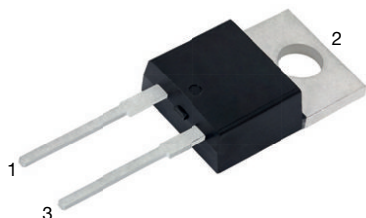
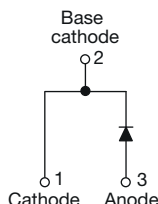


HEXFRED®, Ultrafast Soft Recovery Diode, 6 A



TO-220AC 2L



FEATURES

- Ultrafast and ultrasoft recovery
- Very low I_{RRM} and Q_{rr}
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



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

VS-HFA06TB120 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 1200 V and 6 A continuous current, the VS-HFA06TB120 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 VS-HFA06TB120 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.

PRIMARY CHARACTERISTICS

| | |
|-----------------------|-------------|
| $I_{F(AV)}$ | 6 A |
| V_R | 1200 V |
| V_F at I_F | 3.0 V |
| t_{rr} typ. | 26 ns |
| T_J max. | 150 °C |
| Package | TO-220AC 2L |
| Circuit configuration | Single |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|--|----------------|-----------------------|-------------|-------|
| Cathode to anode voltage | V_R | | 1200 | V |
| Maximum continuous forward current | I_F | $T_C = 100\text{ °C}$ | 6 | A |
| Single pulse forward current | I_{FSM} | | 80 | |
| Maximum repetitive forward current | I_{FRM} | | 24 | |
| Maximum power dissipation | P_D | $T_C = 25\text{ °C}$ | 62.5 | W |
| | | $T_C = 100\text{ °C}$ | 25 | |
| Operating junction and storage temperature range | T_J, T_{Stg} | | -55 to +150 | °C |

**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} | $I_R = 100\text{ }\mu\text{A}$ | 1200 | - | - | V |
| Maximum forward voltage | V_{FM} | $I_F = 6.0\text{ A}$ | - | 2.7 | 3.0 | |
| | | $I_F = 12\text{ A}$ | - | 3.5 | 3.9 | |
| | | $I_F = 6.0\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$ | - | 2.4 | 2.8 | |
| Maximum reverse leakage current | I_{RM} | $V_R = V_R\text{ rated}$ | - | 0.26 | 5.0 | μA |
| | | $T_J = 125\text{ }^{\circ}\text{C}, V_R = 0.8 \times V_R\text{ rated}$ | - | 110 | 500 | |
| Junction capacitance | C_T | $V_R = 200\text{ V}$ | - | 9.0 | 14 | pF |
| Series inductance | L_S | Measured lead to lead 5 mm from package body | - | 8.0 | - | nH |

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|--|-------------------|---|------|------|------|------------------------|
| Reverse recovery time | t_{rr} | $I_F = 1.0\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}, V_R = 30\text{ V}$ | - | 26 | - | ns |
| | t_{rr1} | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 53 | 80 | |
| | t_{rr2} | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 87 | 130 | |
| Peak recovery current | I_{RRM1} | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 4.4 | 8.0 | A |
| | I_{RRM2} | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 5.0 | 9.0 | |
| Reverse recovery charge | Q_{rr1} | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 116 | 320 | nC |
| | Q_{rr2} | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 233 | 585 | |
| Peak rate of recovery current during t_b | $dI_{(rec)M}/dt1$ | $T_J = 25\text{ }^{\circ}\text{C}$ | - | 180 | - | $\text{A}/\mu\text{s}$ |
| | $dI_{(rec)M}/dt2$ | $T_J = 125\text{ }^{\circ}\text{C}$ | - | 100 | - | |

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} | | - | - | 2.0 | K/W |
| Thermal resistance, junction to ambient | R_{thJA} | Typical socket mount | - | - | 80 | |
| Thermal resistance, case to heatsink | R_{thCS} | Mounting surface, flat, smooth, and greased | - | 0.5 | - | |
| Weight | | | - | 2.0 | - | g |
| | | | - | 0.07 | - | oz. |
| Mounting torque | | | 6.0 (5.0) | - | 12 (10) | $\text{kgf} \cdot \text{cm}$ ($\text{lbf} \cdot \text{in}$) |
| Marking device | | Case style 2L TO-220AC | HFA06TB120 | | | |

