



# BYC8-600P

Hyperfast power diode

3 January 2014

Product data sheet

## 1. General description

Hyperfast power diode in a SOD59 (2-lead TO-220AC) plastic package.

## 2. Features and benefits

- Fast switching
- Low leakage current
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET

## 3. Applications

- Continuous Current Mode (CCM) 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 |
|--------------------------------|---------------------------------|--|-----|-----|-----|------|
| $V_{RRM}$                      | repetitive peak reverse voltage |  | -   | -   | 600 | V    |
| $I_{F(AV)}$                    | average forward current         | $\delta = 0.5$ ; $T_{mb} \leq 130$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> | -   | -   | 8   | A    |
| <b>Static characteristics</b>  |                                 |  |     |     |     |      |
| $V_F$                          | forward voltage                 | $I_F = 8$ A; $T_j = 125$ °C; <a href="#">Fig. 6</a>  | -   | 1.5 | 1.9 | V    |
| <b>Dynamic characteristics</b> |                                 |  |     |     |     |      |
| $t_{rr}$                       | reverse recovery time           | $I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 200$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>                                       | -   | 12  | 18  | ns   |

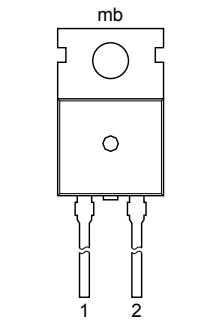
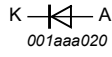


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## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                         | Simplified outline  | Graphic symbol  |
|-----|--------|-------------------------------------|---|---|
| 1   | K      | cathode                             |  <p>TO-220AC (SOD59)</p> |  |
| 2   | A      | anode                               |   |   |
| mb  | mb     | mounting base; connected to cathode |   |   |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package  |  |         |
|-------------|----------|--|---------|
|             | Name     | Description  | Version |
| BYC8-600P   | TO-220AC | plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC | SOD59   |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BYC8-600P   | BYC8-600P    |

## 8. Limiting values

Table 5. 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         | $\delta = 0.5$ ; $T_{mb} \leq 130\text{ }^\circ\text{C}$ ; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> | -   | 8   | A    |
| $I_{FRM}$   | repetitive peak forward current | $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 130\text{ }^\circ\text{C}$ ; square-wave pulse   | -   | 16  | A    |

| Symbol           | Parameter                           | Conditions  | Min | Max | Unit |
|------------------|-------------------------------------|---|-----|-----|------|
| I <sub>FSM</sub> | non-repetitive peak forward current | t <sub>p</sub> = 10 ms; T <sub>j(initial)</sub> = 25 °C; sine-wave pulse; Fig. 4  | -   | 91  | A    |
|                  |                                     | t <sub>p</sub> = 8.3 ms; T <sub>j(initial)</sub> = 25 °C; sine-wave pulse; Fig. 4 | -   | 100 | A    |
| T <sub>stg</sub> | storage temperature                 |   | -65 | 175 | °C   |
| T <sub>j</sub>   | junction temperature                |   | -   | 175 | °C   |

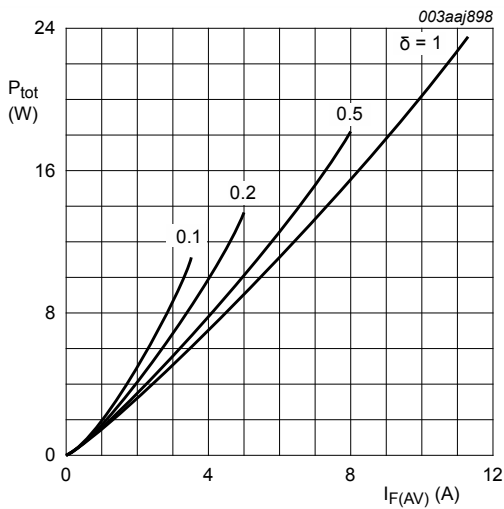


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

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

$$V_O = 1.581 \text{ V}; R_S = 0.043 \text{ } \Omega$$

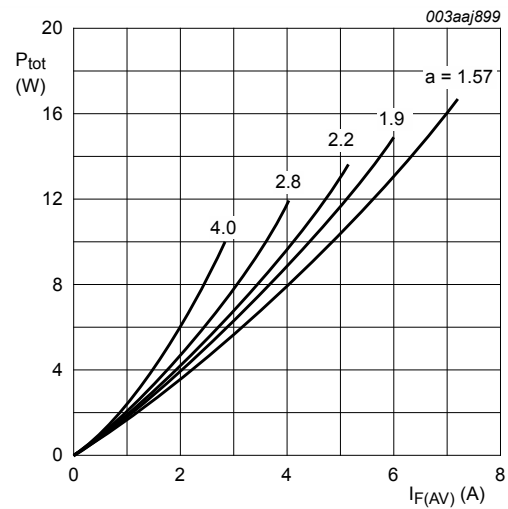


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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

