

## HFA25TB60S

HEXFRED™

Ultrafast, Soft Recovery Diode

### Features

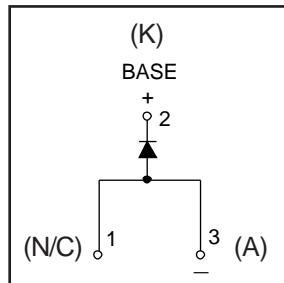
- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low  $I_{RRM}$
- Very Low  $Q_{rr}$
- Guaranteed Avalanche
- Specified at Operating Conditions

### Benefits

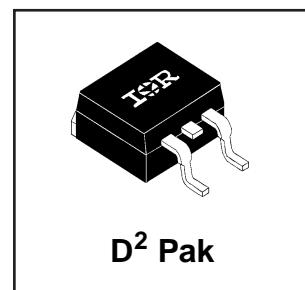
- Reduced RFI and EMI
- Reduced Power Loss in Diode and Switching Transistor
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

### Description

International Rectifier's HFA25TB60S 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 HFA25TB60S 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 HFA25TB60S 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.



$V_R = 600V$
$I_F(\text{typ.})^* = 1.3V$
$I_F(\text{AV}) = 25A$
$Q_{rr} (\text{typ.}) = 112\text{nC}$
$I_{RRM} = 10A$
$t_{rr}(\text{typ.}) = 23\text{ns}$
$dI_{(\text{rec})M}/dt (\text{typ.}) = 250\text{A}/\mu\text{s}$



### Absolute Maximum Ratings

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

\*  $125^\circ\text{C}$

# HFA25TB60S

PD-20616 01/99

International  
**IR** Rectifier

## 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	1.7	V	$I_F = 25\text{A}$
		—	1.5	2.0		$I_F = 50\text{A}$
		—	1.3	1.7		$I_F = 25\text{A}, T_J = 125^\circ\text{C}$
$I_{RM}$	Max Reverse Leakage Current	—	1.5	20	$\mu\text{A}$	$V_R = V_R \text{ Rated}$
		—	600	2000		$T_J = 125^\circ\text{C}, V_R = 0.8 \times V_R \text{ Rated}$
$C_T$	Junction Capacitance	—	55	100	pF	$V_R = 200\text{V}$
$L_S$	Series Inductance	—	8.0	—	nH	Measured lead to lead 5mm from package body

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

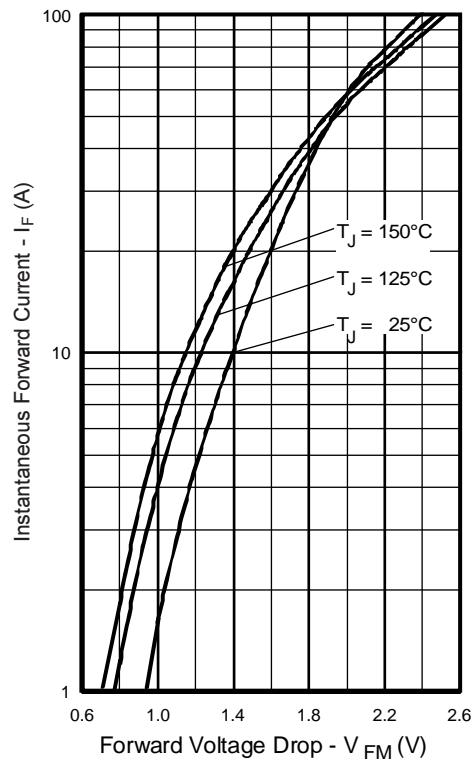
	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{rr}$	Reverse Recovery Time See Fig. 5 & 6	—	17	—	ns	$I_F = 1.0\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_R = 30\text{V}$
$t_{rr1}$		—	28	42		$T_J = 25^\circ\text{C}$
$t_{rr2}$		—	38	57		$T_J = 125^\circ\text{C}$
$I_{RRM1}$	Peak Recovery Current	—	2.9	5.2	A	$T_J = 25^\circ\text{C}$
$I_{RRM2}$		—	3.7	6.7		$T_J = 125^\circ\text{C}$
$Q_{rr1}$	Reverse Recovery Charge See Fig. 7	—	40	60	nC	$T_J = 25^\circ\text{C}$
$Q_{rr2}$		—	70	105		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During $t_b$ See Fig. 8	—	280	—	$\text{A}/\mu\text{s}$	$T_J = 25^\circ\text{C}$
$di_{(rec)M}/dt_2$		—	235	—		$T_J = 125^\circ\text{C}$

