

# International **IR** Rectifier

## FRED

PD - 20371D

HFA35HB120C

Ultrafast, Soft Recovery Diode

### Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetic
- Ceramic Eyelets

$V_R = 1200V$

$I_{F(AV)} = 15A$

$Q_{rr} = 370\text{ns}$

### Description

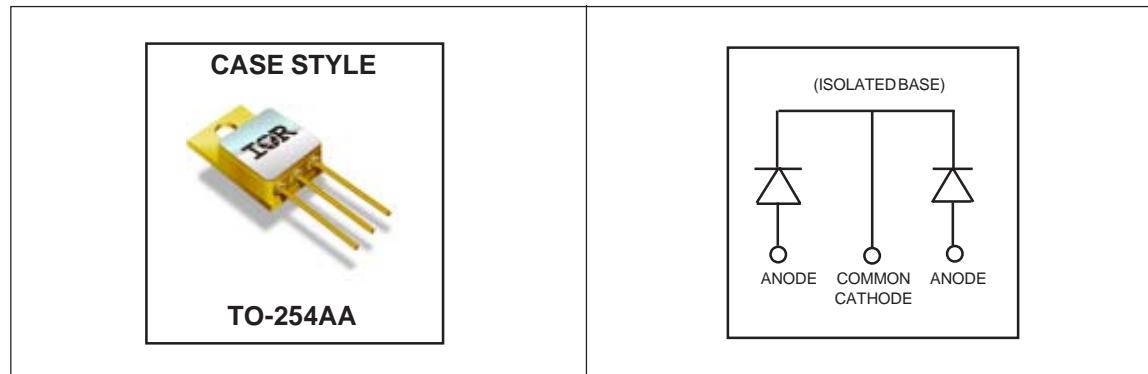
These Ultrafast, soft recovery diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. An extensive characterization of the recovery behavior for different values of current, temperature and  $di/dt$  simplifies the calculations of losses in the operating conditions. 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 ( Per Leg )	1200	V
$I_{F(AV)}$	Continuous Forward Current, $\textcircled{1} T_C = 100^\circ\text{C}$	15	A
$I_{FSM}$	Single Pulse Forward Current, $\textcircled{2} T_C = 25^\circ\text{C}$ ( Per Leg )	80	
$P_D @ T_C = 25^\circ\text{C}$	Maximum Power Dissipation	63	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Note:  $\textcircled{1}$  D.C. = 50% rect. wave

$\textcircled{2}$  1/2 sine wave, 60 Hz , P.W. = 8.33 ms



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**Electrical Characteristics (Per Leg) @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

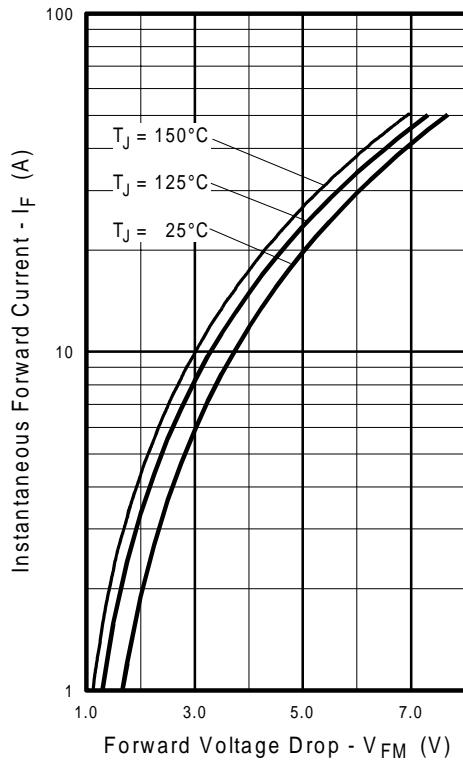
	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{BR}$	Cathode Anode Breakdown Voltage	1200	—	—	V	$I_R = 250\mu\text{A}$
$V_{FM}$ See Fig. 1	Max Forward Voltage	—	—	3.3	V	$I_F = 7.0\text{A}$
		—	—	4.4		$I_F = 15\text{A}$
		—	—	2.8		$I_F = 7.0\text{A}, T_J = 125^\circ\text{C}$
$I_{RM}$ See Fig. 2	Max Reverse Leakage Current	—	—	10	$\mu\text{A}$	$V_R = V_R \text{ Rated}$
		—	—	1.0	mA	$V_R = V_R \text{ Rated}, T_J = 125^\circ\text{C}$
$C_T$	Junction Capacitance, See Fig. 3	—	10	15	pF	$V_R = 200\text{V}$
$L_S$	Series Inductance	—	8.7	—	nH	Measured from anode lead to cathode lead, 6mm ( 0.025 in) from package

