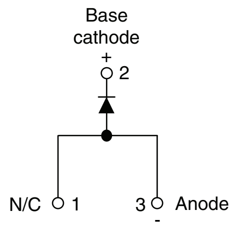
# HEXFRED®
# Ultrafast Soft Recovery Diode, 8 A




**$D^2$PAK**

## FEATURES

- Ultrafast recovery
- Ultrasoft recovery
- Very low $I_{RRM}$
- Very low $Q_{rr}$
- Specified at operating conditions
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- AEC-Q101 qualified

Pb Available

e3

RoHS* COMPLIANT

HALOGEN FREE

## BENEFITS

- Reduced RFI and EMI
- Reduced power loss in diode and switching transistor
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

## DESCRIPTION

HFA08TB60S is a state of the art ultrafast 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 V and 8 A continuous current, the HFA08TB60S is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultrafast 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 HFA08TB60S is ideally suited for applications in power supplies (PFC boost diode) and power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.

| PRODUCT SUMMARY | |
|---|---|
| $V_R$ | 600 V |
| $V_F$ at 8 A at 25 °C | 1.7 V |
| $I_{F(AV)}$ | 8 A |
| $t_{rr}$ (typical) | 18 ns |
| $T_J$ (maximum) | 150 °C |
| $Q_{rr}$ (typical) | 65 nC |
| $dI_{(rec)M}/dt$ (typical) | 240 A/µs |
| $I_{RRM}$ | 5.0 A |

**ABSOLUTE MAXIMUM RATINGS**

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---|---|---|---|
| Cathode to anode voltage | $V_R$ | | 600 | V |
| Maximum continuous forward current | $I_F$ | $T_C$ = 100 °C | 8 | A |
| Single pulse forward current | $I_{FSM}$ | | 60 | |
| Maximum repetitive forward current | $I_{FRM}$ | | 24 | |
| Maximum power dissipation | $P_D$ | $T_C$ = 25 °C | 36 | W |
| | | $T_C$ = 100 °C | 14 | |
| Operating junction and storage temperature range | $T_J$, $T_{Stg}$ | | - 55 to + 150 | °C |

* Pb containing terminations are not RoHS compliant, exemptions may apply

**ELECTRICAL SPECIFICATIONS** ($T_J$ = 25 °C unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|---|
| Cathode to anode breakdown voltage | $V_{BR}$ | $I_R$ = 100 µA | | 600 | - | - | V |
| Maximum forward voltage | $V_{FM}$ | $I_F$ = 8.0 A | See fig. 1 | - | 1.4 | 1.7 | |
| | | $I_F$ = 16 A | | - | 1.7 | 2.1 | |
| | | $I_F$ = 8.0 A, $T_J$ = 125 °C | | - | 1.4 | 1.7 | |
| Maximum reverse leakage current | $I_{RM}$ | $V_R$ = $V_R$ rated | See fig. 2 | - | 0.3 | 5.0 | µA |
| | | $T_J$ = 125 °C, $V_R$ = 0.8 x $V_R$ rated | | - | 100 | 500 | |
| Junction capacitance | $C_T$ | $V_R$ = 200 V | See fig. 3 | - | 10 | 25 | pF |
| Series inductance | $L_S$ | Measured lead to lead 5 mm from package body | | - | 8.0 | - | nH |

**DYNAMIC RECOVERY CHARACTERISTICS** ($T_J$ = 25 °C unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|---|
| Reverse recovery time See fig. 5, 6 | $t_{rr}$ | $I_F$ = 1.0 A, $dI_F/dt$ = 200 A/µs, $V_R$ = 30 V | | - | 18 | - | ns |
| | $t_{rr1}$ | $T_J$ = 25 °C | $I_F$ = 8.0 A<br>$dI_F/dt$ = 200 A/µs<br>$V_R$ = 200 V | - | 37 | 55 | |
| | $t_{rr2}$ | $T_J$ = 125 °C | | - | 55 | 90 | |
| Peak recovery current | $I_{RRM1}$ | $T_J$ = 25 °C | | - | 3.5 | 5.0 | A |
| | $I_{RRM2}$ | $T_J$ = 125 °C | | - | 4.5 | 8.0 | |
| Reverse recovery charge See fig. 7 | $Q_{rr1}$ | $T_J$ = 25 °C | | - | 65 | 138 | nC |
| | $Q_{rr2}$ | $T_J$ = 125 °C | | - | 124 | 360 | |
| Peak rate of fall of recovery current during $t_b$ See fig. 8 | $dI_{(rec)M}/dt1$ | $T_J$ = 25 °C | | - | 240 | - | A/µs |
| | $dI_{(rec)M}/dt2$ | $T_J$ = 125 °C | | - | 210 | - | |

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| Lead temperature | $T_{lead}$ | 0.063" from case (1.6 mm) for 10 s | - | - | 300 | °C |
| Thermal resistance, junction to case | $R_{thJC}$ | | - | - | 3.5 | K/W |
| Thermal resistance, junction to ambient | $R_{thJA}$ | Typical socket mount | - | - | 80 | |
| Weight | | | - | 2.0 | - | g |
| | | | - | 0.07 | - | oz. |
| Marking device | | Case style $D^2PAK$ | HFA08TB60S | | | |