## Thermal - Mechanical Characteristics

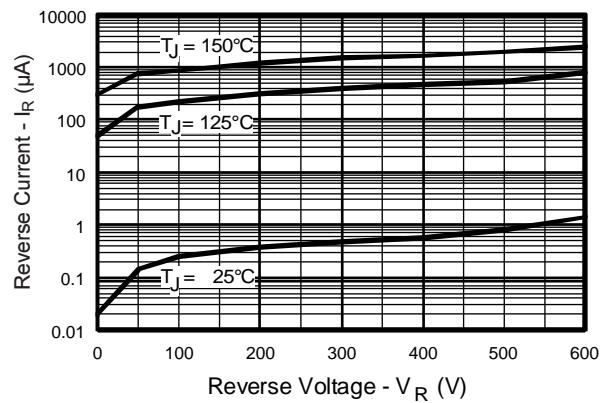
	Parameter	Min.	Typ.	Max.	Units
$T_{lead}$ ①	Lead Temperature	—	—	300	°C
$R_{thJC}$	Thermal Resistance, Junction to Case	—	—	1.0	K/W
$R_{thJA}$ ②		—	—	80	
Wt	Weight	—	2.0	—	g
		—	0.07	—	(oz)

① 0.063 in. from Case (1.6mm) for 10 sec

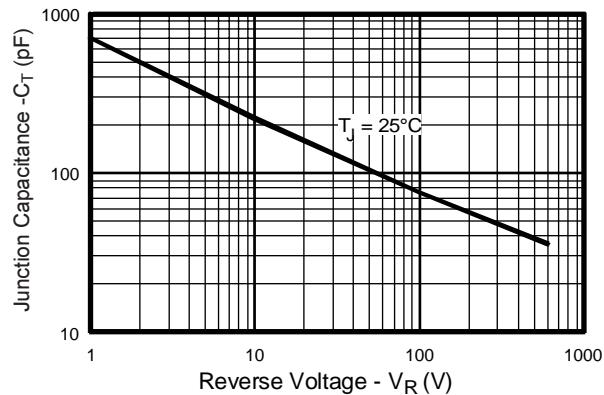
② Typical Socket Mount



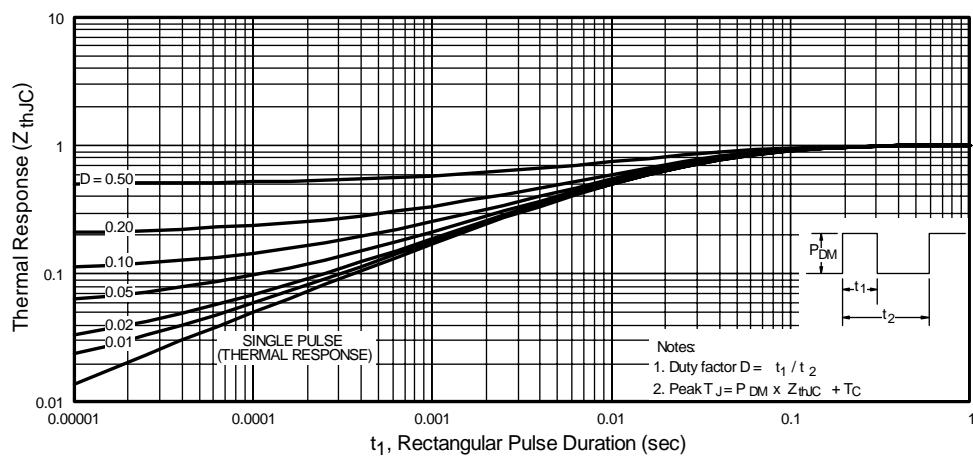
**Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current**



