International
IOR Rectifier

PD -2.461 rev. B 01/99

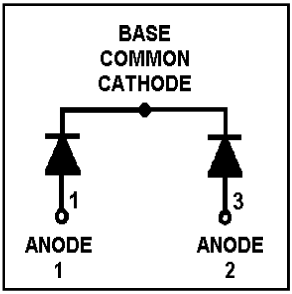
HFA70NC60CSL

HEXFRED™

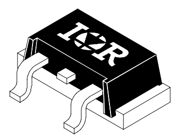
Ultrafast, Soft Recovery Diode

Features

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



V_R = 600V
V_F(typ.)③ = 1.2V
$I_{F(AV)}$ = 70A
Q_{rr} (typ.) = 210nC
I_{RRM}(typ.) = 6A
t_{rr}(typ.) = 30ns
$di_{(rec)M}/dt$ (typ.)③ = 180A/µs



SLD-61-8

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°C	Continuous Forward Current	56	A
I_F @ T_C = 100°C	Continuous Forward Current	27	
I_{FSM}	Single Pulse Forward Current ①	200	
E_{AS}	Non-Repetitive Avalanche Energy ②	220	µJ
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)

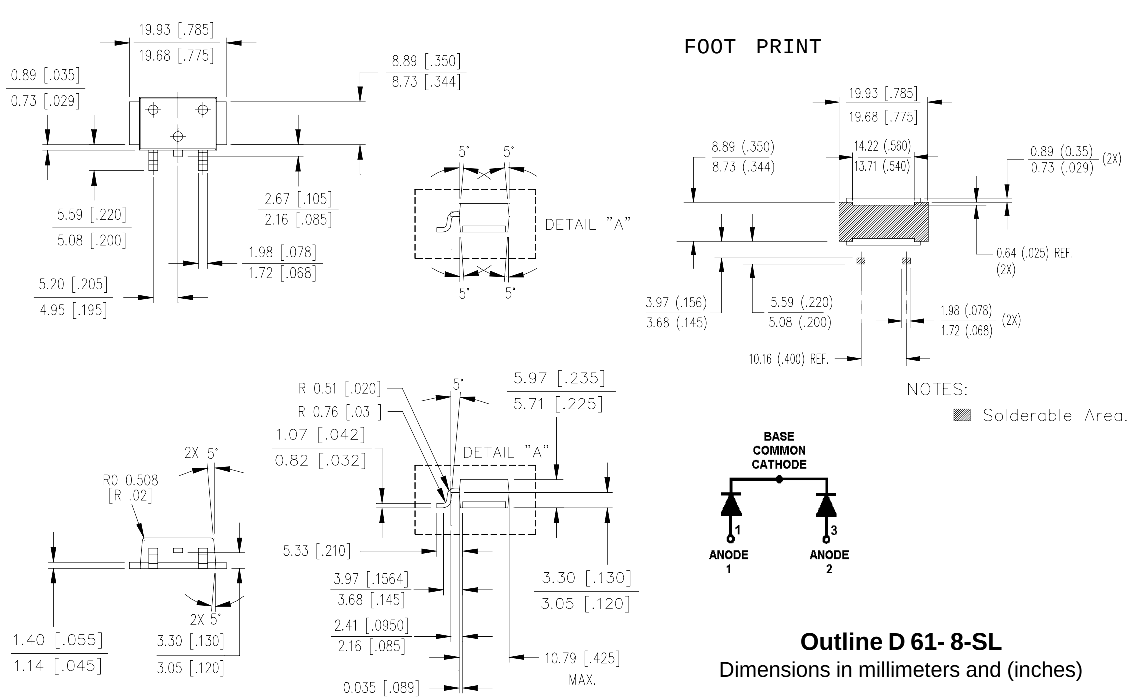
Note: ① Limited by junction temperature
② L = 100µH, duty cycle limited by max T_J
③ 125°C

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

Parameter		Min.	Typ.	Max.	Units	Test Conditions	
V_{BR}	Cathode Anode Breakdown Voltage	600	——	——	V	I_R = 100µA	
V_{FM}	Max Forward Voltage	——	1.3	1.5	V	I_F = 35A	See Fig. 1
		——	1.5	1.7		I_F = 70A	
		——	1.2	1.4		I_F = 35A, T_J = 125°C	
I_{RM}	Max Reverse Leakage Current	——	2.0	10	µA	V_R = V_R Rated	See Fig. 2
		——	0.50	2.0	mA	T_J = 125°C, V_R = 480V	
C_T	Junction Capacitance	——	68	100	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) @ T_J = 25°C (unless otherwise specified)