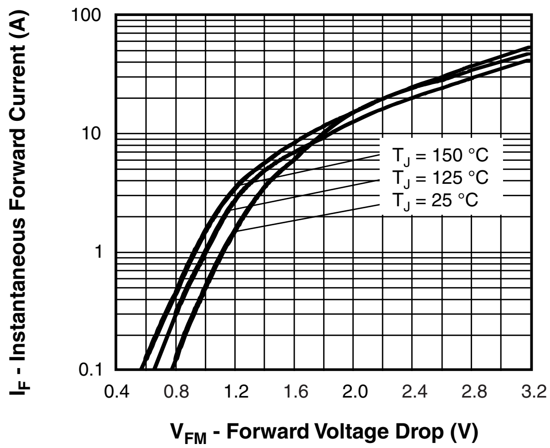



Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

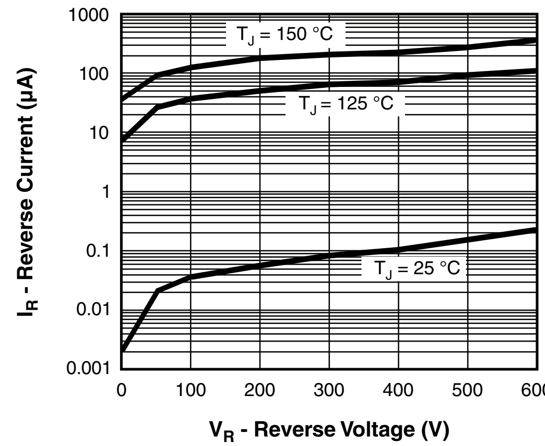



Fig. 2 - Typical Reverse Current vs. Reverse Voltage

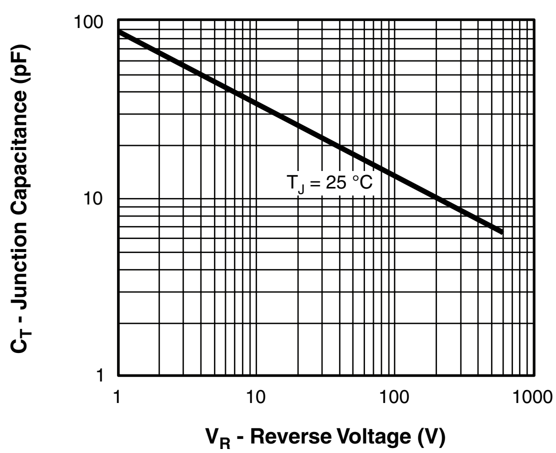



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

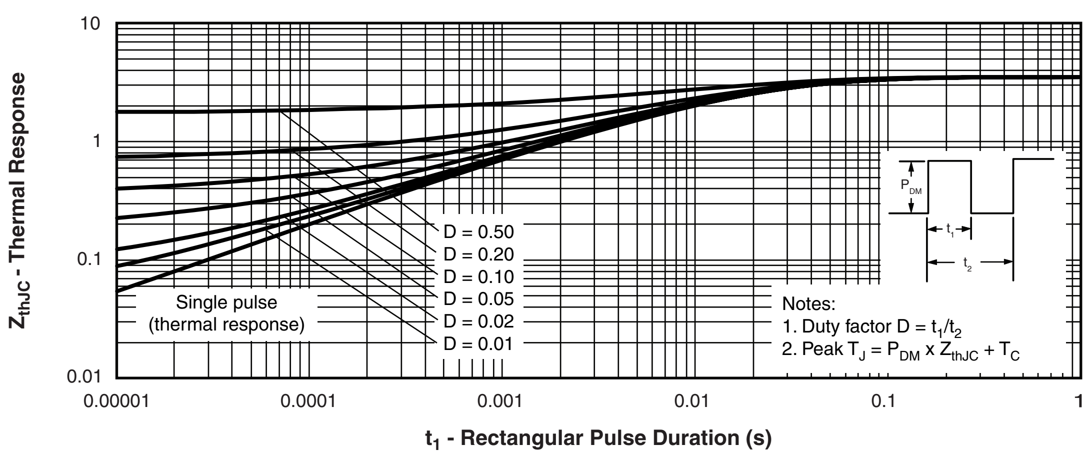



Fig. 4 - Maximum Thermal Impedance $Z_{thJC}$ Characteristics

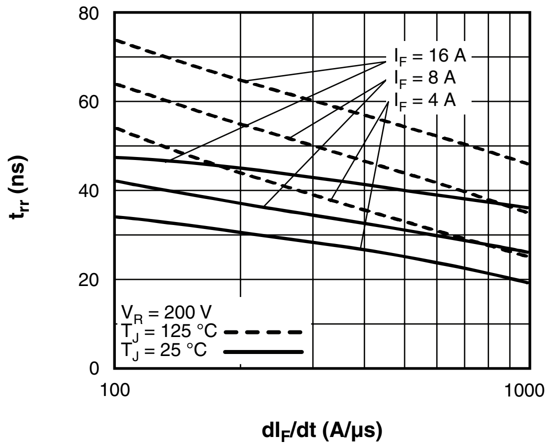



Fig. 5 - Typical Reverse Recovery Time vs. $dI_F/dt$

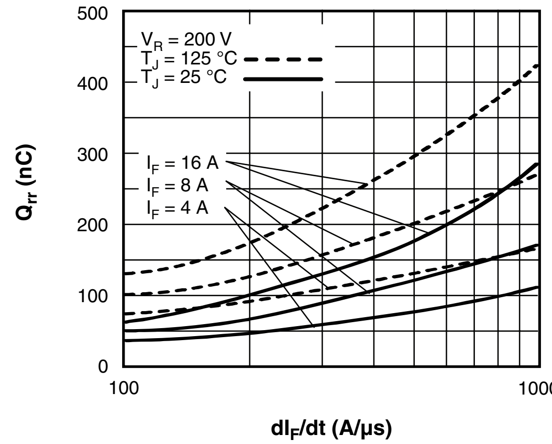



Fig. 7 - Typical Stored Charge vs. $dI_F/dt$

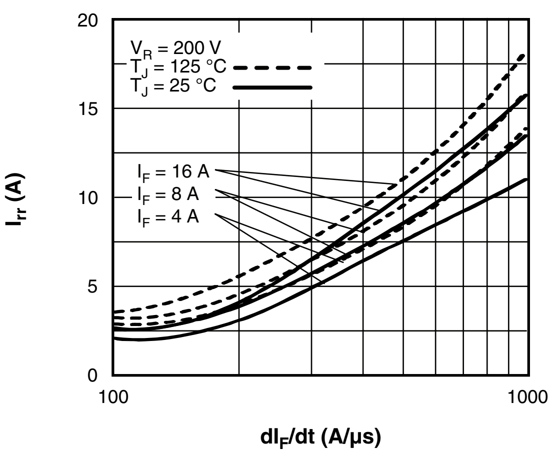



Fig. 6 - Typical Recovery Current vs. $dI_F/dt$

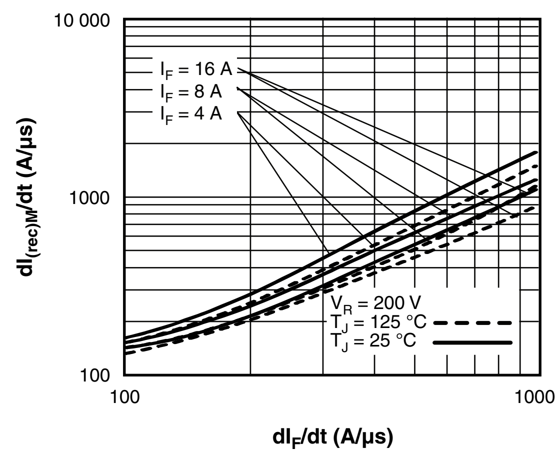



Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. $dI_F/dt$

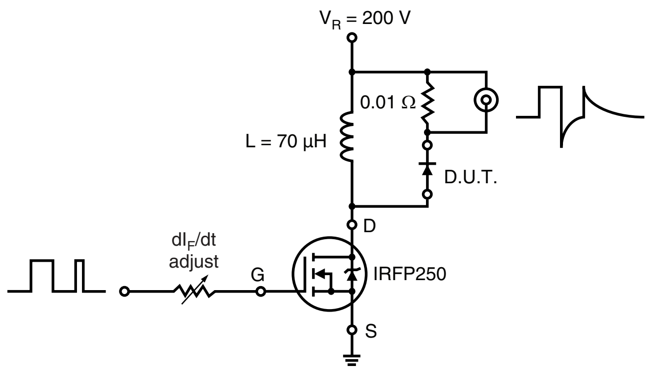
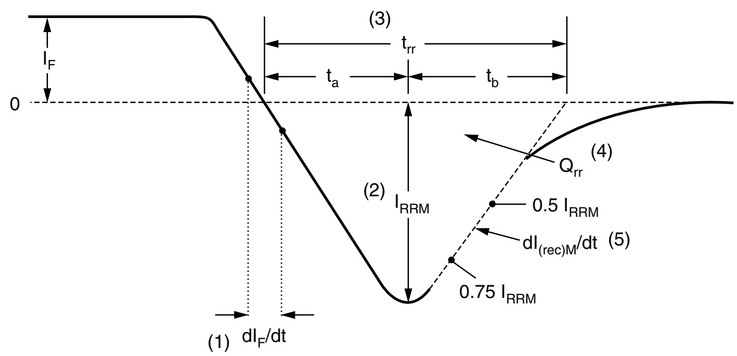



Fig. 9 - Reverse Recovery Parameter Test Circuit




(1) $dI_F/dt$ - rate of change of current through zero crossing

(2) $I_{RRM}$ - peak reverse recovery current

(3) $t_{rr}$ - 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 $I_{RRM}$

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(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

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | www.vishay.com/doc?95046 |
| Part marking information | www.vishay.com/doc?95054 |
| Packaging information | www.vishay.com/doc?95032 |

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