HFB60HNS20

HEXFRED
ULTRAFAST, SOFT RECOVERY DIODE

V_R = 200V

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

t_{rr} = 50ns

Features

- Reduced RFI and EMI
- Extensive Characterization of Recovery Parameters
- Hermetically Sealed
- Surface Mount
- ESD Rating: Class 3B per MIL-STD-750, Method 1020

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 @ T_C = 100°C	Continuous Forward Current ①	60	A
I_{FSM} @ T_C = 25°C	Single Pulse Forward Current ②	500	A
P_D @ T_C = 25°C	Maximum Power Dissipation	125	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C

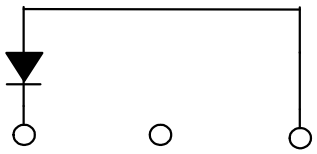
Notes:
① D.C. = 50% rectangle wave
② 1/2 sine wave, 60Hz, Pulse Width = 8.33ms

CASE STYLE

SupIR-SMD

PAD ASSIGNMENTS

(ISOLATED BASE)



1	2	3
CATHODE	OPEN (NC)	ANODE

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	200	—	—	V	I_R = 100µA
V_{FM}	Max. Forward Voltage See Fig. 1	—	—	1.15	V	I_F = 30A, T_J = -55°C
		—	—	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_{RM}	Max. 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	—	—	200	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)

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

Thermal - Mechanical Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.0	°C/W
Wt	Weight	3.0	—	g

