P.W. = 8.33 ms

CASE STYLE

SMD-1



04/20/10

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	1200	—	—	V	I_R = 100µA
V_F	Forward Voltage	—		3.1	V	I_F = 11A
	See Fig. 1	—		4.0		I_F = 22A
		—		2.7		I_F = 11A, T_J = 125°C
I_R	Max Reverse Leakage Current	—	—	10	µA	V_R = V_R Rated
	See Fig. 2	—	—	1.0	mA	V_R = 960V, T_J = 125°C
C_T	Junction Capacitance, See Fig. 3	—	28	42	pF	V_R = 200V
L_S	Series Inductance	—	5.9	—	nH	Measured from center of cathode pad the center of anode pad

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions		
t_{rr1}	Reverse Recovery Time	—	80	120	ns	T_J = 25°C	See Fig.	I_F = 11A
t_{rr2}		—	130	195		T_J = 125°C	5	
I_{RRM1}	Peak Recovery Current	—	7.25	10.9	A	T_J = 25°C	See Fig.	
I_{RRM2}		—	10.2	15.3		T_J = 125°C	6	V_R = 200V
Q_{rr1}	Reverse Recovery Charge	—	340	510	nC	T_J = 25°C	See Fig.	
Q_{rr2}		—	825	1240		T_J = 125°C	7	di_f/dt = 200A/µs
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	230	350	A/µs	T_J = 25°C	See Fig.	
$di_{(rec)M}/dt2$	During t_b	—	160	240		T_J = 125°C	8	

