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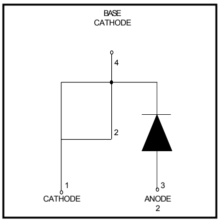
International Rectifier

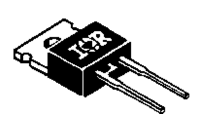
HFA25TB60

HEXFRED™

Ultrafast, Soft Recovery Diode



V_R = 600V
V_F(typ.)* = 1.3V
$I_{F(AV)}$ = 25A
Q_{rr} (typ.)= 112nC
I_{RRM} = 10A
t_{rr}(typ.) = 23ns
$di_{(rec)M}/dt$ (typ.) = 250A/µs



TO-220AC

Features

- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low I_{RRM}
- Very Low Q_{rr}
- Specified at Operating Conditions

Benefits

- Reduced RFI and EMI
- Reduced Power Loss in Diode and Switching Transistor
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

Description

International Rectifier's HFA25TB60 is a state of the art ultra fast recovery diode. Employing the latest in epitaxial construction and advanced processing techniques it features a superb combination of characteristics which result in performance which is unsurpassed by any rectifier previously available. With basic ratings of 600 volts and 25 amps continuous current, the HFA25TB60 is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultra fast recovery time, the HEXFRED product line features extremely low values of peak recovery current (I_{RRM}) and does not exhibit any tendency to "snap-off" during the t_b portion of recovery. The HEXFRED features combine to offer designers a rectifier with lower noise and significantly lower switching losses in both the diode and the switching transistor. These HEXFRED advantages can help to significantly reduce snubbing, component count and heatsink sizes. The HEXFRED HFA25TB60 is ideally suited for applications in power supplies and power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.

Absolute Maximum Ratings

	Parameter	Max	Units
V_R	Cathode-to-Anode Voltage	600	V
I_F @ T_C = 100°C	Continuous Forward Current	25	A
I_{FSM}	Single Pulse Forward Current	225	
I_{FRM}	Maximum Repetitive Forward Current	100	
P_D @ T_C = 25°C	Maximum Power Dissipation	125	C
P_D @ T_C = 100°C	Maximum Power Dissipation	50	
T_J	Operating Junction and	-55 to +150	W
T_{STG}	Storage Temperature Range		

* 125°C

Electrical Characteristics @ 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	1.7	V	I_F = 25A See Fig. 1
			1.5	2.0		I_F = 50A
			1.3	1.7		I_F = 25A, T_J = 125°C
I_{RM}	Max Reverse Leakage Current		1.5	20	µA	V_R = V_R Rated See Fig. 2
			600	2000		T_J = 125°C, V_R = 0.8 x V_R Rated
C_T	Junction Capacitance		55	100	pF	V_R = 200V See Fig. 3
L_S	Series Inductance		8.0		nH	Measured lead to lead 5mm from package body

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

	Parameter	Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time		23		ns	I_F = 1.0A, di_f/dt = 200A/µs, V_R = 30V	
t_{rr1}	See Fig. 5, 6 & 16		50	75		T_J = 25°C	I_F = 25A
t_{rr2}			105	160		T_J = 125°C	
I_{RRM1}	Peak Recovery Current		4.5	10	A	T_J = 25°C	V_R = 200V
I_{RRM2}	See Fig. 7& 8		8.0	15		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge		112	375	nC	T_J = 25°C	di_f/dt = 200A/µs
Q_{rr2}	See Fig. 9 & 10		420	1200		T_J = 125°C	
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current		250		A/µs	T_J = 25°C	
$di_{(rec)M}/dt2$	During t_b See Fig. 11 & 12		160			T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameter	Min	Typ	Max	Units
T_{lead} ①	Lead Temperature			300	°C
R_{thJC}	Thermal Resistance, Junction to Case			1.0	K/W
R_{thJA} ②	Thermal Resistance, Junction to Ambient			80	
R_{thCS} ③	Thermal Resistance, Case to Heat Sink		0.5		
Wt	Weight		2.0		g
			0.07		(oz)
	Mounting Torque	6.0		12	Kg-cm
		5.0		10	lbf•in

① 0.063 in. from Case (1.6mm) for 10 sec
② Typical Socket Mount
③ Mounting Surface, Flat, Smooth and Greased