**Fig. 2 - Typical Reverse Current vs. Reverse Voltage**



**Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage**

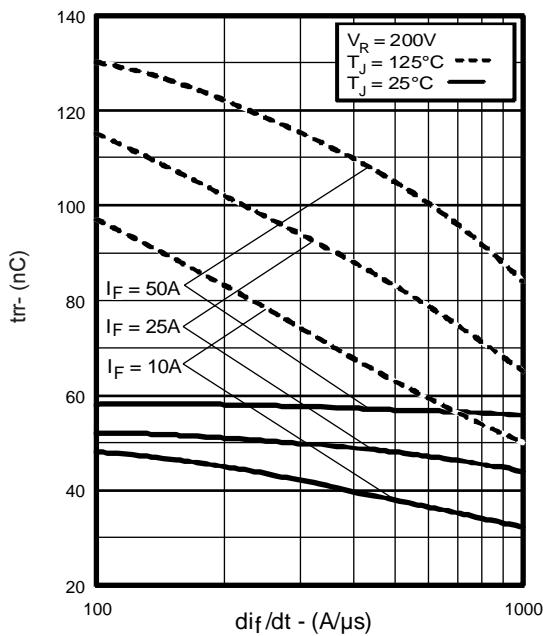


**Fig. 4 - Maximum Thermal Impedance  $Z_{thjc}$  Characteristics**

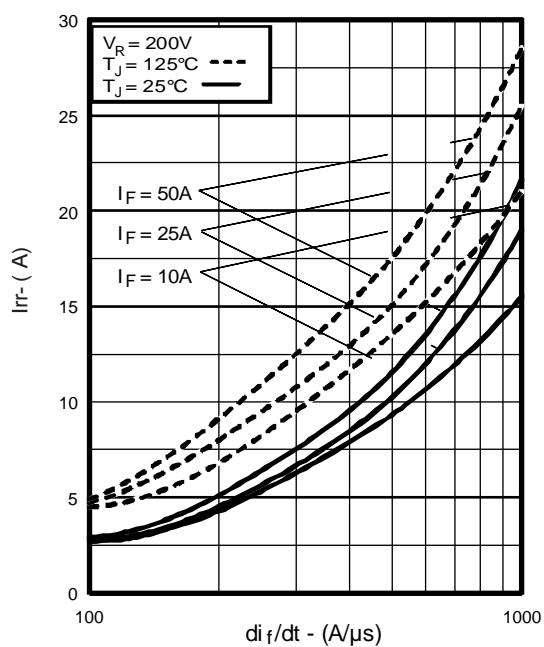
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PD-20616 01/99

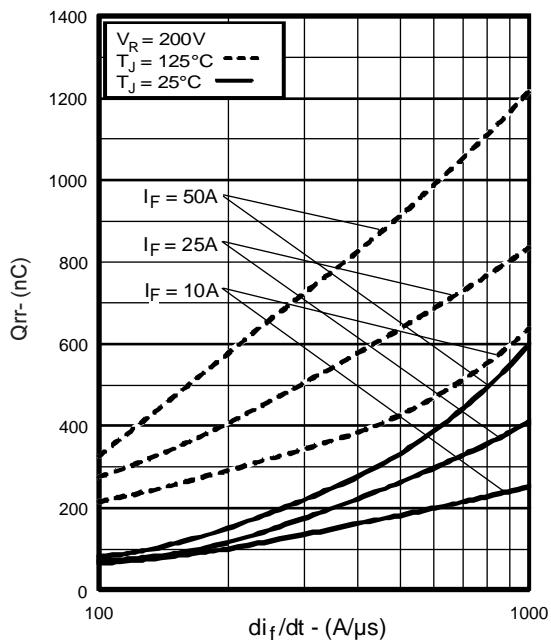
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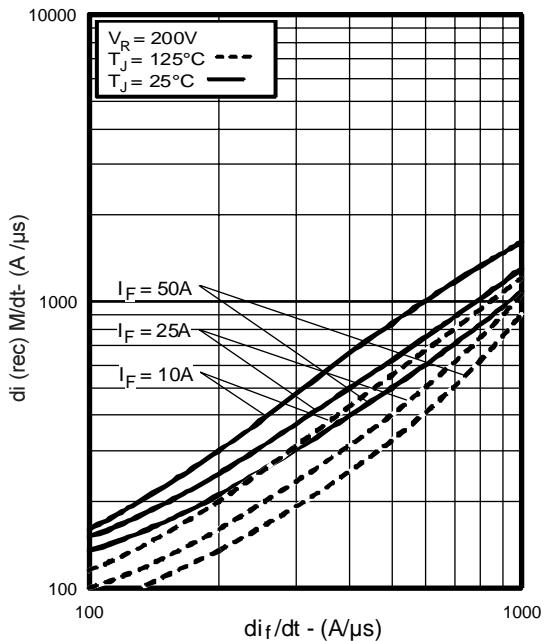
**Fig. 5** - Typical Reverse Recovery vs.  $di_f/dt$



