

International IOR Rectifier

PD-2.444

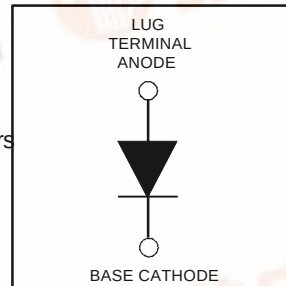
HFA105NH60

HEXFRED™

Ultrafast, Soft Recovery Diode

Features

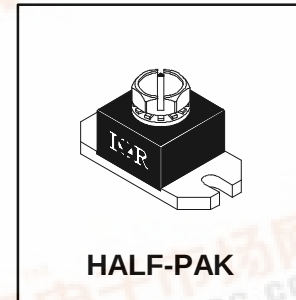
- Reduced RFI and EMI
- Reduced Snubbing
- Extensive Characterization of Recovery Parameters



$V_R = 600V$
$V_F = 1.5V$
$Q_{rr}^* = 1200nC$
$di_{(rec)M}/dt^* = 240A/\mu s$
* 125°C

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

	Parameter	Max.	Units
V_R	Cathode-to-Anode Voltage	600	V
$I_F @ T_C = 25^\circ C$	Continuous Forward Current	171	A
$I_F @ T_C = 100^\circ C$	Continuous Forward Current	85	
I_{FSM}	Single Pulse Forward Current ①	600	
I_{AS}	Maximum Single Pulse Avalanche Current ②	2.0	
E_{AS}	Non-Repetitive Avalanche Energy ②	220	μJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	463	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	185	
T_J	Operating Junction and	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range		

Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case, Single	—	—	0.27	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.15	—	K/W
Wt	Weight	—	26 (0.9)	—	g (oz)
	Mounting Torque	15 (1.7)	—	25 (2.8)	lbf•in
	Terminal Torque	20 (2.2)	—	40 (4.4)	(N•m)

Note: ① Limited by junction temperature

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

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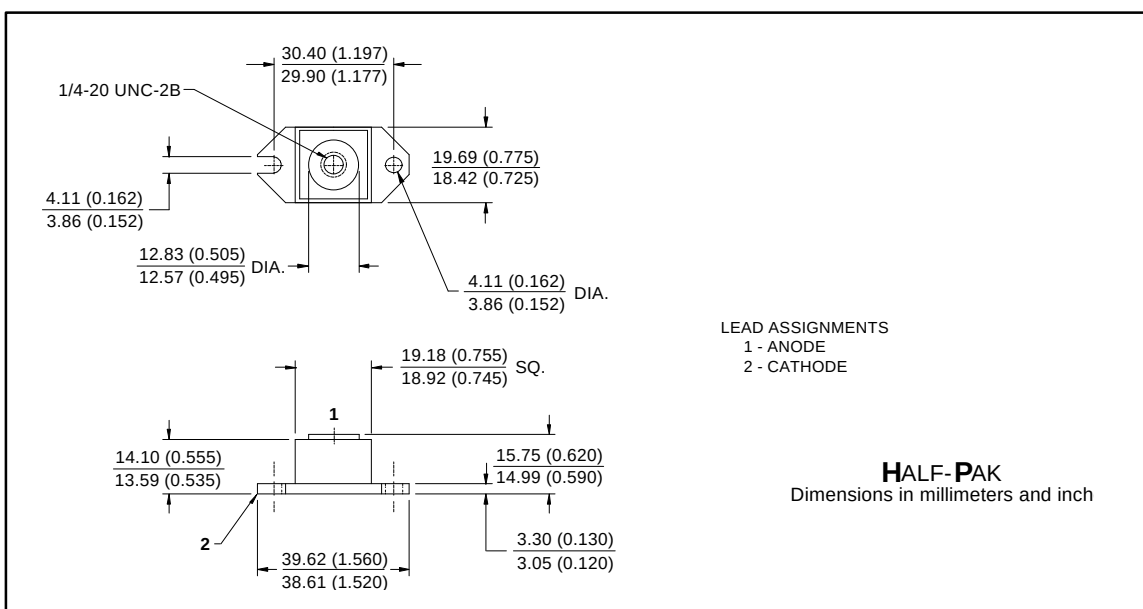


Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	600	—	—	V	$I_R = 100\mu\text{A}$
V_{FM}	Max Forward Voltage	—	1.3	1.5	V	$I_F = 105\text{A}$
			1.5	1.7		$I_F = 210\text{A}$
			1.2	1.4		$I_F = 105\text{A}, T_J = 125^\circ\text{C}$
I_{RM}	Max Reverse Leakage Current	—	6.0	30	μA	$V_R = V_R \text{ Rated}$
			1.5	6.0	mA	$T_J = 125^\circ\text{C}, V_R = 480\text{V}$
C_T	Junction Capacitance	—	200	300	pF	$V_R = 200\text{V}$
L_S	Series Inductance	—	6.0	—	nH	From top of terminal hole to mounting plane

