

1. General description

Ultrafast diode in a TO3PF package.

2. Features and benefits

- Isolated plastic package
- Low leakage current
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET or IGBT

3. Applications

- Active PFC in air conditioner
- S.M.P.S Power Factor Correction (PFC)
- Half-bridge / full-bridge switched-mode power supplies

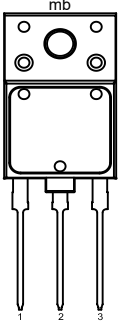
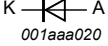
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------------|--|-----|------|-----|------|
| V_R | reverse voltage | DC | - | - | 600 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $T_h \leq 73$ °C; square-wave; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 30 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25$ μ s; square-wave | - | - | 60 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN; Fig. 4 | - | - | 170 | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN | - | - | 190 | A |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 30$ A; $T_j = 25$ °C; Fig. 6 | - | 1.35 | 1.8 | V |
| | | $I_F = 30$ A; $T_j = 150$ °C; Fig. 6 | - | 0.96 | - | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ μ s; $T_j = 25$ °C; Fig. 7 | - | 37 | 65 | ns |
| | | $I_F = 30$ A; $V_R = 200$ V; $di_F/dt = 200$ A/ μ s; $T_j = 25$ °C; Fig. 7 | - | 85 | - | ns |
| | | $I_F = 30$ A; $V_R = 200$ V; $di_F/dt = 200$ A/ μ s; $T_j = 125$ °C; Fig. 7 | - | 138 | - | ns |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------|--|---|
| 1 | A | anode |  <p>TO3PF</p> |  |
| 2 | K | cathode | | |
| 3 | A | anode | | |
| mb | n.c. | mounting base; isolated | | |

6. Ordering information

Table 3. Ordering information

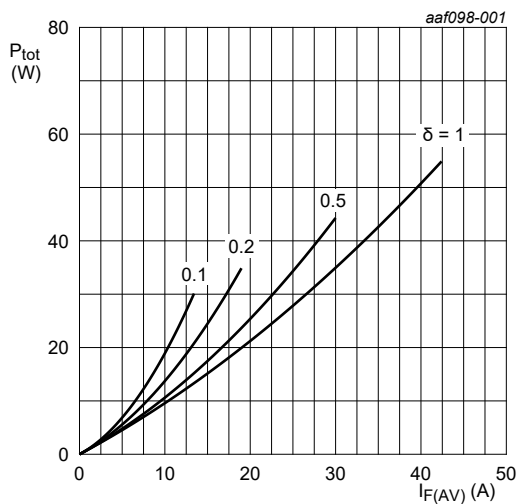
| Type number | Package | | |
|--------------|---------|--|---------|
| | Name | Description | Version |
| BYV30JT-600P | TO3PF | Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-3P 'full pack' | TO3PF |

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

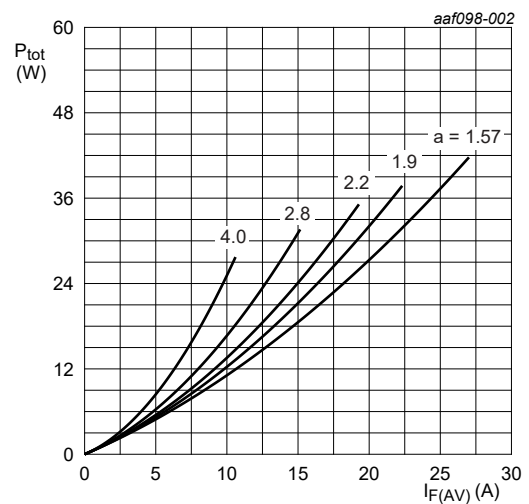
| Symbol | Parameter | Conditions | Min | Max | Unit |
|-------------|-------------------------------------|--|-----|-----|------|
| V_{RRM} | repetitive peak reverse voltage | | - | 600 | V |
| V_{RWM} | crest working reverse voltage | | - | 600 | V |
| V_R | reverse voltage | DC | - | 600 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $T_h \leq 73$ °C; square-wave; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 30 | A |
| $I_{O(AV)}$ | average output current | $\delta = 0.5$; $T_h \leq 73$ °C; SQW | - | 60 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25$ μ s; square-wave | - | 60 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN; Fig. 4 | - | 170 | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN | - | 190 | A |
| T_{stg} | storage temperature | | -65 | 175 | °C |
| T_j | junction temperature | | - | 175 | °C |



