

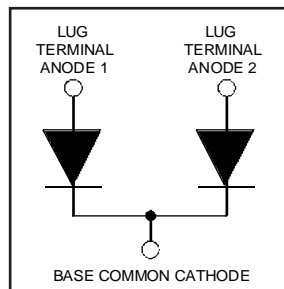
# HFA210NJ60C

HEXFRED™

Ultrafast, Soft Recovery Diode

## Features

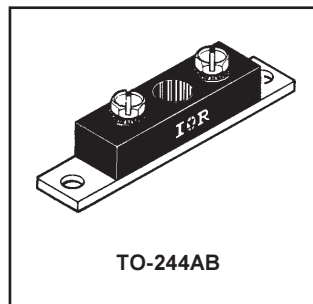
- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters



$V_R = 600V$
$V_F(\text{typ.})^{\textcircled{3}} = 1.2V$
$I_{F(AV)} = 210A$
$Q_{rr}(\text{typ.}) = 450nC$
$I_{RRM}(\text{typ.}) = 10A$
$t_{rr}(\text{typ.}) = 35ns$
$di_{(rec)M}/dt(\text{typ.})^{\textcircled{3}} = 240A/\mu s$

## 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.



## Absolute Maximum Ratings (per Leg)

	Parameter	Max.	Units
$V_R$	Cathode-to-Anode Voltage	600	V
$I_F @ T_C = 25^\circ C$	Continuous Forward Current	171	A
$I_F @ T_C = 100^\circ C$	Continuous Forward Current	85	
$I_{FSM}$	Single Pulse Forward Current <sup>①</sup>	600	
$E_{AS}$	Non-Repetitive Avalanche Energy <sup>②</sup>	220	$\mu J$
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	463	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	185	
$T_J$	Operating Junction and	-55 to +150	C
$T_{STG}$	Storage Temperature Range		

## Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$R_{thJC}$	Junction-to-Case, Single Leg Conducting	—	—	0.27	$^\circ C/W$ K/W
	Junction-to-Case, Both Legs Conducting	—	—	0.135	
$R_{thCS}$	Case-to-Sink, Flat, Greased Surface	—	0.10	—	
$Wt$	Weight	—	79 (2.8)	—	g (oz)
	Mounting Torque <sup>④</sup>	30 (3.4)	—	40 (4.6)	lbf•in (N•m)
	Mounting Torque Center Hole	12 (1.4)	—	18 (2.1)	
	Terminal Torque	30 (3.4)	—	40 (4.6)	
	Vertical Pull	—	—	80	lbf•in
2 inch Lever Pull	—	—	35		

**Note:** <sup>①</sup> Limited by junction temperature  
<sup>②</sup>  $L = 100\mu H$ , duty cycle limited by max  $T_J$   
<sup>③</sup>  $125^\circ C$

<sup>④</sup> Mounting surface must be smooth, flat, free of burrs or other protrusions. Apply a thin even film of thermal grease to mounting surface. Gradually tighten each mounting bolt in 5-10 lbf•in steps until desired or maximum torque limits are reached. Module