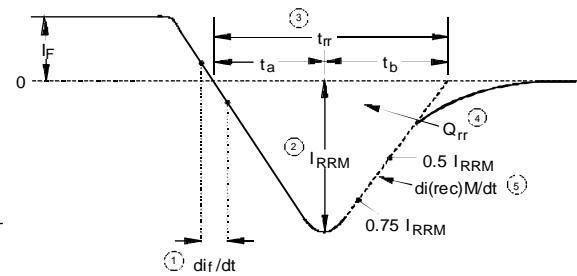
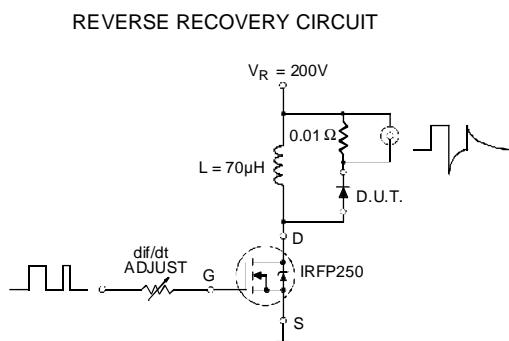
**Fig. 6** - Typical Recovery Current vs.  $di_f/dt$



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



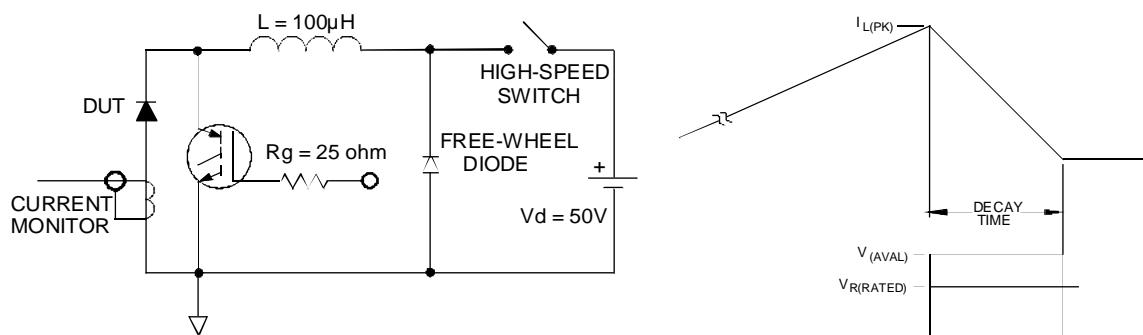
**Fig. 8** - Typical  $di_{(rec)M}/dt$  vs.  $di_f/dt$



1.  $\frac{di}{dt}$  - Rate of change of current through zero crossing
2.  $I_{RRM}$  - Peak reverse recovery current
3.  $t_{rr}$  - 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  $I_{RRM}$
5.  $\frac{di_{(rec)}M}{dt}$  - Peak rate of change of current during  $t_b$  portion of  $t_{rr}$

**Fig. 9 - Reverse Recovery Parameter Test Circuit**

**Fig. 10 - Reverse Recovery Waveform and Definitions**



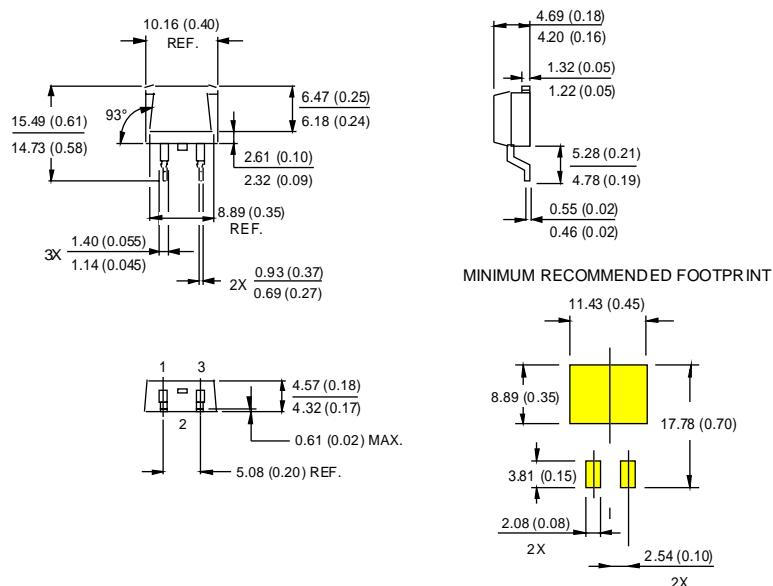
**Fig. 11 - Avalanche Test Circuit and Waveforms**

