International
IOR Rectifier

PD-20378C

HFA35HB60C

FRED

Ultrafast, Soft Recovery Diode

Features

- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters
- Hermetic
- Electrically Isolated
- Ceramic Eyelets
- ESD Rating: Class 3B per MIL-STD-750, Method 1020

V_R = 600V

V_F = 1.9V

Q_{rr} = 270nC

$di_{(rec)M}/dt$ = 345A/µs

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.

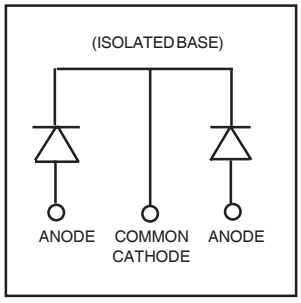
Absolute Maximum Ratings

	Parameter	Max.	Units
V_R	Cathode to Anode Voltage (Per Leg)	600	V
$I_{F(AV)}$	Continuous Forward Current, ① T_C =100 °C	30	A
I_{FSM}	Single Pulse Forward Current, ② T_C = 25°C (Per Leg)	150	
P_D @ T_C = 25°C	Maximum Power Dissipation	63	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

TO-254AA



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 = 250µA
V_F	Forward Voltage	—	—	1.7	V	I_F = 15A, T_J = -55°C
	See Fig. 1	—	—	1.9		I_F = 15A, T_J = 25°C
		—	—	2.3		I_F = 30A, T_J = 25°C
		—	—	2.1		I_F = 15A, T_J = 125°C
I_R	Reverse Leakage Current	—	—	10	µA	V_R = V_R Rated
	See Fig. 2	—	—	1.0	mA	V_R = 480V, T_J = 125°C
C_T	Junction Capacitance, See Fig. 3	—	24	36	pF	V_R = 200V
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°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions		
t_{rr1}	Reverse Recovery Time	—	54	88	ns	T_J = 25°C	See Fig.	I_F = 15A
t_{rr2}		—	94	140		T_J = 125°C	5	
I_{RRM1}	Peak Recovery Current	—	5.6	7.8	A	T_J = 25°C	See Fig.	
I_{RRM2}		—	7.8	11.7		T_J = 125°C	6	V_R = 200V
Q_{rr1}	Reverse Recovery Charge	—	180	270	nC	T_J = 25°C	See Fig.	
Q_{rr2}		—	435	650		T_J = 125°C	7	di_f/dt = 200A/µs
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	300	345	A/µs	T_J = 25°C	See Fig.	
$di_{(rec)M}/dt2$	During t_b	—	190	285		T_J = 125°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

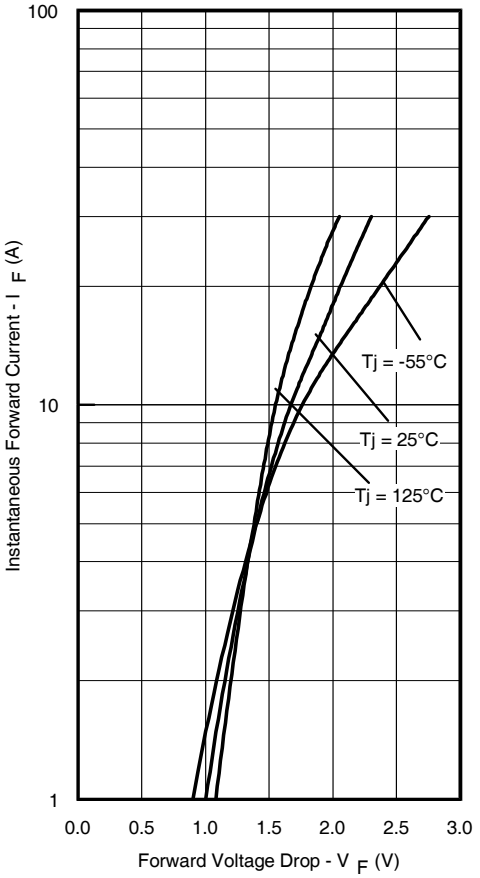


Fig. 1 - Maximum Forward Voltage Drop Vs. Instantaneous Forward Current (Per Leg)

