International IOR Rectifier

HFB60HF20

FRED

Ultrafast, Soft Recovery Diode

V_R = 200V

$I_{F(AV)}$ = 60A

t_{rr} = 35ns

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.

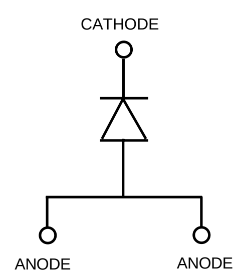
Absolute Maximum Ratings

	Parameter	Max.	Units
V_R	Cathode to Anode Voltage	200	V
$I_{F(AV)}$	Continuous Forward Current, ① T_C = 55°C	60	A
I_{FSM}	Single Pulse Forward Current, ② T_C = 25°C	500	
P_D @ T_C = 25°C	Maximum Power Dissipation	70	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



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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	200	—	—	V	I_R = 100µA
V_F	Forward Voltage	—	—	1.15	V	I_F = 30A, T_J =-55°C
	See Fig. 1	—	—	0.97		I_F = 30A, T_J = 25°C
		—	—	1.08		I_F = 60A, T_J = 25°C
		—	—	1.30		I_F =120A, T_J = 25°C
		—	—	0.8		I_F = 30A, T_J =125°C
I_R	Reverse Leakage Current	—	—	50	µA	V_R = V_R Rated
	See Fig. 2	—	—	1.0	mA	V_R = V_R Rated, T_J = 125°C
C_T	Junction Capacitance, See Fig. 3	—	—	190	pF	V_R = 200V
L_S	Series Inductance	—	5.9	—	nH	Measured from center of cathode pad to center of anode pad

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions		
t_{rr}	Reverse Recovery Time	—	—	35	ns	I_F = 1.0A,V_R = 30V, di_f/dt = 300A/µs		
t_{rr1}	Reverse Recovery Time	—	45	—	ns	T_J = 25°C	See Fig.	I_F = 60A
t_{rr2}		—	71	—		T_J = 125°C	5	
I_{RRM1}	Peak Recovery Current	—	5.3	—	A	T_J = 25°C	See Fig.	V_R = 160V
I_{RRM2}		—	10.3	—		T_J = 125°C	6	
Q_{rr1}	Reverse Recovery Charge	—	120	—	nC	T_J = 25°C	See Fig.	di_f/dt = 200A/µs
Q_{rr2}		—	366	—		T_J = 125°C	7	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	590	—	A/µs	T_J = 25°C	See Fig.	
$di_{(rec)M}/dt2$	During t_b	—	1290	—		T_J = 125°C	8	

Thermal - Mechanical Characteristics

	Parameter	Typ.	Max.	Units
R_{thJC}	Junction-to-Case	—	1.76	°C/W
Wt	Weight	2.6	—	g

