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# IMPORTANT NOTICE

10 December 2015

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## 1. Global joint venture starts operations as WeEn Semiconductors

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Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

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WeEn Semiconductors





# BYC8-600

Hyperfast power diode

23 May 2013

Product data sheet

## 1. General description

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

## 2. Features and benefits

- Low reverse recovery current and 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
- Half-bridge lighting ballasts

## 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         | $\delta = 0.5$ ; $T_{mb} \leq 109$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> | -   | -   | 8    | A    |
| <b>Static characteristics</b>  |                                 |   |     |     |      |      |
| $V_F$                          | forward voltage                 | $I_F = 8$ A; $T_j = 150$ °C; <a href="#">Fig. 4</a>   | -   | 1.4 | 1.85 | V    |
| <b>Dynamic characteristics</b> |                                 |   |     |     |      |      |
| $t_{rr}$                       | reverse recovery time           | $I_F = 8$ A; $V_R = 400$ V; $dI_F/dt = 500$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 5</a>             | -   | 19  | -    | ns   |

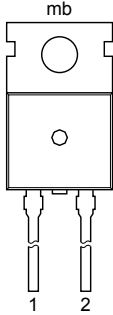
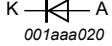


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## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description            | Simplified outline  | Graphic symbol  |
|-----|--------|------------------------|---|---|
| 1   | K      | cathode                |  <p style="text-align: center;">TO-220AC (SOD59)</p> |  |
| 2   | A      | anode                  |   |   |
| mb  | mb     | mounting base; cathode |   |   |

## 6. Ordering information

Table 3. Ordering information

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

## 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    |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $T_{mb} \leq 109$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> | -   | 8   | A    |
| $I_{FRM}$   | repetitive peak forward current     | $\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 109$ °C; square-wave pulse                              | -   | 16  | A    |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 8.3$ ms; $T_{j(init)} = 150$ °C; sine-wave pulse   | -   | 60  | A    |
|             |                                     | $t_p = 10$ ms; $T_{j(init)} = 150$ °C; sine-wave pulse  | -   | 55  | A    |
| $T_{stg}$   | storage temperature                 |   | -40 | 150 | °C   |
| $T_j$       | junction temperature                |   | -   | 150 | °C   |

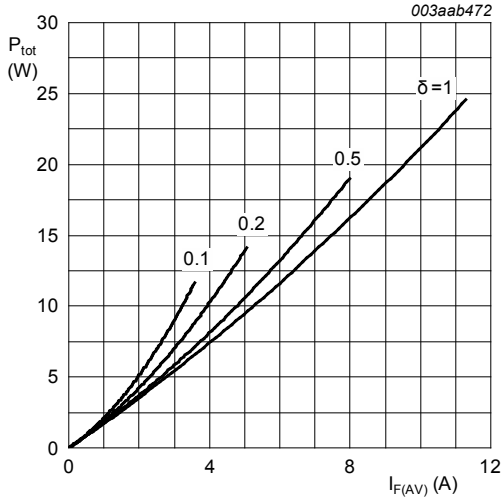


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

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

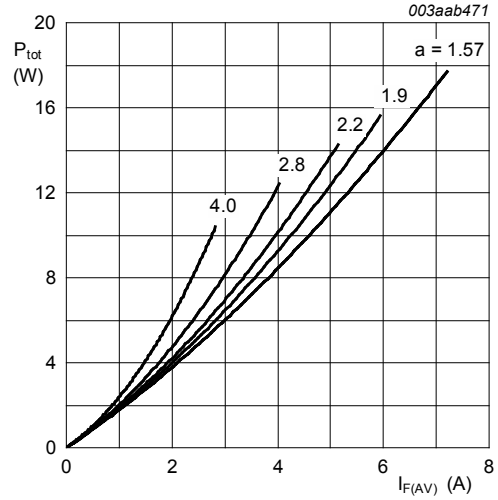


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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

## 8. Thermal characteristics

Table 5. Thermal characteristics

| Symbol                | Parameter  | Conditions | Min | Typ | Max | Unit |
|-----------------------|--|------------|-----|-----|-----|------|
| R <sub>th(j-mb)</sub> | thermal resistance from junction to mounting base    | Fig. 3     | -   | -   | 2.2 | K/W  |
| R <sub>th(j-a)</sub>  | thermal resistance from junction to ambient free air |            | -   | 60  | -   | K/W  |

