

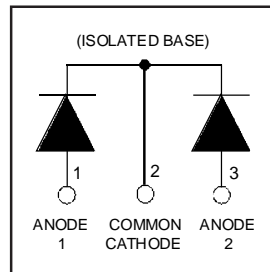
# HFA60MC60C

HEXFRED™

Ultrafast, Soft Recovery Diode

## Features

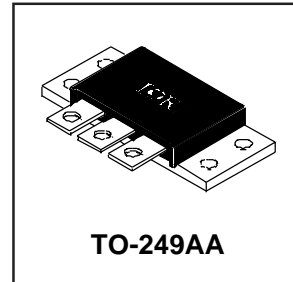
- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters



$V_R = 600V$
$V_F(\text{typ.})^{\textcircled{3}} = 1.1V$
$I_{F(AV)} = 60A$
$Q_{rr}(\text{typ.}) = 200nC$
$I_{RRM}(\text{typ.}) = 6A$
$t_{rr}(\text{typ.}) = 30ns$
$di_{(rec)}/dt(\text{typ.})^{\textcircled{3}} = 170A/\mu s$

## 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	50	A
$I_F @ T_C = 100^\circ C$	Continuous Forward Current	24	
$I_{FSM}$	Single Pulse Forward Current <sup>①</sup>	200	
$E_{AS}$	Non-Repetitive Avalanche Energy <sup>②</sup>	220	μJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	125	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	50	
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	°C
	Soldering Temperature, for 10 sec.	300 (0.063 in. (1.6mm) from case)	

## Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, Single Leg Conducting	—	—	1.0	°C/W K/W
	Junction-to-Case, Both Legs Conducting	—	—	0.50	
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.10	—	
Wt	Weight	—	58 (2.0)	—	g (oz)
	Mounting Torque	35 (4.0)	—	50 (5.7)	lbf•in (N•m)

**Note:** <sup>①</sup> Limited by junction temperature  
<sup>②</sup> L = 100μH, duty cycle limited by max  $T_J$   
<sup>③</sup> 125°C

