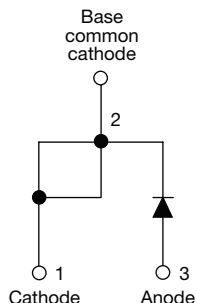


HEXFRED® Ultrafast Soft Recovery Diode, 15 A


TO-247AC modified


FEATURES

- Ultrafast recovery
- Ultrasoft recovery
- Very low I_{RRM}
- Very low Q_{rr}
- Specified at operating conditions
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level



Available
RoHS*
COMPLIANT

BENEFITS

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

DESCRIPTION

HFA15PB60 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 15 A continuous current, the HFA15PB60 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 HFA15PB60 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.

PRODUCT SUMMARY

| | |
|--------------------------------------|----------|
| V_R | 600 V |
| V_F at 15 A at 25 °C | 1.7 V |
| $I_{F(AV)}$ | 15 A |
| t_{rr} (typical) | 19 ns |
| T_J (maximum) | 150 °C |
| Q_{rr} (typical) | 80 nC |
| $di_{(rec)M}/dt$ (typical) at 125 °C | 160 A/μs |
| I_{RRM} (typical) | 4.0 A |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|--|----------------|-----------------------|---------------|-------|
| Cathode to anode voltage | V_R | | 600 | V |
| Maximum continuous forward current | I_F | $T_C = 100\text{ °C}$ | 15 | A |
| Single pulse forward current | I_{FSM} | | 150 | |
| Maximum repetitive forward current | I_{FRM} | | 60 | |
| Maximum power dissipation | P_D | $T_C = 25\text{ °C}$ | 74 | W |
| | | $T_C = 100\text{ °C}$ | 29 | |
| 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 ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified) | | | | | | |
|---|----------|---|------------|------|------|------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. UNITS |
| Cathode to anode breakdown voltage | V_{BR} | $I_R = 100\text{ }\mu\text{A}$ | | 600 | - | - |
| Maximum forward voltage | V_{FM} | $I_F = 15\text{ A}$ | See fig. 1 | - | 1.3 | 1.7 |
| | | $I_F = 30\text{ A}$ | | - | 1.5 | 2.0 |
| | | $I_F = 15\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$ | | - | 1.2 | 1.6 |
| Maximum reverse leakage current | I_{RM} | $V_R = V_R$ rated | See fig. 2 | - | 1.0 | 10 |
| | | $T_J = 125\text{ }^{\circ}\text{C}, V_R = 0.8 \times V_R$ rated | | - | 400 | 1000 |
| Junction capacitance | C_T | $V_R = 200\text{ V}$ | See fig. 3 | - | 25 | 50 |
| Series inductance | L_S | Measured lead to lead 5 mm from package body | | - | 12 | - |

| DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified) | | | | | | |
|--|-------------------|---|---|------|------|------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. UNITS |
| Reverse recovery time See fig. 5, 10 | t_{rr} | $I_F = 1.0\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$ | | - | 19 | - |
| | t_{rr1} | $T_J = 25\text{ }^{\circ}\text{C}$ | $I_F = 15\text{ A}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$ | - | 42 | 60 |
| | t_{rr2} | $T_J = 125\text{ }^{\circ}\text{C}$ | | - | 74 | 120 |
| Peak recovery current See fig. 6 | I_{RRM1} | $T_J = 25\text{ }^{\circ}\text{C}$ | | - | 4.0 | 6.0 |
| | I_{RRM2} | $T_J = 125\text{ }^{\circ}\text{C}$ | | - | 6.5 | 10 |
| Reverse recovery charge See fig. 7 | Q_{rr1} | $T_J = 25\text{ }^{\circ}\text{C}$ | | - | 80 | 180 |
| | Q_{rr2} | $T_J = 125\text{ }^{\circ}\text{C}$ | | - | 220 | 600 |
| Peak rate of fall of recovery current during t_b See fig. 8 | $dI_{(rec)M}/dt1$ | $T_J = 25\text{ }^{\circ}\text{C}$ | | - | 188 | - |
| | $dI_{(rec)M}/dt2$ | $T_J = 125\text{ }^{\circ}\text{C}$ | | - | 160 | - |

| 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 | $^{\circ}\text{C}$ |
| Thermal resistance, junction to case | R_{thJC} | | - | - | 1.7 | K/W |
| Thermal resistance, junction to ambient | R_{thJA} | Typical socket mount | - | - | 40 | |
| Thermal resistance, case to heatsink | R_{thCS} | Mounting surface, flat, smooth and greased | - | 0.25 | - | |
| Weight | | | - | 6.0 | - | g |
| | | | - | 0.21 | - | oz. |
| Mounting torque | | | 6.0 (5.0) | - | 12 (10) | kgf · cm (lbf · in) |
| Marking device | | Case style TO-247AC modified (JEDEC) | HFA15PB60 | | | |