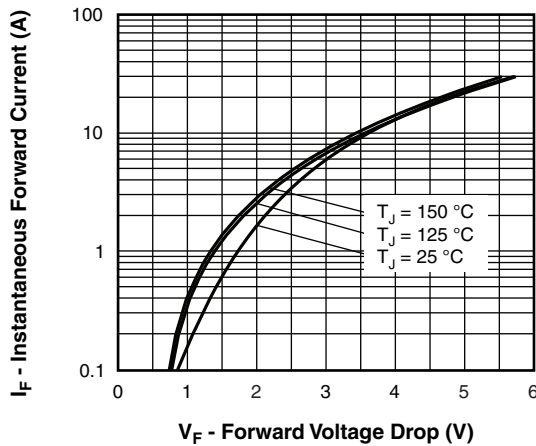


Fig. 1 - Typical Forward Voltage Drop Characteristics

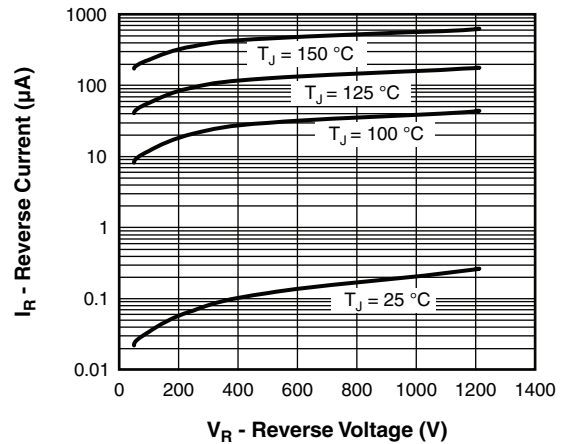


Fig. 2 - Typical Reverse Current vs. Reverse Voltage

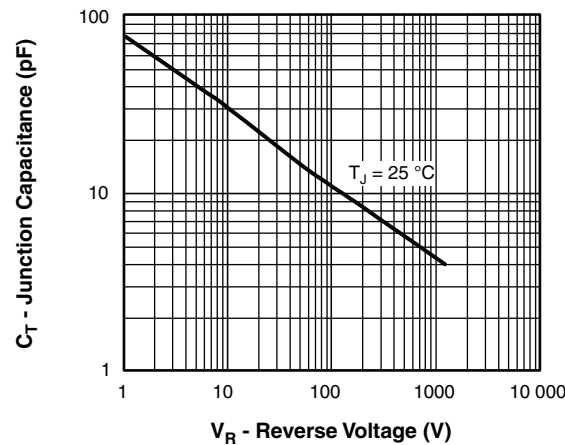
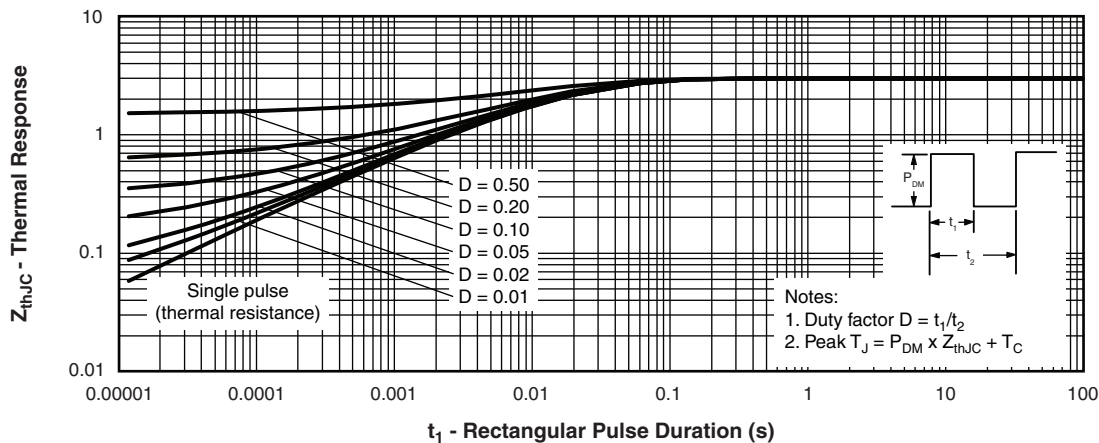