$$V_O = 1.581 \text{ V}; R_S = 0.043 \text{ } \Omega$$

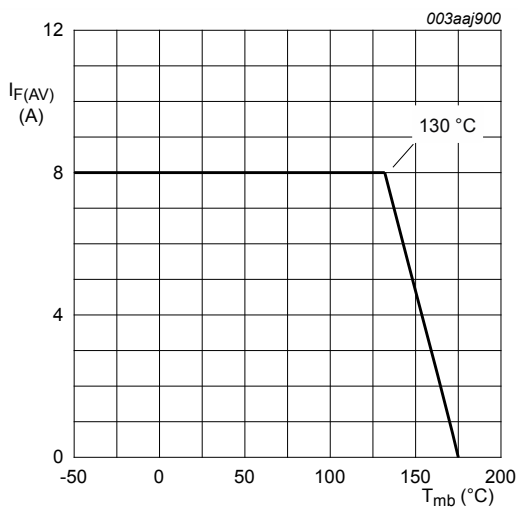


Fig. 3. Average forward current as a function of mounting base temperature; maximum values

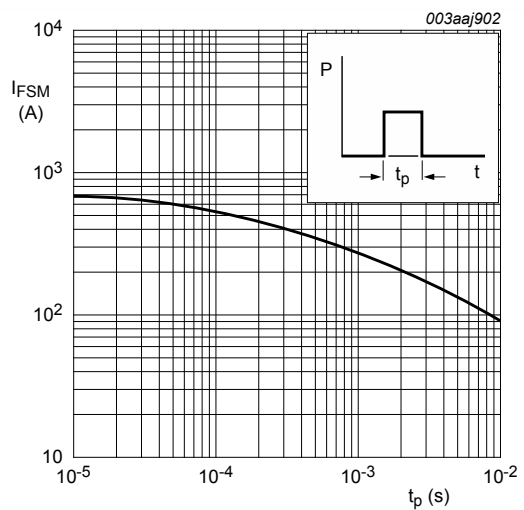


Fig. 4. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

## 9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol         | Parameter  | Conditions             | Min | Typ | Max | Unit |
|----------------|--|------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base    | <a href="#">Fig. 5</a> | -   | -   | 2.5 | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient free air | in free air            | -   | 60  | -   | K/W  |

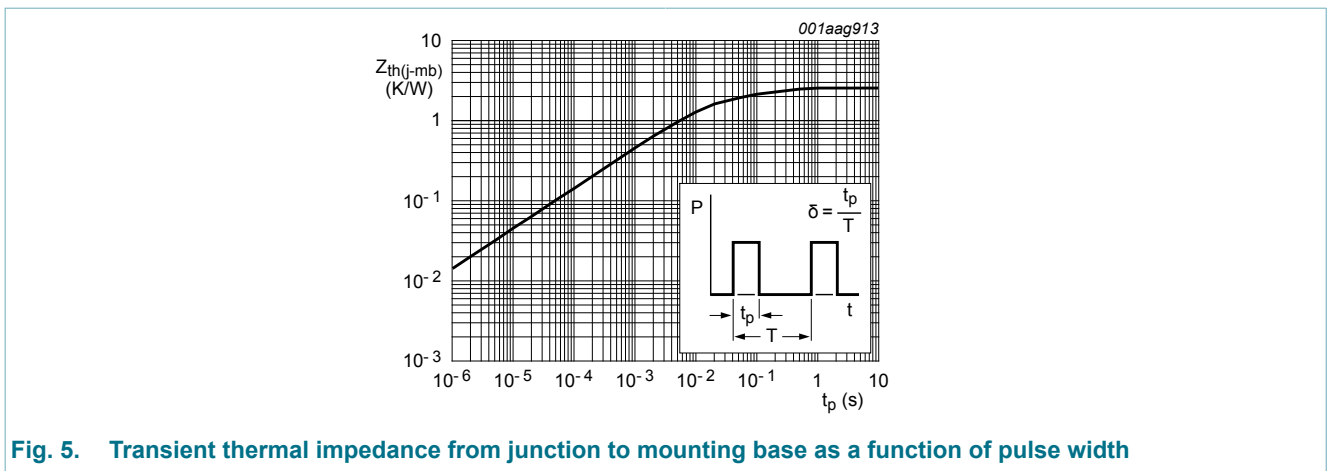


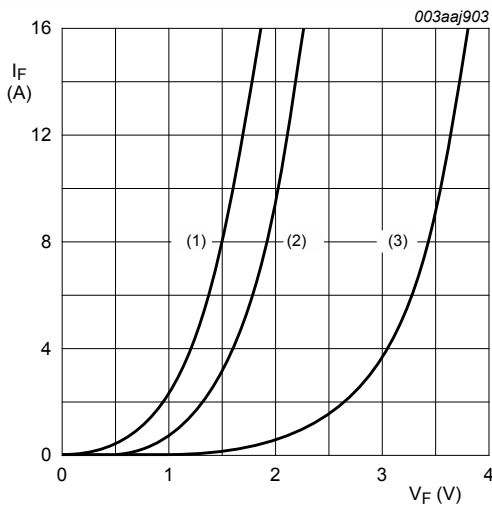
Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse width