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t_{rr}	Reverse Recovery Time	—	35	—	ns	$I_F = 1.0\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_R = 30\text{V}$
t_{rr1}		—	90	140		$T_J = 25^\circ\text{C}$
t_{rr2}		—	160	240		$T_J = 125^\circ\text{C}$
I_{RRM1}	Peak Recovery Current	—	10	18	A	$T_J = 25^\circ\text{C}$
I_{RRM2}		—	15	30		$T_J = 125^\circ\text{C}$
Q_{rr1}	Reverse Recovery Charge	—	450	1300	nC	$T_J = 25^\circ\text{C}$
Q_{rr2}		—	1200	3600		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current During t_b	—	310	—	$\text{A}/\mu\text{s}$	$T_J = 25^\circ\text{C}$
$di_{(rec)M}/dt2$		—	240	—		$T_J = 125^\circ\text{C}$



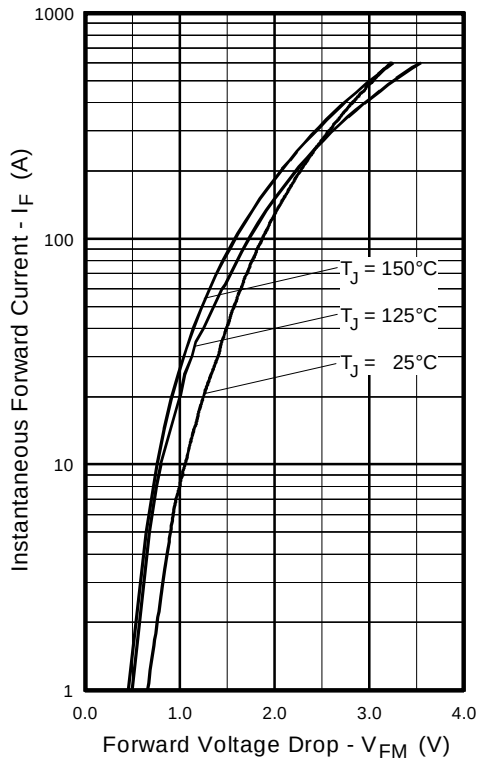


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

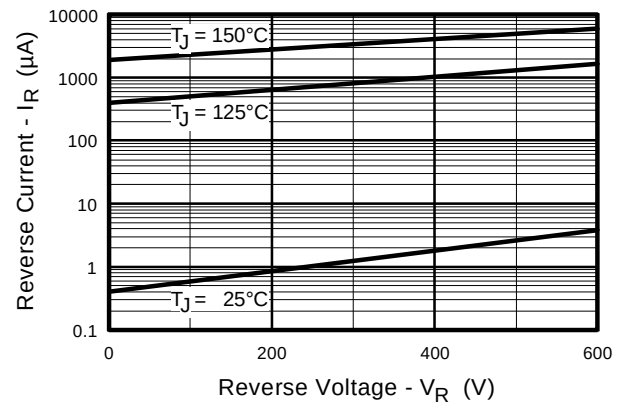


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

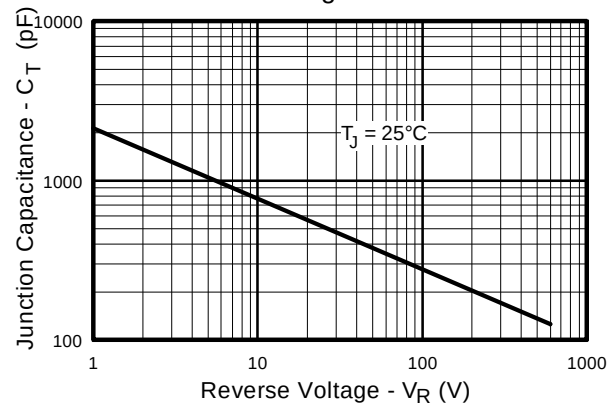


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

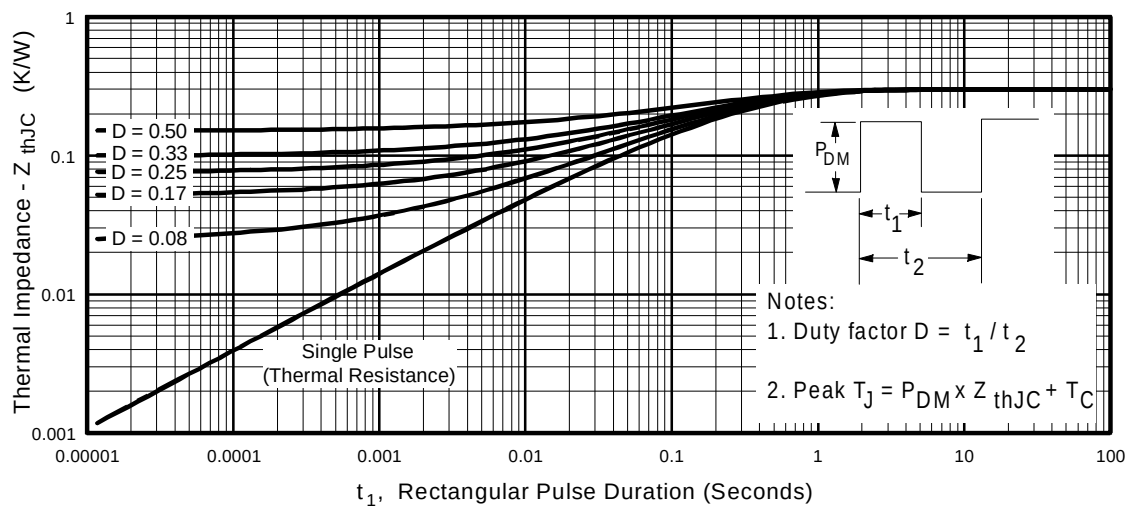


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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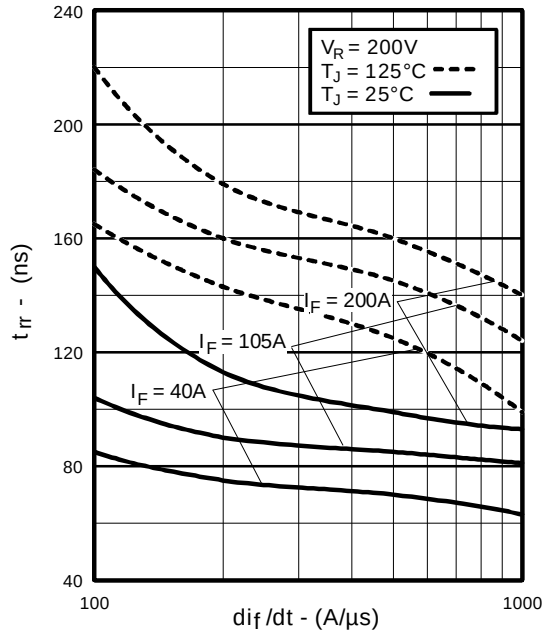


