International
IOR Rectifier

PRELIMINARY

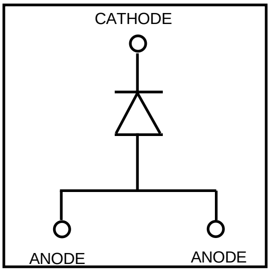
HFA50HF20

HEXFRED™

Ultrafast, Soft Recovery Diode

Features

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



V_R = 200V

V_F = 0.96V

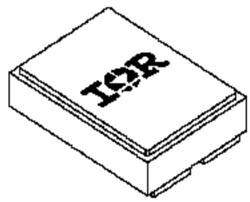
Q_{rr} * = 640nC

$di_{(rec)M}/dt$ * = 980A/µs

* 125°C

Description

HEXFRED™ 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.


SMD -1

Absolute Maximum Ratings (per Leg)

	Parameter	Max.	Units
V_R	D.C. Reverse Voltage	200	V
I_F @ T_C = 100°C	Continuous Forward Current ①	50	A
I_{FSM} @ T_C = 25°C	Single Pulse Forward Current ②	600	
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

Thermal - Mechanical Characteristics

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, Single Leg Conducting	—	1.0	°C/W
Wt	Weight	2.6	—	g

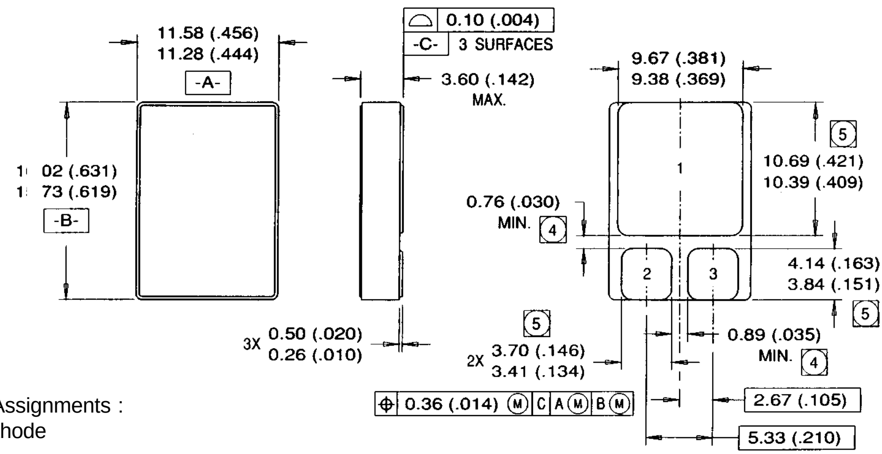
Note: ① D.C. = 50% rect. wave
② 1/2 sine wave, 60 Hz , P.W. = 8.33 ms

Electrical Characteristics (per Leg) @ 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_{FM}	Max Forward Voltage	—	0.88	0.96	V	I_F = 50A	See Fig. 1
			0.98	1.11		I_F = 100A	
			0.75	0.84		I_F = 50A, T_J = 125°C	
I_{RM}	Max Reverse Leakage Current	—	—	10	µA	V_R = V_R Rated	See Fig. 2
		—	—	1.0	mA	T_J = 125°C, V_R = 160V	
C_T	Junction Capacitance	—	170	310	pF	V_R = 200V	See Fig. 3
L_S	Series Inductance	—	2.8	—	nH	Measured from center of bond pad to end of anode bonding wire	

Dynamic Recovery Characteristics (per Leg) @ 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, di_f/dt = 200A/µs, V_R = 30V		
t_{rr1}		—	62	93		T_J = 25°C	See Fig. 5	I_F = 50A
t_{rr2}		—	98	150		T_J = 125°C		
I_{RRM1}	Peak Recovery Current	—	10	18	A	T_J = 25°C	See Fig. 6	V_R = 200V
I_{RRM2}		—	14	26		T_J = 125°C		
Q_{rr1}	Reverse Recovery Charge	—	260	390	nC	T_J = 25°C	See Fig. 7	di_f/dt = 200A/µs
Q_{rr2}		—	640	960		T_J = 125°C		
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current During t_b	—	600	900	A/µs	T_J = 25°C	See Fig. 8	
$di_{(rec)M}/dt2$		—	980	1500		T_J = 125°C		



Lead Assignments :
1 - Cathode
2, 3 - Anode

IR Case Style SMD-1
Dimensions in millimeters and (inches)