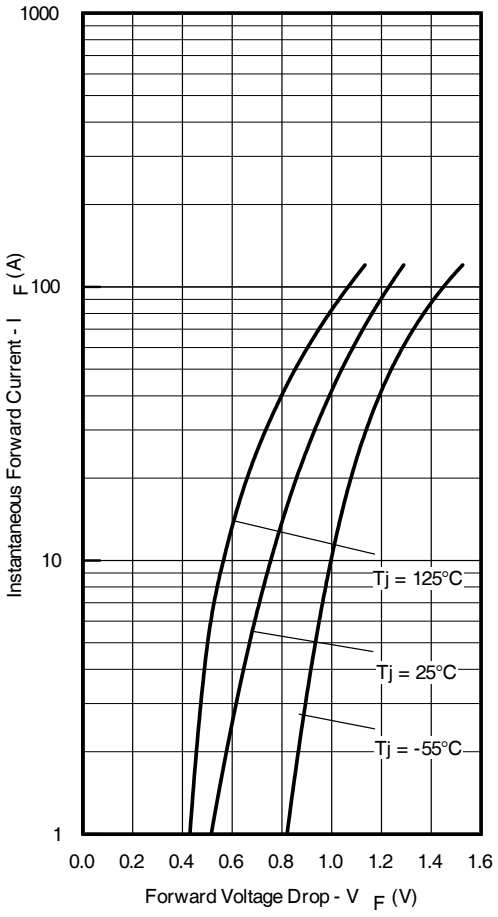


Fig. 1 Maximum Forward Voltage Drop
Vs. Instantaneous Forward Current

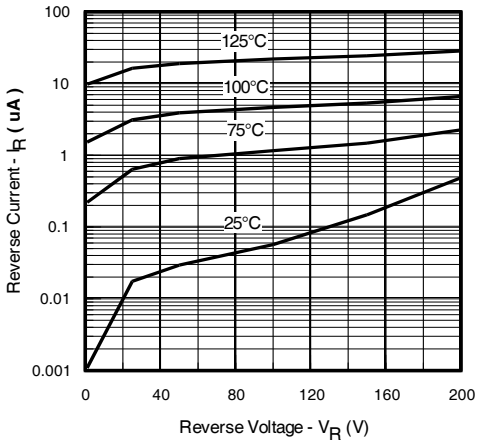


Fig. 2 Typical Values of Reverse Current
Vs. Reverse Voltage

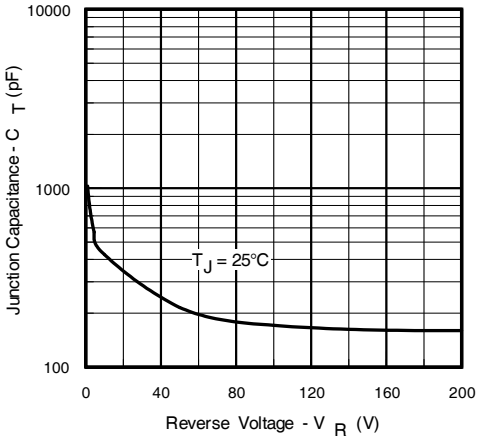


Fig. 3 Typical Junction Capacitance
Vs. Reverse Voltage

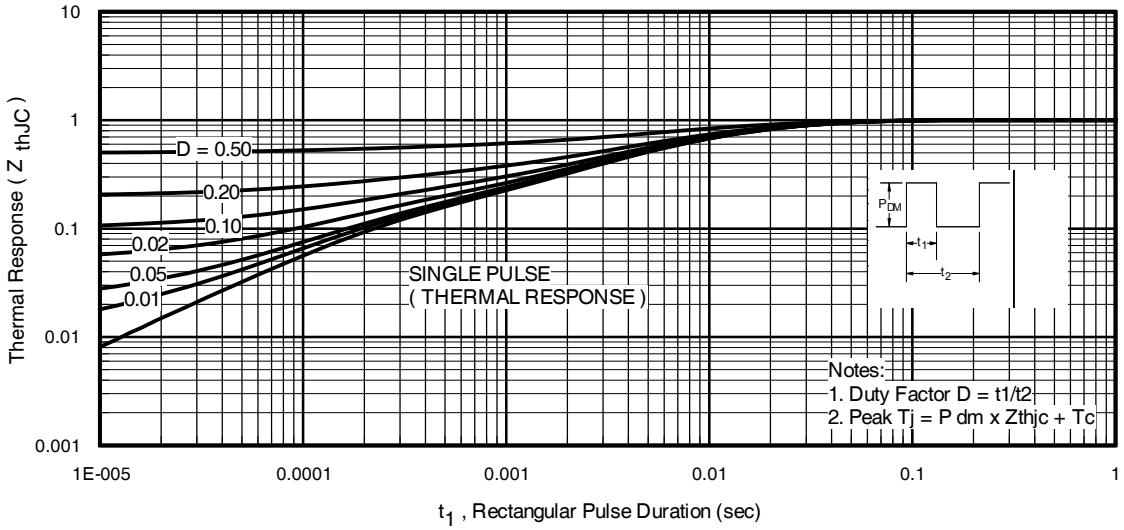


Fig. 4 Maximum Thermal Impedance Z_{thJC} Characteristics

