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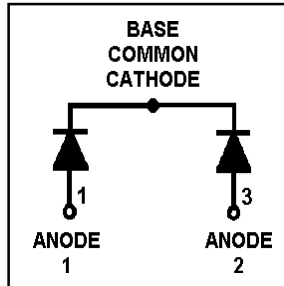4. If you have any questions, please contact us at marketing@iczoom.com and mark the subject with "Datasheets".

International IƏR Rectifier

HEXFRED™

HFA80NC40CSL

Ultrafast, Soft Recovery Diode

Features

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

BASE COMMON CATHODE

ANODE 1

ANODE 2

$V_R = 400V$
$V_F(typ.)$③ $= 1V$
$I_{F(AV)} = 80A$
Q_{rr} (typ.) $= 200nC$
$I_{RRM}(typ.) = 6A$
$t_{rr}(typ.) = 30ns$
$di_{(rec)M}/dt$ (typ.)③ $= 190A/\mu s$

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.

SLD-61-8

Absolute Maximum Ratings (per Leg)

	Parameter	Max.	Units
V_R	Cathode-to-Anode Voltage	400	V
I_F @ $T_C = 25°C$	Continuous Forward Current	85	
I_F @ $T_C = 100°C$	Continuous Forward Current	42	A
I_{FSM}	Single Pulse Forward Current ①	300	
E_{AS}	Non-Repetitive Avalanche Energy ②	1.4	mJ
P_D @ $T_C = 25°C$	Maximum Power Dissipation	150	W
P_D @ $T_C = 100°C$	Maximum Power Dissipation	59	
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_{thJC}	Junction-to-Case, Single Leg Conducting	——	——	0.85	°C/W
	Junction-to-Case, Both Legs Conducting	——	——	0.42	K/W
Wt	Weight	——	4.3 (0.15)	——	g (oz)

Note: ① Limited by junction temperature
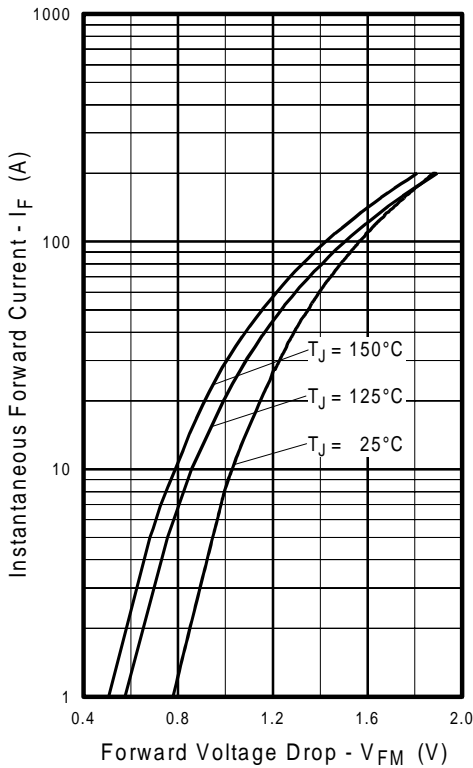② $L = 100\mu H$, duty cycle limited by max T_J
③ 125°C

HFA80NC40CSL

PD-2.472 rev. B 01/99

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

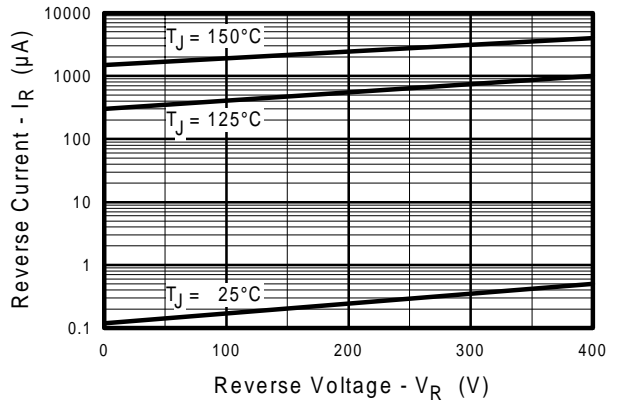|	Parameter	Min.	Typ.	Max.	Units	Test Conditions	
V_{BR}	Cathode Anode Breakdown Voltage	400	—	—	V	$I_R = 100\mu A$	
V_{FM}	Max Forward Voltage	—	1.1	1.3	V	$I_F = 40A$	See Fig. 1
		—	1.3	1.5		$I_F = 80A$	
		—	1.0	1.2		$I_F = 40A$, $T_J = 125°C$	
I_{RM}	Max Reverse Leakage Current	—	0.50	3.0	μA	$V_R = V_R$ Rated	See Fig. 2
		—	0.75	4.0	mA	$T_J = 125°C$, $V_R = 320V$	
C_T	Junction Capacitance	—	90	125	pF	$V_R = 200V$	See Fig. 3
L_S	Series Inductance	—	5.5	—	nH	Lead to lead 5mm from package body	