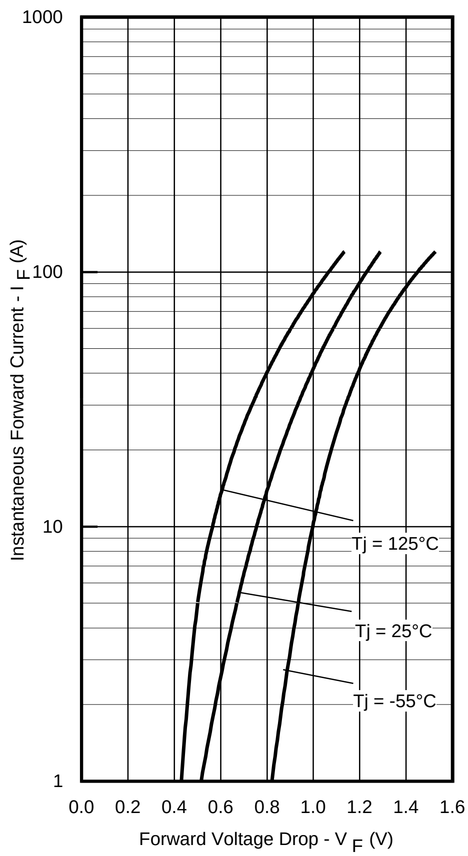


Fig. 1 - Maximum Forward Voltage Drop Vs. Instantaneous Forward Current

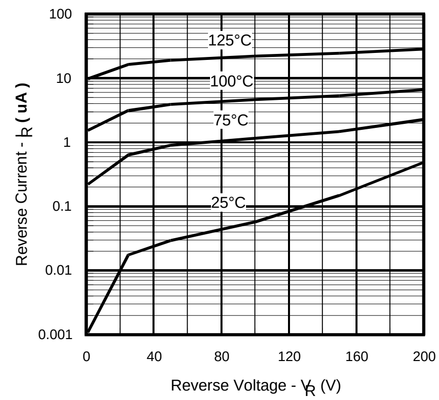


Fig. 2 - Typical Reverse Current Vs. Reverse Voltage

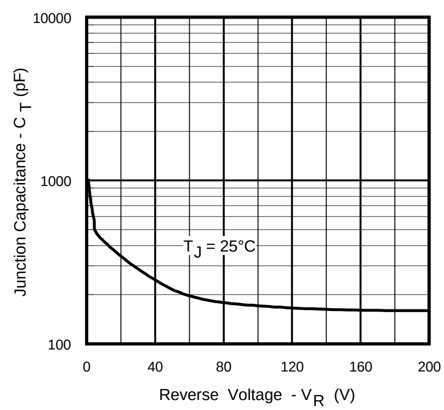


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

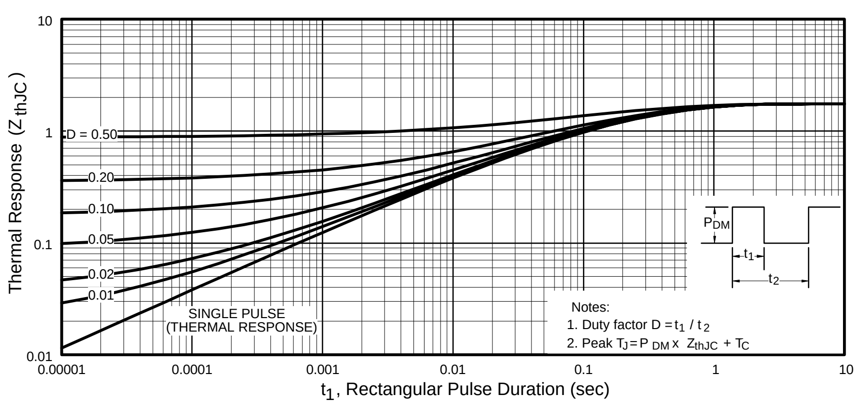


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics

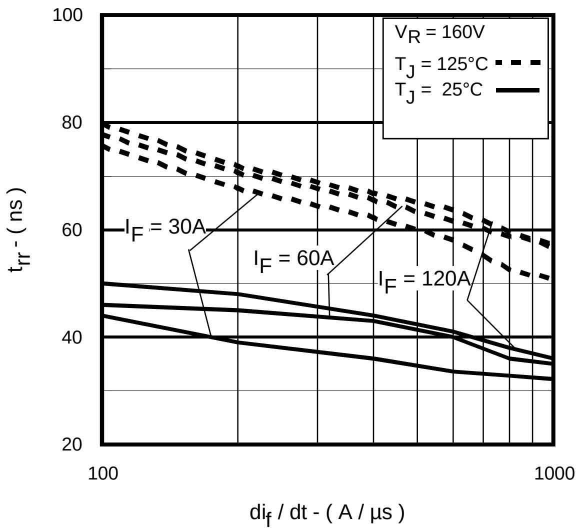


Fig. 5 - Typical Reverse Recovery Vs. di_f/dt,

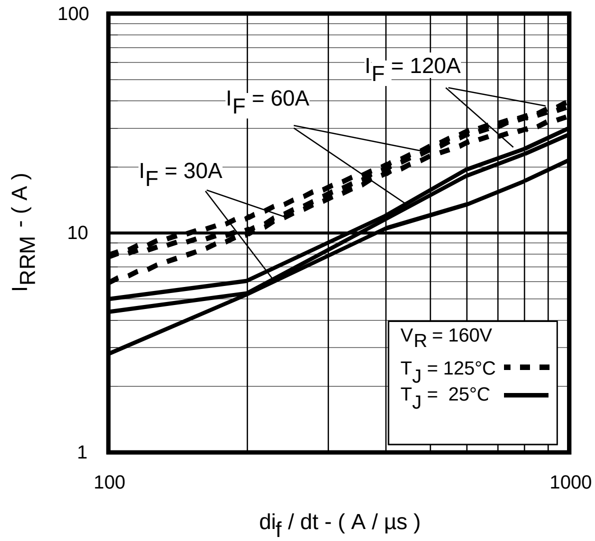


Fig. 6 - Typical Recovery Current Vs. di_f/dt,

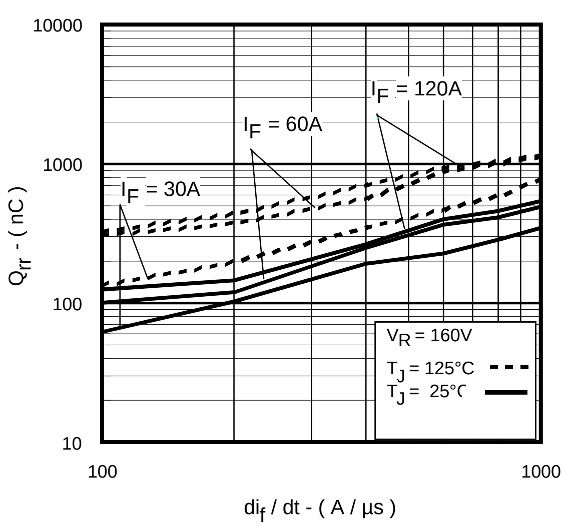