Parameter		Min.	Typ.	Max.	Units	Test Conditions		
t_{rr}	Reverse Recovery Time	——	30	——	ns	I_F = 1.0A, di_f/dt = 200A/µs, V_R = 30V		
t_{rr1}		——	70	110		T_J = 25°C	See Fig. 5	I_F = 35A
t_{rr2}		——	115	180		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	——	210	580	nC	T_J = 25°C	See Fig. 7	di_f/dt = 200A/µs
Q_{rr2}		——	520	1400		T_J = 125°C		
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	——	280	——	A/µs	T_J = 25°C	See Fig. 8	
$di_{(rec)M}/dt2$	During t_b	——	180	——		T_J = 125°C		



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

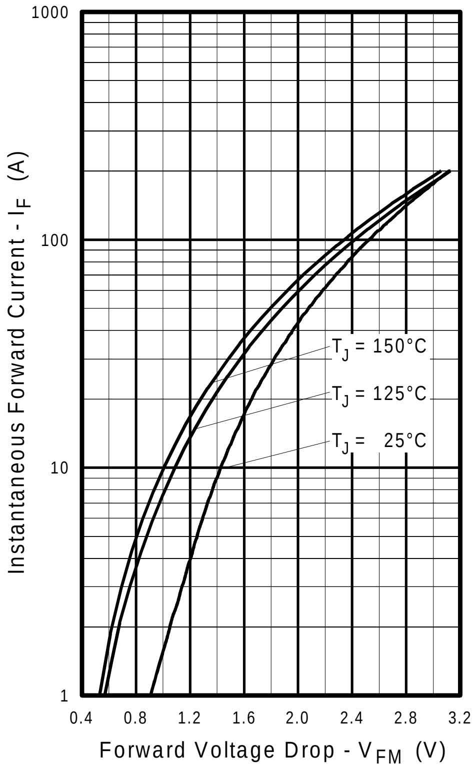


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

