

International
IR Rectifier

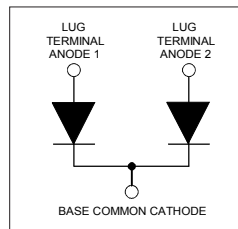
IRHD320CW40

HEXFRED™

Ultrafast, Soft Recovery Diode

Features

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



$V_R = 400V$
 $V_F(\text{typ.})^{\text{③}} = 1V$
 $I_{F(AV)} = 320A$
 $Q_{rr}(\text{typ.}) = 420nC$
 $I_{RRM}(\text{typ.}) = 8.7A$
 $t_{rr}(\text{typ.}) = 45ns$
 $di_{(rec)}/dt(\text{typ.})^{\text{③}} = 280A/\mu s$

Description/ Applications

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

	Parameters	Max	Units
V_R	Cathode-to-Anode Voltage	400	V
$I_F @ T_C = 25^\circ C$	Continuous Forward Current	321	A
$I_F @ T_C = 100^\circ C$	Continuous Forward Current	160	
I_{FSM}	Single Pulse Forward Current ①	1200	
E_{AS}	Non-Repetitive Avalanche Energy ②	1.4	mJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	625	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	250	
T_J, T_{STG}	Operating Junction and Storage Temperature Range	- 55 to 150	°C

Case Styles

IRHD320CW40



TO-244

① Limited by junction temperature

② $L = 100\mu H$, duty cycle limited by max T_J

③ $125^\circ C$

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

Parameters	Min	Typ	Max	Units	Test Conditions
V _{BR} Cathode Anode Breakdown Voltage,	400	-	-	V	I _R = 100μA
V _{FM} Max. Forward Voltage	-	1.10	1.35	V	I _F = 160A
	-	1.30	1.55	V	I _F = 320A See Fig. 1
	-	1.00	1.20	V	I _F = 160A, T _J = 125°C
I _{RM} Max. Reverse Leakage Current	-	2.0	12	μA	V _R = V _R Rated See Fig. 2
	-	3.0	16	μA	T _J = 125°C, V _R = 320V
C _T Junction Capacitance	-	370	500	pF	V _R = 200V See Fig. 3
L _S Series Inductance	-	5.0	-	nH	From top of terminal hole to mounting plane

Dynamic Recovery Characteristics @ T_J = 25°C (unless otherwise specified)

Parameters	Min	Typ	Max	Units	Test Conditions
t _{rr} Reverse Recovery Time	-	45	-	ns	I _F = 1.0A, di _F /dt = 200A/μs, V _R = 30V
t _{rr1}	-	90	140	ns	T _J = 25°C See Fig. 5
t _{rr2}	-	290	440		T _J = 125°C
I _{RRM1} Peak Recovery Current	-	8.7	20		A
	-	18	30	A	T _J = 125°C
Q _{rr1} Reverse Recovery Charge	-	420	1100	nC	T _J = 25°C See Fig. 7
	-	2600	7000		T _J = 125°C
di _{(rec)M} /d/t1	-	300	-	A/μs	T _J = 25°C See Fig. 8
di _{(rec)M} /d/t2	-	280	-		T _J = 25°C

Thermal - Mechanical Characteristics

Parameters	Min	Typ	Max	Units
T _J Max. Junction Temperature Range	-	-	-55 to 150	°C
T _{Stg} Max. Storage Temperature Range	-	-	-55 to 150	°C
R _{thJC} Thermal Resistance, Junction to Case	-	-	0.24	°C/W
Thermal Resistance, Junction to Case	-	-	0.12	K/W
R _{thCS} Thermal Resistance, Case to Heatsink	-	0.10	-	°C/W
Wt Weight	-	68 (2.4)	-	g (oz)
Mounting Torque (*)	30 (3.4)	-	40 (4.6)	lbf.in
Mounting Torque Center Hole	12 (1.4)	-	18 (2.1)	(N.m)
Terminal Torque	30 (3.4)	-	40 (4.6)	lbf.in
Vertical Pull	-	-	80	lbf.in
2 inch Lever Pull	-	-	35	lbf.in

(*) 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 5-10lbf.in steps until desired or maximum torque limits are reached