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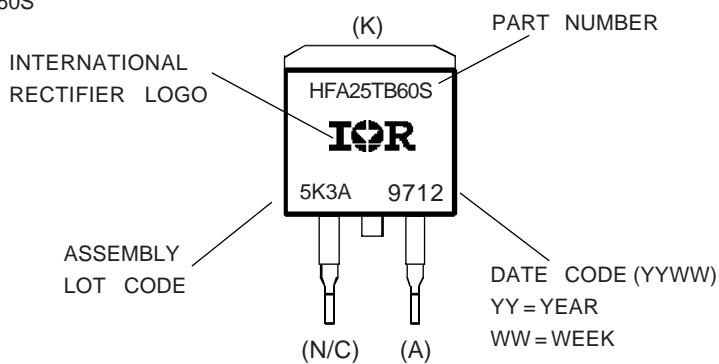
## Outline Table



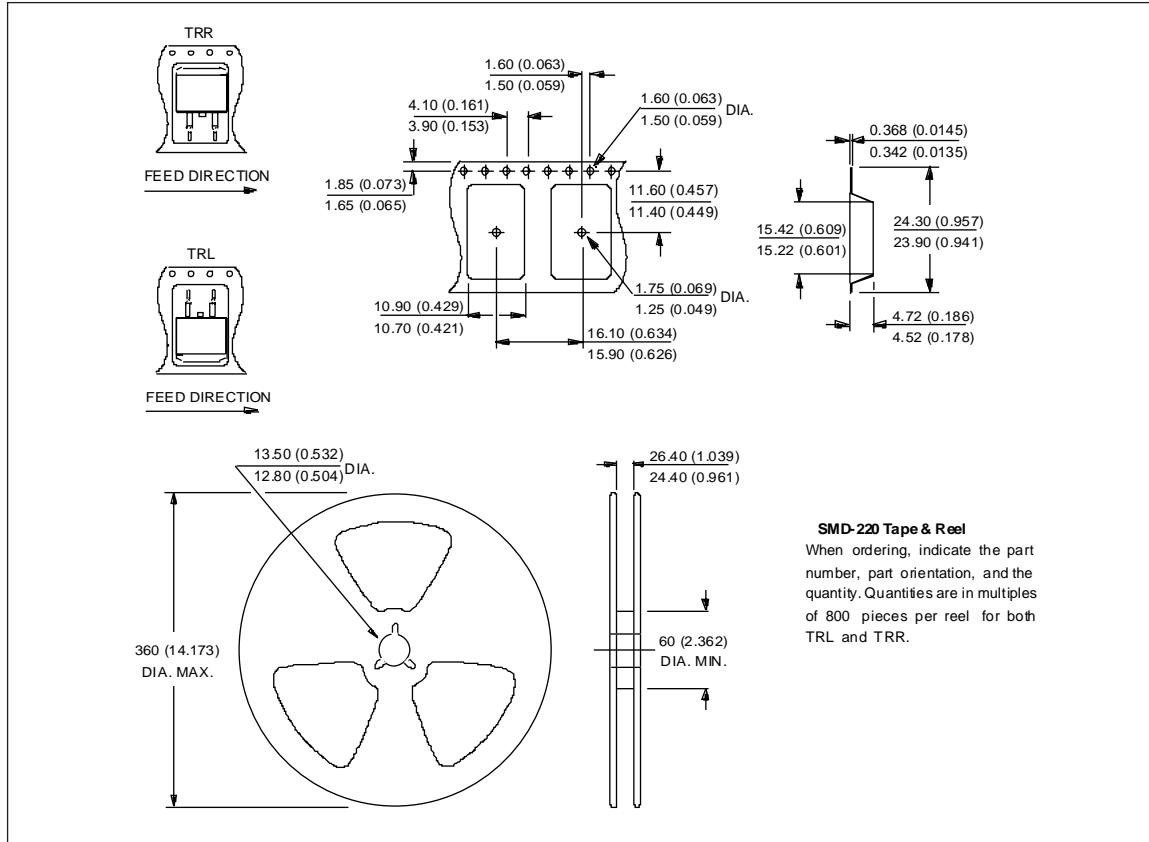
Conforms to JEDEC Outline D<sup>2</sup>PAK  
Dimensions in millimeters and inches

## Part Marking Information

EXAMPLE: THIS IS AN HFA25TB60S



### Tape & Reel Information



International  
**IR** Rectifier

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