



# BYV29-400

## Ultrafast power diode

Rev. 3 — 29 May 2012

Product data sheet

## 1. Product profile

### 1.1 General description

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

### 1.2 Features and benefits

- Fast switching
- High thermal cycling performance
- Low forward volt drop
- Low thermal resistance
- Soft recovery minimizes power-consuming oscillations

### 1.3 Applications

- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)
- Output rectifiers in high-frequency switched-mode power supplies

### 1.4 Quick reference data

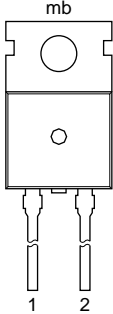

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	400	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 123$ °C; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	9	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see <a href="#">Figure 4</a>	-	0.9	1.03	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/s; $T_j = 25$ °C; see <a href="#">Figure 7</a> ; see <a href="#">Figure 5</a>	-	50	60	ns



## 2. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		 001aaa020
2	A	anode		
mb	mb	mounting base; cathode		

**SOD59 (TO-220AC)**

## 3. Ordering information

**Table 3. Ordering information**

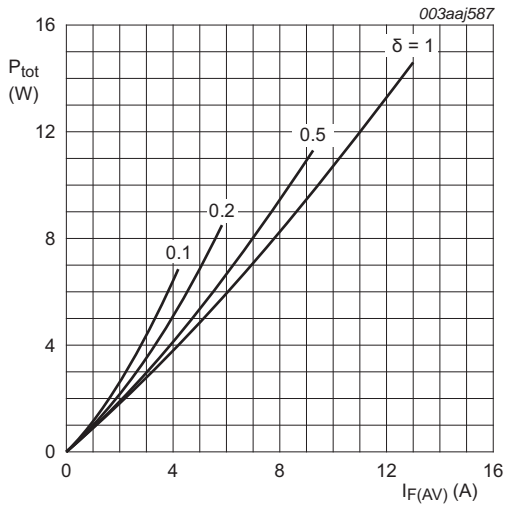
Type number	Package		
	Name	Description	Version
BYV29-400	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

## 4. Limiting values

**Table 4. Limiting values**

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

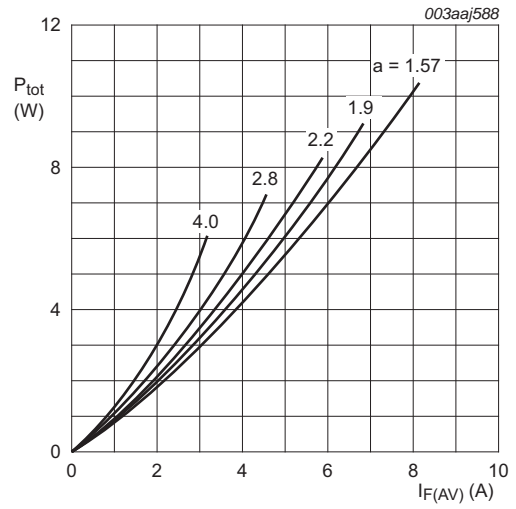
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	400	V
$V_{RWM}$	crest working reverse voltage		-	400	V
$V_R$	reverse voltage	DC	-	400	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 123\text{ °C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	9	A
$I_{FRM}$	repetitive peak forward current	square-wave pulse; $\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 123\text{ °C}$	-	18	A
$I_{FSM}$	non-repetitive peak forward current	sine-wave pulse; $t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$	-	100	A
		sine-wave pulse; $t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$	-	110	A
$T_{stg}$	storage temperature		-40	150	°C
$T_j$	junction temperature		-	150	°C