Dynamic Recovery Characteristics (per Leg) @ TJ = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions		
t_{rr}	Reverse Recovery Time	—	30	—		$I_F = 1.0A$, $di_f/dt = 200A/\mu s$, $V_R = 30V$		
t_{rr1}		—	67	100	ns	$T_J = 25°C$	See Fig. 5	$I_F = 40A$
t_{rr2}		—	110	170		$T_J = 125°C$		
I_{RRM1}	Peak Recovery Current	—	6.0	11	A	$T_J = 25°C$	See Fig. 6	$V_R = 200V$
I_{RRM2}		—	9.0	16		$T_J = 125°C$		
Q_{rr1}	Reverse Recovery Charge	—	200	540	nC	$T_J = 25°C$	See Fig. 7	$di_f/dt = 200A/\mu s$
Q_{rr2}		—	500	1300		$T_J = 125°C$		
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	240	—	A/μs	$T_J = 25°C$	See Fig. 8	
$di_{(rec)M}/dt2$	During t_b	—	190	—		$T_J = 125°C$		

FOOT PRINT

DETAIL "A"

NOTES:

▨ Solderable Area.

BASE
COMMON
CATHODE

ANODE 1

ANODE 2

Outline D 61- 8-SL
Dimensions in millimeters and (inches)

International **IOR** Rectifier
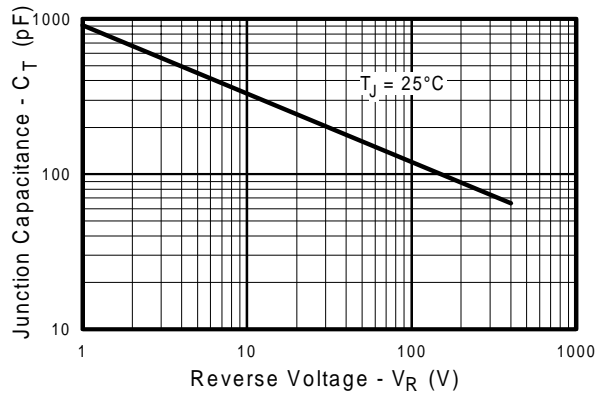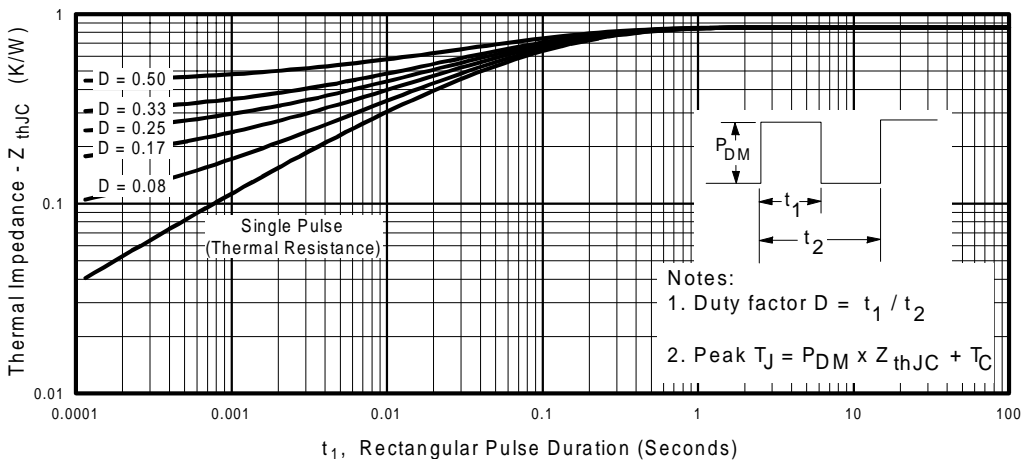
HFA80NC40CSL
PD-2.472 rev. B 01/99

