

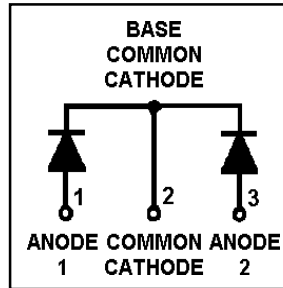
HFA80NC40C

HEXFRED™

Ultrafast, Soft Recovery Diode

Features

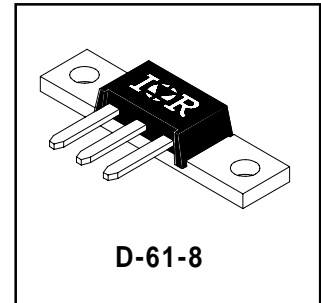
- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters



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

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.



D-61-8

Absolute Maximum Ratings (per Leg)

	Parameter	Max.	Units
V_R	Cathode-to-Anode Voltage	400	V
$I_F @ T_C = 25^\circ C$	Continuous Forward Current	85	A
$I_F @ T_C = 100^\circ C$	Continuous Forward Current	42	
I_{FSM}	Single Pulse Forward Current ①	300	
E_{AS}	Non-Repetitive Avalanche Energy ②	1.4	mJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	150	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	59	
T_J	Operating Junction and	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range		

Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
R_{thJC}	Junction-to-Case, Single Leg Conducting	—	—	0.85	$^\circ C/W$ K/W
	Junction-to-Case, Both Legs Conducting	—	—	0.42	
R_{thCS}	Case-to-Sink, Flat , Greased Surface	—	0.30	—	
Wt	Weight	—	7.8 (0.28)	—	g (oz)
	Mounting Torque	35 (4.0)	—	50 (5.7)	lbf•in (N•m)

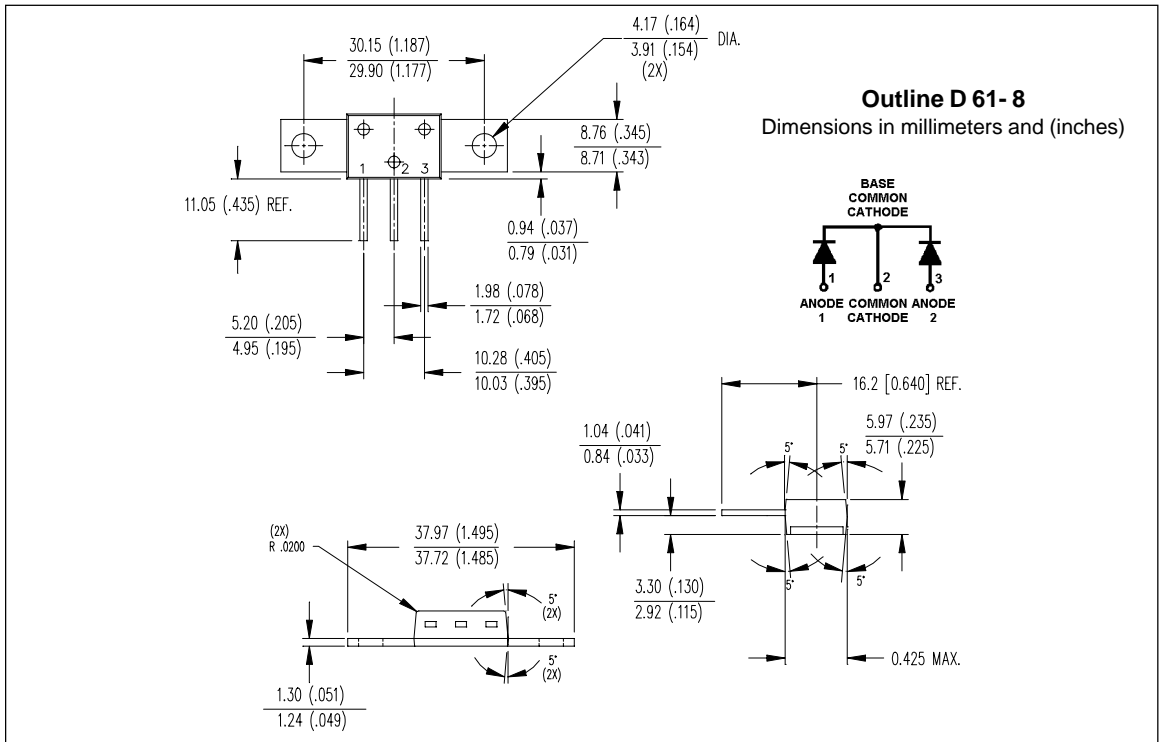
- Note:** ① Limited by junction temperature
 ② L = 100μH, duty cycle limited by max T_J
 ③ 125°C