# HFA60MC60C

PD-2.463 rev. B 03/99

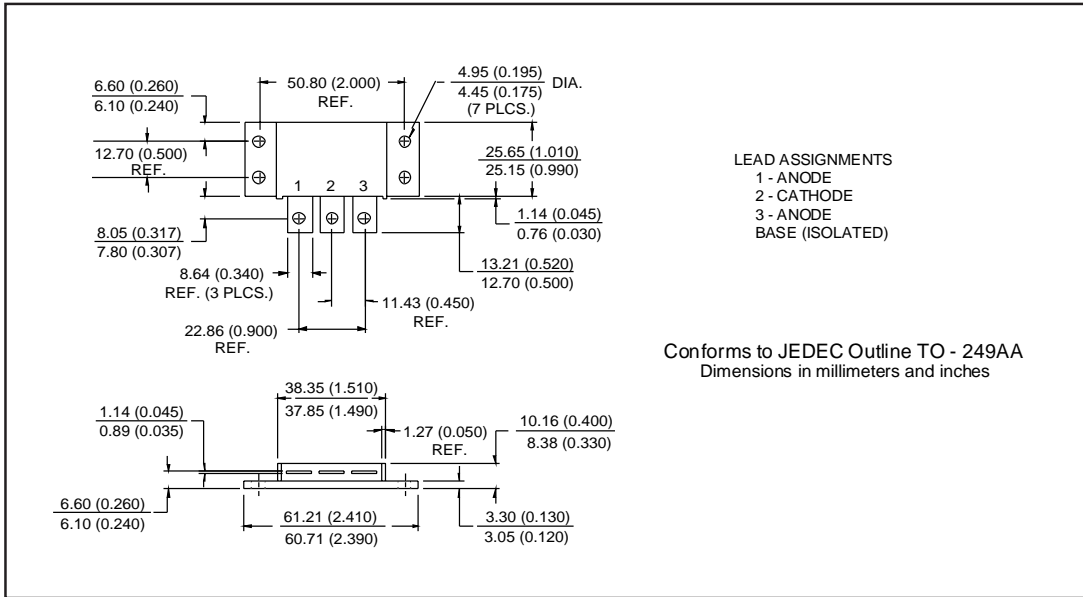
International  
**IOR** Rectifier

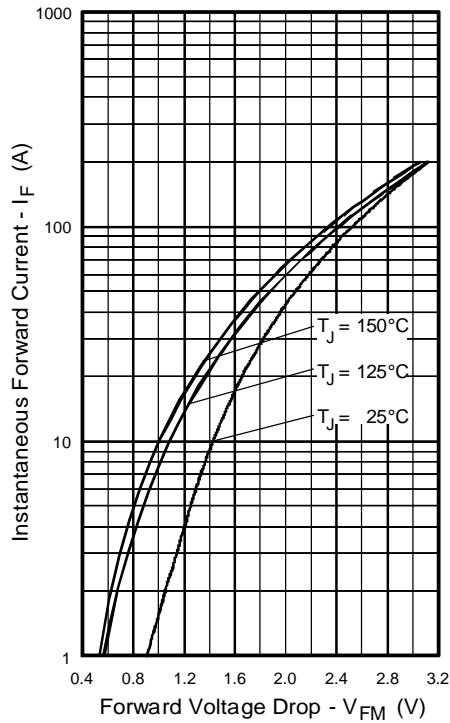
## Electrical Characteristics (per Leg) @ T<sub>J</sub> = 25°C (unless otherwise specified)

	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> = 30A
		—	1.4	1.7		I <sub>F</sub> = 60A See Fig. 1
		—	1.1	1.3		I <sub>F</sub> = 30A, T <sub>J</sub> = 125°C
I <sub>RM</sub>	Max Reverse Leakage Current	—	2.0	10	μA	V <sub>R</sub> = V <sub>R</sub> Rated See Fig. 2
		—	0.50	2.0	mA	T <sub>J</sub> = 125°C, V <sub>R</sub> = 480V
C <sub>T</sub>	Junction Capacitance	—	68	100	pF	V <sub>R</sub> = 200V See Fig. 3
L <sub>S</sub>	Series Inductance	—	8.0	—	nH	From terminal hole to terminal hole

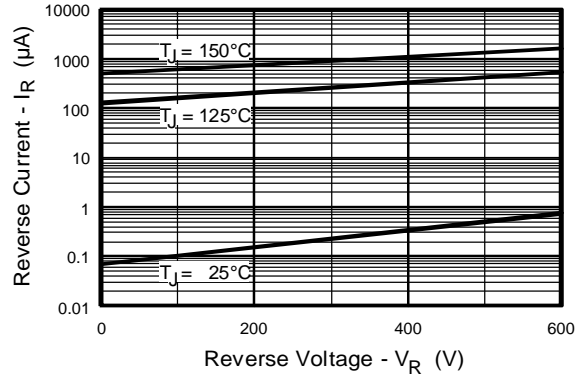
## Dynamic Recovery Characteristics (per Leg) @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t <sub>rr</sub>	Reverse Recovery Time	—	30	—	ns	I <sub>F</sub> = 1.0A, di <sub>F</sub> /dt = 200A/μs, V <sub>R</sub> = 30V
t <sub>rr1</sub>		—	67	100		T <sub>J</sub> = 25°C See Fig. 5
t <sub>rr2</sub>		—	112	170		T <sub>J</sub> = 125°C
I <sub>RRM1</sub>	Peak Recovery Current	—	6.0	11	A	T <sub>J</sub> = 25°C See Fig. 6
I <sub>RRM2</sub>		—	9.0	16		T <sub>J</sub> = 125°C
Q <sub>rr1</sub>	Reverse Recovery Charge	—	200	550	nC	T <sub>J</sub> = 25°C See Fig. 7
Q <sub>rr2</sub>		—	500	1400		T <sub>J</sub> = 125°C
di <sub>(rec)M</sub> /dt1	Peak Rate of Fall of Recovery Current During t <sub>b</sub>	—	250	—	A/μs	T <sub>J</sub> = 25°C See Fig. 8
di <sub>(rec)M</sub> /dt2		—	170	—		T <sub>J</sub> = 125°C

