



# BYV29F-600

## Enhanced ultrafast power diode

Rev. 02 — 7 March 2011

Product data sheet

## 1. Product profile

### 1.1 General description

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

### 1.2 Features and benefits

- High thermal cycling performance
- Low thermal resistance
- Low on-state losses
- Soft recovery characteristic

### 1.3 Applications

- Dual Mode (DCM and CCM) PFC
- Power Factor Correction (PFC) for Interleaved Topology

### 1.4 Quick reference data

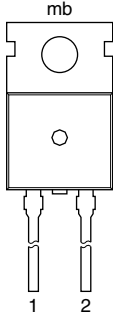
Table 1. Quick reference data

| Symbol                  | Parameter                       | Conditions                                                                                                                              | Min | Typ  | Max | Unit |
|-------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|------|
| V <sub>RRM</sub>        | repetitive peak reverse voltage |                                                                                                                                         | -   | -    | 600 | V    |
| I <sub>F(AV)</sub>      | average forward current         | square-wave pulse; δ = 0.5 ;<br>T <sub>mb</sub> ≤ 115 °C; see <a href="#">Figure 1</a> ;<br>see <a href="#">Figure 2</a>                | -   | -    | 9   | A    |
| Static characteristics  |                                 |                                                                                                                                         |     |      |     |      |
| V <sub>F</sub>          | forward voltage                 | I <sub>F</sub> = 8 A; T <sub>j</sub> = 25 °C;<br>see <a href="#">Figure 5</a>                                                           | -   | 1.45 | 1.9 | V    |
|                         |                                 | I <sub>F</sub> = 8 A; T <sub>j</sub> = 150 °C;<br>see <a href="#">Figure 5</a>                                                          | -   | 1.25 | 1.7 | V    |
| Dynamic characteristics |                                 |                                                                                                                                         |     |      |     |      |
| t <sub>rr</sub>         | reverse recovery time           | I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V;<br>dI <sub>F</sub> /dt = 100 A/μs;<br>T <sub>j</sub> = 25 °C; see <a href="#">Figure 6</a> | -   | 17.5 | 35  | 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; cathode |                                                                                   |                                                                                     |

SOD59 (TO-220AC)

## 3. Ordering information

Table 3. Ordering information

| Type number | Package  |                                                                                  |         |
|-------------|----------|----------------------------------------------------------------------------------|---------|
|             | Name     | Description                                                                      | Version |
| BYV29F-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; $\delta = 0.5$ ; $T_{mb} \leq 115^\circ\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a> | -   | 9   | A                |
| $I_{FRM}$   | repetitive peak forward current     | square-wave pulse; $\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 115^\circ\text{C}$                                     | -   | 18  | A                |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 10\ \text{ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$ ; see <a href="#">Figure 3</a>                   | -   | 91  | A                |
|             |                                     | $t_p = 8.3\ \text{ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$ ; see <a href="#">Figure 3</a>                  | -   | 100 | A                |
| $T_{stg}$   | storage temperature                 |                                                                                                                                   | -40 | 150 | $^\circ\text{C}$ |
| $T_j$       | junction temperature                |                                                                                                                                   | -   | 150 | $^\circ\text{C}$ |