Electrical Characteristics (per Leg) @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	400	—	—	V	$I_R = 100\mu\text{A}$
V_{FM}	—	1.1	1.3	V	$I_F = 40\text{A}$
	—	1.3	1.5		$I_F = 80\text{A}$ See Fig. 1
	—	1.0	1.2		$I_F = 40\text{A}, T_J = 125^\circ\text{C}$
I_{RM}	—	0.50	3.0	μA	$V_R = V_R$ Rated
	—	0.75	4.0	mA	$T_J = 125^\circ\text{C}, V_R = 320\text{V}$ See Fig. 2
C_T	—	90	125	pF	$V_R = 200\text{V}$ See Fig. 3
L_S	—	5.5	—	nH	Lead to lead 5mm from package body

Dynamic Recovery Characteristics (per Leg) @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Test Conditions
t_{rr}	—	30	—	ns	$I_F = 1.0\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_R = 30\text{V}$
t_{rr1}	—	67	100		$T_J = 25^\circ\text{C}$ See Fig. 4
t_{rr2}	—	110	170		$T_J = 125^\circ\text{C}$ 5
I_{RRM1}	—	6.0	11	A	$T_J = 25^\circ\text{C}$ See Fig. 5
	—	9.0	16		$T_J = 125^\circ\text{C}$ 6
I_{RRM2}	—	200	540	nC	$T_J = 25^\circ\text{C}$ See Fig. 6
	—	500	1300		$T_J = 125^\circ\text{C}$ 7
Q_{rr1}	—	240	—	A/ μs	$T_J = 25^\circ\text{C}$ See Fig. 8
Q_{rr2}	—	190	—		$T_J = 125^\circ\text{C}$ 8
$di_{(rec)M}/dt1$	—	240	—	A/ μs	$T_J = 25^\circ\text{C}$ See Fig. 8
$di_{(rec)M}/dt2$	—	190	—		$T_J = 125^\circ\text{C}$ 8



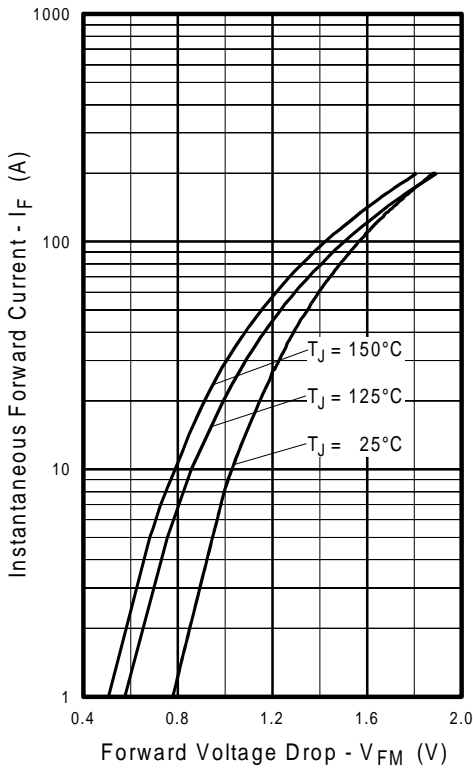


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current, (per Leg)