Fig. 5 - Typical Reverse Recovery vs. dI/dt

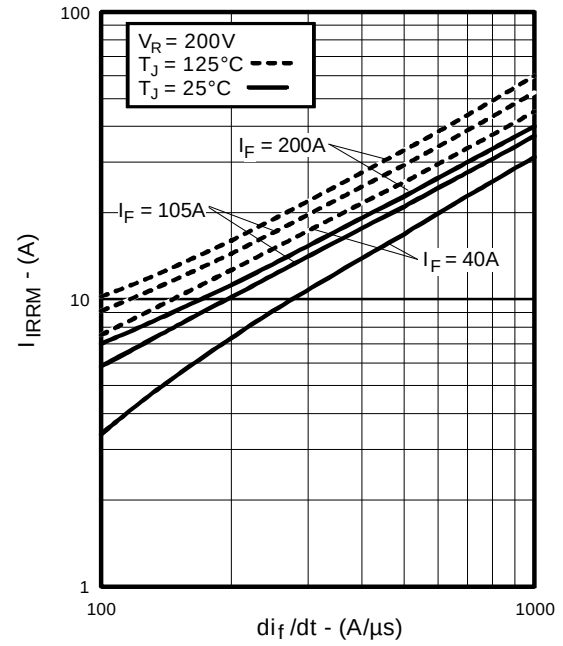


Fig. 6 - Typical Recovery Current vs. dI/dt

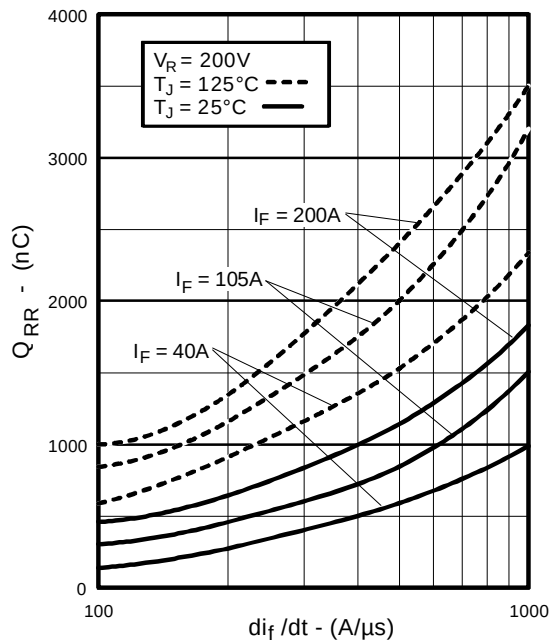


Fig. 7 - Typical Stored Charge vs. dI/dt

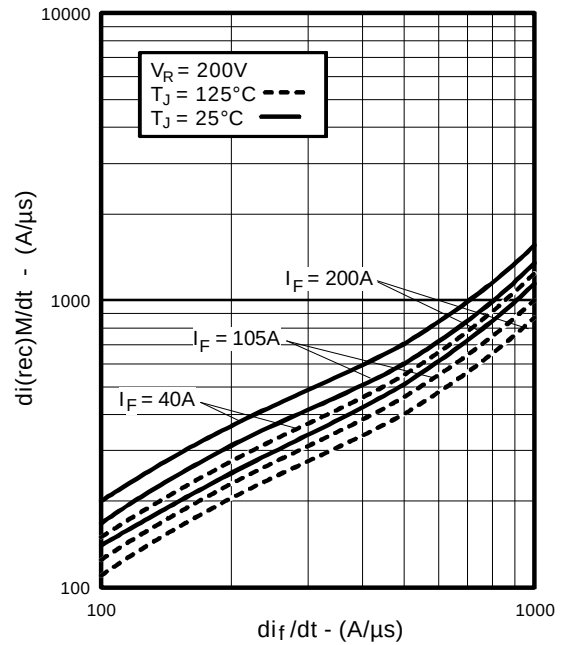


Fig. 8 - Typical $di_{(rec)M}/dt$ vs. dI/dt