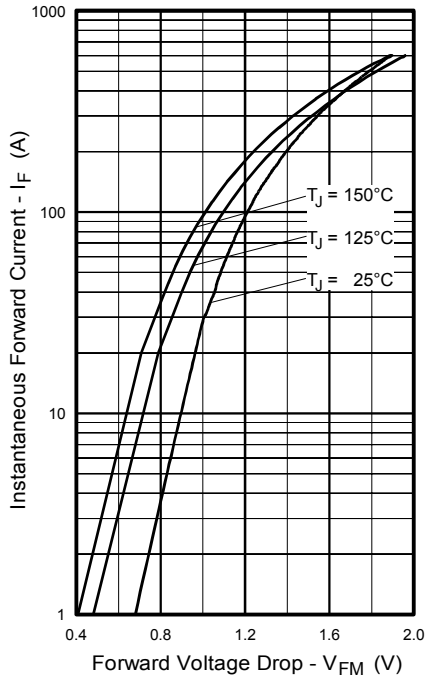


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current (per Leg)

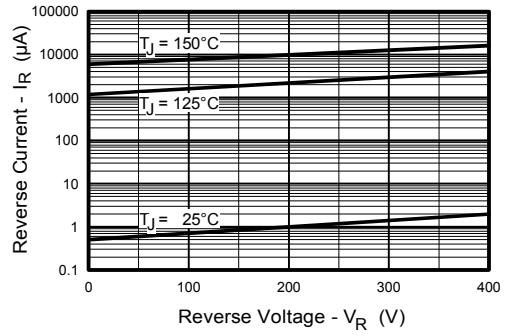


Fig. 2 - Typical Reverse Current vs. Reverse Voltage, (per Leg)

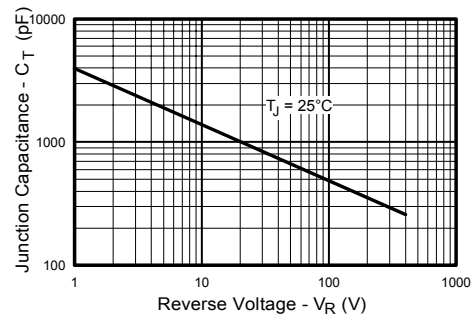


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, (per Leg)

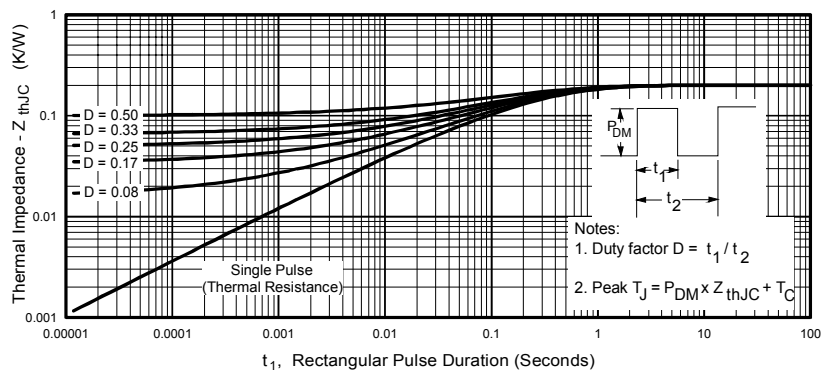


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics, (per Leg)

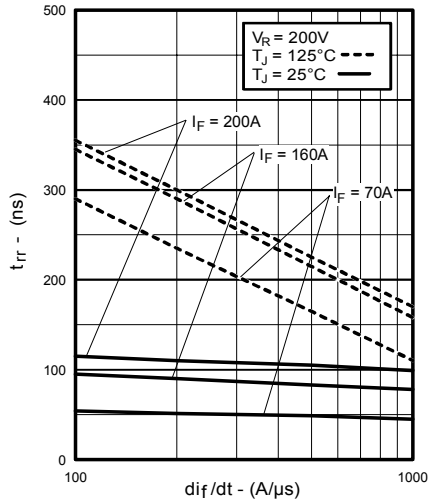


Fig. 5 - Typical Reverse Recovery vs. di_f/dt , (per Leg)

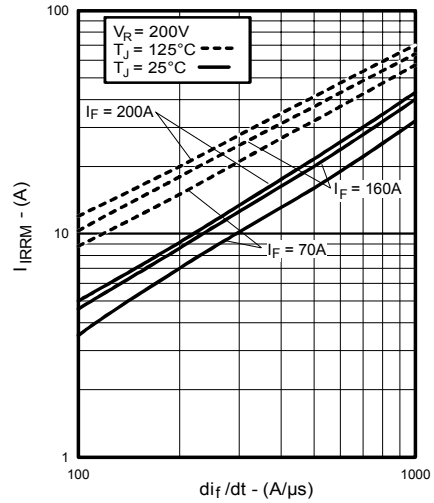


Fig. 6 - Typical Recovery Current vs. di_f/dt , (per Leg)