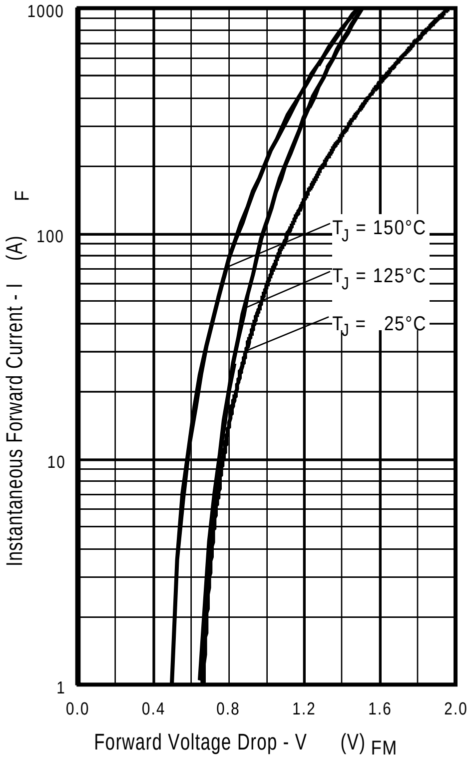


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

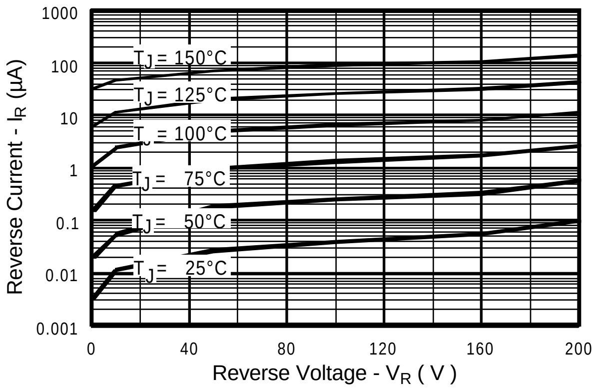


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

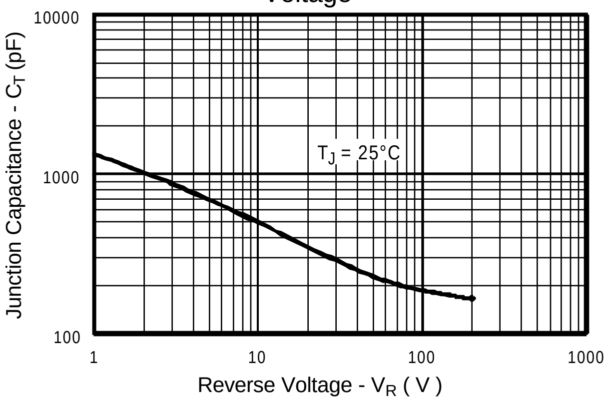


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

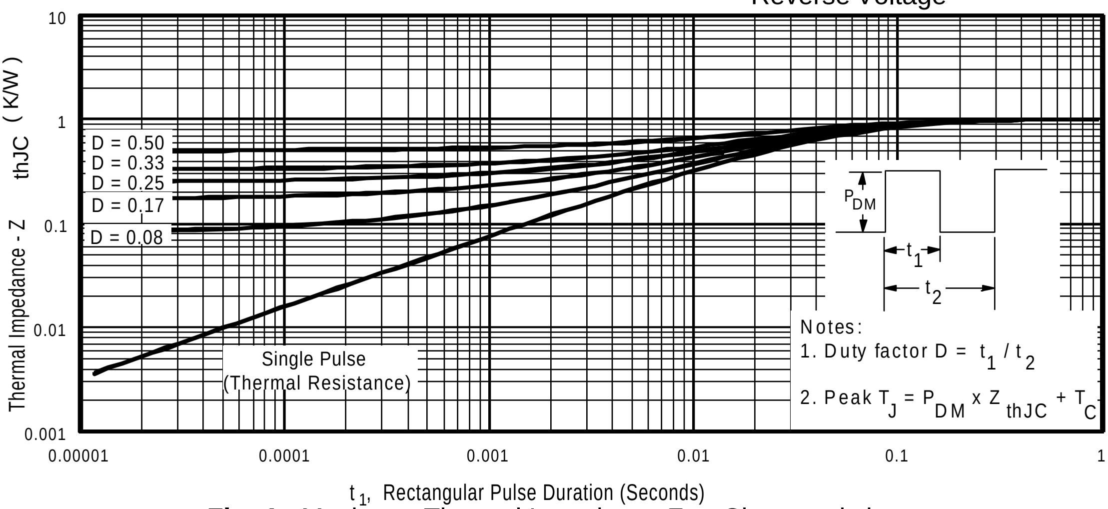


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics

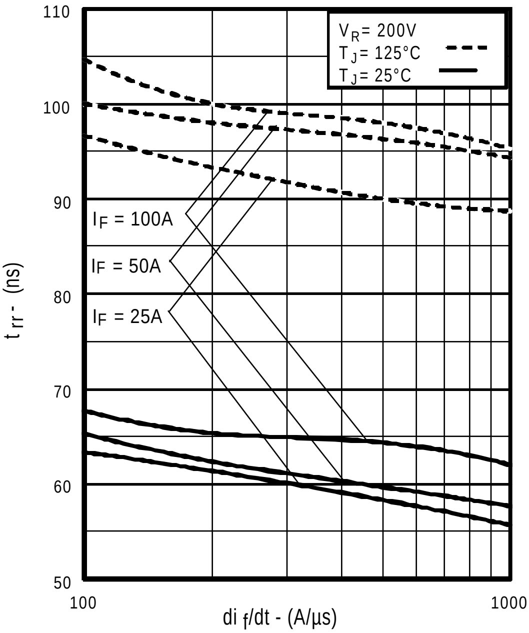


Fig. 5 - Typical Reverse Recovery vs. di_f/dt,