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

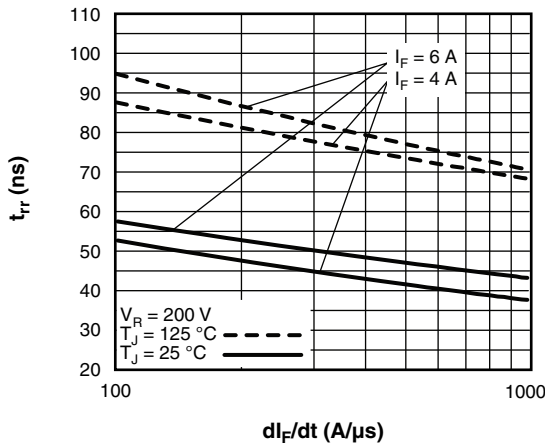
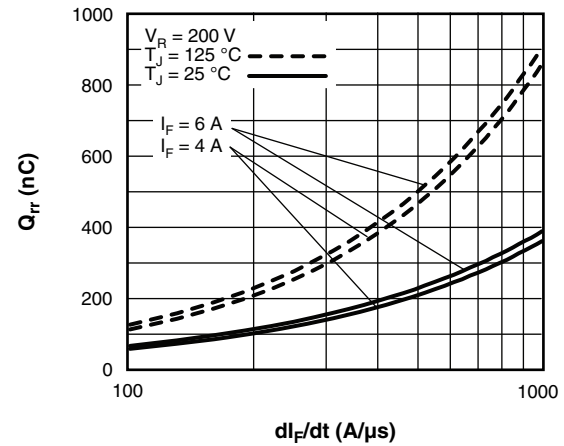
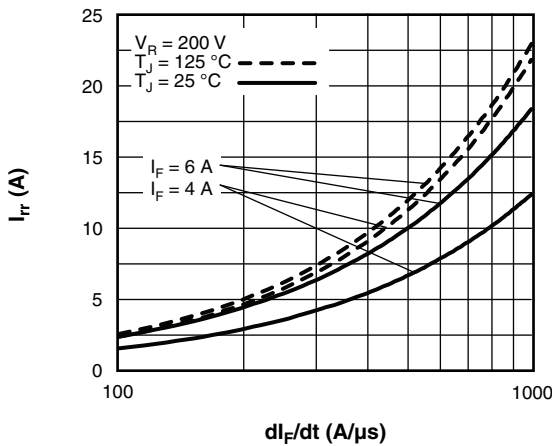
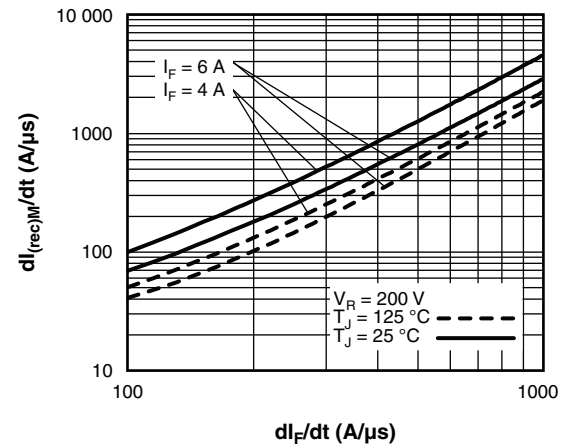
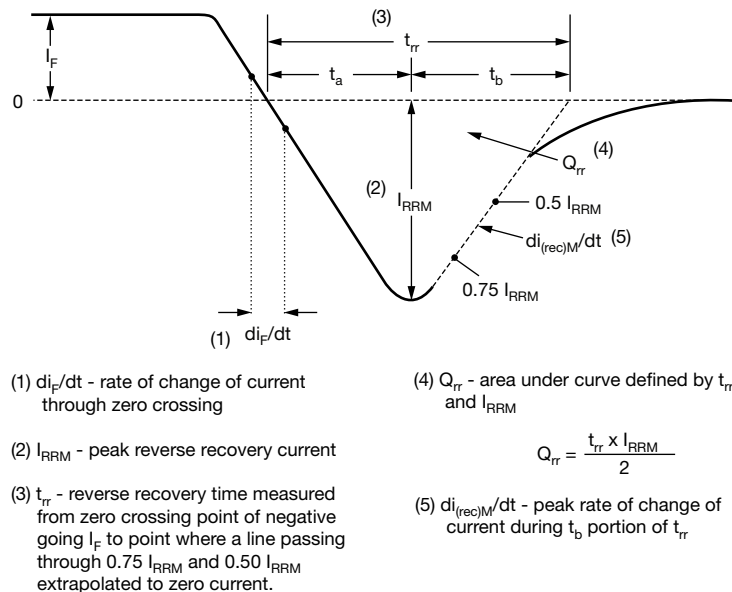

