## 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 | $V_{FM}$ | $I_F$ = 4.0 A | See fig. 1 | - | 1.5 | 1.8 | |
| | | $I_F$ = 8.0 A | | - | 1.8 | 2.2 | |
| | | $I_F$ = 4.0 A, $T_J$ = 125 °C | | - | 1.4 | 1.7 | |
| Maximum reverse leakage current | $I_{RM}$ | $V_R$ = $V_R$ rated | See fig. 2 | - | 0.17 | 3.0 | µA |
| | | $T_J$ = 125 °C, $V_R$ = 0.8 x $V_R$ rated | | - | 44 | 300 | |
| Junction capacitance | $C_T$ | $V_R$ = 200 V | See fig. 3 | - | 4.0 | 8.0 | 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 | | - | 17 | - | ns |
| | $t_{rr1}$ | $T_J$ = 25 °C | $I_F$ = 4.0 A<br>$dI_F/dt$ = 200 A/µs<br>$V_R$ = 200 V | - | 28 | 42 | |
| | $t_{rr2}$ | $T_J$ = 125 °C | | - | 38 | 57 | |
| Peak recovery current | $I_{RRM1}$ | $T_J$ = 25 °C | | - | 2.9 | 5.2 | A |
| | $I_{RRM2}$ | $T_J$ = 125 °C | | - | 3.7 | 6.7 | |
| Reverse recovery charge See fig. 7 | $Q_{rr1}$ | $T_J$ = 25 °C | | - | 40 | 60 | nC |
| | $Q_{rr2}$ | $T_J$ = 125 °C | | - | 70 | 105 | |
| Peak rate of fall of recovery current during $t_b$ See fig. 8 | $dI_{(rec)M}/dt1$ | $T_J$ = 25 °C | | - | 280 | - | A/µs |
| | $dI_{(rec)M}/dt2$ | $T_J$ = 125 °C | | - | 235 | - | |

## 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 | $R_{thJC}$ | | - | - | 5.0 | K/W |
| Thermal resistance, junction to ambient | $R_{thJA}$ | Typical socket mount | - | - | 80 | |
| Weight | | | - | 2.0 | - | g |
| | | | - | 0.07 | - | oz. |
| Marking device | | Case style $D^2PAK$ | HFA04TB60S | | | |

