

International
IR Rectifier

HEXFRED™

HFA25TB60S

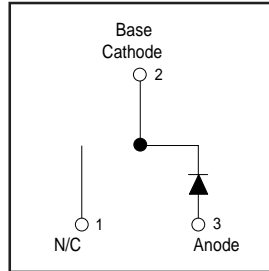
Ultrafast, Soft Recovery Diode

Features

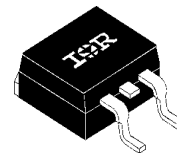
- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low I_{RRM}
- Very Low Q_{rr}
- Specified at Operating Conditions

Benefits

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



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



D² Pak

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.

Absolute Maximum Ratings

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

* $125^\circ C$

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 | | $I_F = 50\text{A}$ See Fig. 1 |
| | | — | 1.3 | 1.7 | | $I_F = 25\text{A}, T_J = 125^\circ\text{C}$ |
| I_{RM} | Max Reverse Leakage Current | — | 1.5 | 20 | μA | $V_R = V_R \text{ Rated}$ See Fig. 2 |
| | | — | 600 | 2000 | | $T_J = 125^\circ\text{C}, V_R = 0.8 \times V_R \text{ Rated}$ |
| C_T | Junction Capacitance | — | 55 | 100 | pF | $V_R = 200\text{V}$ See Fig. 3 |
| 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 | — | 23 | — | ns | $I_F = 1.0\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_R = 30\text{V}$ |
| t_{rr1} | See Fig. 5 | — | 50 | 75 | | $T_J = 25^\circ\text{C}$ |
| t_{rr2} | | — | 105 | 160 | | $T_J = 125^\circ\text{C}$ |
| I_{RRM1} | Peak Recovery Current | — | 4.5 | 10 | A | $T_J = 25^\circ\text{C}$ |
| I_{RRM2} | See Fig. 6 | — | 8.0 | 15 | | $T_J = 125^\circ\text{C}$ |
| Q_{rr1} | Reverse Recovery Charge | — | 112 | 375 | nC | $T_J = 25^\circ\text{C}$ |
| Q_{rr2} | See Fig. 7 | — | 420 | 1200 | | $T_J = 125^\circ\text{C}$ |
| $di_{(rec)M}/dt1$ | Peak Rate of Fall of Recovery Current | — | 250 | — | A/ μs | $T_J = 25^\circ\text{C}$ |
| $di_{(rec)M}/dt2$ | During t_b See Fig. 8 | — | 160 | — | | $T_J = 125^\circ\text{C}$ |