Fig. 5 - Typical Reverse Recovery Time vs. di_F/dt

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 Waveform and Definitions



ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|-----|----|---|----|----|-----|-----|
| Device code | VS- | HF | A | 06 | TB | 120 | -M3 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

- 1** - Vishay Semiconductors product
- 2** - HEXFRED® family
- 3** - Electron irradiated
- 4** - Current rating (06 = 6 A)
- 5** - Package:
TB = 2L TO-220AC
- 6** - Voltage rating (120 = 1200 V)
- 7** - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

| ORDERING INFORMATION (Example) | | |
|--------------------------------|---------------|-------------------------|
| PREFERRED P/N | BASE QUANTITY | PACKAGING DESCRIPTION |
| VS-HFA06TB120-M3 | 50 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?96156 |
| Part marking information | www.vishay.com/doc?95391 |



TO-220AC 2L

DIMENSIONS in millimeters and inches



Conforms to JEDEC® outline TO-220AC

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.25 | 4.65 | 0.167 | 0.183 | |
| A1 | 1.14 | 1.40 | 0.045 | 0.055 | |
| A2 | 2.50 | 2.92 | 0.098 | 0.115 | |
| b | 0.69 | 1.01 | 0.027 | 0.040 | |
| b1 | 0.38 | 0.97 | 0.015 | 0.038 | 4 |
| b2 | 1.20 | 1.73 | 0.047 | 0.068 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 |
| c | 0.36 | 0.61 | 0.014 | 0.024 | |
| c1 | 0.36 | 0.56 | 0.014 | 0.022 | 4 |
| D | 14.85 | 15.35 | 0.585 | 0.604 | 3 |
| D1 | 8.38 | 9.02 | 0.330 | 0.355 | |
| D2 | 11.68 | 13.30 | 0.460 | 0.524 | 6, 7 |
| E | 10.11 | 10.51 | 0.398 | 0.414 | 3, 6 |
| E1 | 6.86 | 8.89 | 0.270 | 0.350 | 6 |
| e | 2.41 | 2.67 | 0.095 | 0.105 | |
| e1 | 4.88 | 5.28 | 0.192 | 0.208 | |
| H1 | 6.09 | 6.48 | 0.240 | 0.255 | 6 |
| L | 13.52 | 14.02 | 0.532 | 0.552 | |
| L1 | 3.32 | 3.82 | 0.131 | 0.150 | 2 |
| Ø P | 3.54 | 3.91 | 0.139 | 0.154 | |
| Q | 2.60 | 3.00 | 0.102 | 0.118 | |

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1, and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
- (4) Dimension b1, b3, and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2, and E1
- (7) Outline conforms to JEDEC® TO-220, except D2



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