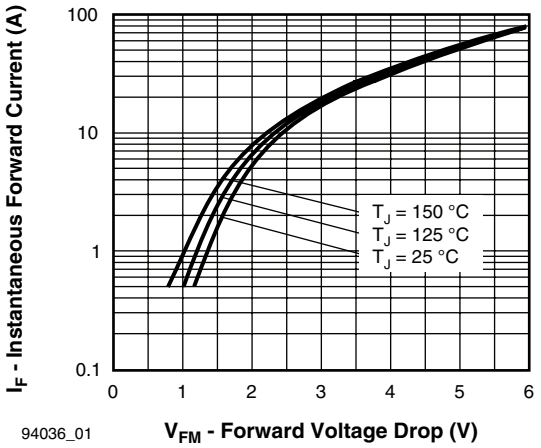



Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

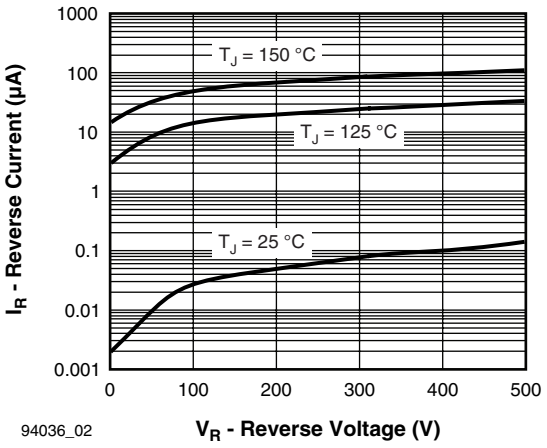



Fig. 2 - Typical Reverse Current vs. Reverse Voltage

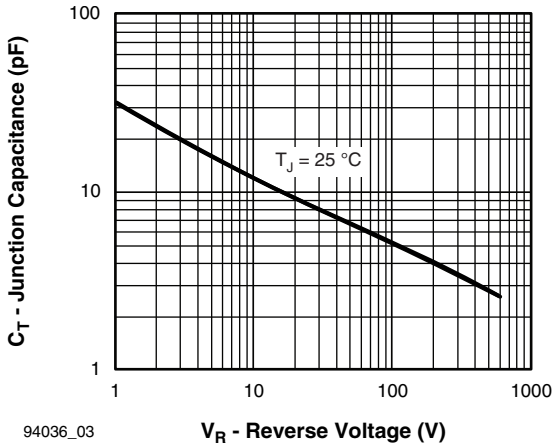



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

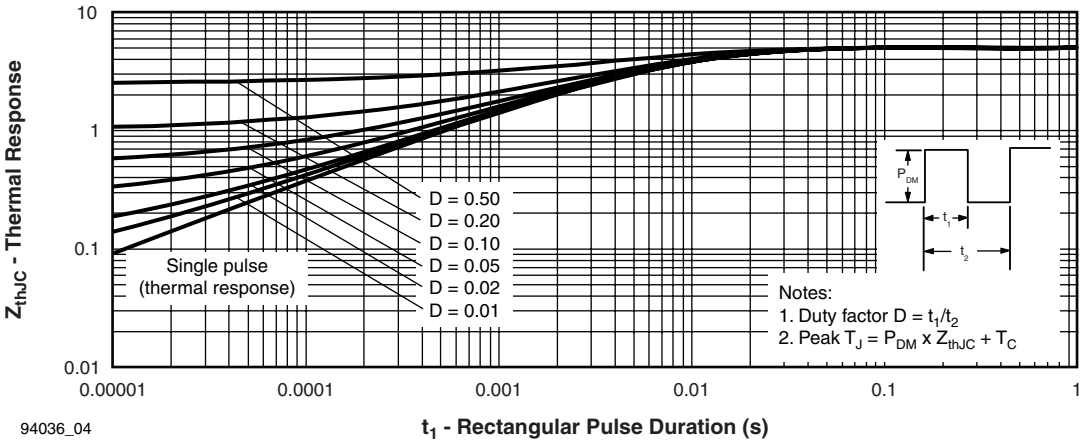



Fig. 4 - Maximum Thermal Impedance $Z_{thJC}$ Characteristics

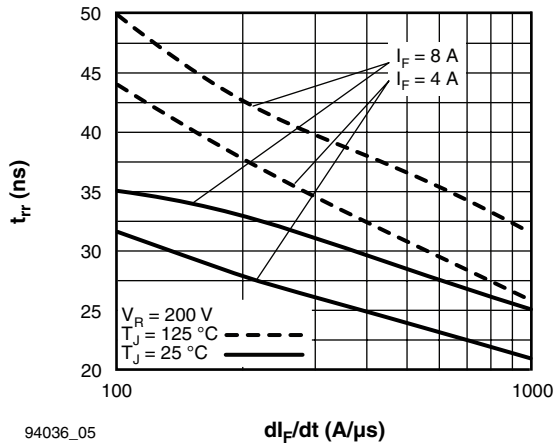



Fig. 5 - Typical Reverse Recovery Time vs. $dI_F/dt$

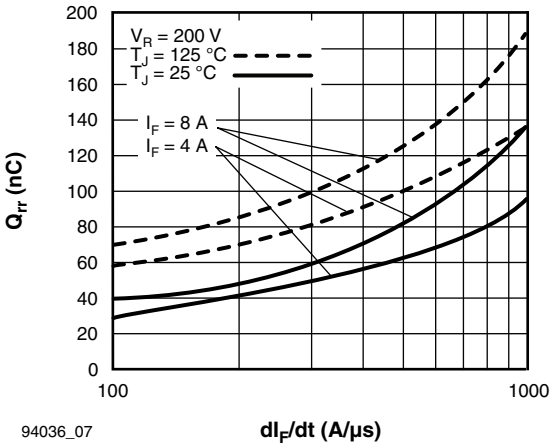



Fig. 7 - Typical Stored Charge vs. $dI_F/dt$

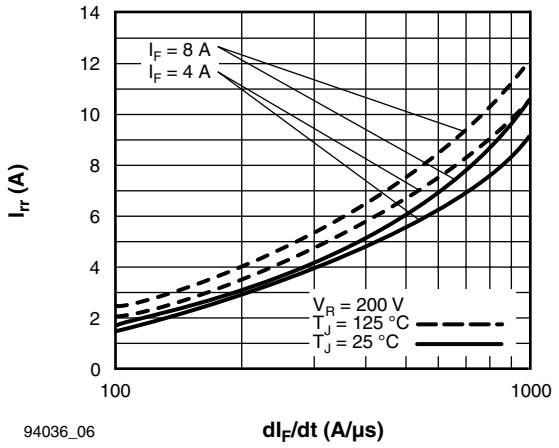



Fig. 6 - Typical Recovery Current vs. $dI_F/dt$

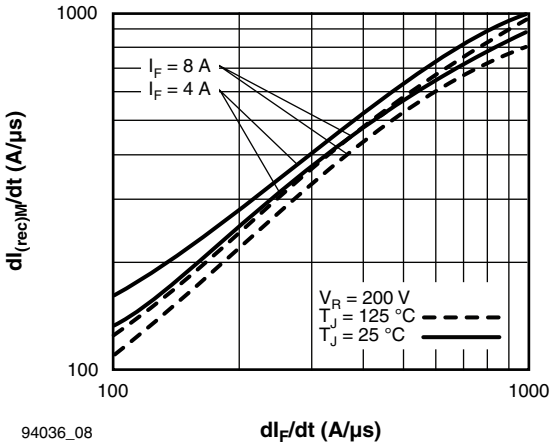



Fig. 8 - Typical $dI_{(rec)M}/dt$ vs. $dI_F/dt$