Thermal - Mechanical Characteristics

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

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

② Typical Socket Mount

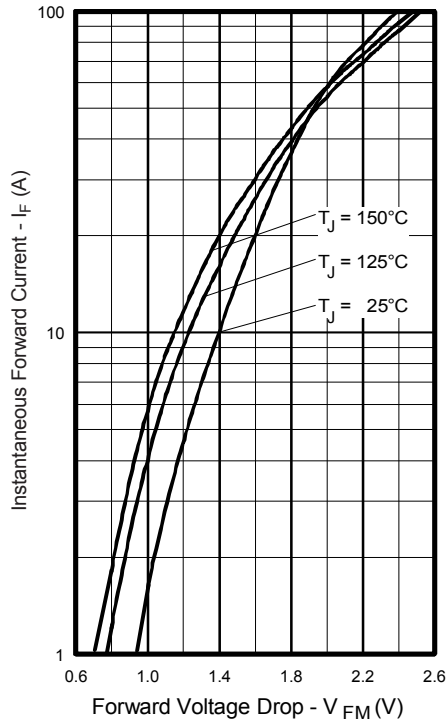


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

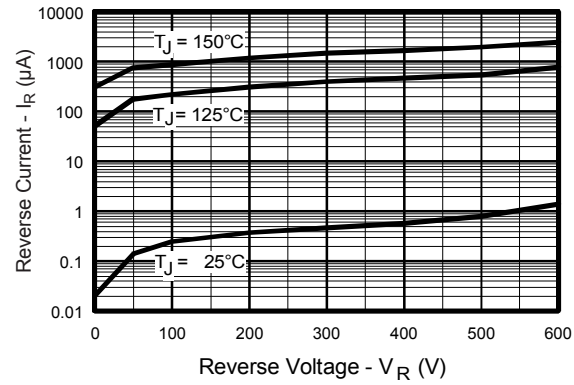


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

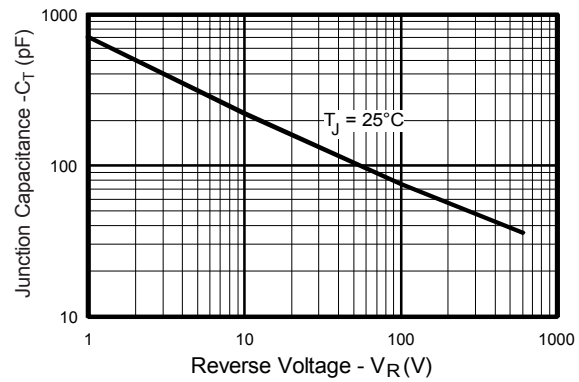


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

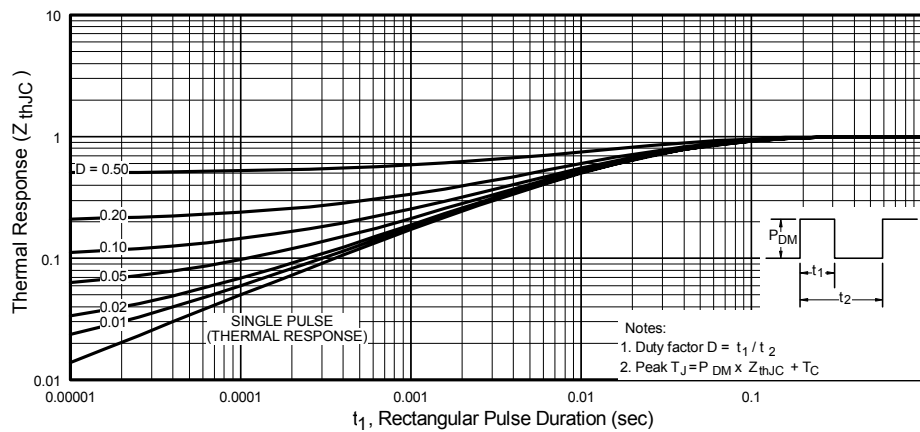
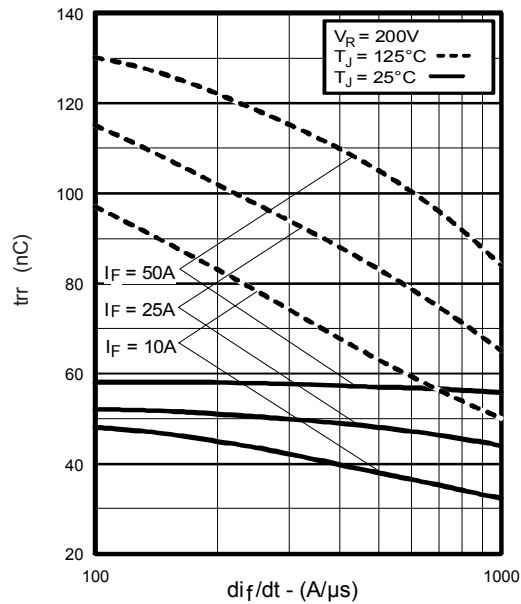
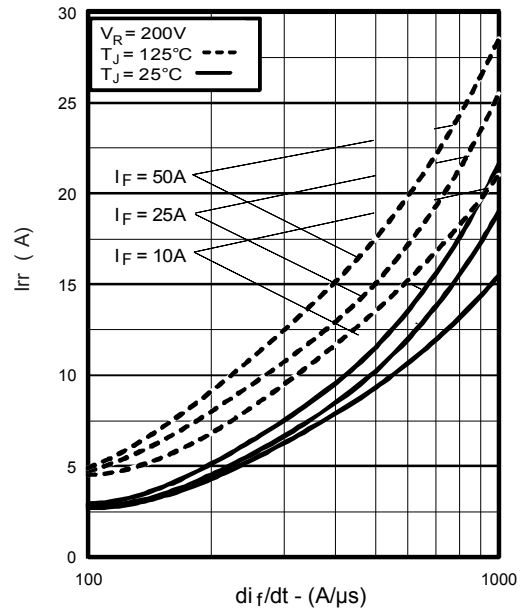
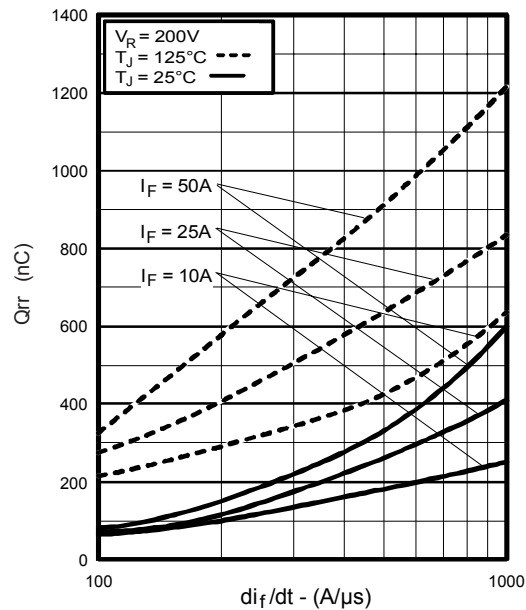
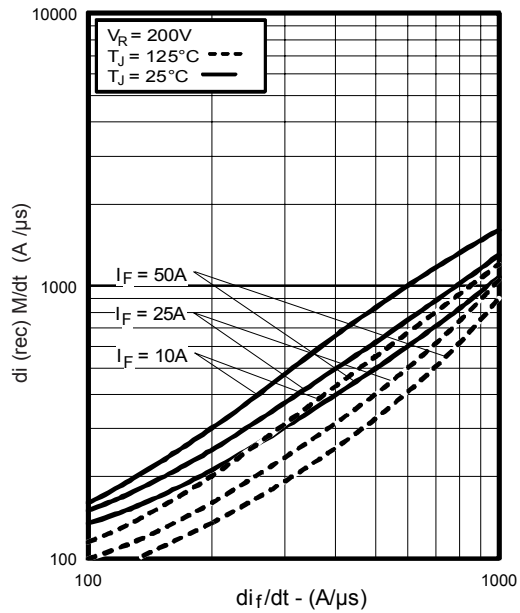