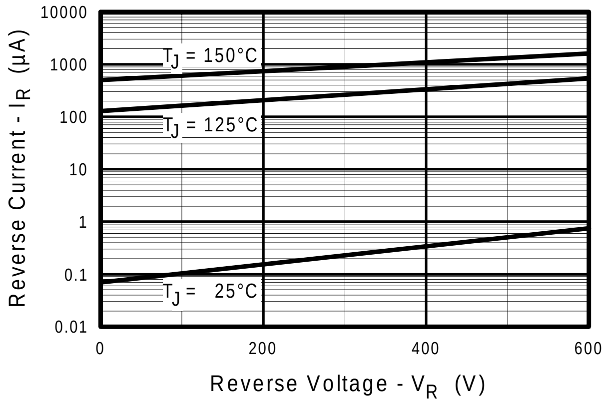


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

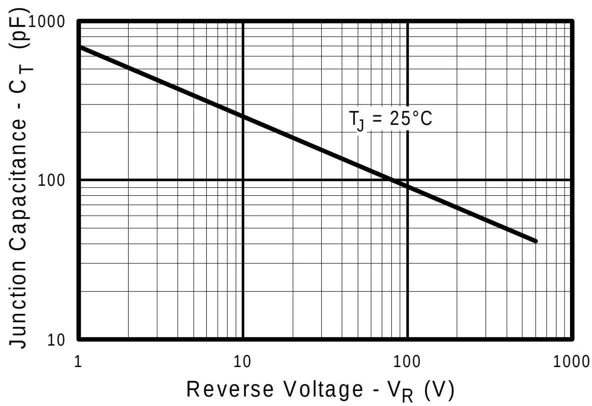


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

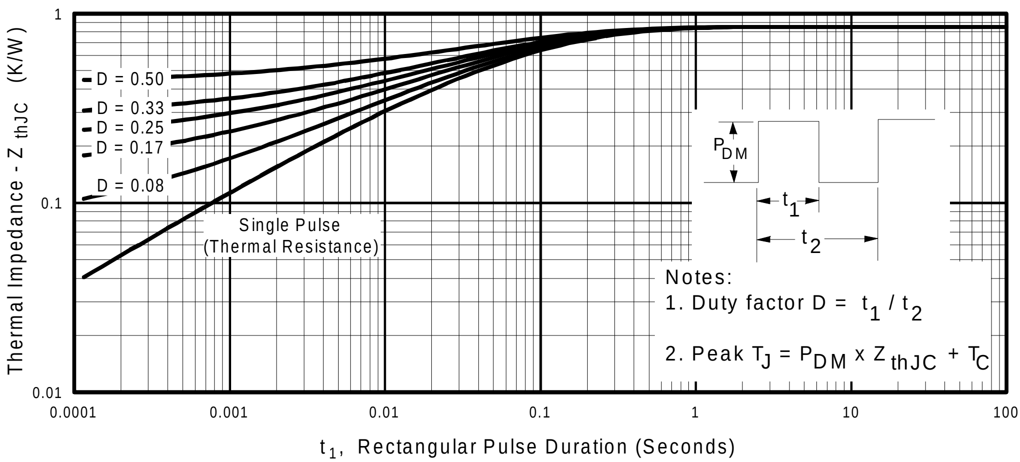


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics, (per Leg)

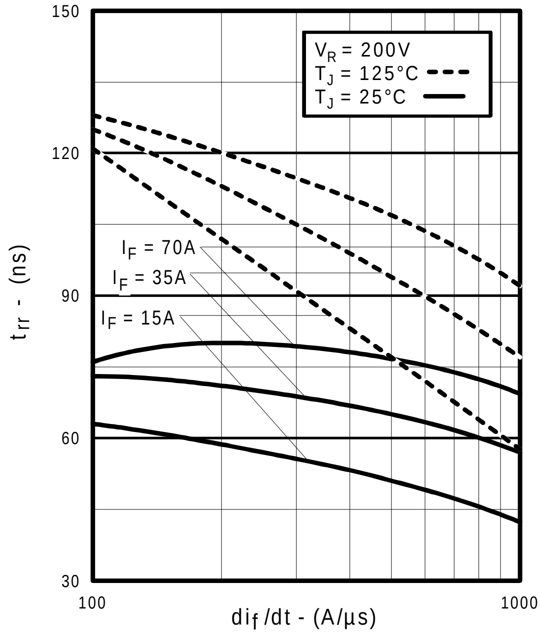


Fig. 5 - Typical Reverse Recovery vs. di_f/dt, (per Leg)

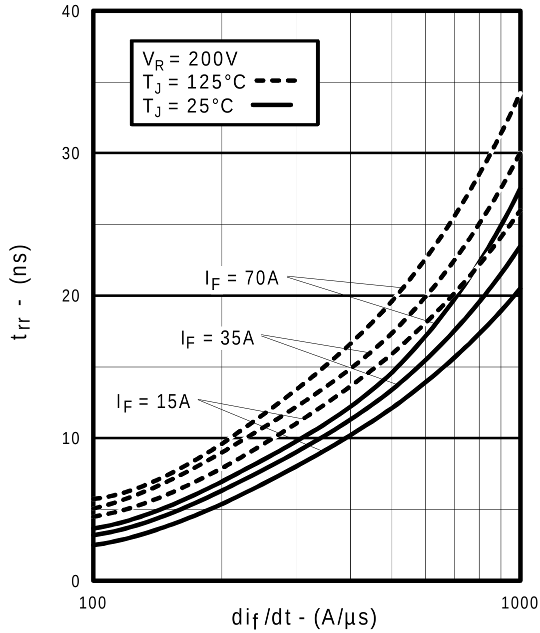


Fig. 6 - Typical Recovery Current vs. di_f/dt, (per Leg)

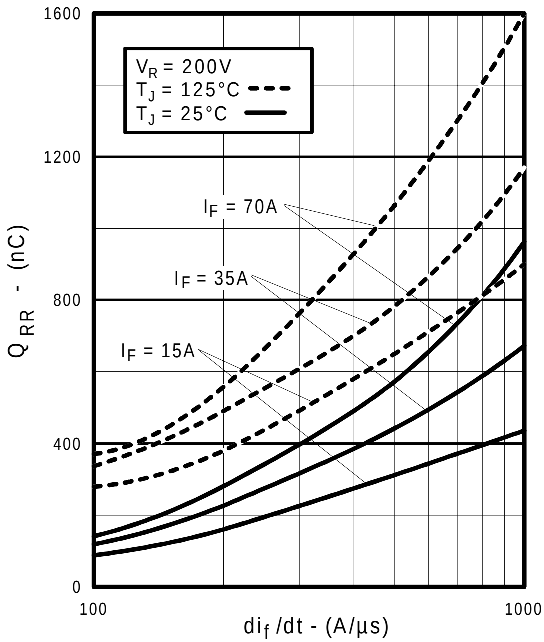


Fig. 7 - Typical Stored Charge vs. di_f/dt, (per Leg)