Fig. 7 - Typical Stored Charge Vs. di_f/dt

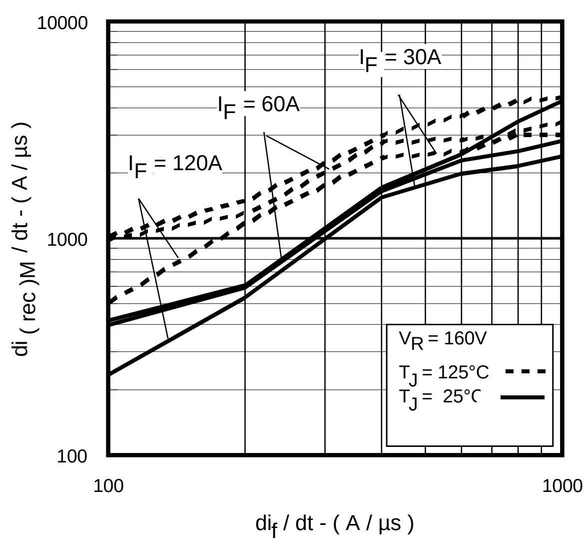


Fig. 8 - Typical $di_{(rec)M}$/dt Vs. di_f/dt

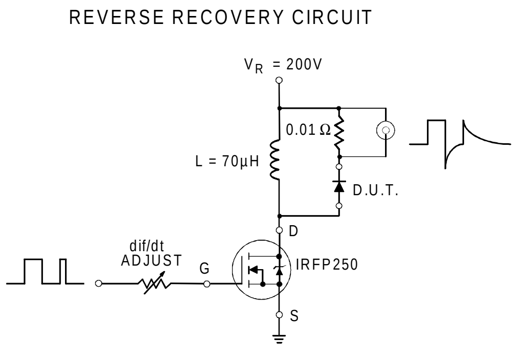
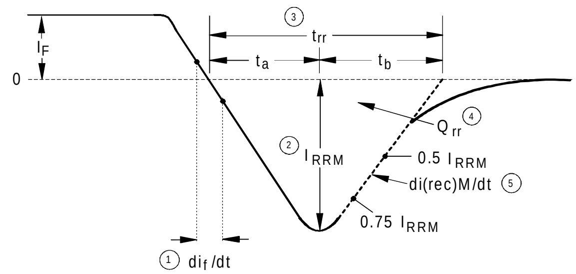


Fig. 9 - Reverse Recovery Parameter Test Circuit



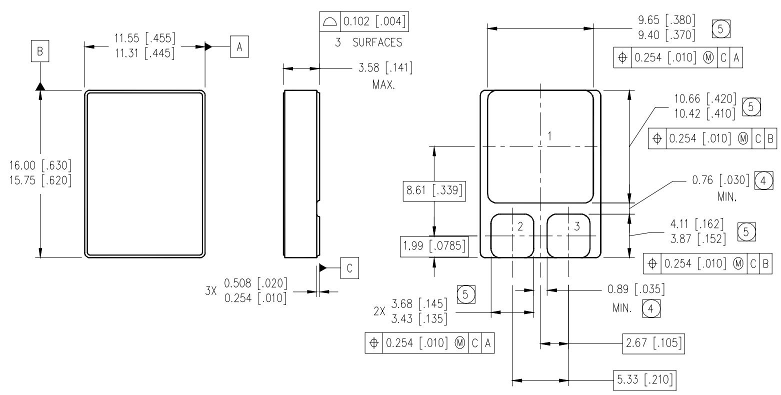
1. di_f/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. trr - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area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

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Data and specifications subject to change without notice. 07/01