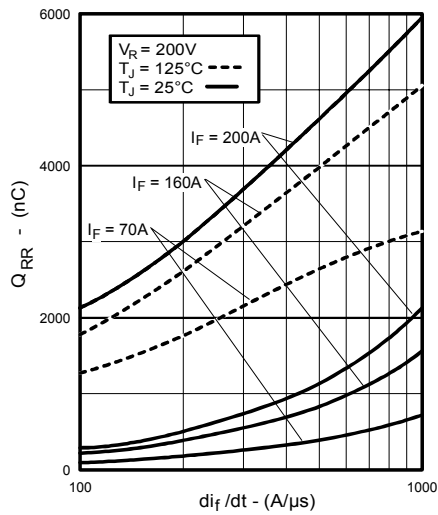


Fig. 7 - Typical Stored Charge vs. di_f/dt , (per Leg)

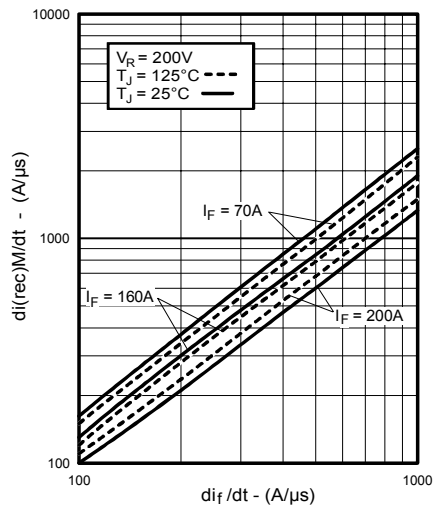


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. di_f/dt , (per Leg)