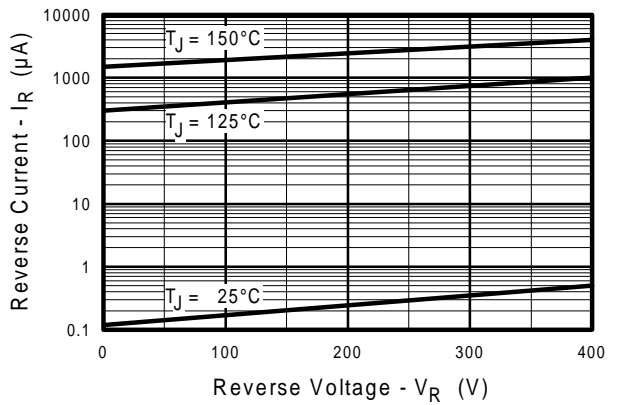


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

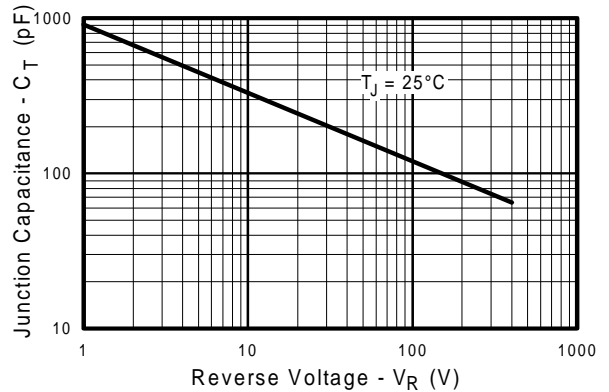


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

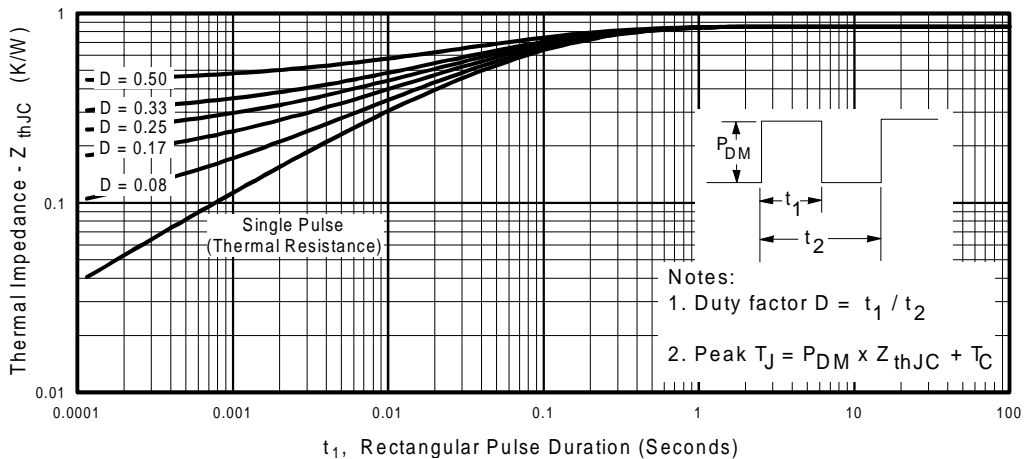


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics, (per Leg)

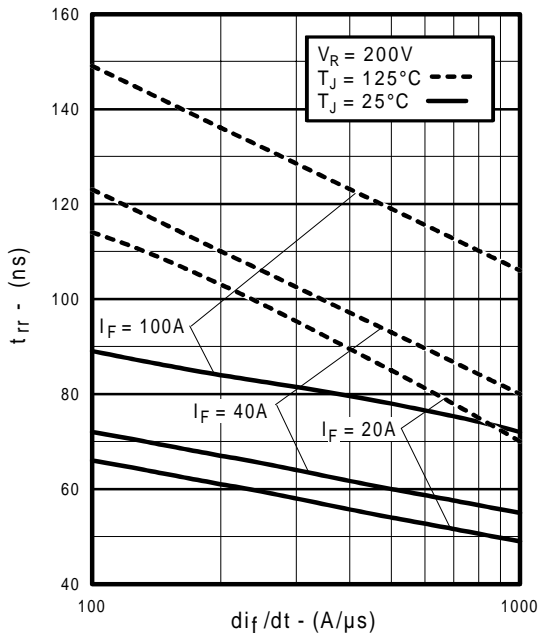


Fig. 5 - Typical Reverse Recovery vs. di_f/dt , (per Leg)

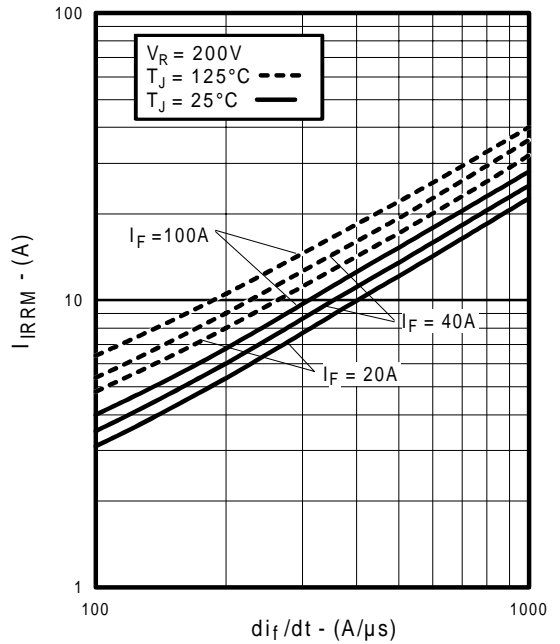


Fig. 6 - Typical Recovery Current vs. di_f/dt , (per Leg)

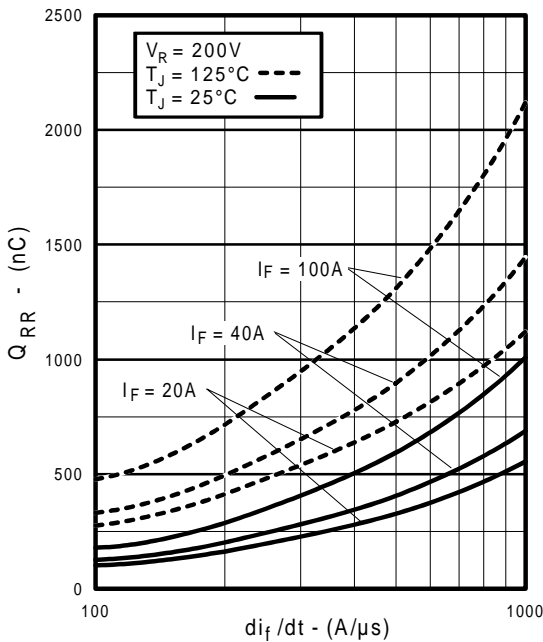


Fig. 7 - Typical Stored Charge vs. di_f/dt , (per Leg)