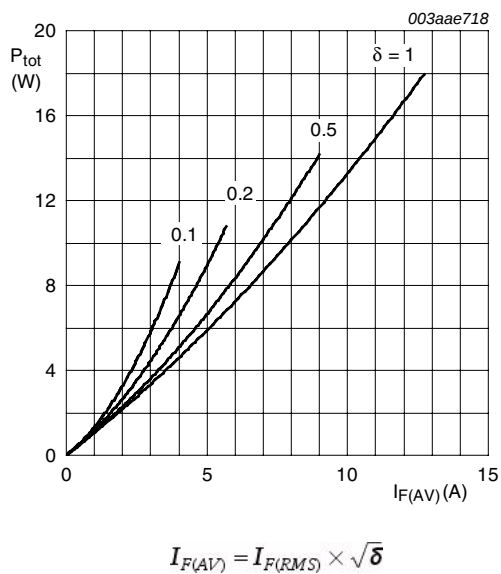


Fig 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

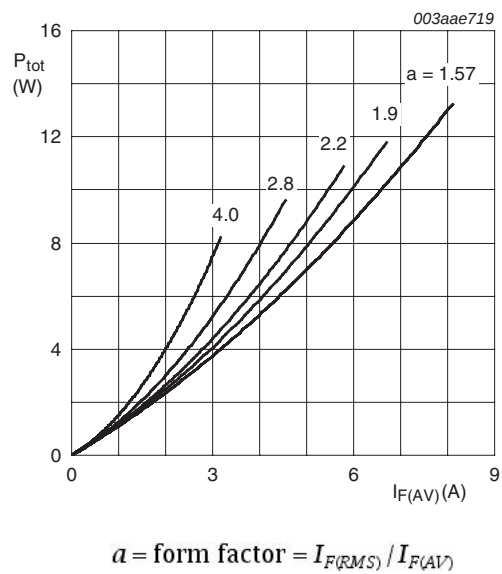


Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

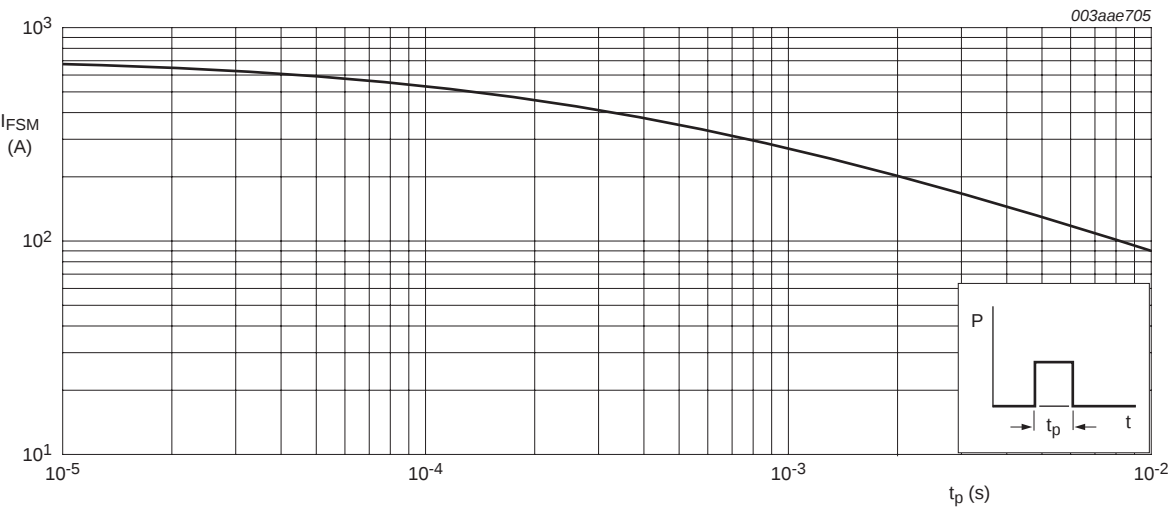


Fig 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

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 <a href="#">Figure 4</a> | -   | -   | 2.5 | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient       | in free air                  | -   | 60  | -   | K/W  |

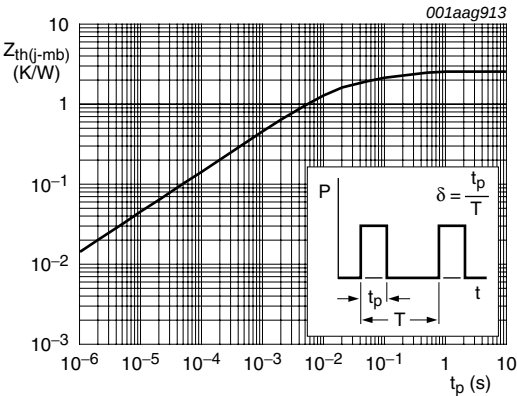
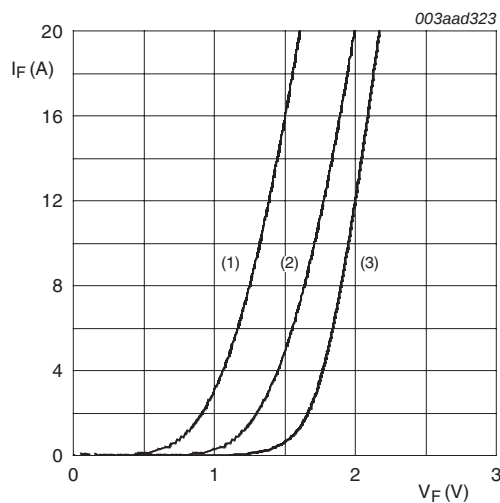