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Vishay High Power Products

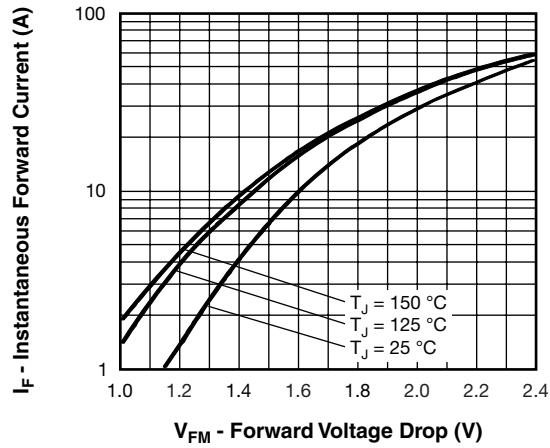


Fig. 1 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

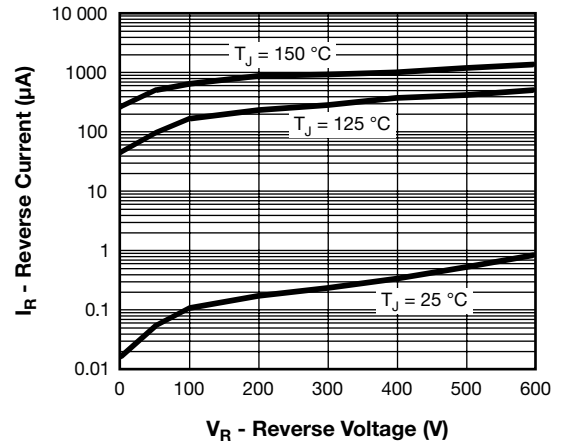


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

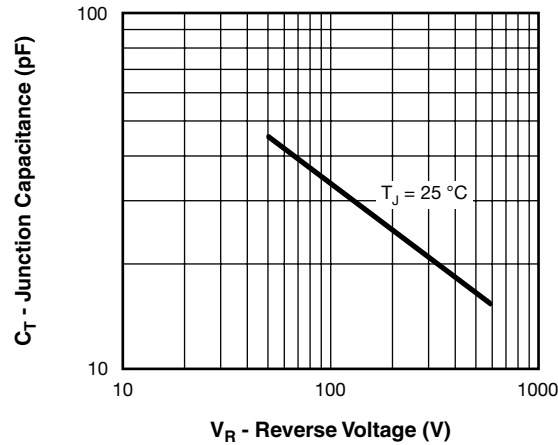


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

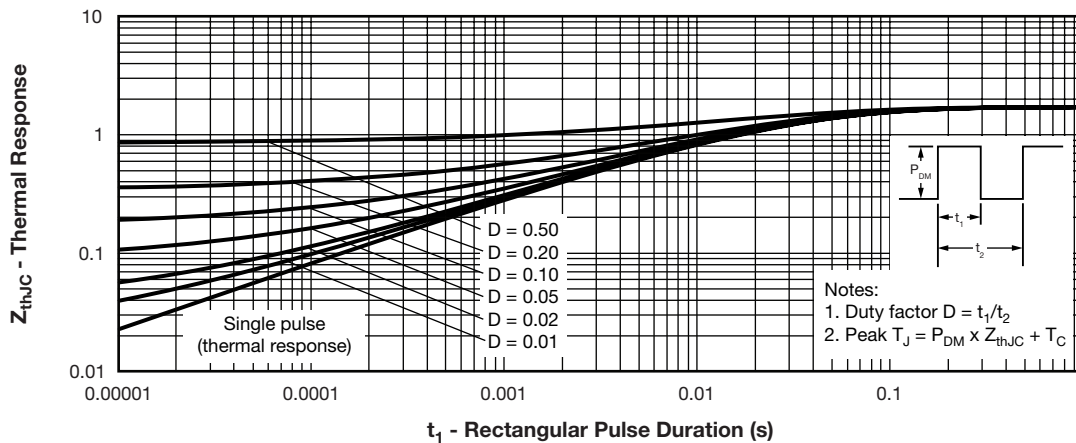
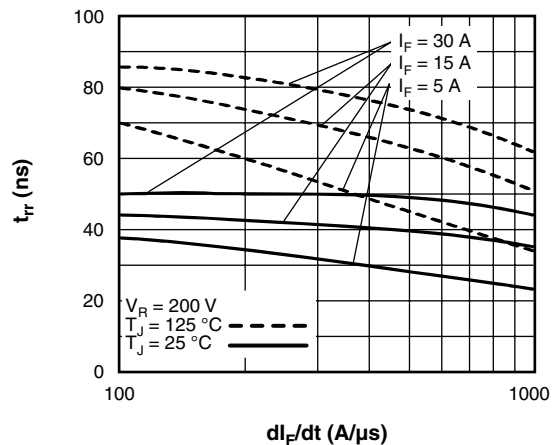
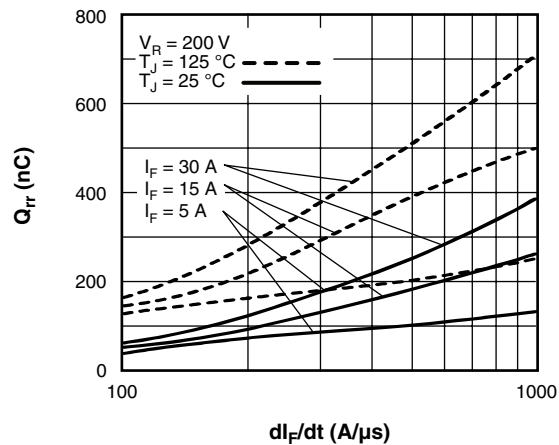
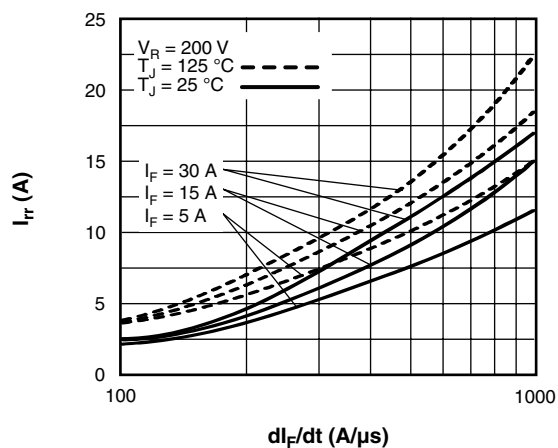
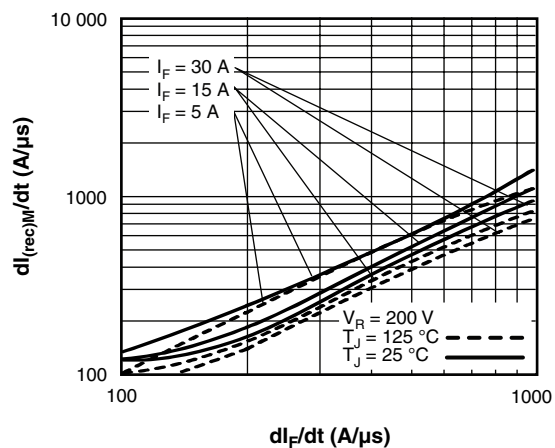