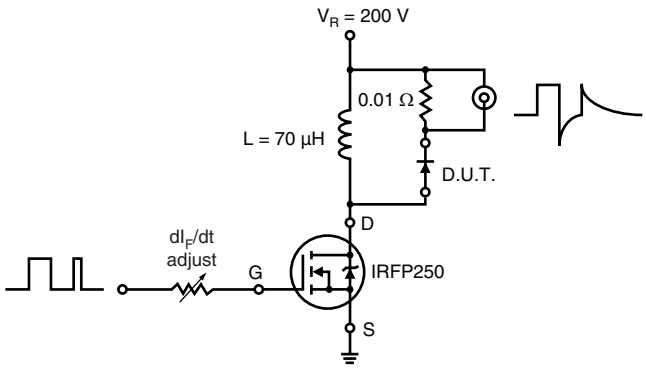
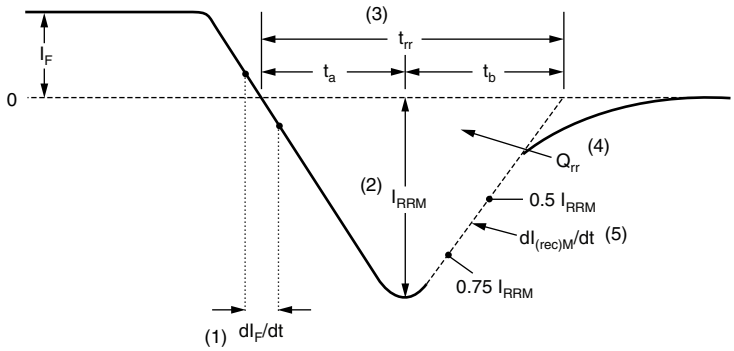



Fig. 9 - Reverse Recovery Parameter Test Circuit




(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 $I_{RRM}$

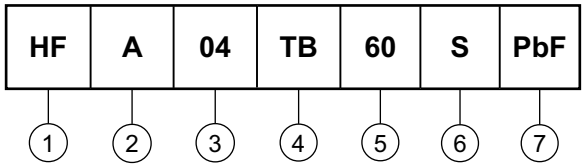
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(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

## ORDERING INFORMATION TABLE

**Device code**




1 - HEXFRED® family

2 - Process designator: A = Subs. electron irradiated
B = Subs. platinum

3 - Current rating (04 = 4 A)

4 - Package outline (TB = TO-220, 2 leads)

5 - Voltage rating (60 = 600 V)

6 - Configuration (S = SMD)

7 - • None = Standard production
• PbF = Lead (Pb)-free

| 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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