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PD-2.448 rev. B 02/99

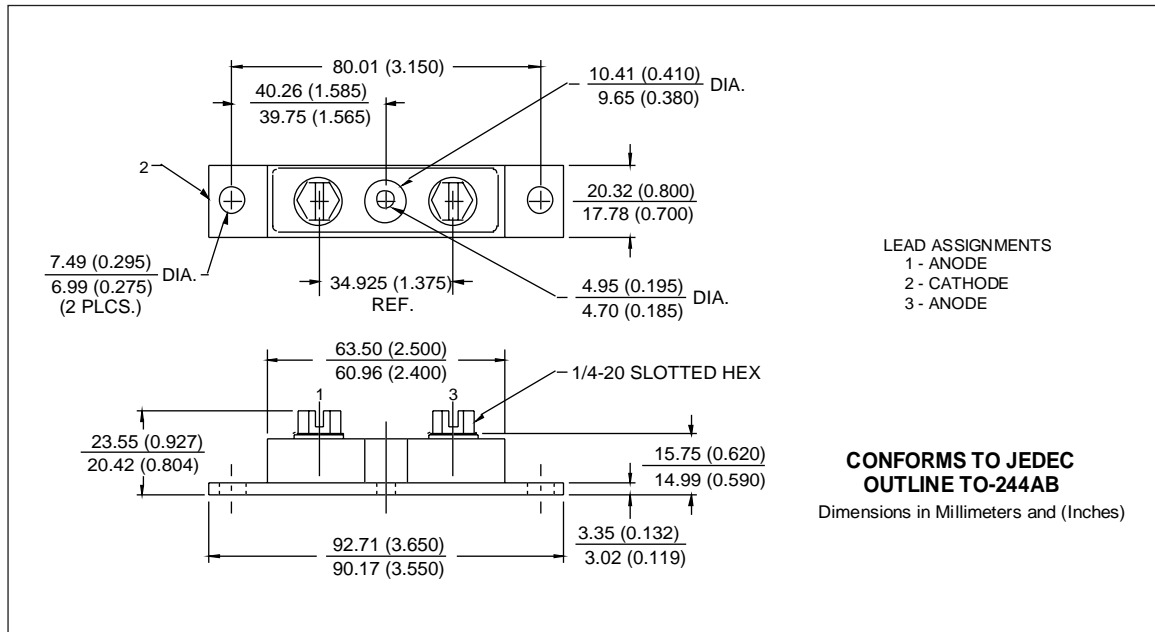
International  
**IOR** Rectifier

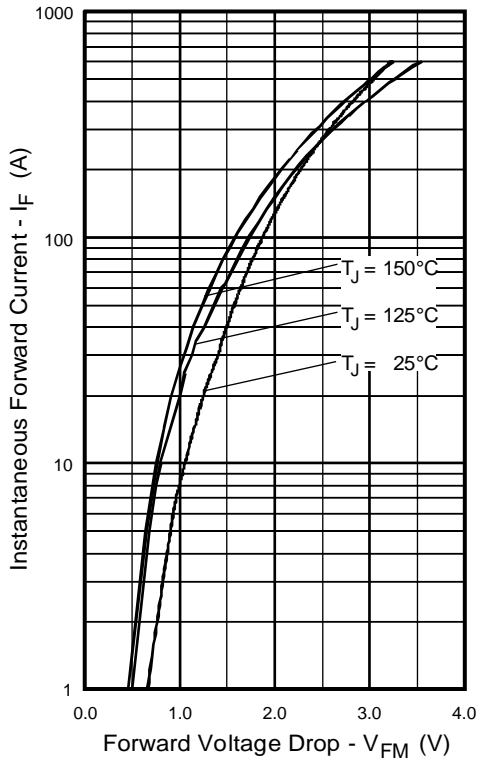
## Electrical Characteristics (per Leg) @ T<sub>J</sub> = 25°C (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Test Conditions
V <sub>BR</sub> Cathode Anode Breakdown Voltage	600	—	—	V	I <sub>R</sub> = 100μA
V <sub>FM</sub> Max Forward Voltage	—	1.3	1.5	V	I <sub>F</sub> = 105A
	—	1.5	1.7		I <sub>F</sub> = 210A See Fig. 1
	—	1.2	1.4		I <sub>F</sub> = 105A, T <sub>J</sub> = 125°C
I <sub>RM</sub> Max Reverse Leakage Current	—	6.0	30	μA	V <sub>R</sub> = V <sub>R</sub> Rated See Fig. 2
	—	1.5	6.0	mA	T <sub>J</sub> = 125°C, V <sub>R</sub> = 480V
C <sub>T</sub> Junction Capacitance	—	200	300	pF	V <sub>R</sub> = 200V See Fig. 3
L <sub>S</sub> Series Inductance	—	6.0	—	nH	From top of terminal hole to mounting plane