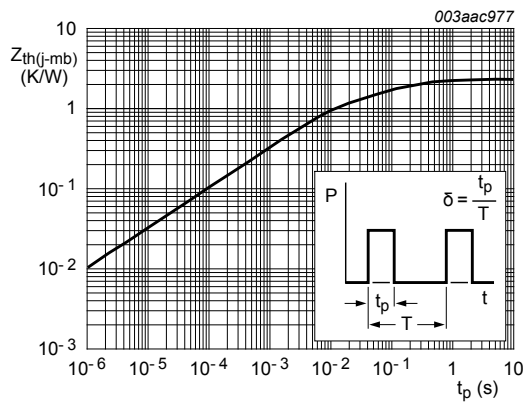
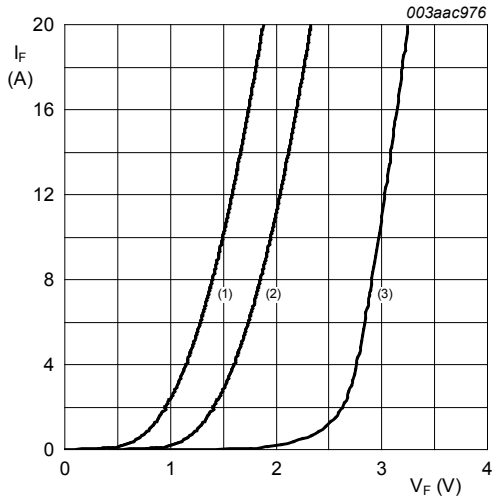


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

## 9. Characteristics

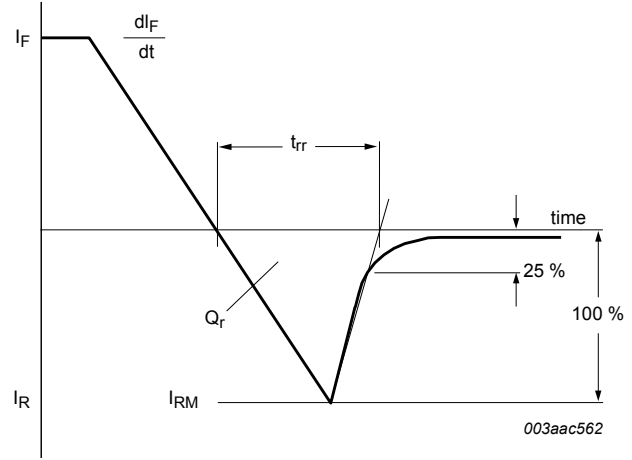
Table 6. Characteristics

| Symbol                         | Parameter                     | Conditions  | Min | Typ | Max  | Unit          |
|--------------------------------|-------------------------------|---|-----|-----|------|---------------|
| <b>Static characteristics</b>  |                               |   |     |     |      |               |
| $V_F$                          | forward voltage               | $I_F = 8\text{ A}; T_j = 25\text{ °C}$  | -   | 2   | 2.9  | V             |
|                                |                               | $I_F = 8\text{ A}; T_j = 150\text{ °C};$ <a href="#">Fig. 4</a>   | -   | 1.4 | 1.85 | V             |
|                                |                               | $I_F = 16\text{ A}; T_j = 150\text{ °C}$  | -   | 1.7 | 2.3  | V             |
| $I_R$                          | reverse current               | $V_R = 600\text{ V}; T_j = 25\text{ °C}$  | -   | 9   | 150  | $\mu\text{A}$ |
|                                |                               | $V_R = 500\text{ V}; T_j = 100\text{ °C}$   | -   | 1.1 | 3    | mA            |
| <b>Dynamic characteristics</b> |                               |   |     |     |      |               |
| $Q_r$                          | recovered charge              | $I_F = 1\text{ A}; V_R = 100\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s};$<br>$T_j = 25\text{ °C}$                         | -   | 12  | -    | nC            |
| $t_{rr}$                       | reverse recovery time         | $I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s};$<br>$T_j = 25\text{ °C}$                           | -   | 30  | 52   | ns            |
|                                |                               | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s};$<br>$T_j = 25\text{ °C};$ <a href="#">Fig. 5</a> | -   | 19  | -    | ns            |
|                                |                               | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s};$<br>$T_j = 100\text{ °C}$                        | -   | 32  | 40   | ns            |
| $I_{RM}$                       | peak reverse recovery current | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s};$<br>$T_j = 125\text{ °C}$                         | -   | 1.5 | 5.5  | A             |
|                                |                               | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s};$<br>$T_j = 100\text{ °C}$                        | -   | 9.5 | 12   | A             |
| $V_{FR}$                       | forward recovery voltage      | $I_F = 10\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$<br><a href="#">Fig. 6</a>                      | -   | 8   | 10   | V             |