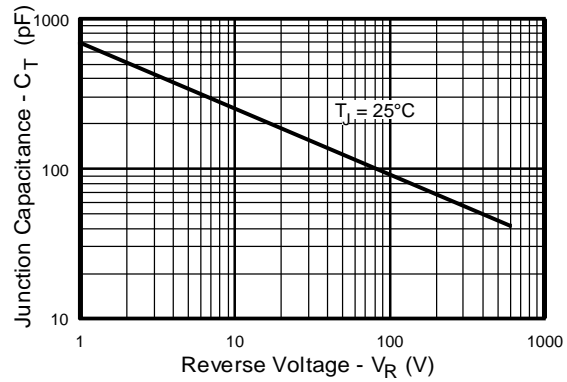




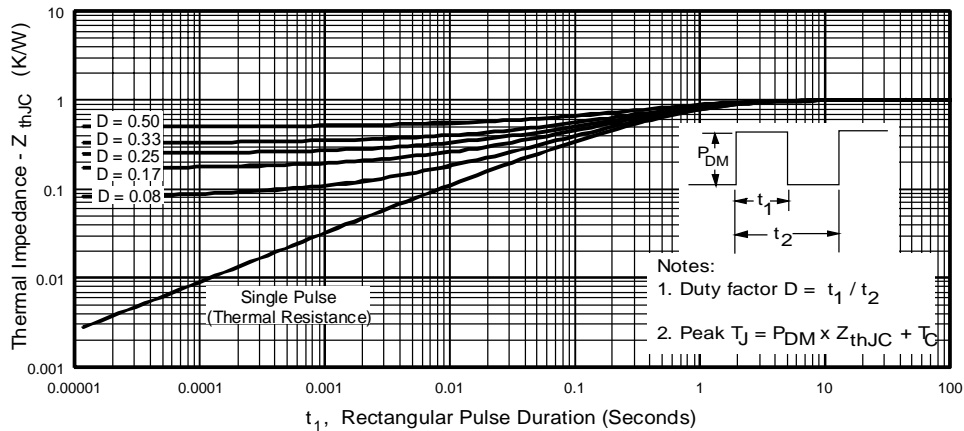
**Fig. 1** - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)