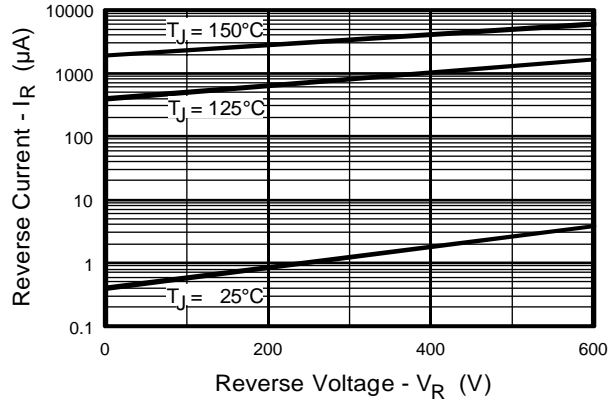
## Dynamic Recovery Characteristics (per Leg) @ T<sub>J</sub> = 25°C (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Test Conditions	
t <sub>rr</sub> Reverse Recovery Time	—	35	—	ns	I <sub>F</sub> = 1.0A, di <sub>f</sub> /dt = 200A/μs, V <sub>R</sub> = 30V T <sub>J</sub> = 25°C	
t <sub>rr1</sub>	—	90	140			T <sub>J</sub> = 125°C
t <sub>rr2</sub>	—	160	240			
I <sub>RRM1</sub> Peak Recovery Current	—	10	18	A	T <sub>J</sub> = 25°C V <sub>R</sub> = 200V	
I <sub>RRM2</sub>	—	15	30			T <sub>J</sub> = 125°C
Q <sub>rr1</sub> Reverse Recovery Charge	—	450	1300	nC	T <sub>J</sub> = 25°C di <sub>f</sub> /dt = 200A/μs	
Q <sub>rr2</sub>	—	1200	3600			T <sub>J</sub> = 125°C
di <sub>(rec)M</sub> /dt1 Peak Rate of Fall of Recovery Current	—	310	—	A/μs	T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C	
di <sub>(rec)M</sub> /dt2 During t <sub>b</sub>	—	240	—			

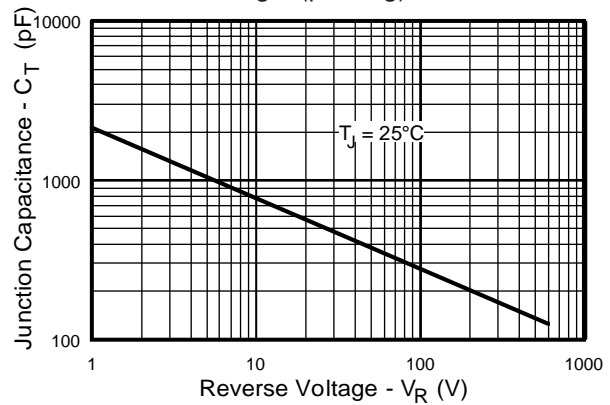




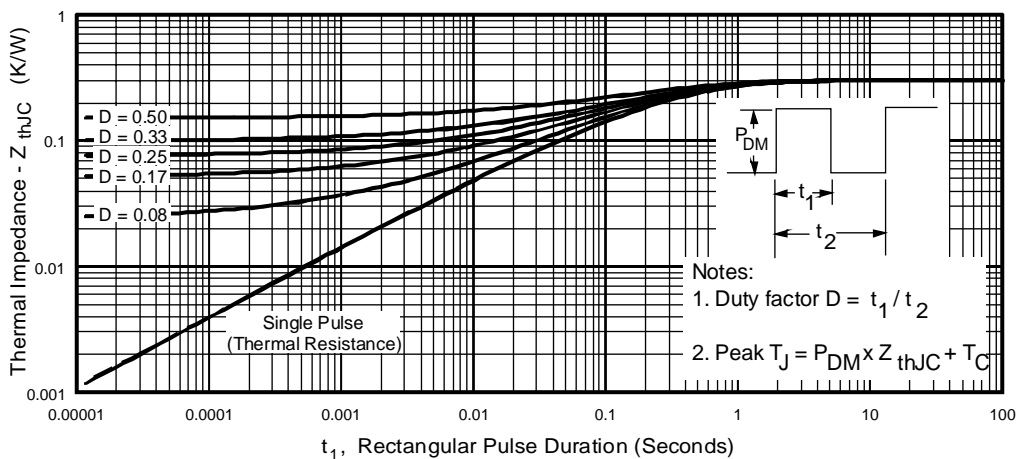
**Fig. 1** - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)



