

**HEXFRED
ULTRAFast, SOFT RECOVERY DIODE**

$V_R = 200V$
$I_{F(AV)} = 60A$
$t_{rr} = 50ns$

Features

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

Description

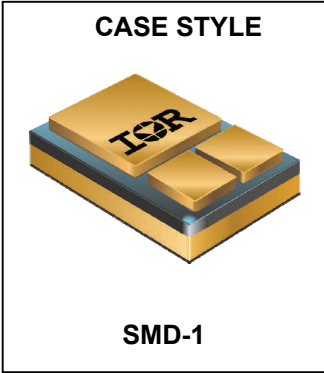
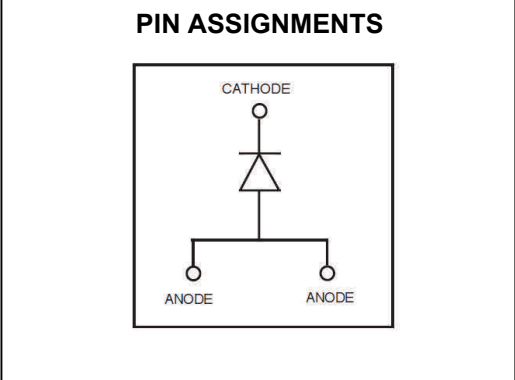
These Ultrafast, soft recovery diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. An extensive characterization of the recovery behavior for different values of current, temperature and di/dt simplifies the calculations of losses in the operating conditions. 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

Characteristics	Parameter	Max.	Units
V_R	Cathode to Anode Voltage	200	V
$I_{F(AV)}$	Continuous Forward Current, $T_C = 55^\circ C$ ①	60	A
I_{FSM}	Single Pulse Forward Current, $T_C = 25^\circ C$ ②	500	A
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	70	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ C$

Notes:

- ① D.C. = 50% rectangle wave
- ② 1/2 sine wave, 60Hz, Pulse Width = 8.33ms

<p>CASE STYLE</p>  <p>SMD-1</p>	<p>PIN ASSIGNMENTS</p> 
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Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

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

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions	
t_{rr1}	Reverse Recovery Time See Fig. 5	—	45	50	ns	$T_J = 25^\circ\text{C}$	$I_F = 60\text{A}$ $V_R = 160\text{V}$ $di_f/dt = 200\text{A}/\mu\text{s}$
t_{rr2}		—	71	—		$T_J = 125^\circ\text{C}$	
I_{RRM1}	Peak Recovery Current See Fig. 6	—	5.3	—	A	$T_J = 25^\circ\text{C}$	
I_{RRM2}		—	10.3	—		$T_J = 125^\circ\text{C}$	
Q_{rr1}	Reverse Recovery Charge See Fig. 7	—	120	—	nC	$T_J = 25^\circ\text{C}$	
Q_{rr2}		—	366	—		$T_J = 125^\circ\text{C}$	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	590	—	$\text{A}/\mu\text{s}$	$T_J = 25^\circ\text{C}$	
$di_{(rec)M}/dt1$	During t_b - See Fig. 8	—	1290	—		$T_J = 125^\circ\text{C}$	

Thermal - Mechanical Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, See Fig. 4	—	1.76	$^\circ\text{C}/\text{W}$
Wt	Weight	2.6	—	g

