



IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

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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





BYC8D-600

Hyperfast power diode

Rev. 01 — 27 December 2010

Product data sheet

1. Product profile

1.1 General description

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

1.2 Features and benefits

- Low reverse recovery current and low thermal resistance
- Reduces switching losses in associated MOSFET

1.3 Applications

- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies
- Half-bridge lighting ballasts

1.4 Quick reference data

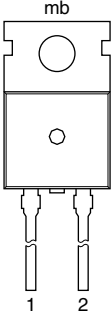

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------|---|-----|-----|------|------|
| V_{RRM} | repetitive peak reverse voltage | | - | - | 600 | V |
| $I_{F(AV)}$ | average forward current | square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 103$ °C; see Figure 1 ; see Figure 2 | - | - | 8 | A |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 8$ A; $T_j = 25$ °C | - | 2 | 2.9 | V |
| | | $I_F = 8$ A; $T_j = 150$ °C; see Figure 4 | - | 1.5 | 1.85 | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 8$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ μ s; $T_j = 25$ °C; see Figure 5 | - | 20 | - | ns |



2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------------------|--|---|
| 1 | K | cathode |  |  |
| 2 | A | anode | | |
| mb | mb | mounting base; connected to cathode | | |

SOD59 (TO-220AC)

3. Ordering information

Table 3. Ordering information

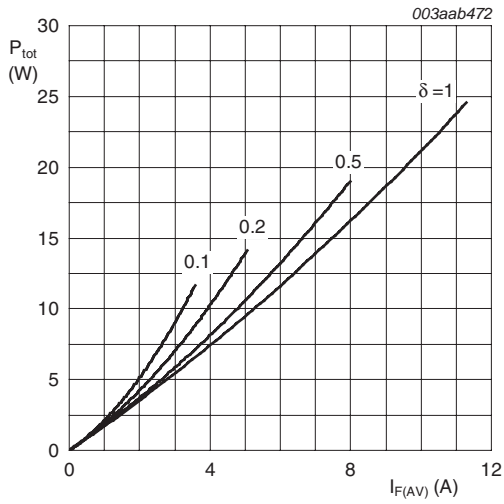
| Type number | Package | | |
|-------------|----------|--|---------|
| | Name | Description | Version |
| BYC8D-600 | TO-220AC | plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC | SOD59 |

4. Limiting values

Table 4. Limiting values

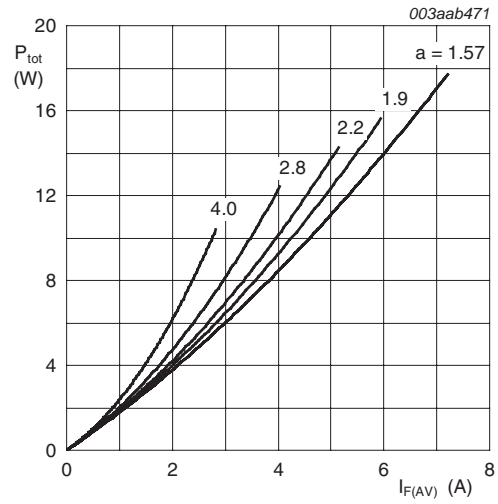
In accordance with the Absolute Maximum Rating System (IEC 60134).

| 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 | square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 103$ °C; see Figure 1 ; see Figure 2 | - | 8 | A |
| I_{FRM} | repetitive peak forward current | square-wave pulse; $\delta = 0.5$; $t_p = 25$ μ s; $T_{mb} \leq 103$ °C | - | 16 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 8.3$ ms; sine-wave pulse; $T_{j(init)} = 150$ °C | - | 60 | A |
| | | $t_p = 10$ ms; sine-wave pulse; $T_{j(init)} = 150$ °C | - | 55 | A |
| T_{stg} | storage temperature | | -40 | 150 | °C |
| T_j | junction temperature | | - | 150 | °C |



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

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



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

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

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|------------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | see Figure 3 | - | - | 2.5 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 60 | - | K/W |