Thermal - Mechanical Characteristics

	Parameter	Typ.	Max.	Units
R_{thJC}	Junction-to-Case	—	1.5	°C/W
Wt	Weight	2.6	—	g

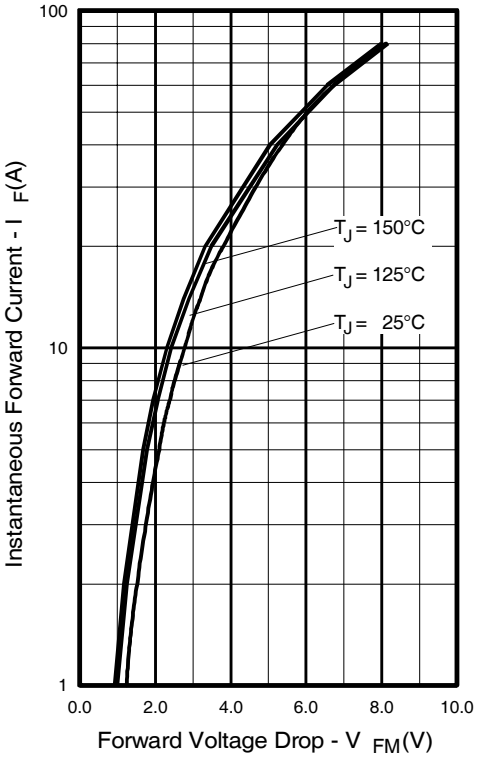


Fig. 1 - Maximum Forward Voltage Drop Vs. Instantaneous Forward Current

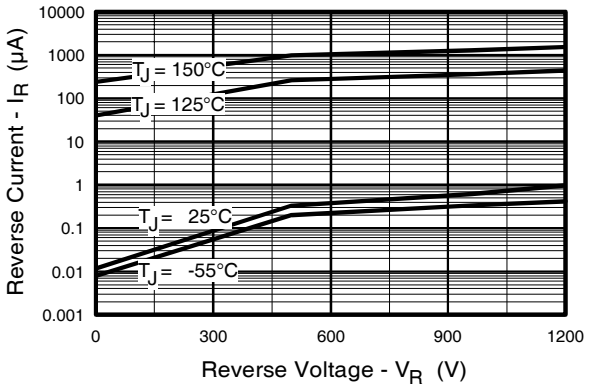


Fig. 2 - Typical Reverse Current Vs. Reverse Voltage

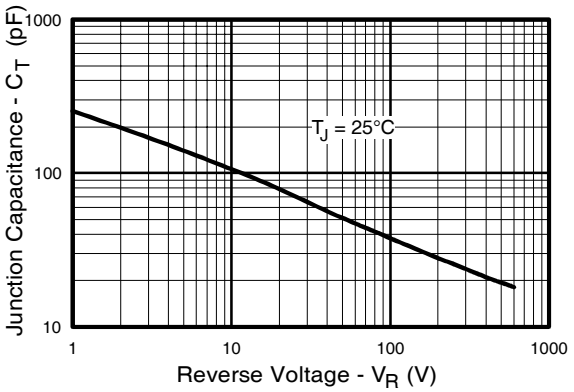


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

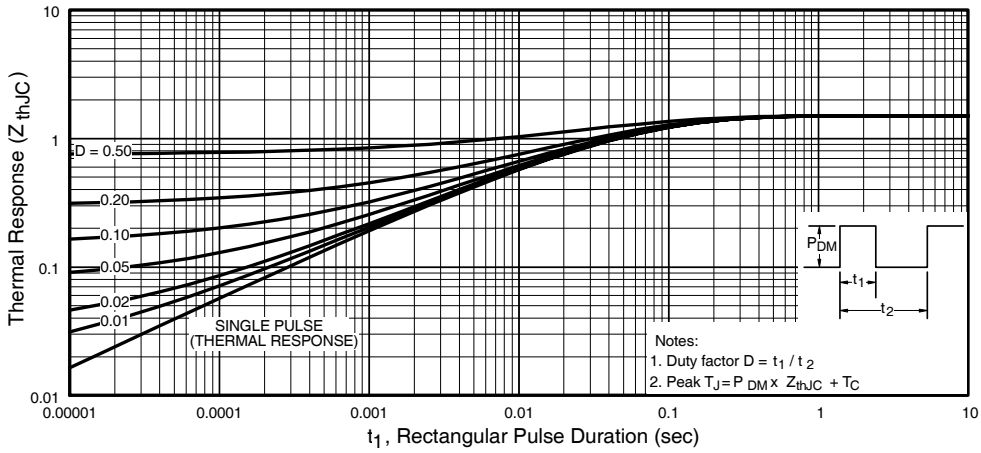


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics

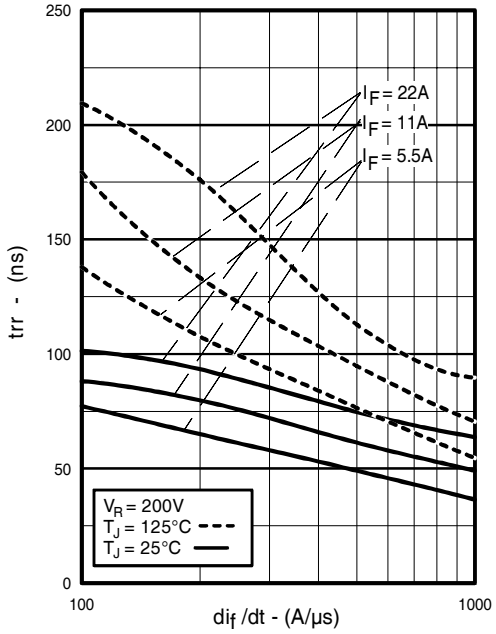


Fig. 5 - Typical Reverse Recovery vs. di_f/dt,

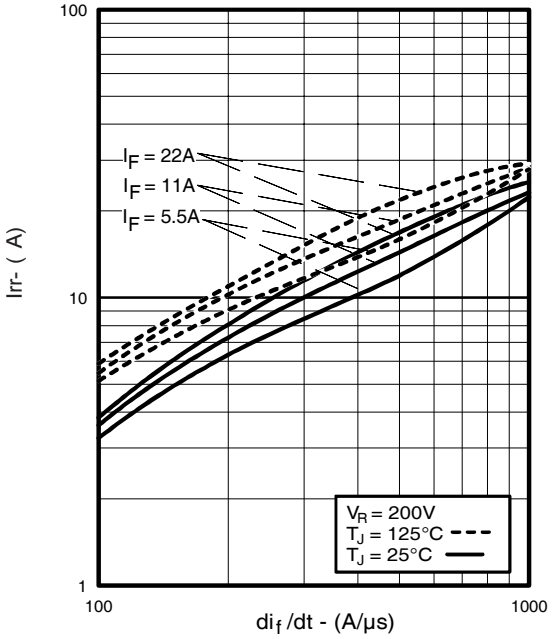


Fig. 6 - Typical Recovery Current vs. di_f/dt,

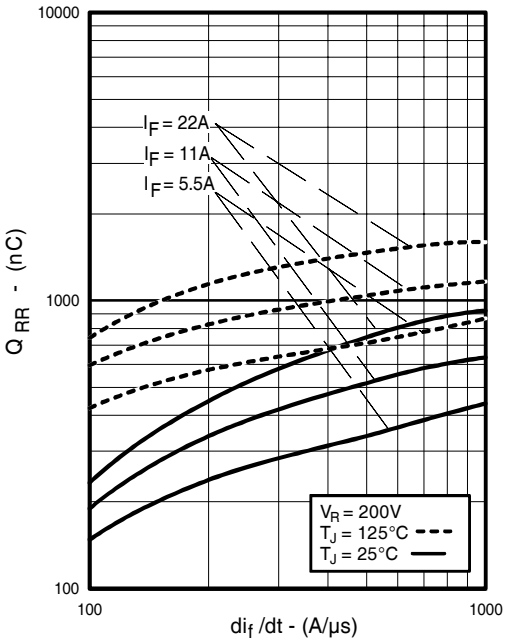


Fig. 7 - Typical Stored Charge vs. di_f/dt

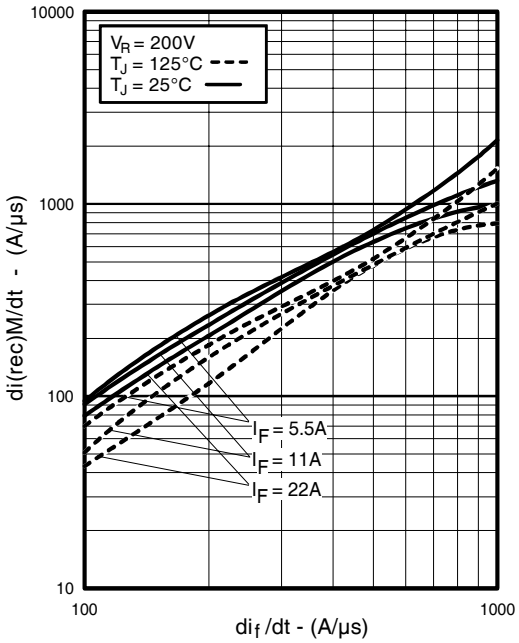


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt

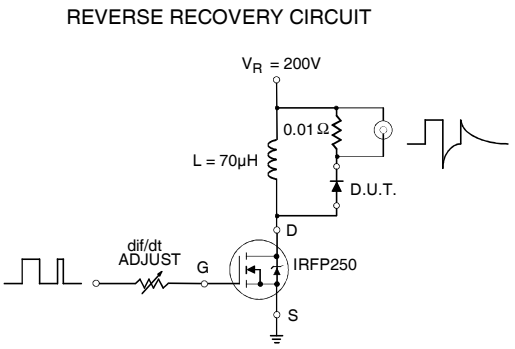