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



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

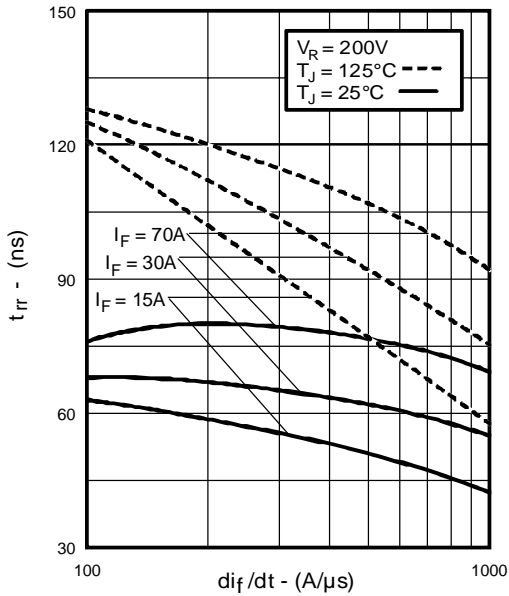


**Fig. 4** - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics, (per Leg)

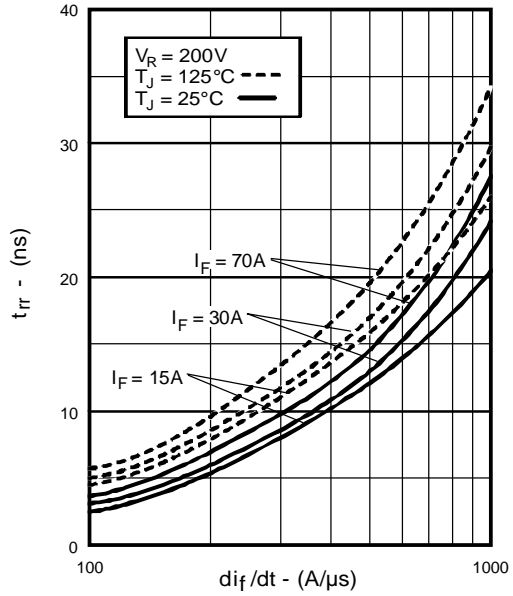
# HFA60MC60C

PD-2.463 rev. B 03/99

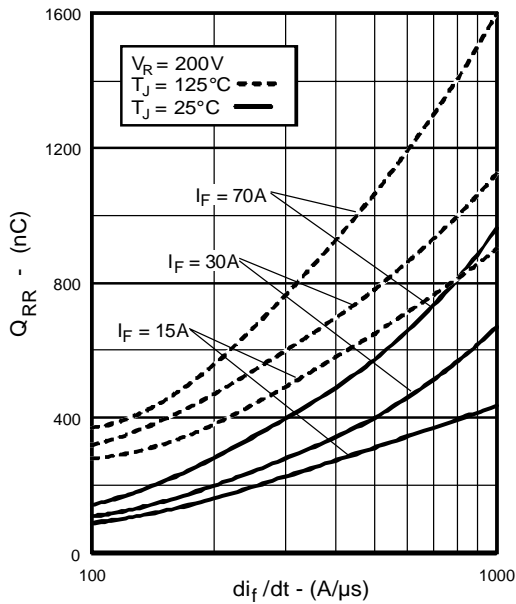
International  
**IOR** Rectifier



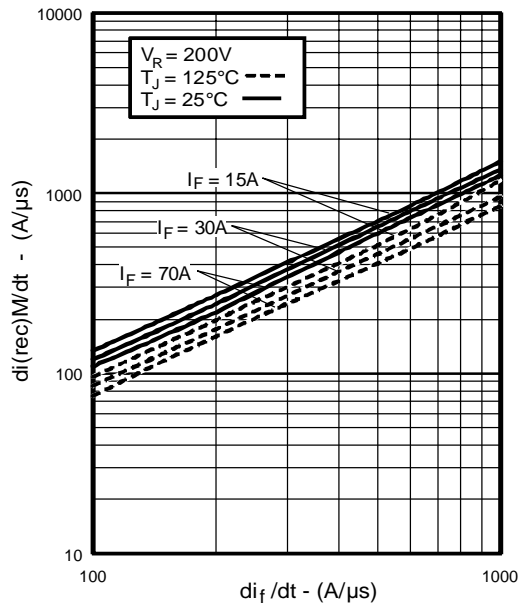
**Fig. 5** - Typical Reverse Recovery vs.  $di_f/dt$ , (per Leg)



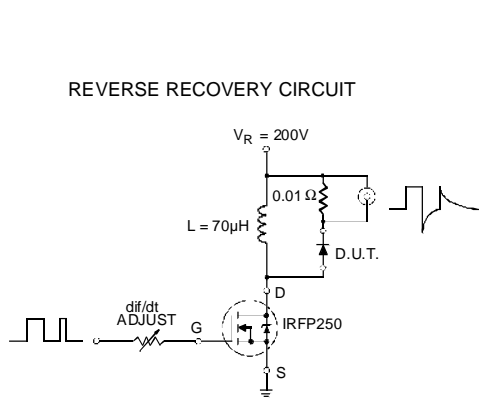
**Fig. 6** - Typical Recovery Current vs.  $di_f/dt$ , (per Leg)



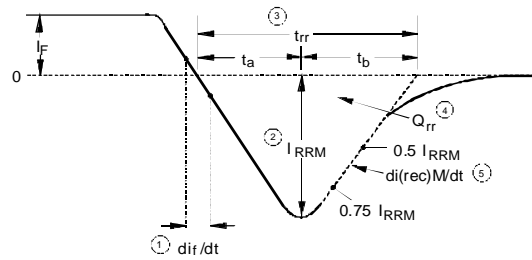
**Fig. 7** - Typical Stored Charge vs.  $di_f/dt$ , (per Leg)



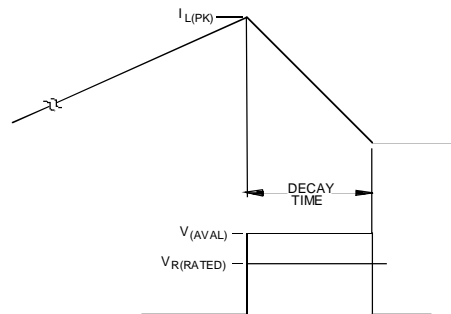
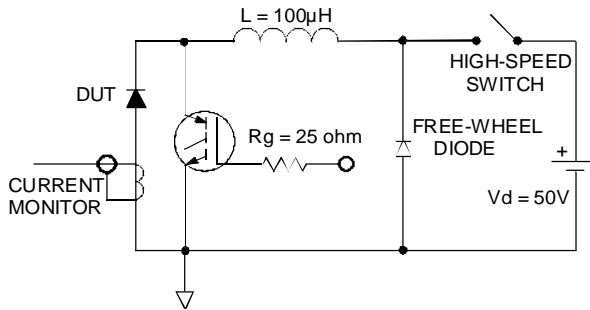
**Fig. 8** - Typical  $di_{(rec)M}/dt$  vs.  $di_f/dt$ , (per Leg)



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



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



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