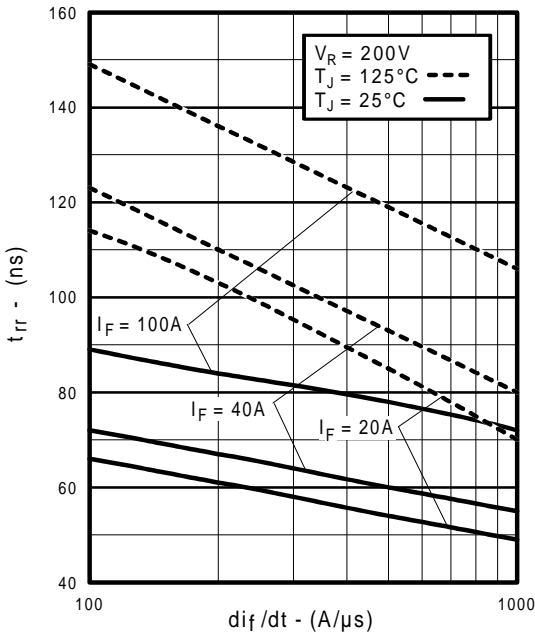**Fig. 1** - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

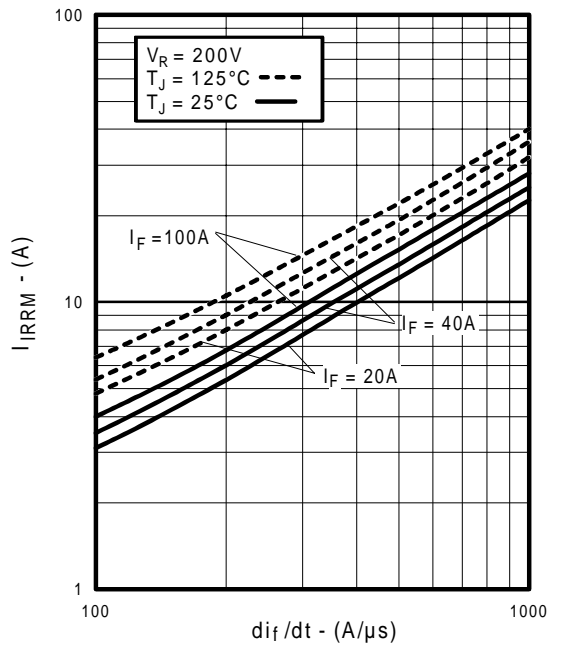**Fig. 2** - Typical Reverse Current vs. Reverse Voltage, (per Leg)

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

Notes:

1. Duty factor D = t_1 / t_2
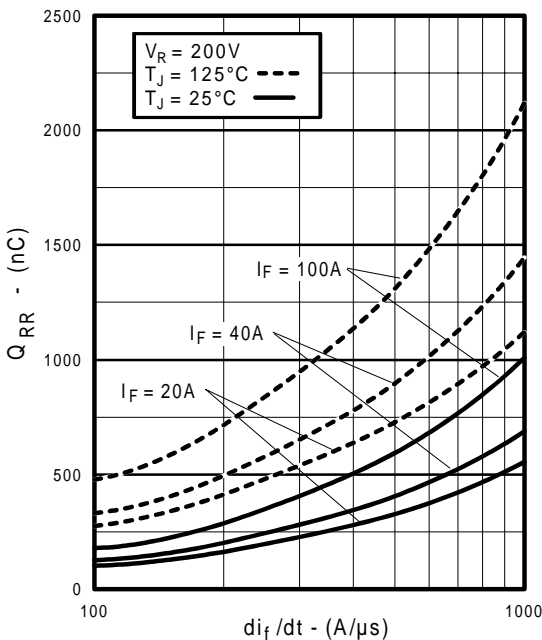
2. Peak $T_J = P_{DM} \times Z_{thJC} + T_C$

Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics, (per Leg)
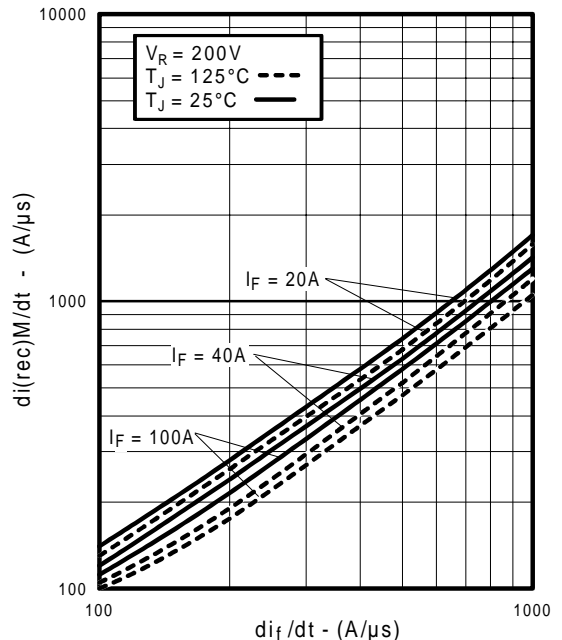
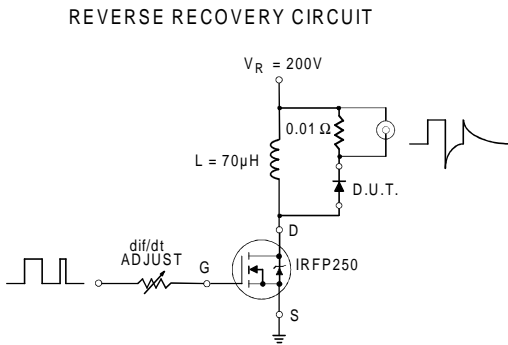**Fig. 5** - Typical Reverse Recovery vs. di$_f$/dt, (per Leg)

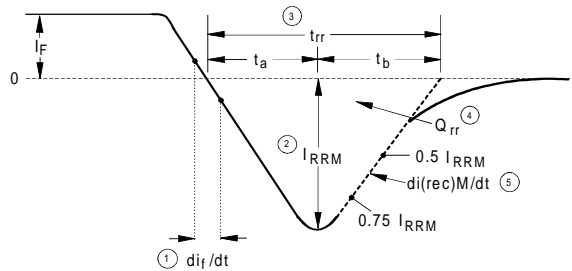**Fig. 6** - Typical Recovery Current vs. di$_f$/dt, (per Leg)

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

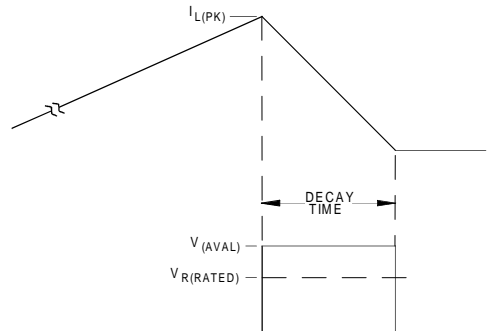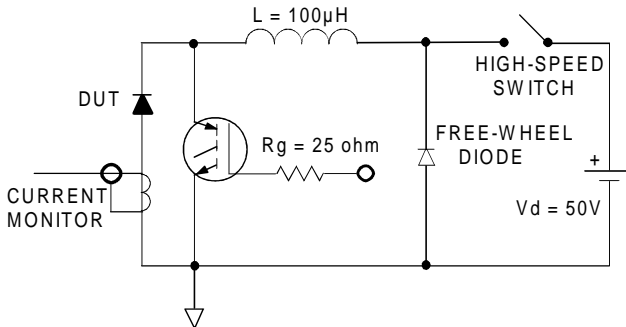**Fig. 8** - Typical di$_{(rec)M}$/dt vs. di$_f$/dt, (per Leg)

International **IQR** Rectifier

HFA80NC40CSL
PD-2.472 rev. B 01/99

REVERSE RECOVERY CIRCUIT

$V_R = 200V$

$0.01\,\Omega$

$L = 70\mu H$

D.U.T.

dif/dt ADJUST

G

IRFP250

D

S

Fig. 9 - Reverse Recovery Parameter Test Circuit

I_F

0

③ t_{rr}

t_a t_b

Q_{rr} ④

② I_{RRM}

$0.5\ I_{RRM}$

di(rec)M/dt ⑤

$0.75\ I_{RRM}$

① di_f/dt

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 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current

4. Q_{rr} - Area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr}\ X\ I_{RRM}}{2}$$

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

$L = 100\mu H$

HIGH-SPEED SWITCH

FREE-WHEEL DIODE

DUT

$Rg = 25$ ohm

$Vd = 50V$

+

CURRENT MONITOR

$I_{L(PK)}$

DECAY TIME

$V_{(AVAL)}$

$V_{R(RATED)}$

Fig. 11 - Avalanche Test Circuit and Waveforms

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