## 10. Characteristics

Table 7. Characteristics

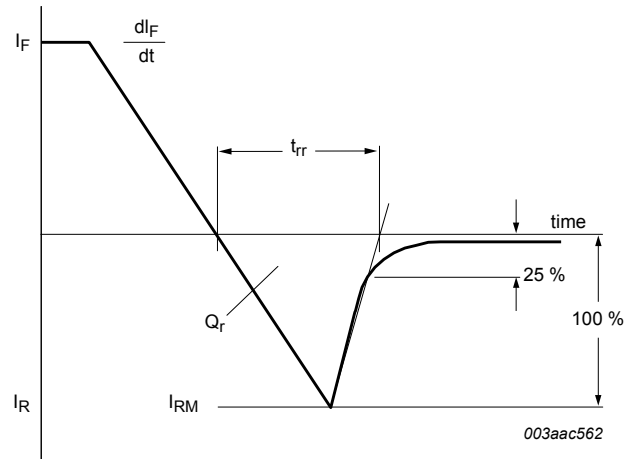
| Symbol                         | Parameter             | Conditions  | Min | Typ | Max | Unit          |
|--------------------------------|-----------------------|---|-----|-----|-----|---------------|
| <b>Static characteristics</b>  |                       |   |     |     |     |               |
| $V_F$                          | forward voltage       | $I_F = 8\text{ A}; T_j = 25\text{ °C};$ <a href="#">Fig. 6</a>  | -   | -   | 3.4 | V             |
|                                |                       | $I_F = 8\text{ A}; T_j = 125\text{ °C};$ <a href="#">Fig. 6</a>   | -   | 1.5 | 1.9 | V             |
|                                |                       | $I_F = 8\text{ A}; T_j = 150\text{ °C}$   | -   | 1.4 | -   | V             |
| $I_R$                          | reverse current       | $V_R = 600\text{ V}; T_j = 25\text{ °C}$  | -   | -   | 20  | $\mu\text{A}$ |
|                                |                       | $V_R = 600\text{ V}; T_j = 125\text{ °C}$   | -   | -   | 200 | $\mu\text{A}$ |
| <b>Dynamic characteristics</b> |                       |   |     |     |     |               |
| $Q_r$                          | recovered charge      | $I_F = 8\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ <a href="#">Fig. 7</a>  | -   | 17  | -   | nC            |
|                                |                       | $I_F = 8\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ <a href="#">Fig. 7</a> | -   | 90  | -   | nC            |
| $t_{rr}$                       | reverse recovery time | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ <a href="#">Fig. 7</a>  | -   | 19  | -   | ns            |

| Symbol   | Parameter                     | Conditions   | Min | Typ | Max | Unit |
|----------|-------------------------------|--|-----|-----|-----|------|
|          |                               | $I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $dI_F/dt = 200\text{ A}/\mu\text{s}$ ;<br>$T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a>   | -   | 12  | 18  | ns   |
| $I_{RM}$ | peak reverse recovery current | $I_F = 8\text{ A}$ ; $V_R = 200\text{ V}$ ; $dI_F/dt = 200\text{ A}/\mu\text{s}$ ;<br>$T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a>  | -   | -   | 2.2 | A    |
|          |                               | $I_F = 8\text{ A}$ ; $V_R = 200\text{ V}$ ; $dI_F/dt = 200\text{ A}/\mu\text{s}$ ;<br>$T_j = 125\text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a> | -   | -   | 6   | A    |



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

- (1)  $T_j = 125\text{ }^\circ\text{C}$ ; typical values;
  - (2)  $T_j = 125\text{ }^\circ\text{C}$ ; maximum values;
  - (3)  $T_j = 25\text{ }^\circ\text{C}$ ; maximum values;
- $V_O = 1.581\text{ V}$ ;  $R_S = 0.043\text{ }\Omega$