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

$$V_o = 0.854 \text{ V}; R_s = 0.0104 \text{ } \Omega$$

Fig. 1. Forward power dissipation as a function of average forward current; square waveform; typical values



$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$

$$V_o = 0.854 \text{ V}; R_s = 0.0104 \text{ } \Omega$$

Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; typical values

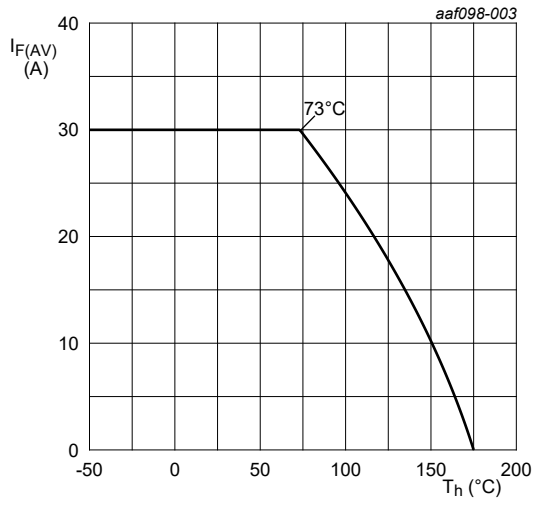


Fig. 3. Average forward current as a function of heatsink temperature; typical values

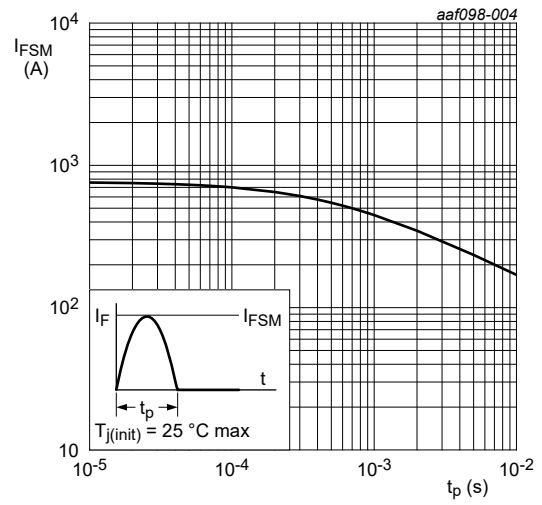


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|--|--|-----|-----|-----|------|
| $R_{th(j-h)}$ | thermal resistance from junction to heatsink | With heatsink compound; Fig. 5 | - | 2.3 | 2.6 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 35 | - | K/W |

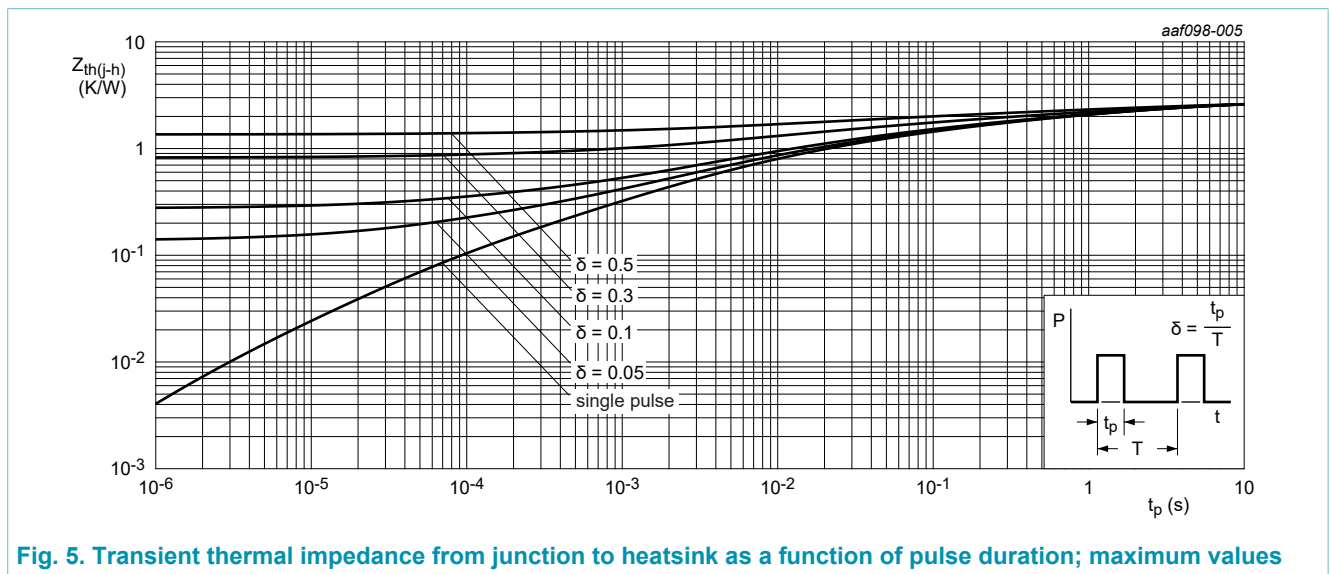
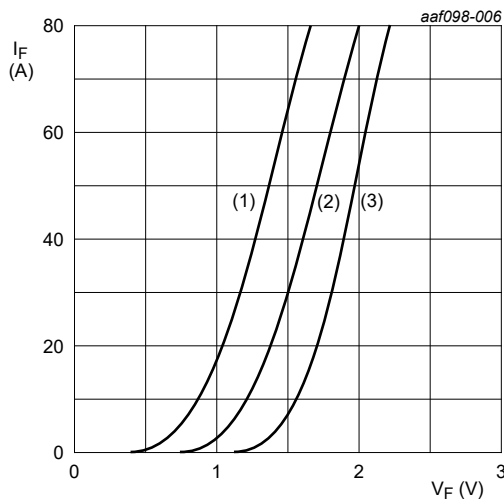