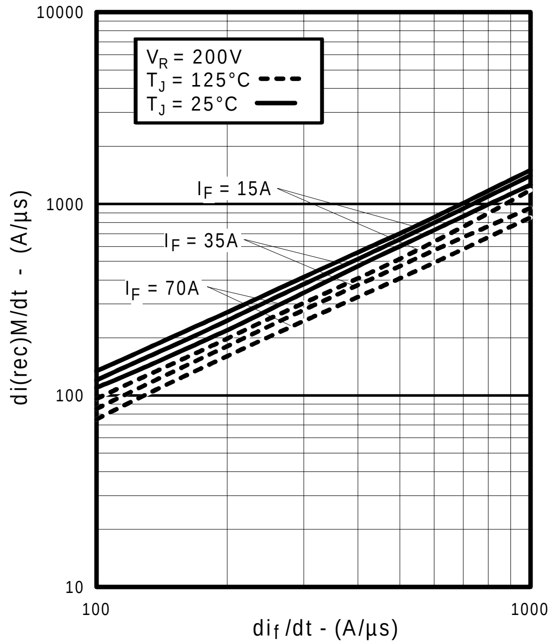


Fig. 8 - Typical $di_{(rec)M}$/dt vs. di_f/dt, (per Leg)

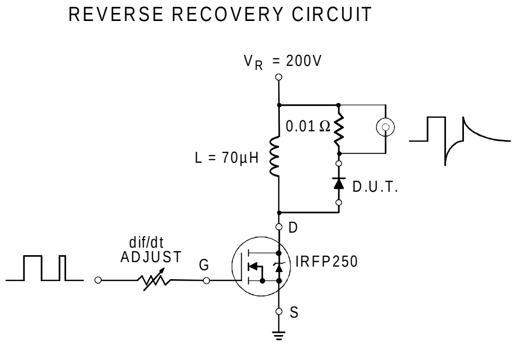
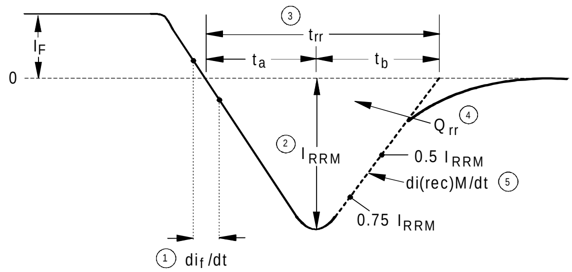


Fig. 9 - Reverse Recovery Parameter Test Circuit



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

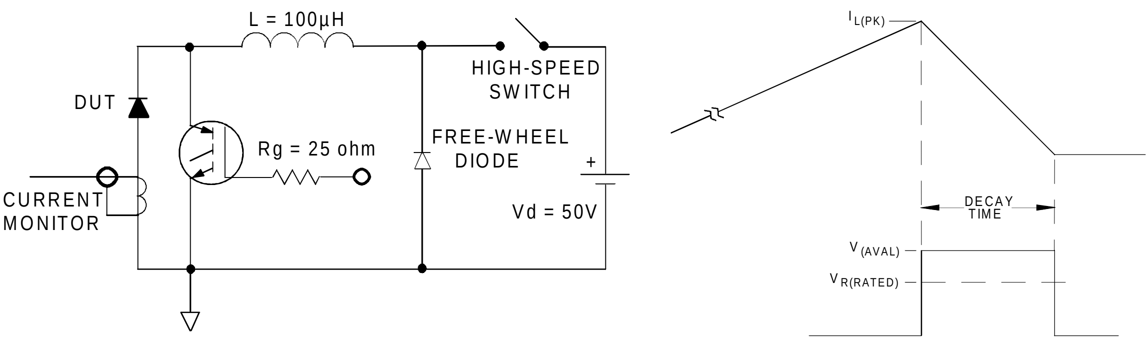


Fig. 11 - Avalanche Test Circuit and Waveforms

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