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

$$V_O = 0.890 \text{ V}; R_S = 0.019 \text{ } \Omega$$

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



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

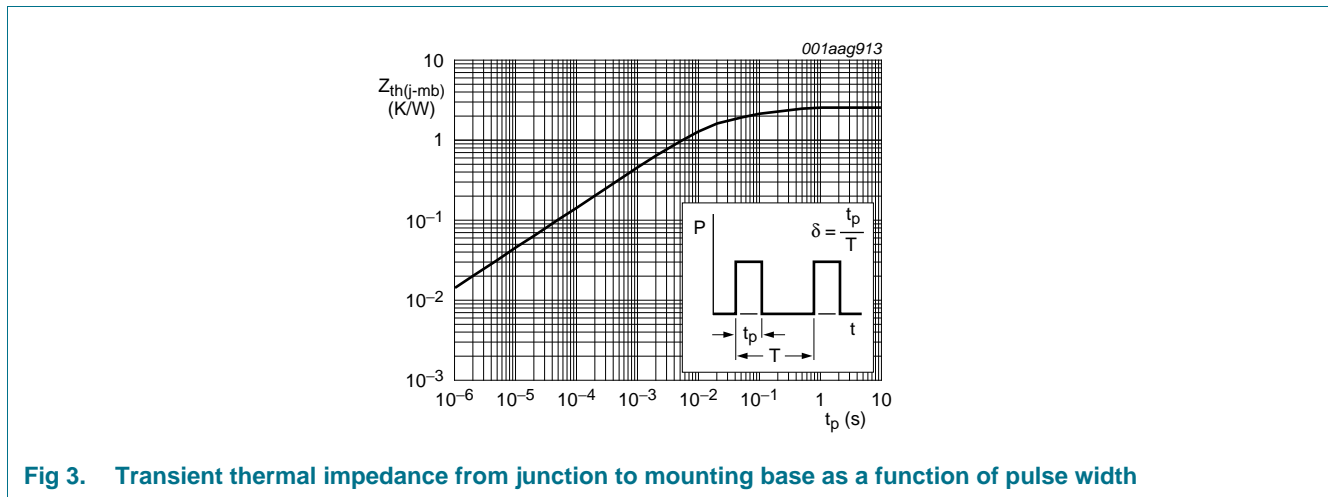
$$V_O = 0.890 \text{ V}; R_S = 0.019 \text{ } \Omega$$

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

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

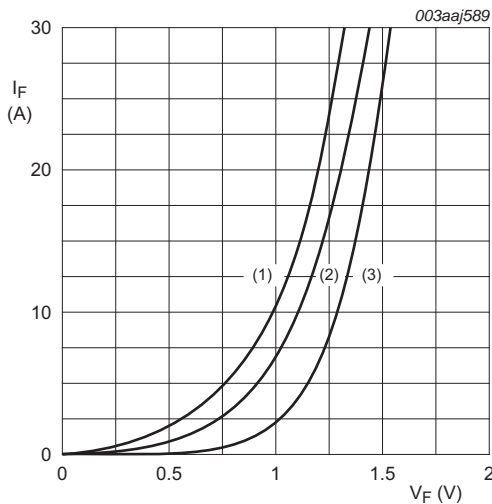
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see <a href="#">Figure 3</a>	-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W



## 6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8 \text{ A}; T_j = 150 \text{ }^\circ\text{C};$ see <a href="#">Figure 4</a>	-	0.9	1.03	V
		$I_F = 8 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 4</a>	-	1.05	1.25	V
		$I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 4</a>	-	1.2	1.4	V
$I_R$	reverse current	$V_R = 400 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	2	50	$\mu\text{A}$
		$V_R = 400 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	0.1	0.35	mA
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A/s};$ $T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 5</a> ; see <a href="#">Figure 6</a>	-	40	60	nC
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A/s};$ $T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 7</a> ; see <a href="#">Figure 5</a>	-	50	60	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A/s};$ $T_j = 100 \text{ }^\circ\text{C};$ see <a href="#">Figure 8</a> ; see <a href="#">Figure 5</a>	-	4	5.5	A
$V_{FRM}$	forward recovery voltage	$I_F = 10 \text{ A}; dI_F/dt = 10 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C};$ see <a href="#">Figure 9</a>	-	2.5	-	V



(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;  
 $V_O = 0.890 \text{ V}; R_S = 0.019 \text{ } \Omega$