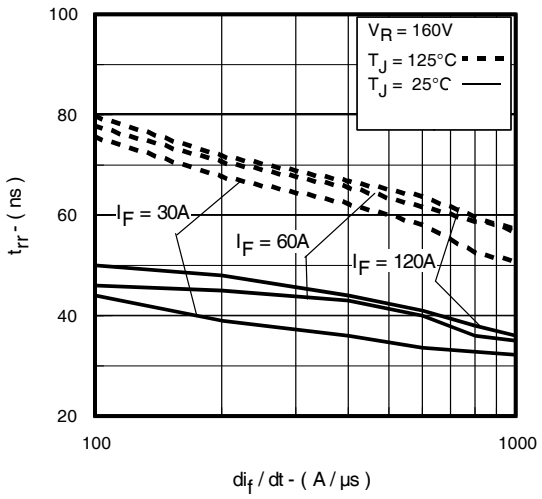


Fig. 5 Typical Reverse Recovery Vs di_f/dt

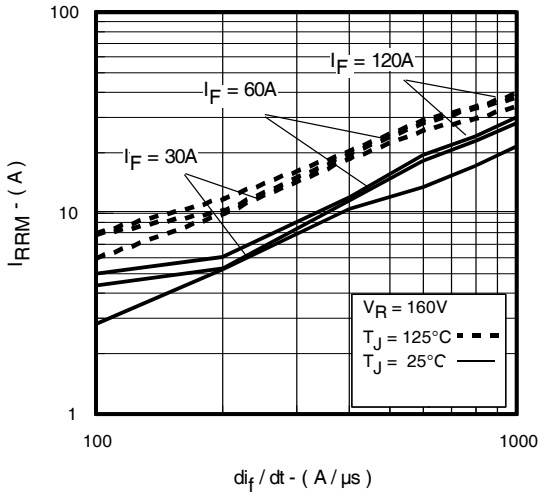


Fig. 6 Typical Recovery Current Vs di_f/dt

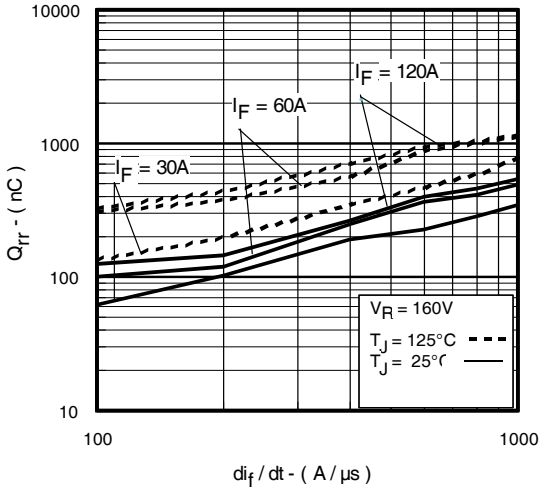


Fig. 7 Typical Stored Charge Vs di_f/dt

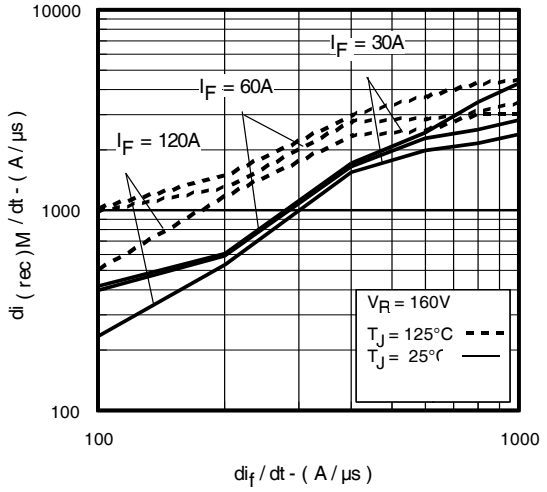


Fig. 8 Typical $di_{(rec)M}/dt$ Vs di_f/dt

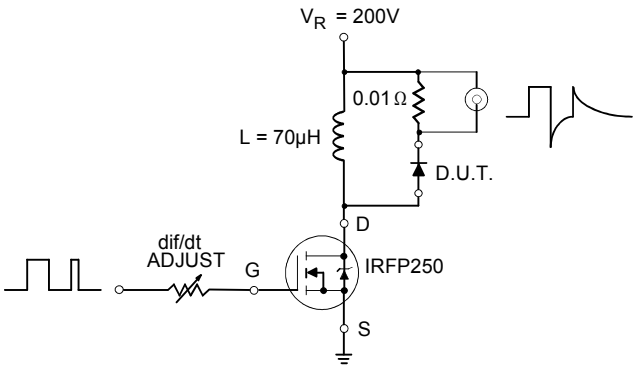
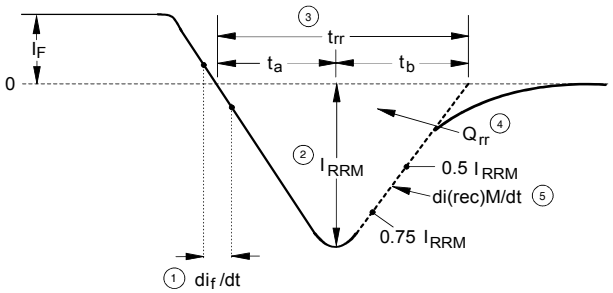