**Fig. 2** - Typical Reverse Current vs. Reverse Voltage, (per Leg)



**Fig. 3** - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

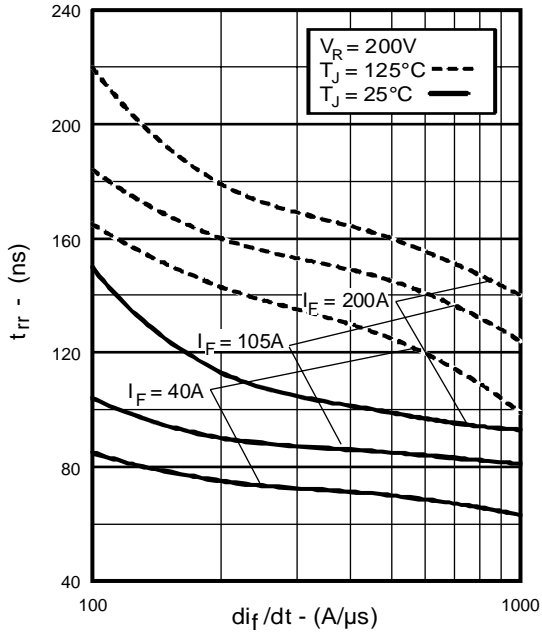


**Fig. 4** - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics, (per Leg)

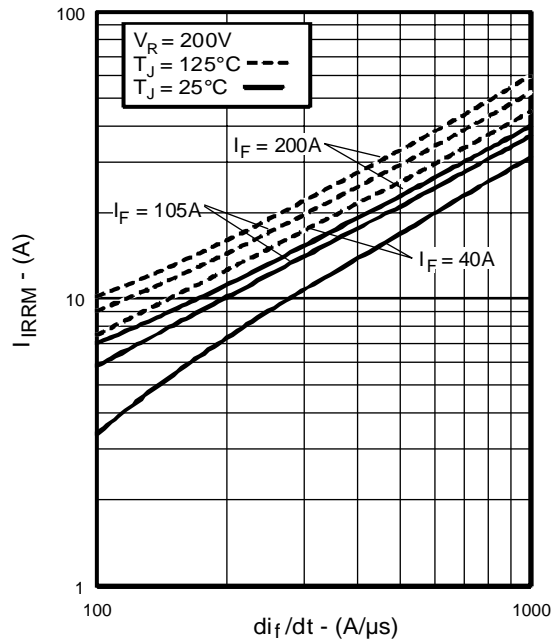
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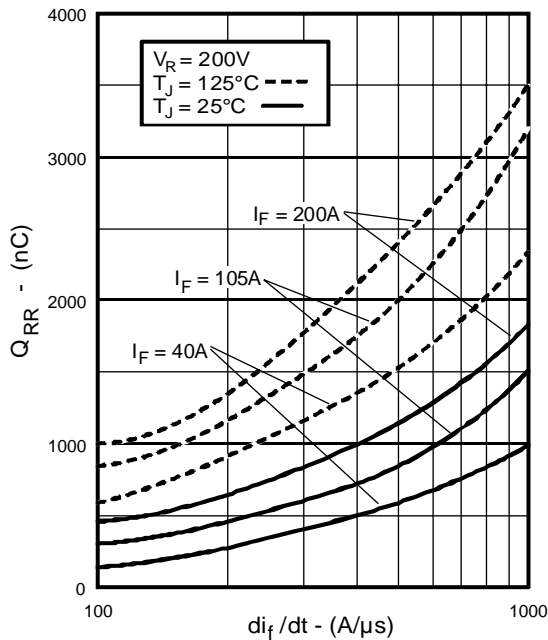
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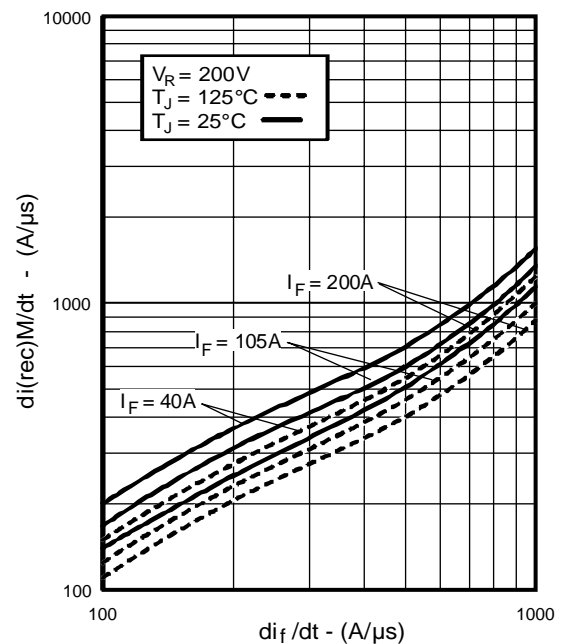
**Fig. 5** - Typical Reverse Recovery vs.  $di_f/dt$ , (per Leg)