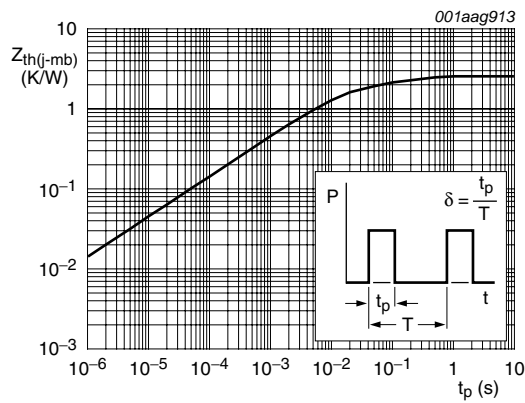
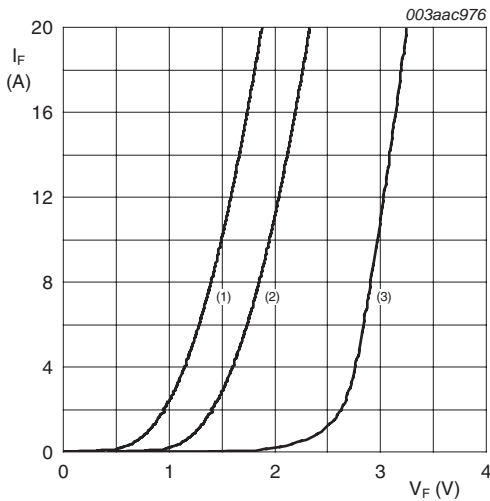


Fig 3. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|-----|------|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 8\text{ A}; T_j = 25\text{ °C}$ | - | 2 | 2.9 | V |
| | | $I_F = 8\text{ A}; T_j = 150\text{ °C}$; see Figure 4 | - | 1.5 | 1.85 | V |
| I_R | reverse current | $V_R = 600\text{ V}$ | - | 9 | 40 | μA |
| | | $V_R = 500\text{ V}; T_j = 100\text{ °C}$ | - | 1.1 | 3 | mA |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 1\text{ A}; V_R = 100\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$ | - | 13 | - | nC |
| t_{rr} | reverse recovery time | $I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$ | - | 30 | 52 | ns |
| | | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}$ | - | 32 | 40 | ns |
| | | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$; see Figure 5 | - | 20 | - | ns |
| I_{RM} | peak reverse recovery current | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 125\text{ °C}$ | - | 1.5 | 5.5 | A |
| | | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}$ | - | 9.5 | 12 | A |
| V_{FR} | forward recovery voltage | $I_F = 10\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$; see Figure 6 | - | 8 | 10 | V |



- (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 4. Forward current as a function of forward voltage