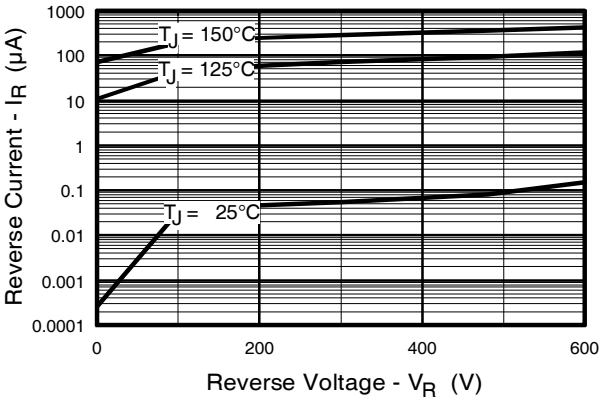


Fig. 2 - Typical Reverse Current Vs. Reverse Voltage (Per Leg)

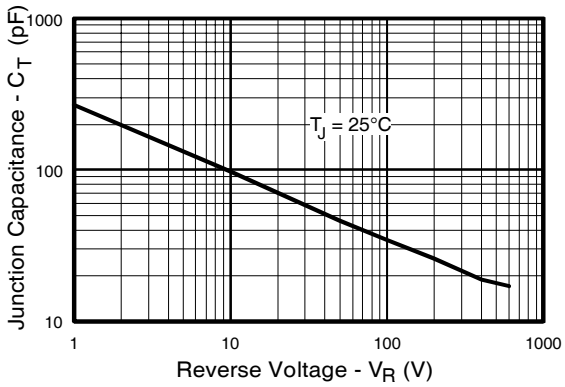


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

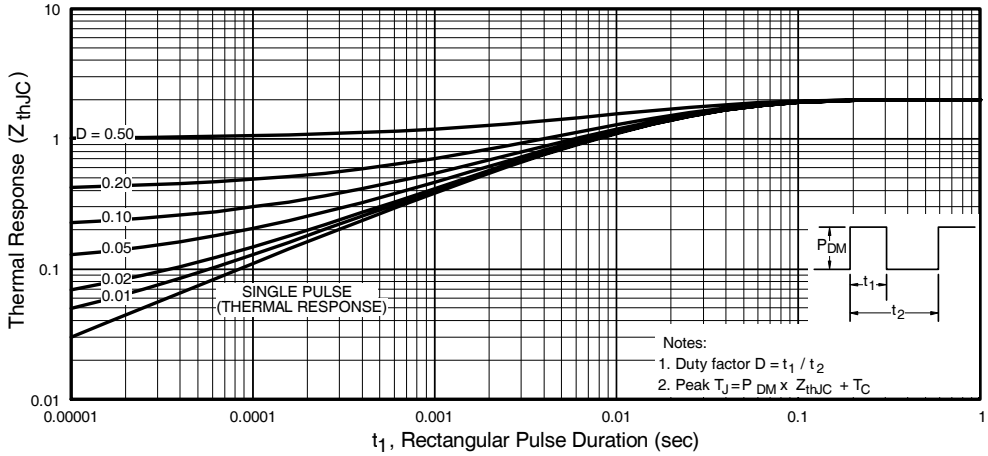


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics (Per Leg)