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration; maximum values

9. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|------|-----|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 30\text{ A}; T_j = 25\text{ °C}; \text{Fig. 6}$ | - | 1.35 | 1.8 | V |
| | | $I_F = 30\text{ A}; T_j = 150\text{ °C}; \text{Fig. 6}$ | - | 0.96 | - | V |
| I_R | reverse current | $V_R = 600\text{ V}; T_j = 25\text{ °C}$ | - | - | 10 | μA |
| | | $V_R = 600\text{ V}; T_j = 150\text{ °C}$ | - | - | 500 | μA |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$ | - | 37 | 65 | ns |
| | | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$ | - | 85 | - | ns |
| | | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$ | - | 138 | - | ns |
| I_{RM} | peak reverse recovery current | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$ | - | 11 | - | A |
| | | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}$ | - | 18 | - | A |
| Q_r | recovered charge | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$ | - | 461 | - | nC |
| | | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$ | - | 1227 | - | nC |



- (1) $T_j = 150\text{ °C}$; typical values
- (2) $T_j = 150\text{ °C}$; maximum values
- (3) $T_j = 25\text{ °C}$; maximum values

Fig. 6. Forward current as a function of forward voltage

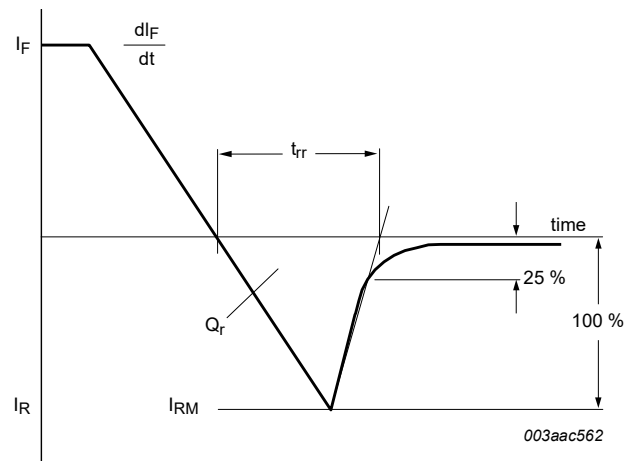
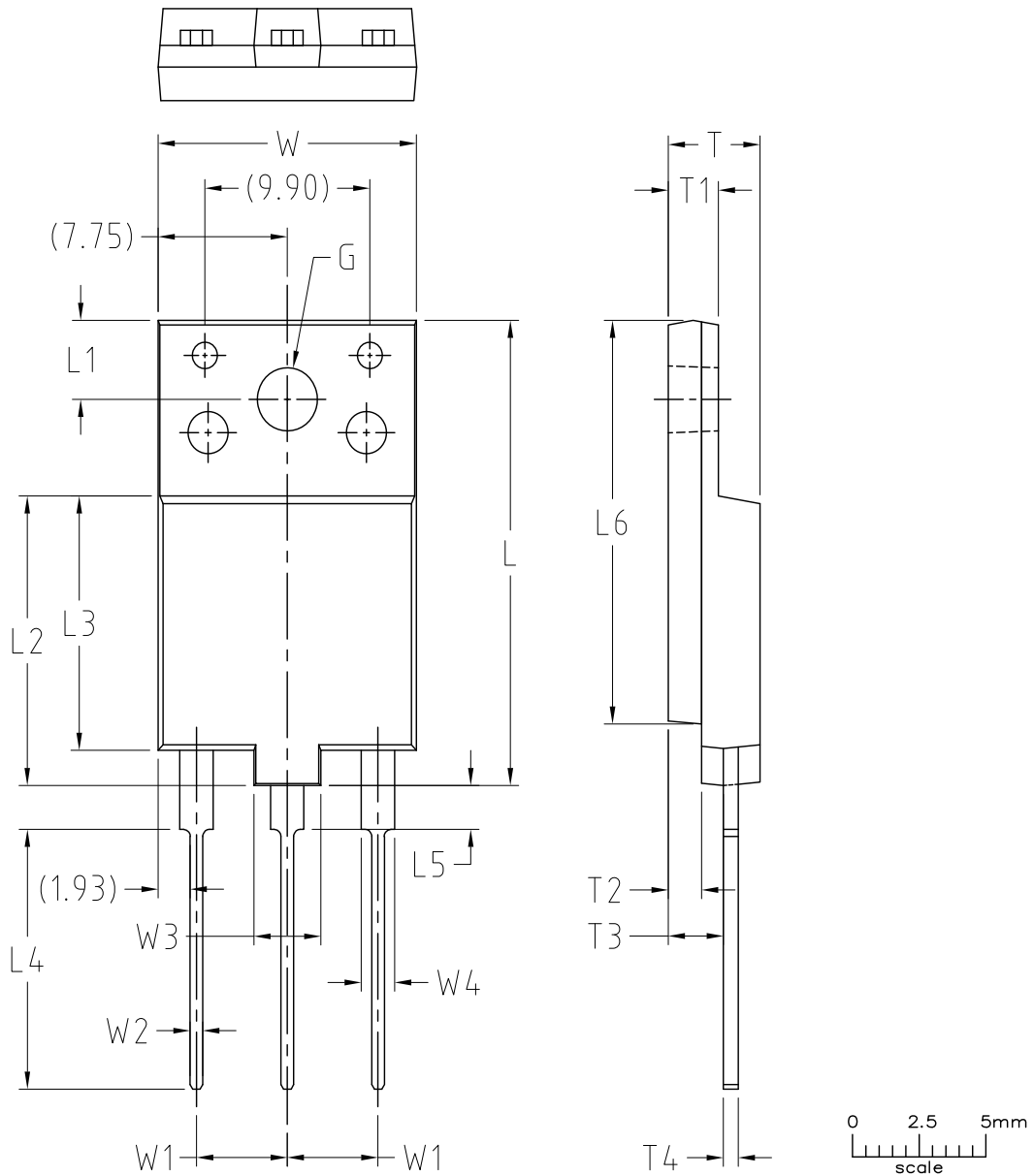


Fig. 7. Reverse recovery definitions; ramp recovery

10. Package outline

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-3P 'full pack' TO3PF



Remark : (X) the dimension X in brackets is for reference

| UNIT | W | W1 | W2 | W3 | W4 | L | L1 | L2 | L3 | L4 | L5 | L6 | T | T1 | T2 | T3 | T4 | G(φ) |
|------|------|------|------|------|------|------|-----|------|------|------|-----|------|-----|-----|-----|-----|-----|------|
| mm | 15.7 | 5.75 | 0.95 | 4.20 | 2.20 | 26.7 | 4.6 | 16.7 | 14.7 | 15.0 | 2.7 | 23.2 | 5.7 | 3.2 | 2.2 | 3.5 | 1.1 | 3.8 |
| | 15.3 | 5.15 | 0.65 | 3.80 | 1.80 | 26.3 | 4.4 | 16.3 | 14.3 | 14.6 | 2.3 | 22.8 | 5.3 | 2.8 | 1.8 | 3.1 | 0.8 | 3.4 |

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|------|---------------------|------------|
| | IEC | JEDEC | EIAJ | | |
| | | TO-3PF | | | |

Fig. 8. Package outline TO3PF

11. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
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