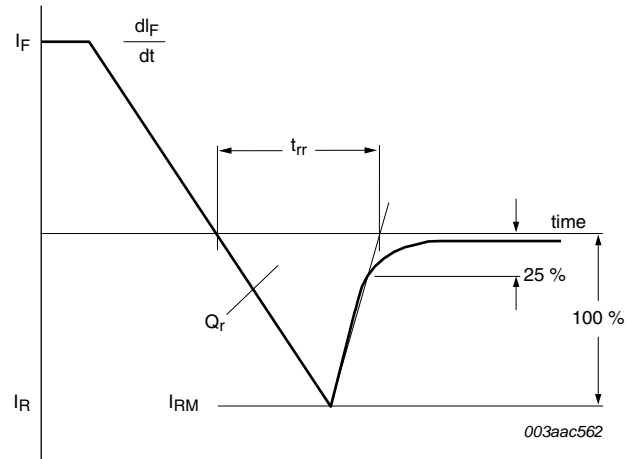


Fig 5. Reverse recovery definitions; ramp recovery

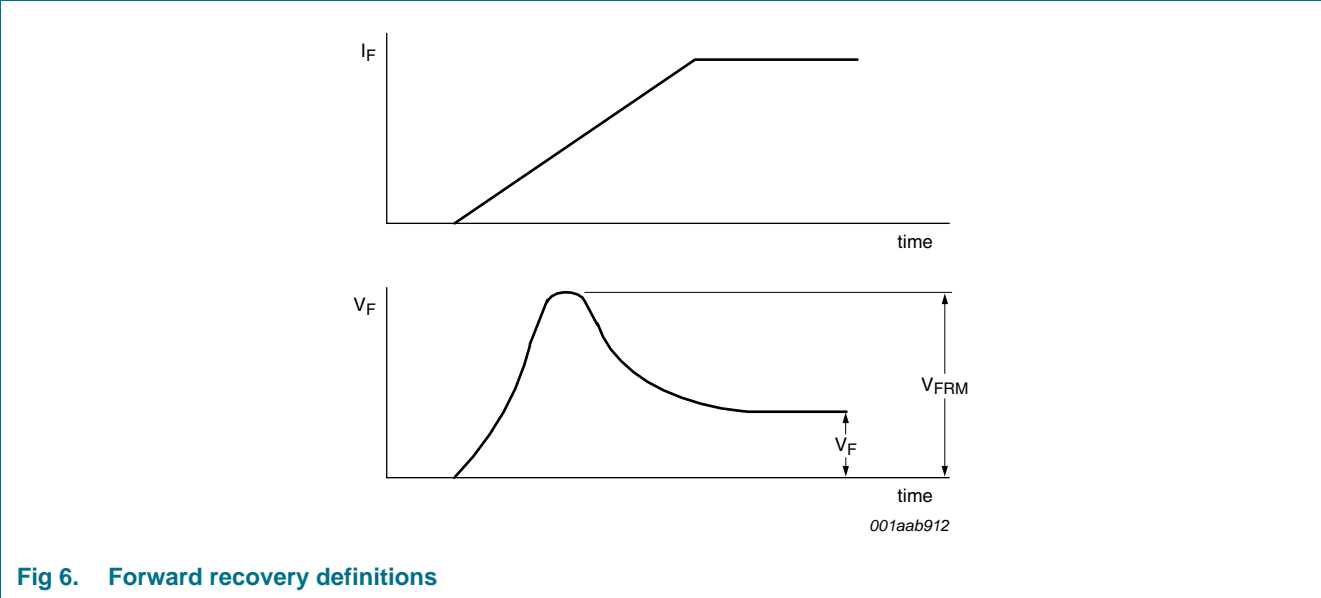
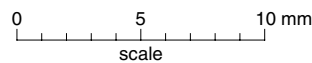
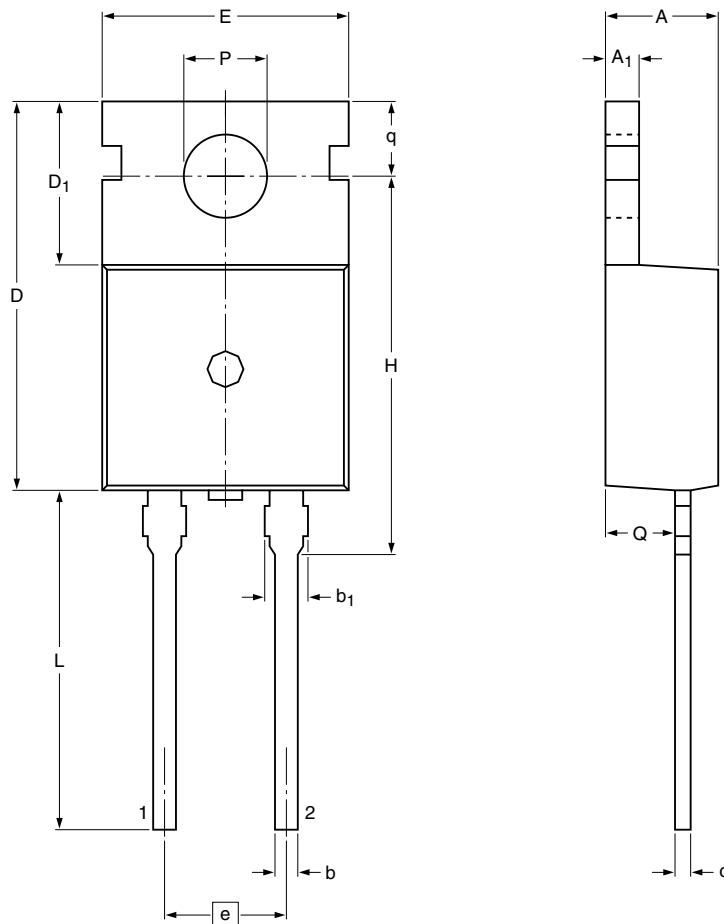


Fig 6. Forward recovery definitions

7. Package outline

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

SOD59



Dimensions

| Unit | A | A ₁ | b | b ₁ (¹) | c | D | D ₁ | 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 | 3.7 | 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 | 3.5 | 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 | | | | -09-08-17 09-08-25 |

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

8. Revision history

Table 7. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BYC8D-600 v.1 | 20101227 | Product data sheet | - | - |

9. Legal information

9.1 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.

[2] The term 'short data sheet' is explained in section "Definitions".

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Date of release: 27 December 2010

Document identifier: BYC8D-600