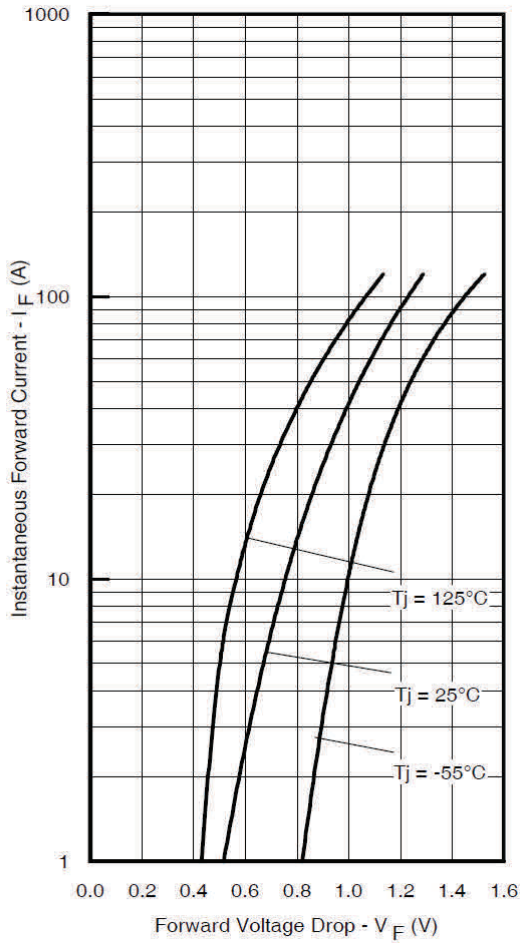


Fig. 1 Maximum Forward Voltage Drop Vs. Instantaneous Forward Current

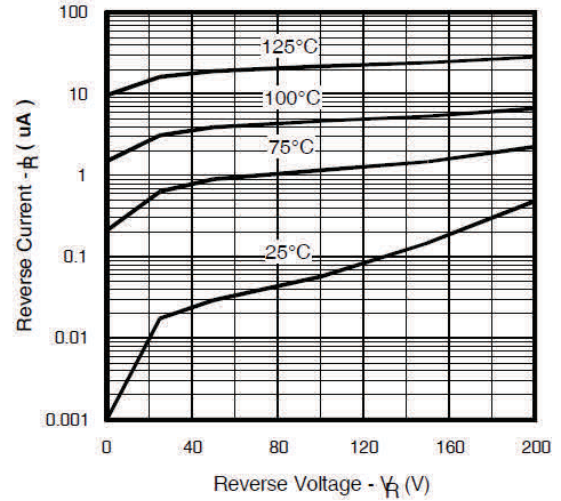


Fig. 2 Typical Values of Reverse Current Vs. Reverse Voltage

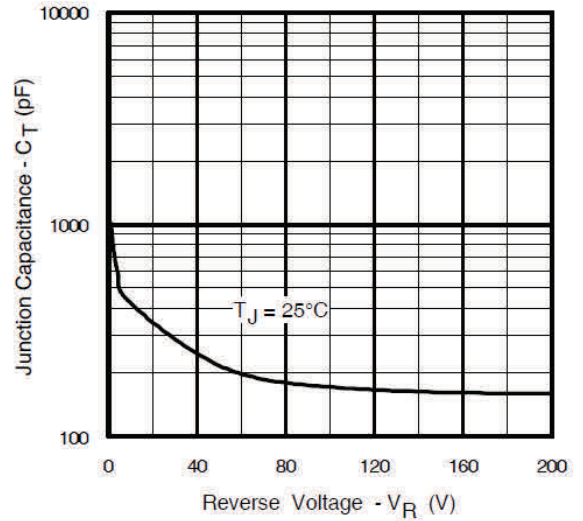


Fig. 3 Typical Junction Capacitance Vs. Reverse Voltage

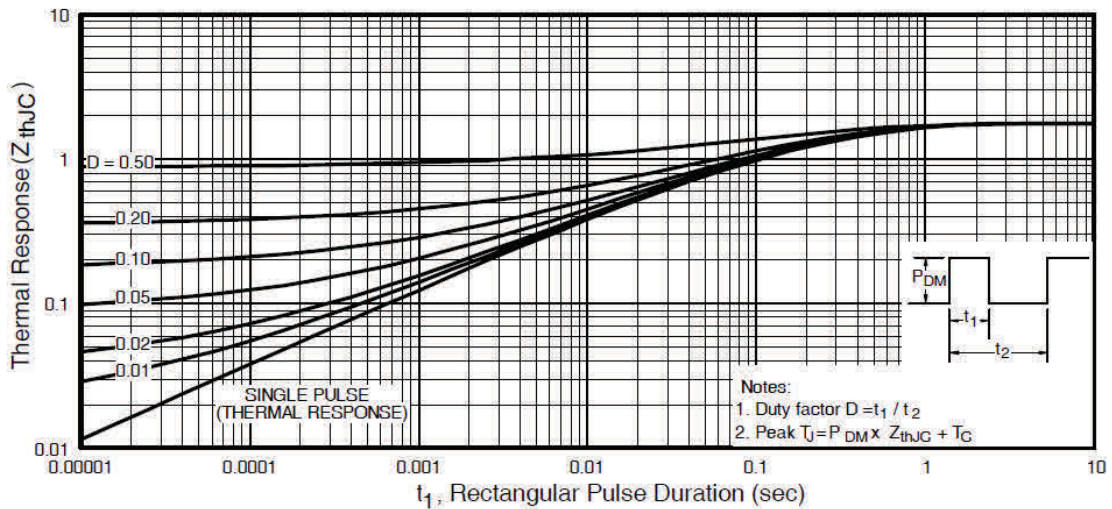


Fig. 4 Max. Thermal Impedance Z_{thJC} Characteristics

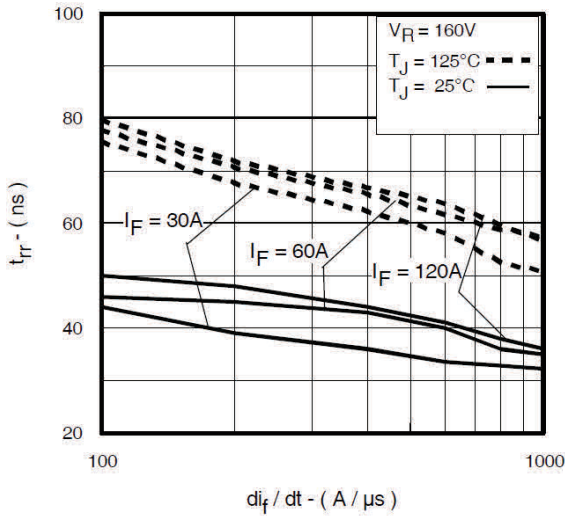