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse width

## 6. Characteristics

Table 6. Characteristics

| Symbol                         | Parameter                     | Conditions                                                                                                                            | Min | Typ  | Max | Unit          |
|--------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|---------------|
| <b>Static characteristics</b>  |                               |                                                                                                                                       |     |      |     |               |
| $V_F$                          | forward voltage               | $I_F = 8\text{ A}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 5</a>                                                              | -   | 1.45 | 1.9 | V             |
|                                |                               | $I_F = 8\text{ A}$ ; $T_j = 150\text{ °C}$ ; see <a href="#">Figure 5</a>                                                             | -   | 1.25 | 1.7 | V             |
| $I_R$                          | reverse current               | $V_R = 600\text{ V}$ ; $T_j = 100\text{ °C}$                                                                                          | -   | -    | 1.5 | mA            |
|                                |                               | $V_R = 600\text{ V}$ ; $T_j = 25\text{ °C}$                                                                                           | -   | -    | 50  | $\mu\text{A}$ |
| <b>Dynamic characteristics</b> |                               |                                                                                                                                       |     |      |     |               |
| $Q_r$                          | recovered charge              | $I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; see <a href="#">Figure 6</a>                        | -   | 13   | -   | nC            |
| $t_{rr}$                       | reverse recovery time         | $I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 6</a> | -   | 17.5 | 35  | ns            |
| $I_{RM}$                       | peak reverse recovery current | $I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; see <a href="#">Figure 6</a>                        | -   | 1.5  | -   | A             |
| $V_{FR}$                       | forward recovery voltage      | $I_F = 1\text{ A}$ ; $dI_F/dt = 100\text{ A}/\mu\text{s}$ ; see <a href="#">Figure 7</a>                                              | -   | 3.2  | -   | 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 5. Forward current as a function of forward voltage