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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

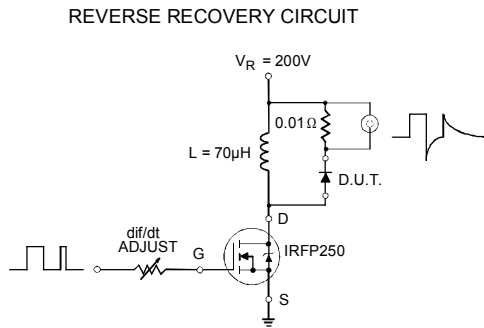


Fig. 9 - Reverse Recovery Parameter Test Circuit

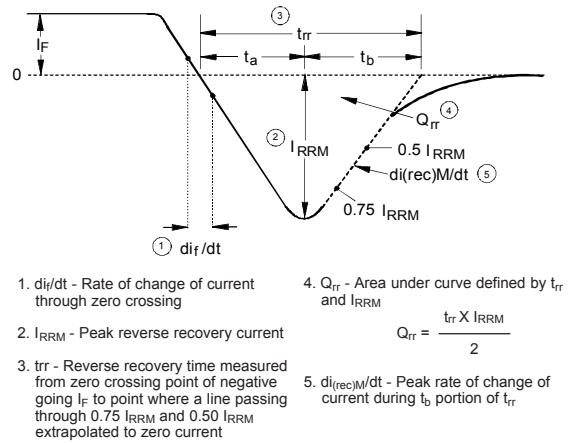
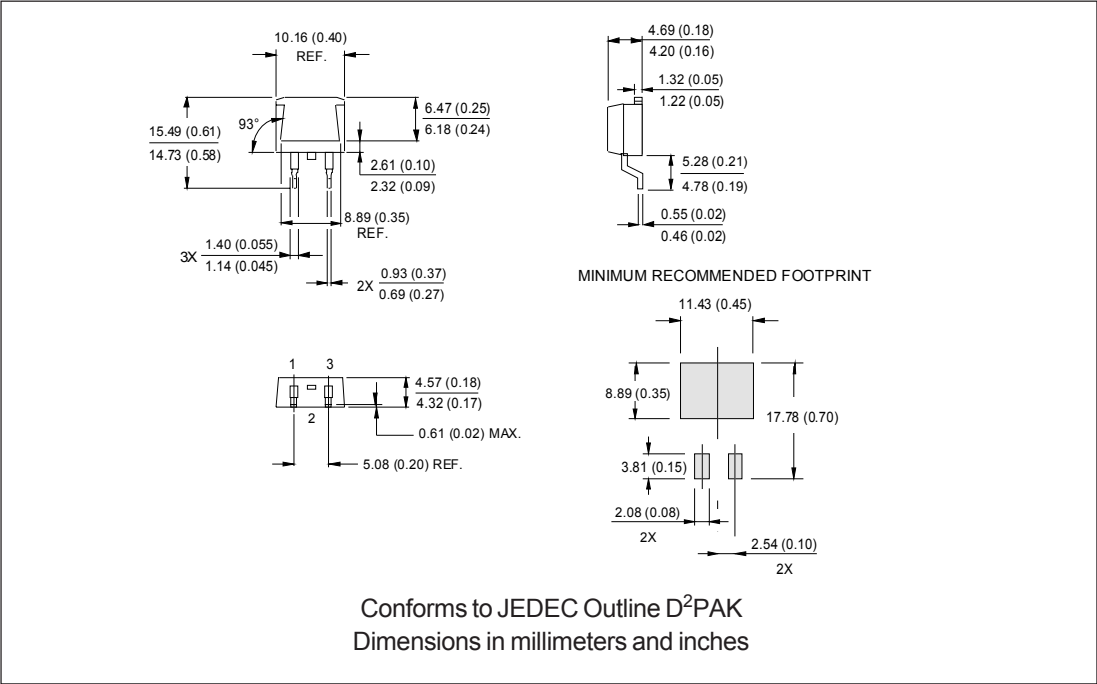