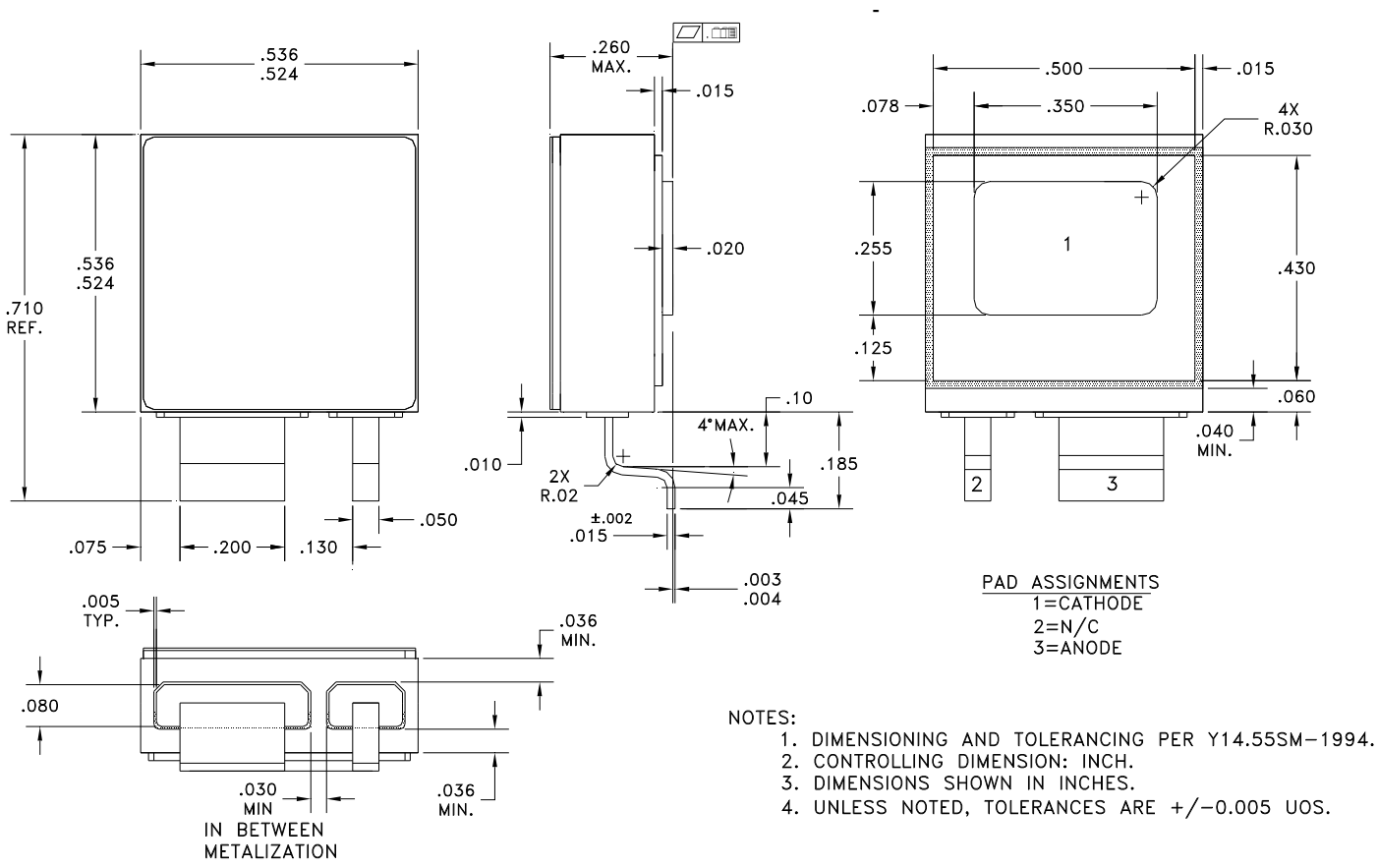
Fig. 9 Typical Reverse Recovery Parameter Test Circuit



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 — SupIR-SMD



NOTES:
1. DIMENSIONING AND TOLERANCING PER Y14.55SM−1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS SHOWN IN INCHES.
4. UNLESS NOTED, TOLERANCES ARE +/−0.005 UOS.

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