**Dynamic Recovery Characteristics (Per Leg) @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

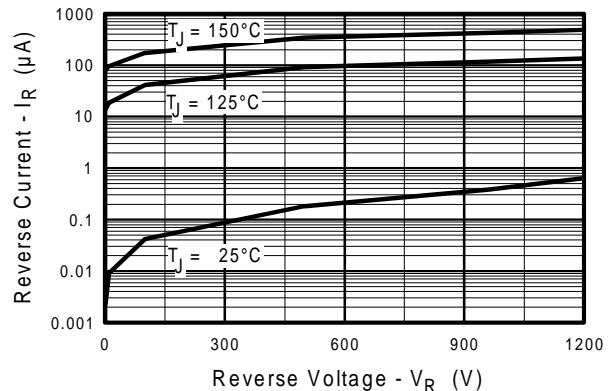
	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{rr1}$	Reverse Recovery Time	—	58	100	ns	$T_J = 25^\circ\text{C}$ See Fig.
		—	110	165		$T_J = 125^\circ\text{C}$ 5
$I_{RRM1}$	Peak Recovery Current	—	5.4	8.1	A	$T_J = 25^\circ\text{C}$ See Fig.
		—	7.2	10.8		$T_J = 125^\circ\text{C}$ 6
$Q_{rr1}$	Reverse Recovery Charge	—	185	370	nC	$T_J = 25^\circ\text{C}$ See Fig.
		—	395	590		$T_J = 125^\circ\text{C}$ 7
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During $t_b$	—	255	380	A/ $\mu\text{s}$	$T_J = 25^\circ\text{C}$ See Fig.
		—	160	240		$T_J = 125^\circ\text{C}$ 8

**Thermal - Mechanical Characteristics**

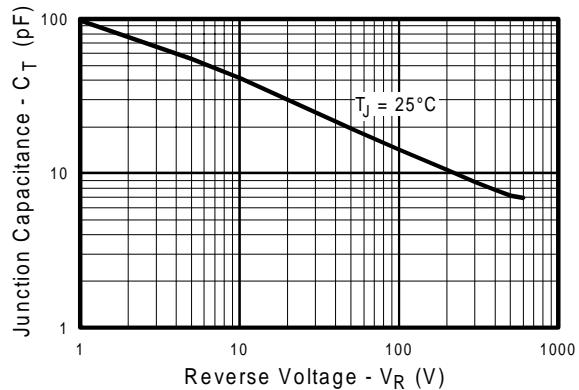
	Parameter	Typ.	Max.	Units
$R_{thJC}$	Junction-to-Case, Single Leg Conducting	—	2.0	°C/W
Wt	Weight	9.3	—	g



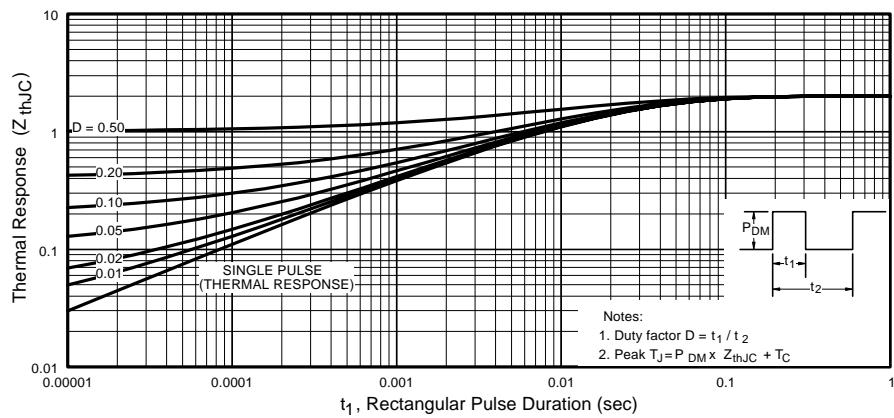
**Fig. 1** - Maximum Forward Voltage Drop Vs.  
Instantaneous Forward Current ( Per Leg )