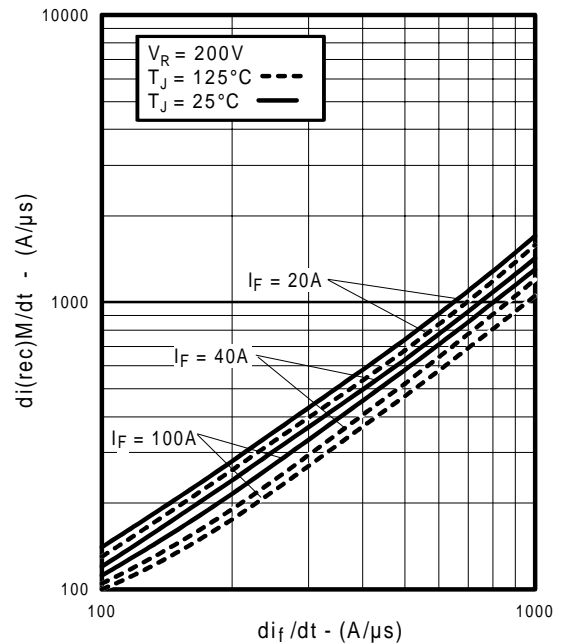


Fig. 8 - Typical $di_{(rec)}M/dt$ vs. di_f/dt , (per Leg)

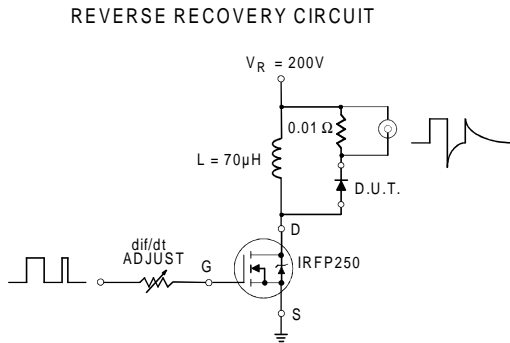


Fig. 9 - Reverse Recovery Parameter Test Circuit

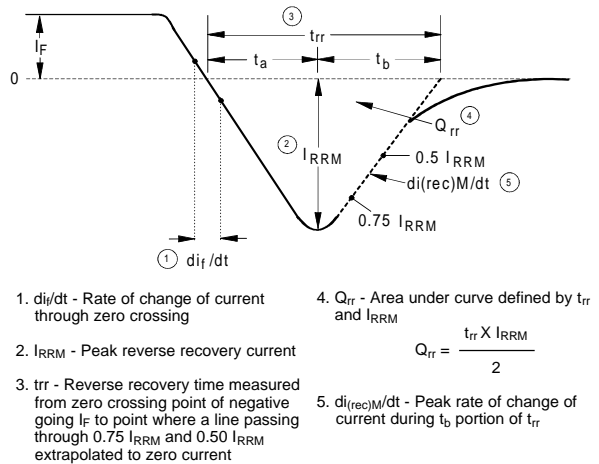


Fig. 10 - Reverse Recovery Waveform and Definitions

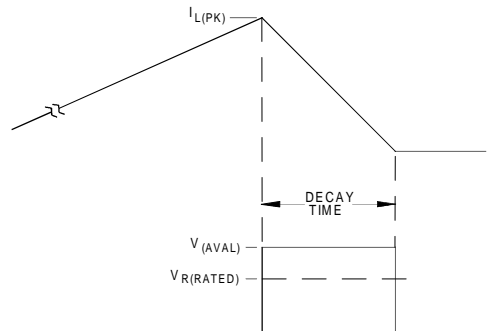
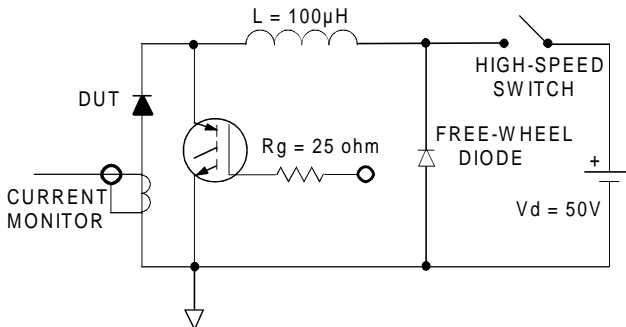


Fig. 11 - Avalanche Test Circuit and Waveforms

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