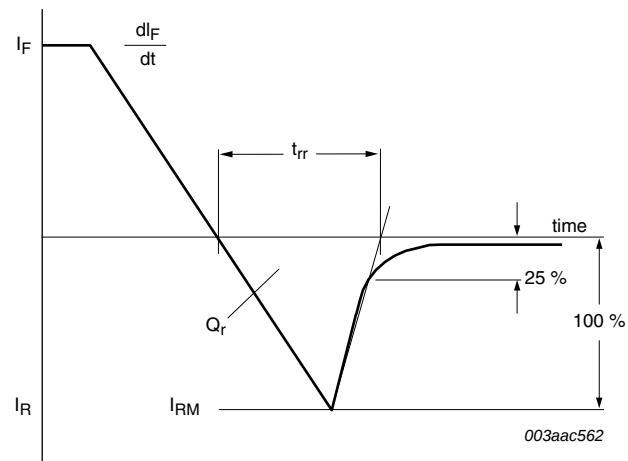


Fig 6. Reverse recovery definitions; ramp recovery

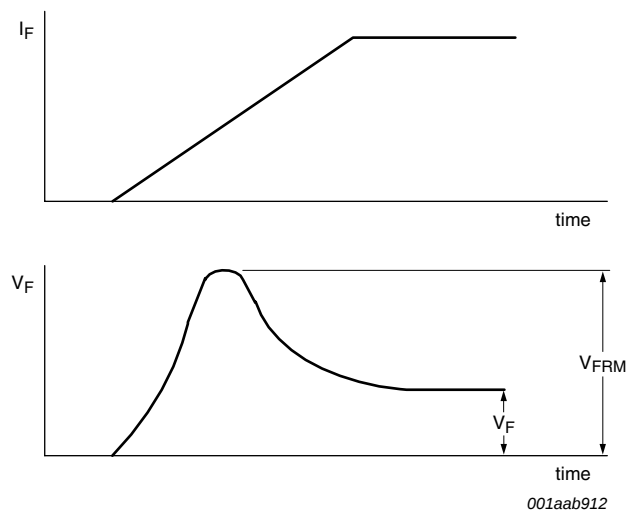


Fig 7. Forward recovery definitions

7. Package outline

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

SOD59

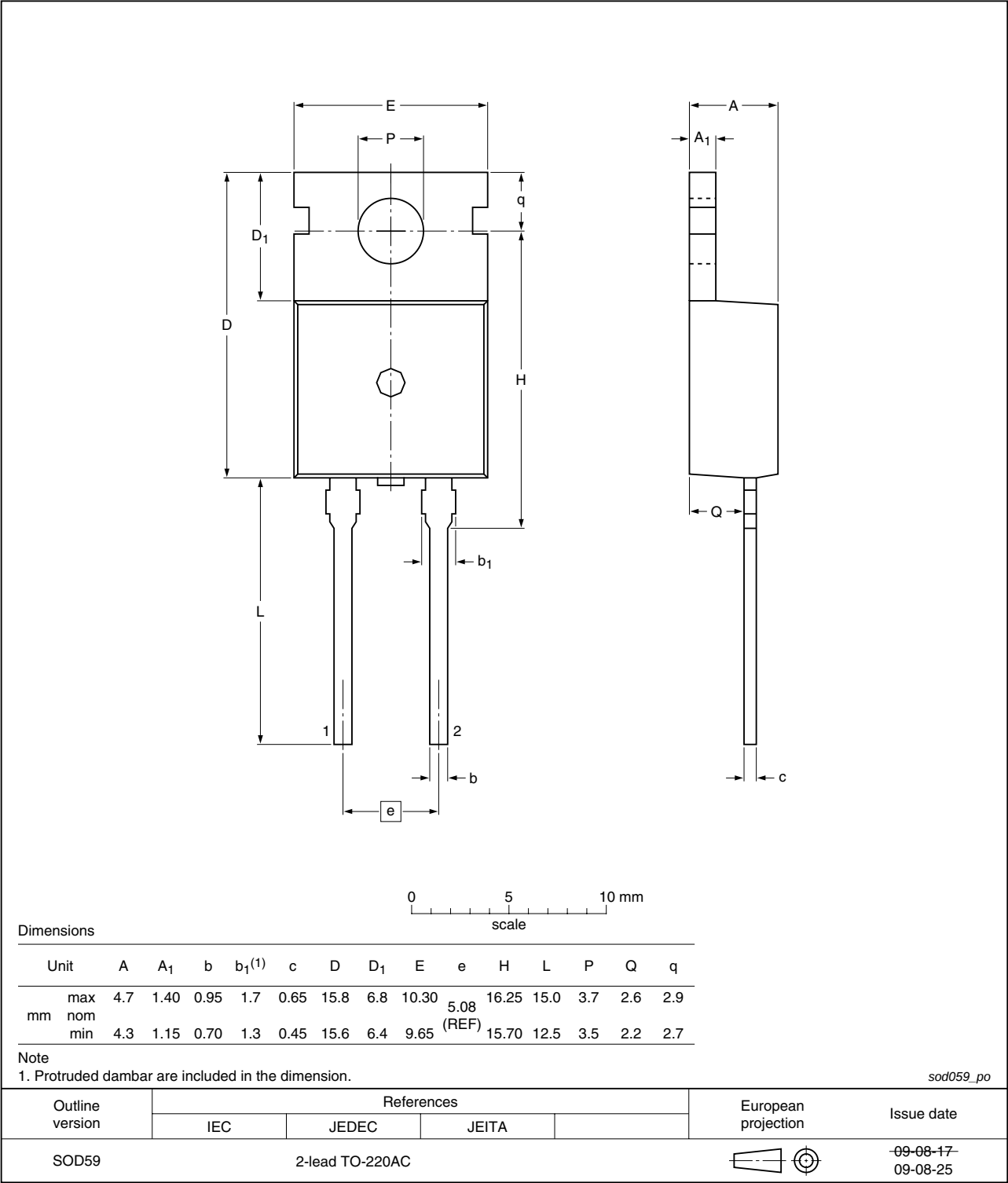


Fig 8. Package outline SOD59 (TO-220AC)

## 8. Revision history

Table 7. Revision history

| Document ID    | Release date                                                                  | Data sheet status  | Change notice | Supersedes     |
|----------------|-------------------------------------------------------------------------------|--------------------|---------------|----------------|
| BYV29F-600 v.2 | 20110307                                                                      | Product data sheet | -             | BYV29F-600 v.1 |
| Modifications: | <ul style="list-style-type: none"><li>• Various changes to content.</li></ul> |                    |               |                |
| BYV29F-600 v.1 | 20100907                                                                      | Product data sheet | -             | -              |

## 9. Legal information

### 9.1 Data sheet status

| Document status <sup>[1] [2]</sup> | Product status <sup>[3]</sup> | 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.                                     |

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Date of release: 7 March 2011

Document identifier: BYV29F-600