**Fig. 2** - Typical Reverse Current Vs. Reverse  
Voltage ( Per Leg )

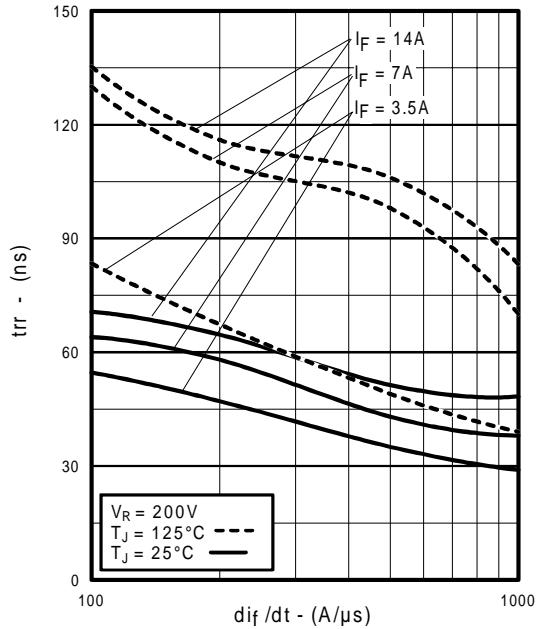


**Fig. 3** - Typical Junction Capacitance Vs.  
Reverse Voltage ( Per Leg )



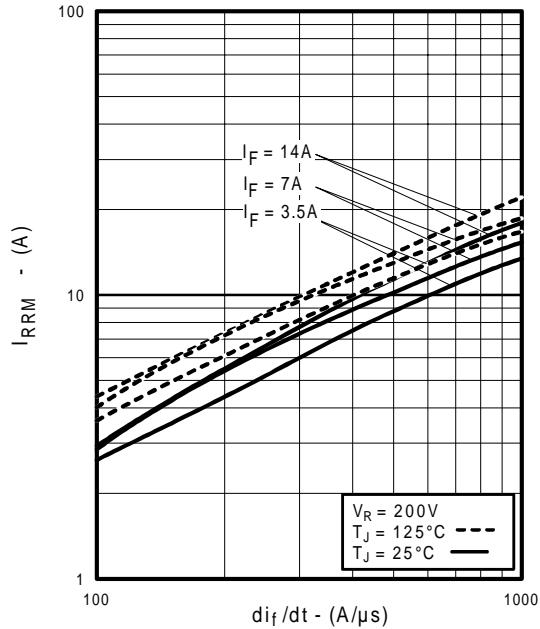
**Fig. 4** - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics ( Per Leg )

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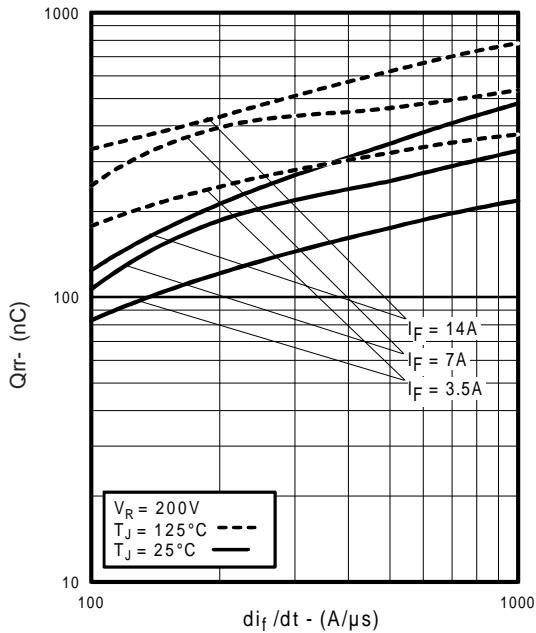