Fig. 10 - Reverse Recovery Waveform and Definitions

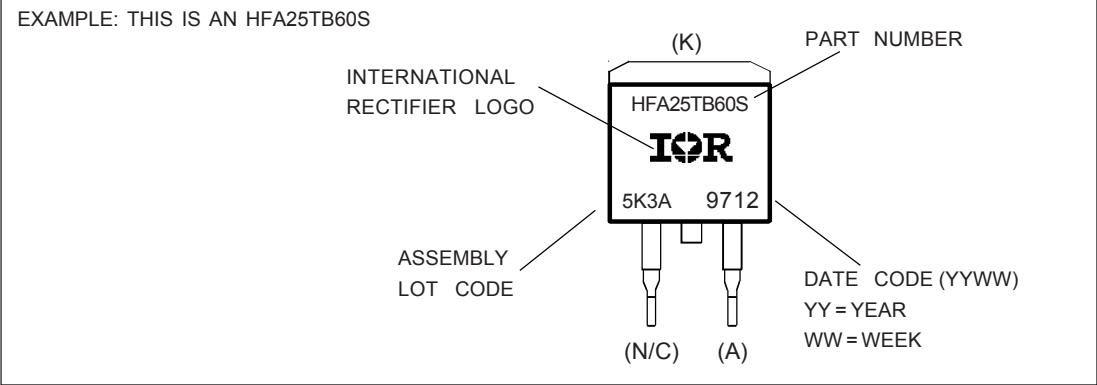
HFA25TB60S

Bulletin PD-20616 rev. B 11/03

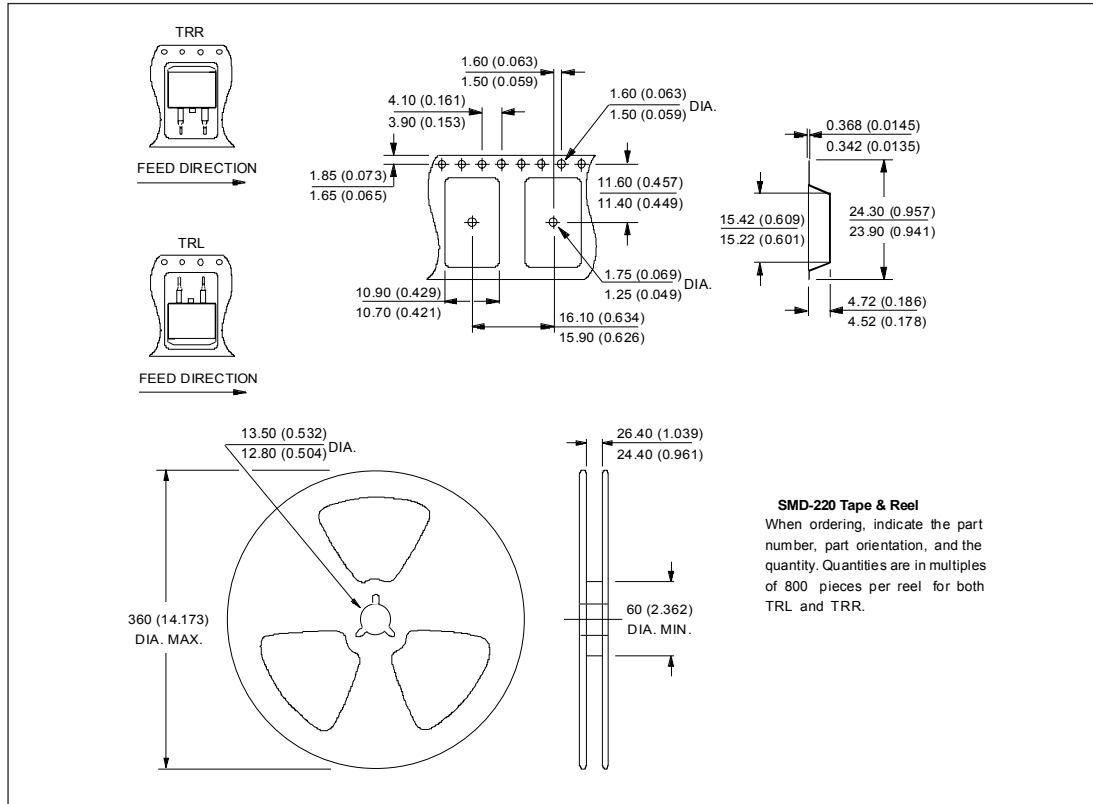
Outline Table



Part Marking Information



Tape & Reel Information



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.