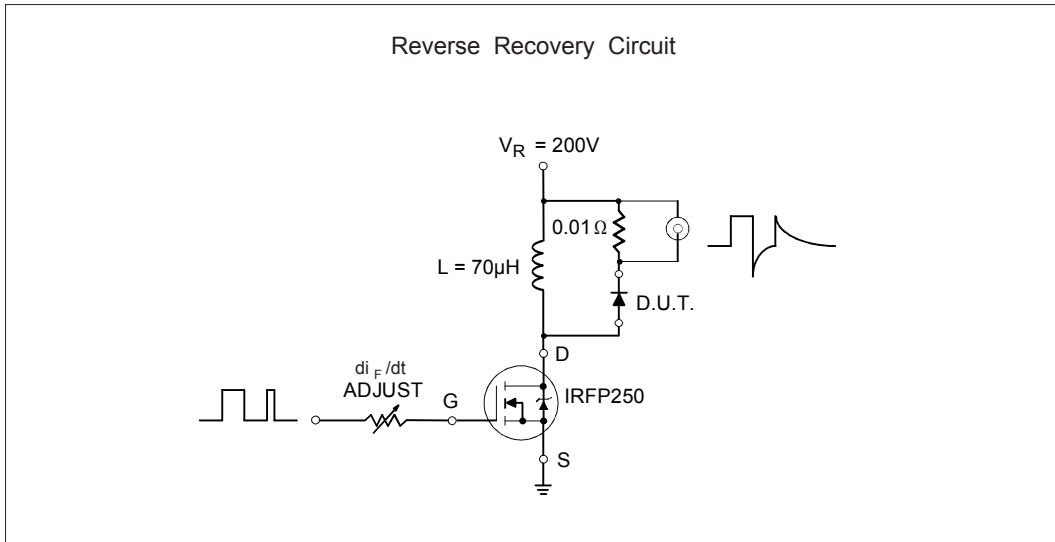


Fig. 9- Reverse Recovery Parameter Test Circuit

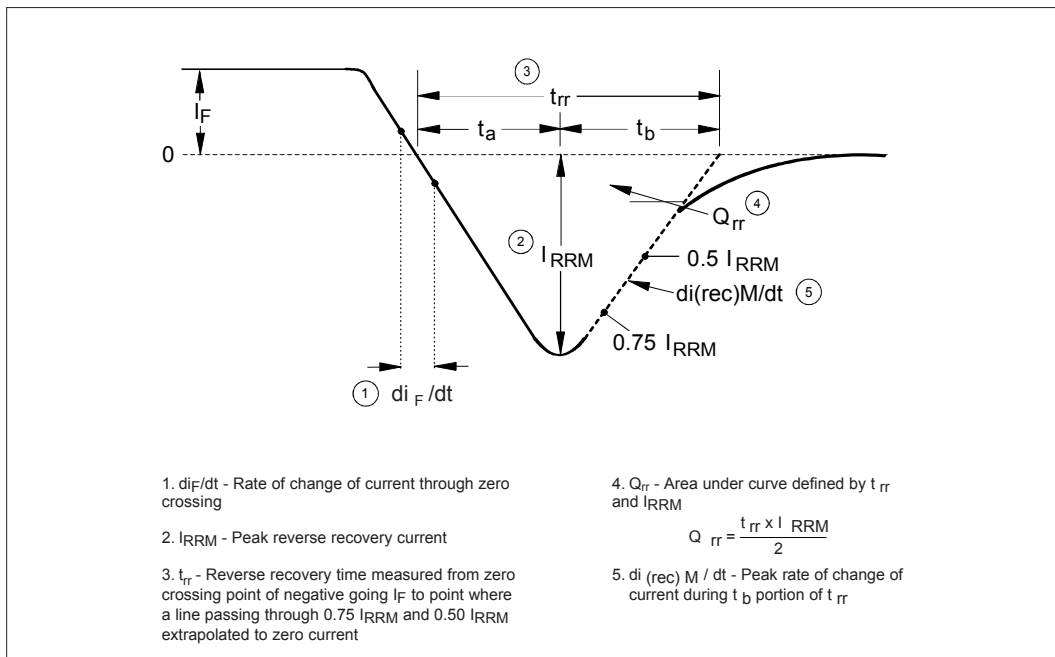
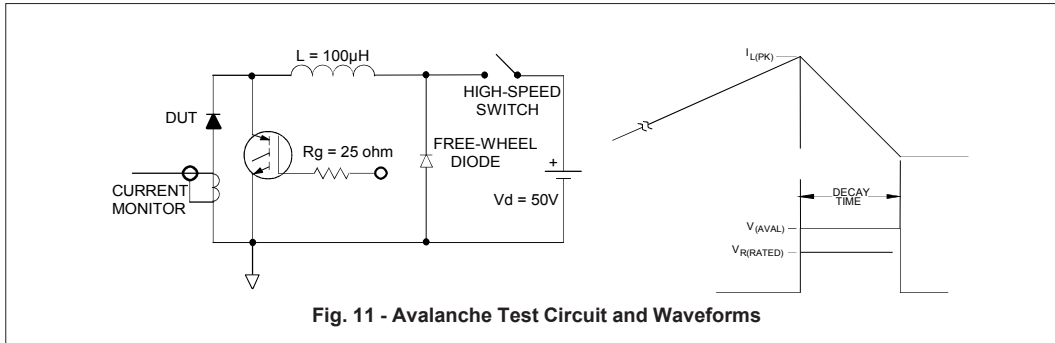
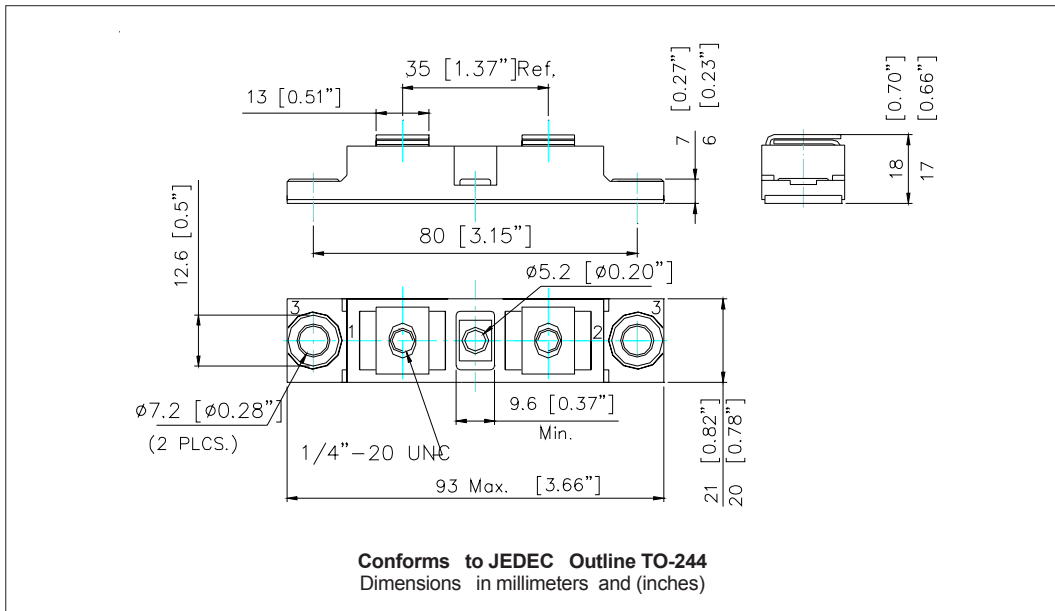


Fig. 10 - Reverse Recovery Waveform and Definitions



Outline Table



Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level.
Qualification Standards can be found on IR's Web site.