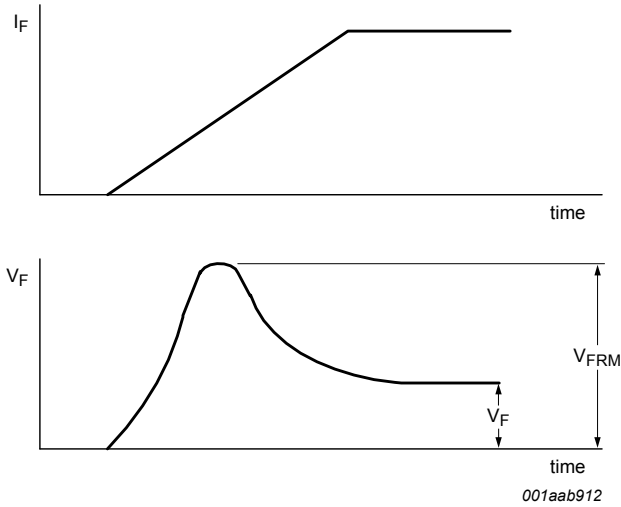


**Fig. 4. Forward current as a function of forward voltage**

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



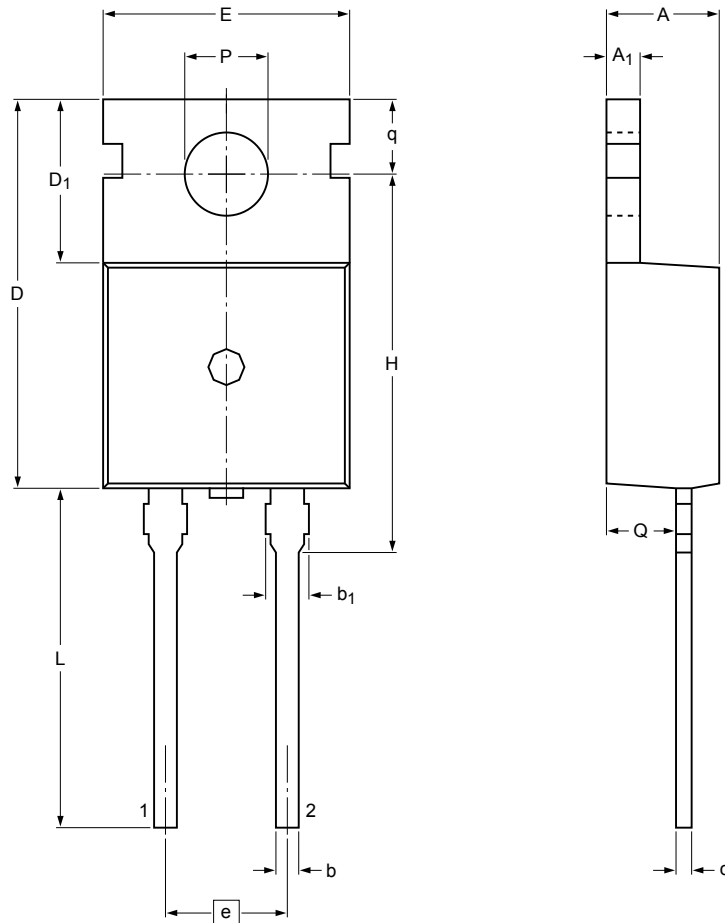
**Fig. 5. Reverse recovery definitions; ramp recovery**



**Fig. 6. Forward recovery definitions**

### 10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC SOD59



Dimensions

| Unit | A   | A <sub>1</sub> | b    | b <sub>1</sub> <sup>(1)</sup> | c    | D    | D <sub>1</sub> | E     | e     | H     | L    | P    | Q   | q   |
|------|-----|----------------|------|-------------------------------|------|------|----------------|-------|-------|-------|------|------|-----|-----|
| max  | 4.7 | 1.40           | 0.95 | 1.7                           | 0.65 | 15.8 | 6.8            | 10.30 | 5.08  | 16.25 | 15.0 | 3.80 | 2.6 | 2.9 |
| nom  |     |                |      |                               |      |      |                |       | (REF) |       |      |      |     |     |
| min  | 4.3 | 1.15           | 0.70 | 1.3                           | 0.45 | 15.6 | 6.4            | 9.65  |       | 15.70 | 12.5 | 3.65 | 2.2 | 2.7 |

Note

1. Protruded dambar are included in the dimension.

sod059\_po

| Outline version | References      |       |       | European projection | Issue date           |
|-----------------|-----------------|-------|-------|---------------------|----------------------|
|                 | IEC             | JEDEC | JEITA |                     |                      |
| SOD59           | 2-lead TO-220AC |       |       |                     | 09-08-25<br>12-11-27 |

Fig. 7. Package outline TO-220AC (SOD59)



## 11. Legal information

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|--------------------------------|--------------------|---|
| 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.                       |
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- [1] Please consult the most recently issued document before initiating or completing a design.
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## 12. 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    | Limiting values .....         | 2 |
| 8    | Thermal characteristics ..... | 3 |
| 9    | Characteristics .....         | 4 |
| 10   | Package outline .....         | 6 |
| 11   | Legal information .....       | 7 |
| 11.1 | Data sheet status .....       | 7 |
| 11.2 | Definitions .....             | 7 |
| 11.3 | Disclaimers .....             | 7 |
| 11.4 | Trademarks .....              | 8 |

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