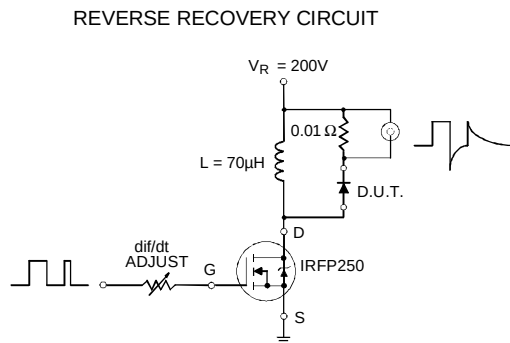


Fig. 9 - Reverse Recovery Parameter Test Circuit

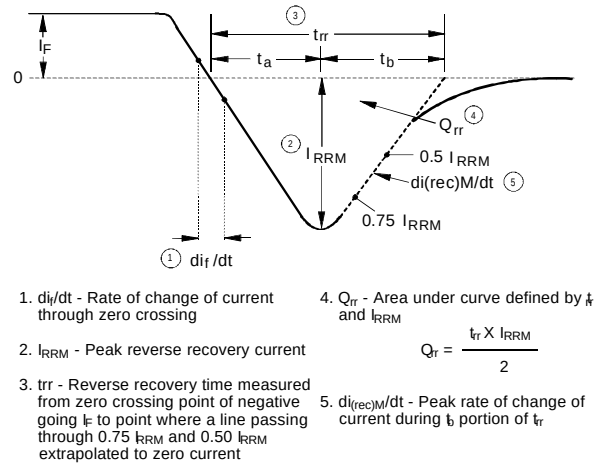


Fig. 10 - Reverse Recovery Waveform and Definitions

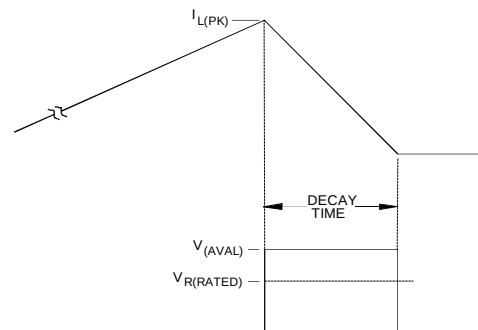
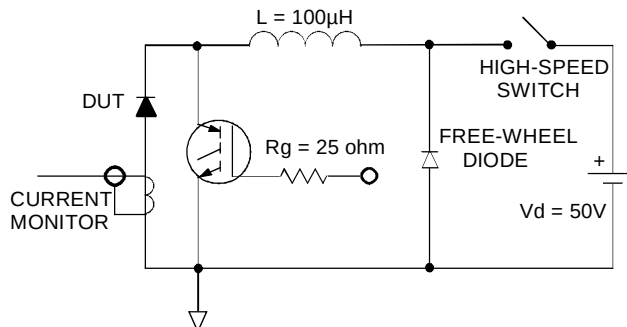


Fig. 11 - Avalanche Test Circuit and Waveforms