Fig. 5 Typical Reverse Recovery Vs di_f/dt

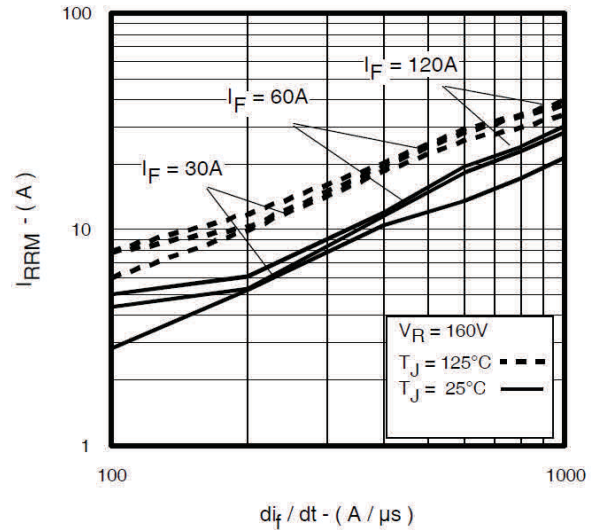


Fig. 6 Typical Recovery Current Vs di_f/dt

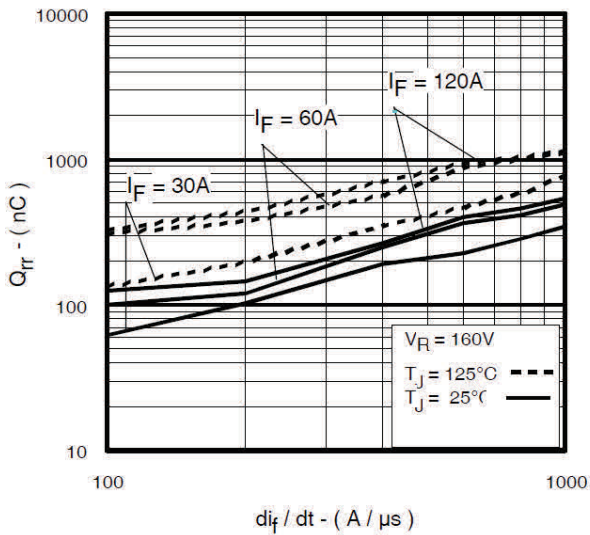


Fig. 7 Typical Stored Charge Vs di_f/dt

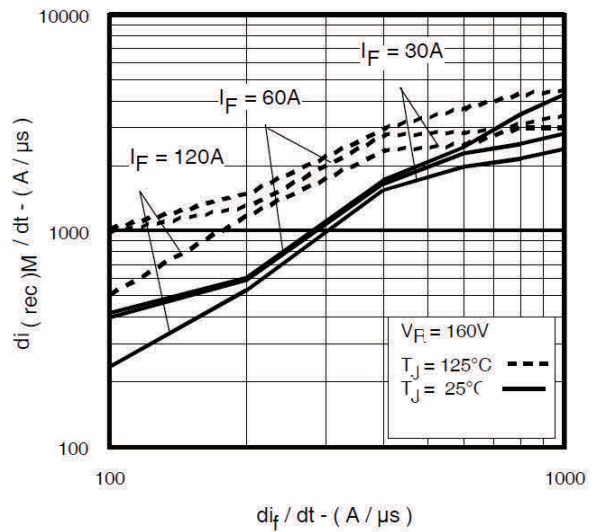


Fig. 8 Typical $di_{(rec)M}/dt$ Vs di_f/dt

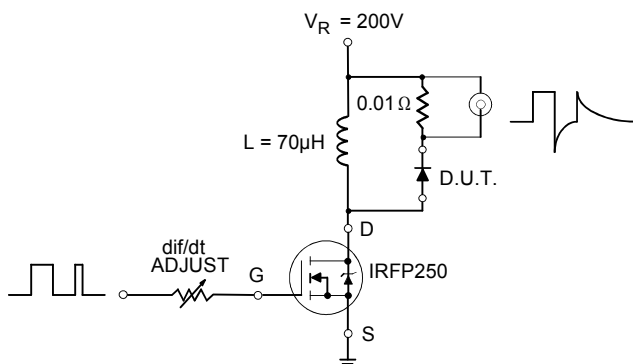
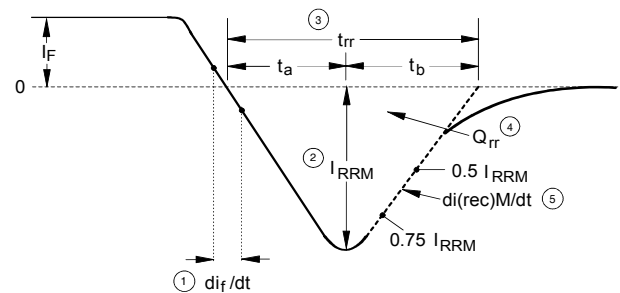


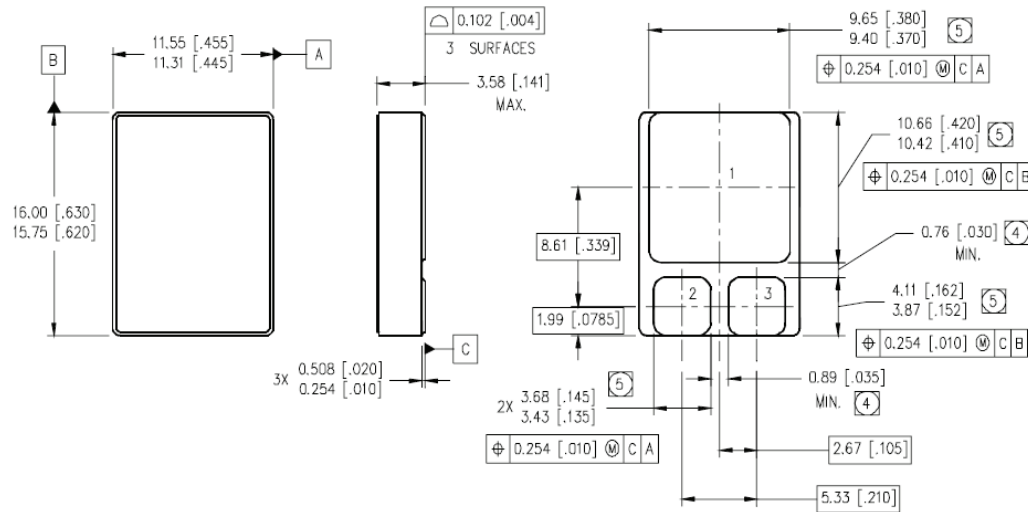
Fig. 9 Typical Reverse Recovery Parameter Test Circuit



- 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 $0.75I_{RRM}$ and $0.5I_{RRM}$ extrapolated to zero current.
- ④ Q_{rr} - Area under curve defined by t_{rr} and I_{RRM} - $Q_{rr} = (t_{rr} \times I_{RRM}) / 2$
- ⑤ $di_{(rec)M}/dt$ - Peak rate of change of current during t_b position 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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