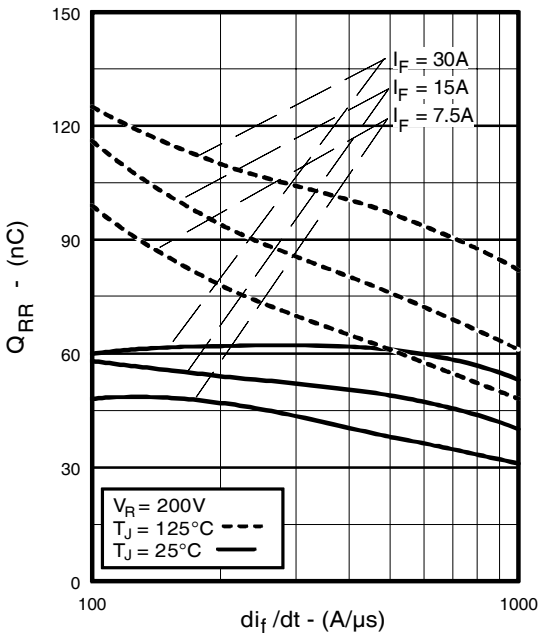


Fig. 5 - Typical Reverse Recovery Vs. di_f/dt (Per Leg)

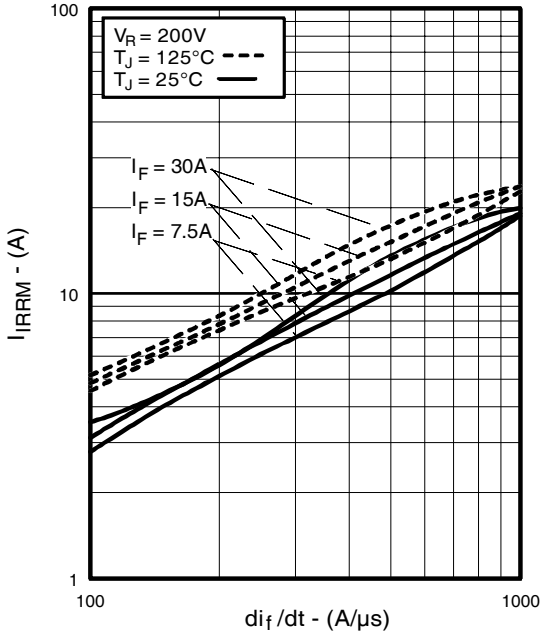


Fig. 6 - Typical Recovery Current Vs. di_f/dt (Per Leg)

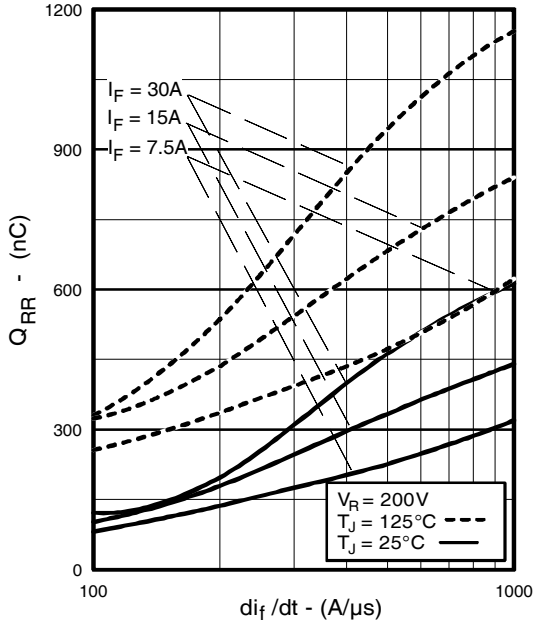


Fig. 7 - Typical Stored Charge Vs. di_f/dt (Per Leg)