**Fig. 5** - Typical Reverse Recovery vs.  $di_f/dt$

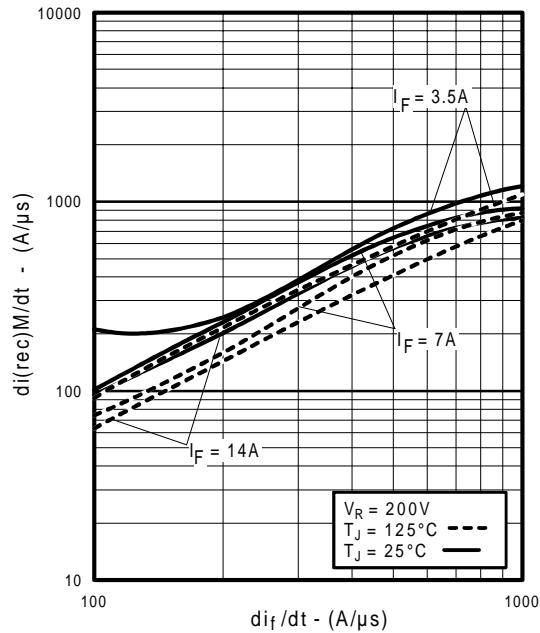
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**Fig. 6** - Typical Recovery Current vs.  $di_f/dt$



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



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

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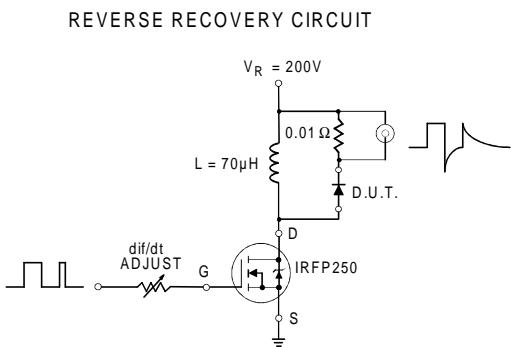


Fig. 9 - Reverse Recovery Parameter Test Circuit

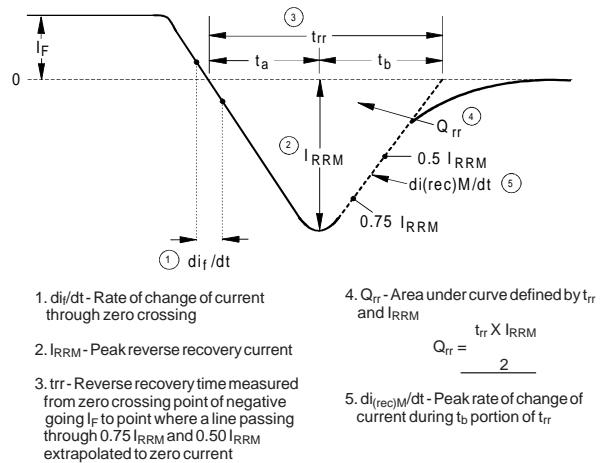
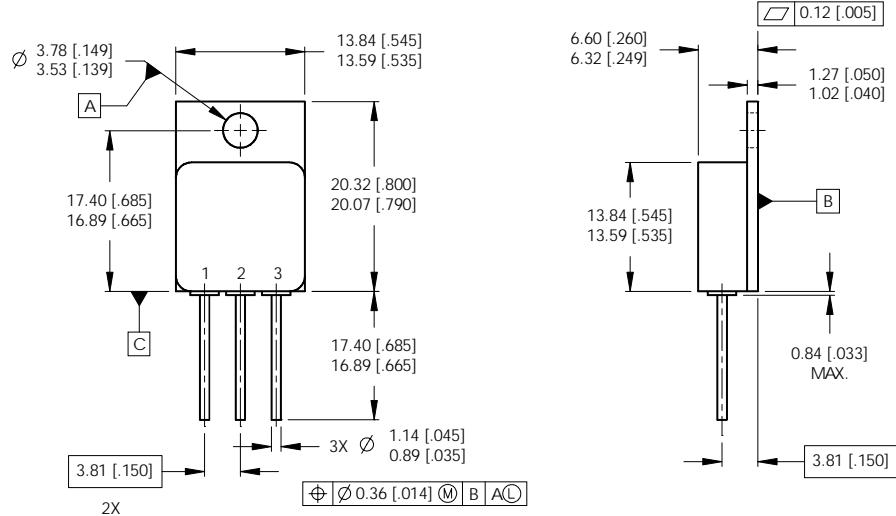


Fig. 10 - Reverse Recovery Waveform and Definitions

### Case Outline and Dimensions — TO-254AA



#### NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. CONTROLLING DIMENSION: INCH.
4. CONFORMS TO JEDEC OUTLINE TO-254AA.

#### PIN ASSIGNMENTS

- 1 = ANODE 1
- 2 = COMMON CATHODE
- 3 = ANODE 2

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Visit us at [www.irf.com](http://www.irf.com) for sales contact information.  
Data and specifications subject to change without notice. 08/02