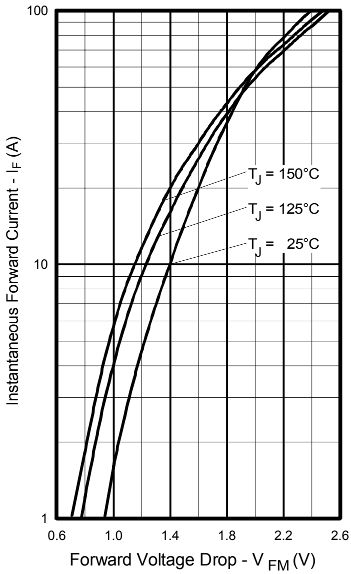


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

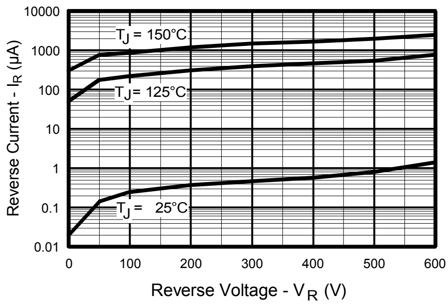


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

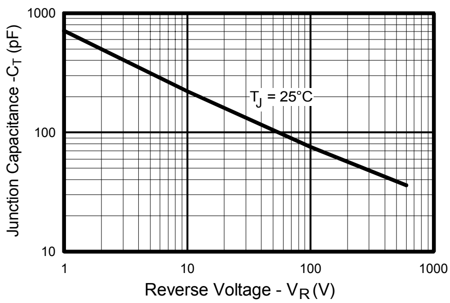


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

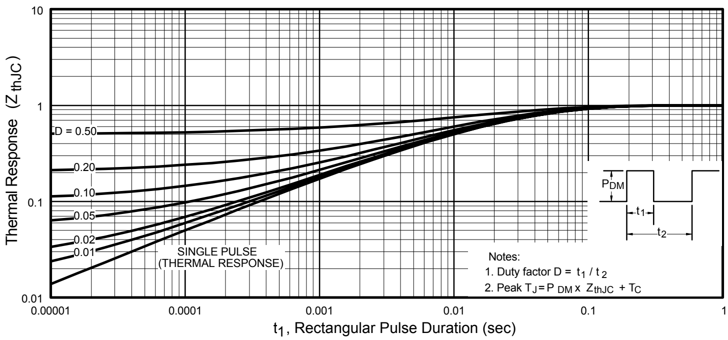


Fig. 4 - Maximum Thermal Impedance Z_{thjc} Characteristics

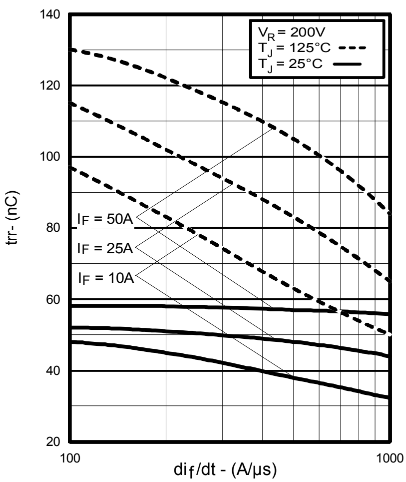


Fig. 5 - Typical Reverse Recovery vs. di_f/dt

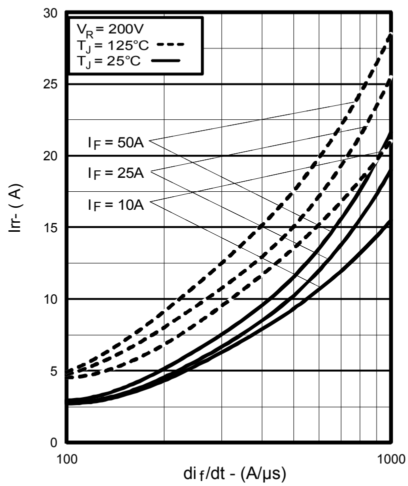


Fig. 6 - Typical Recovery Current vs. di_f/dt

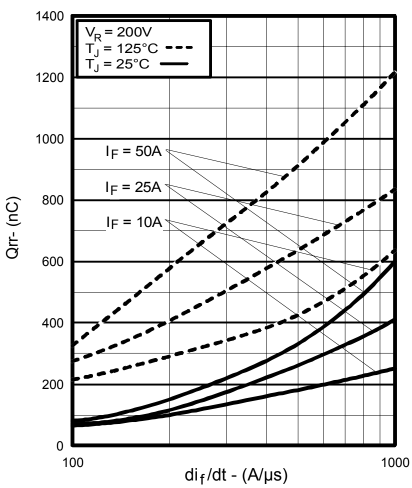


Fig. 7 - Typical Stored Charge vs. di_f/dt

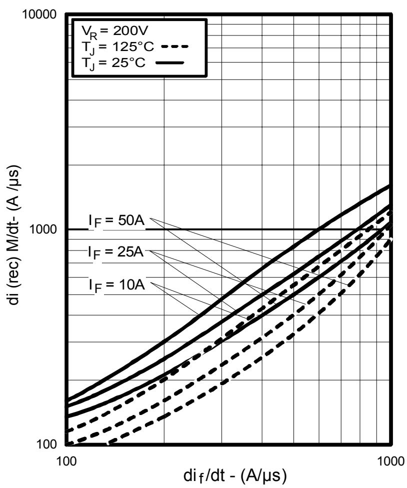


Fig. 8 - Typical $di_{(rec)M}$/dt vs. di_f/dt

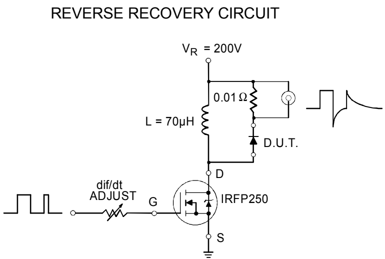
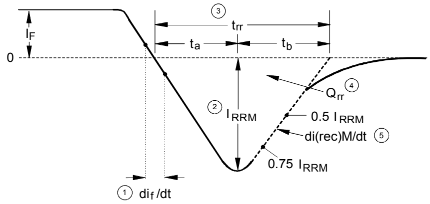


Fig. 9 - Reverse Recovery Parameter Test Circuit

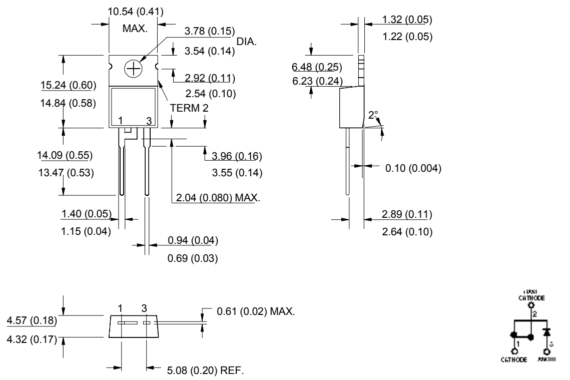


1. di_f/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. trr - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area 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



Conforms to JEDEC Outline TO-220AC
Dimensions in millimeters and inches

International IOR Rectifier

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