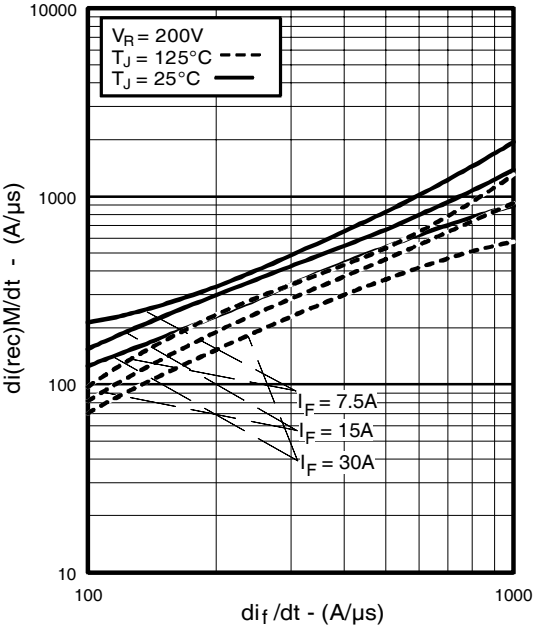


Fig. 8 - Typical $di_{(rec)M}/dt$ Vs. di_f/dt (Per Leg)

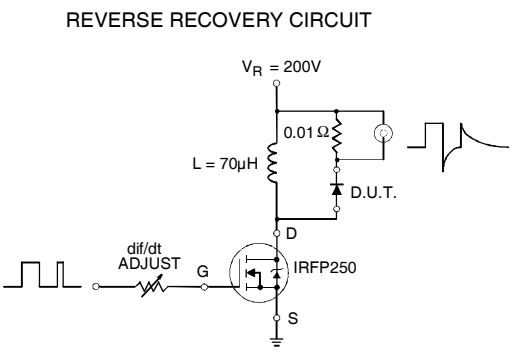


Fig. 9 - Reverse Recovery Parameter Test Circuit

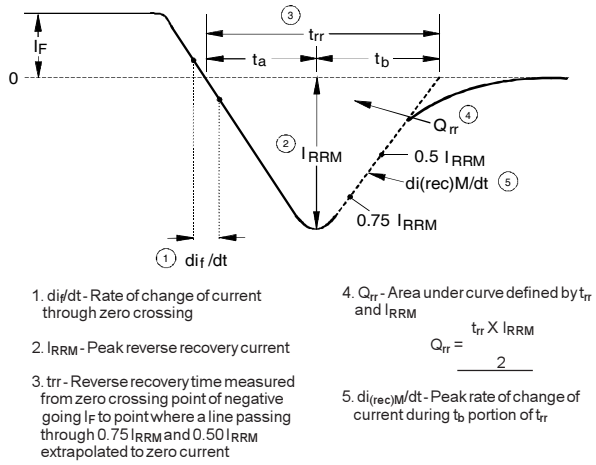
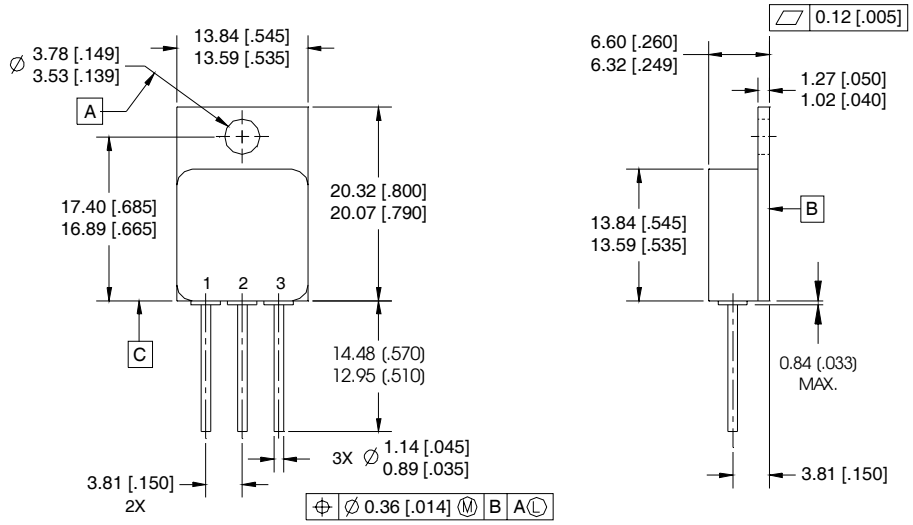


Fig. 10 - Reverse Recovery Waveform and Definitions

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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