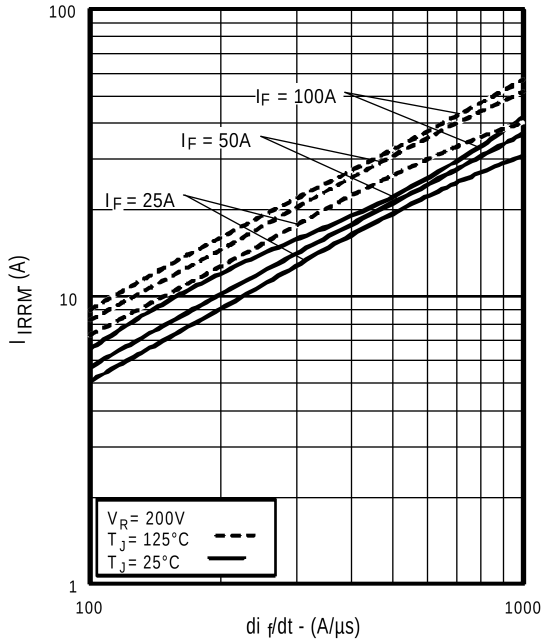


Fig. 6 - Typical Recovery Current vs. di_f/dt,

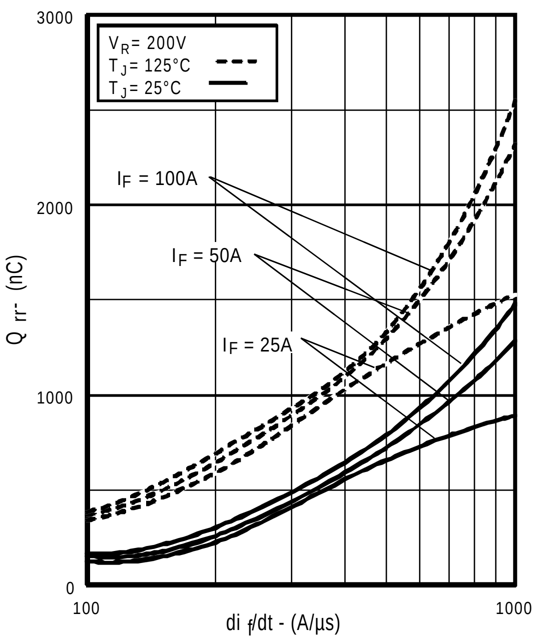


Fig. 7 - Typical Stored Charge vs. di_f/dt

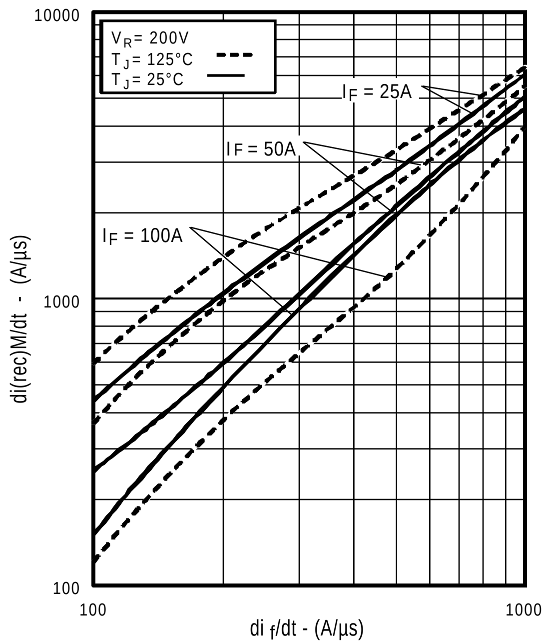


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt

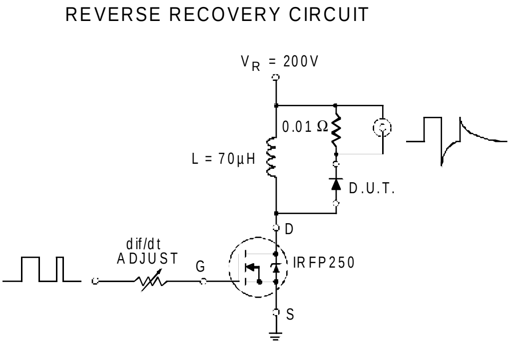
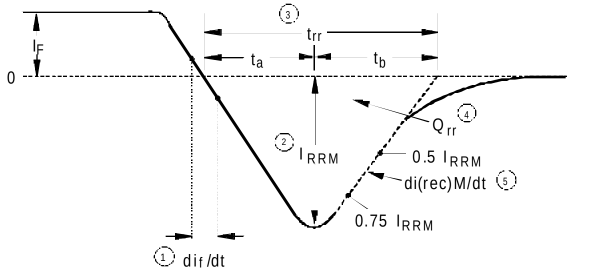


Fig. 9 - Reverse Recovery Parameter Test Circuit



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

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