**Fig. 7. Reverse recovery definitions; ramp recovery**

### 11. Package outline

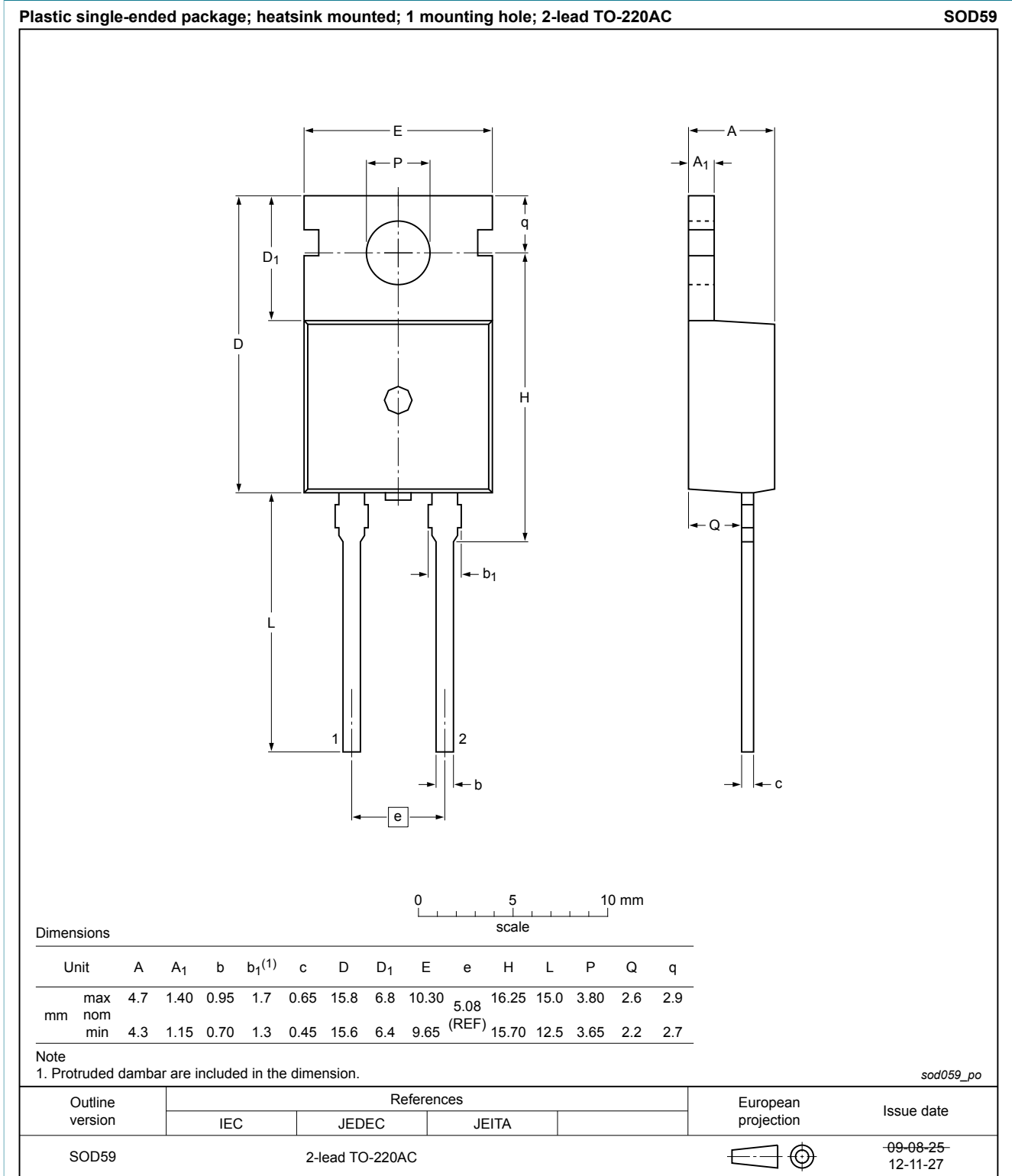


Fig. 8. Package outline TO-220AC (SOD59)

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| Objective [short] data sheet   | Development        | This document contains data from the objective specification for product development. |
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## 13. Contents

|      |                               |   |
|------|-------------------------------|---|
| 1    | General description .....     | 1 |
| 2    | Features and benefits .....   | 1 |
| 3    | Applications .....            | 1 |
| 4    | Quick reference data .....    | 1 |
| 5    | Pinning information .....     | 2 |
| 6    | Ordering information .....    | 2 |
| 7    | Marking .....                 | 2 |
| 8    | Limiting values .....         | 2 |
| 9    | Thermal characteristics ..... | 4 |
| 10   | Characteristics .....         | 4 |
| 11   | Package outline .....         | 6 |
| 12   | Legal information .....       | 7 |
| 12.1 | Data sheet status .....       | 7 |
| 12.2 | Definitions .....             | 7 |
| 12.3 | Disclaimers .....             | 7 |
| 12.4 | Trademarks .....              | 8 |

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