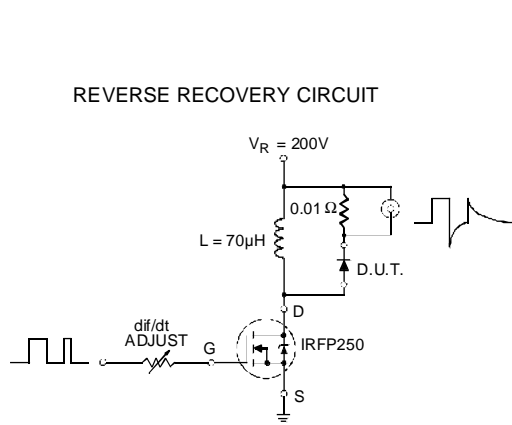
**Fig. 6** - Typical Recovery Current vs.  $di_f/dt$ , (per Leg)



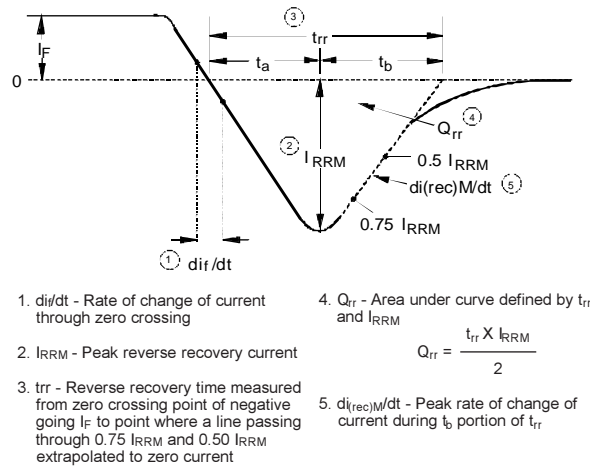
**Fig. 7** - Typical Stored Charge vs.  $di_f/dt$ , (per Leg)



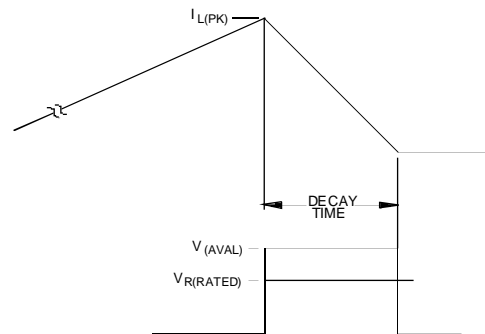
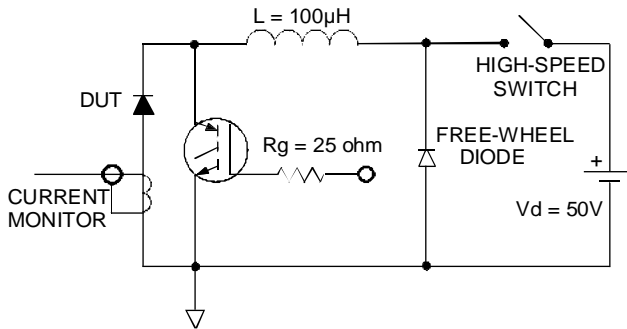
**Fig. 8** - Typical  $di(rec)M/dt$  vs.  $di_f/dt$ , (per Leg)



**Fig. 9** - Reverse Recovery Parameter Test Circuit



**Fig. 10** - Reverse Recovery Waveform and Definitions



**Fig. 11** - Avalanche Test Circuit and Waveforms



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