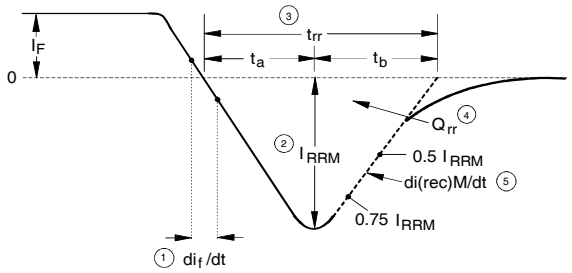


Fig. 9 - Reverse Recovery Parameter Test Circuit



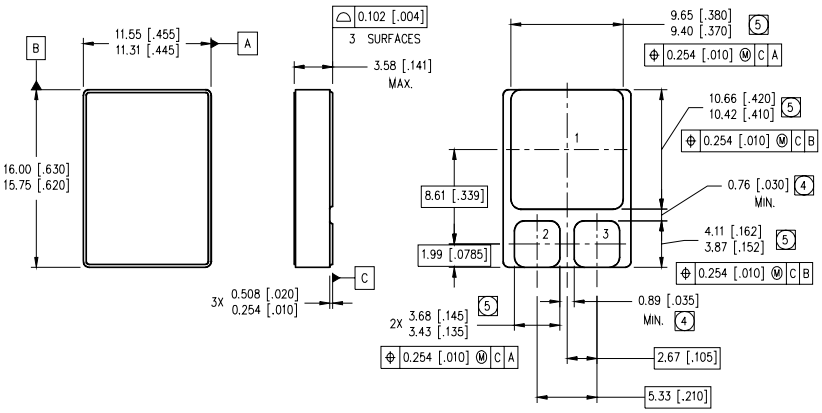
1. di_f/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. trr - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area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

Case Outline and Dimensions — SMD-1



NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M–1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. DIMENSION INCLUDES METALLIZATION FLASH.
5. DIMENSION DOES NOT INCLUDE METALLIZATION FLASH.

PAD ASSIGNMENTS
1 = CATHODE
2 = ANODE
3 = N / C

International
IOR Rectifier
IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
IR LEOMINSTER : 205 Crawford St., Leominster, Massachusetts 01453, USA Tel: (978) 534-5776
TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information.
Data and specifications subject to change without notice. 04/2010