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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

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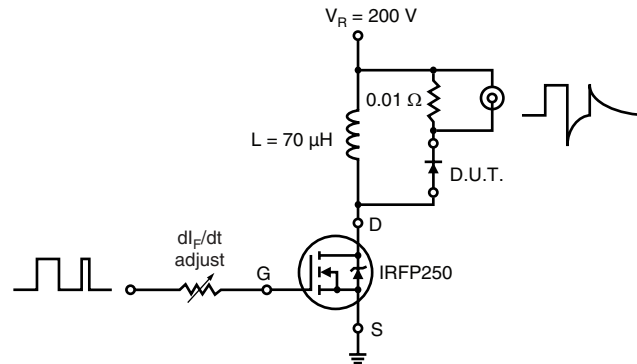


Fig. 9 - Reverse Recovery Parameter Test Circuit

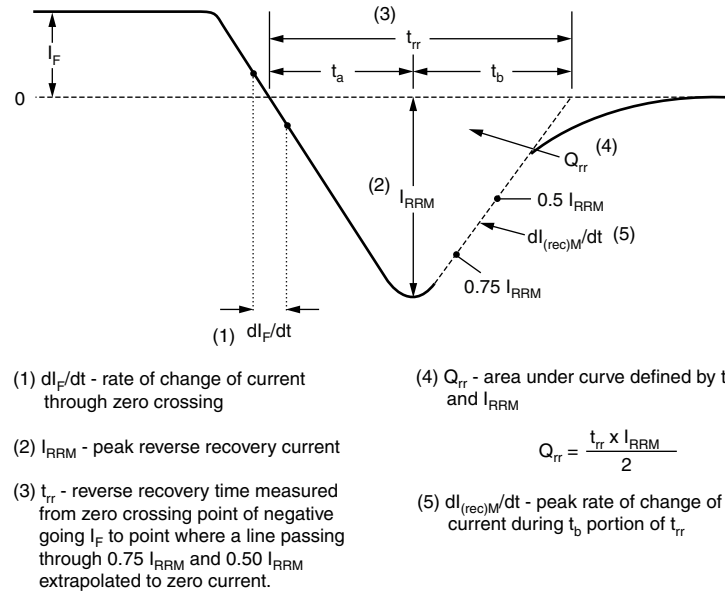


Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

| | | | | | | |
|-------------|-----------|----------|-----------|-----------|-----------|------------|
| Device code | HF | A | 15 | PB | 60 | PbF |
| | ① | ② | ③ | ④ | ⑤ | ⑥ |

- | | | |
|---|---|--|
| 1 | - | HEXFRED® family |
| 2 | - | Process designator: A = Electron irradiated B = Platinum diffused |
| 3 | - | Current rating (15 = 15 A) |
| 4 | - | Package outline (PB = TO-247, 2 pins) |
| 5 | - | Voltage rating (60 = 600 V) |
| 6 | - | <ul style="list-style-type: none"> • None = Standard production • PbF = Lead (Pb)-free |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95253 |
| Part marking information | www.vishay.com/doc?95255 |



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