Fig 4. Forward current as a function of forward voltage

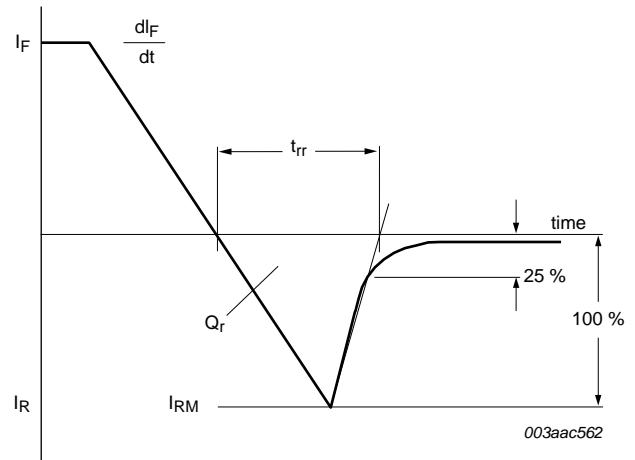
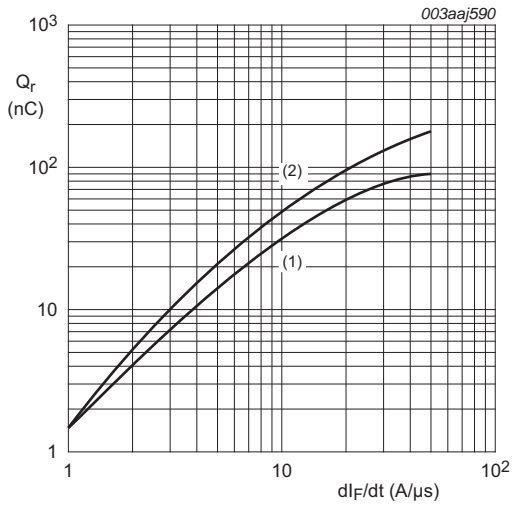
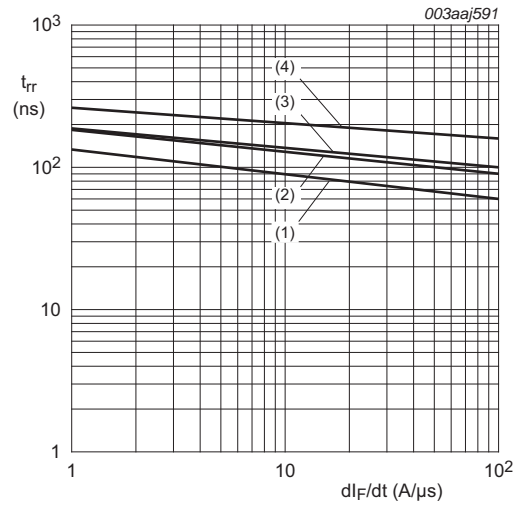


Fig 5. Reverse recovery definitions; ramp recovery



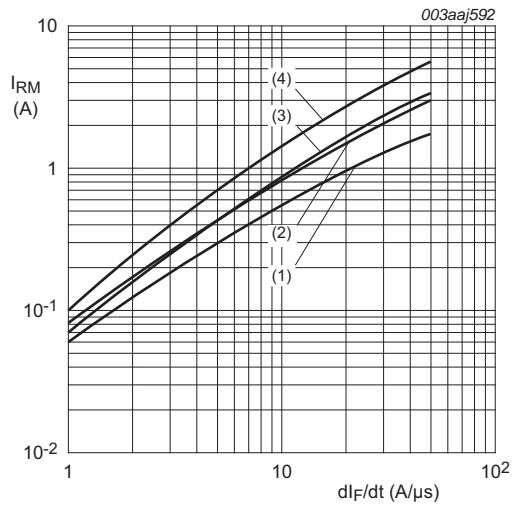
(1)  $I_F = 2$  A;  $T_j = 25$  °C;  
 (2)  $I_F = 10$  A;  $T_j = 25$  °C

Fig 6. Recovered charge as a function of rate of change of forward current; maximum values



(1)  $I_F = 1$  A;  $T_j = 25$  °C;  
 (2)  $I_F = 1$  A;  $T_j = 100$  °C;  
 (3)  $I_F = 10$  A;  $T_j = 25$  °C;  
 (4)  $I_F = 10$  A;  $T_j = 100$  °C

Fig 7. Reverse recovery time as a function of rate of change of forward current; maximum values



(1)  $I_F = 1$  A;  $T_j = 25$  °C;  
 (2)  $I_F = 1$  A;  $T_j = 100$  °C;  
 (3)  $I_F = 10$  A;  $T_j = 25$  °C;  
 (4)  $I_F = 10$  A;  $T_j = 100$  °C

Fig 8. Peak reverse recovery current as a function of rate of change of forward current; maximum values

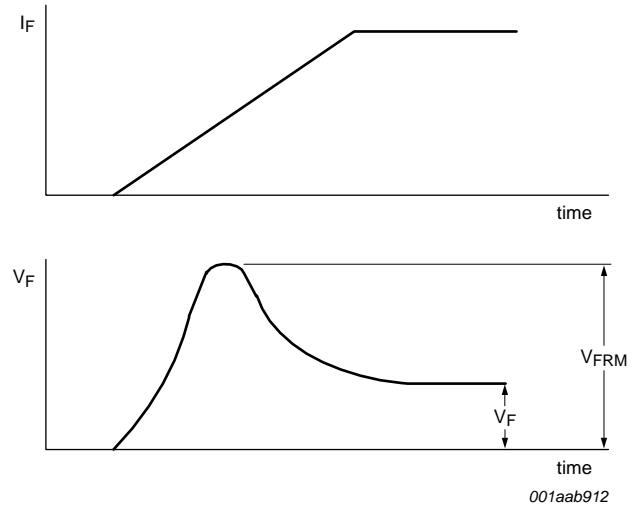


Fig 9. Forward recovery definitions

7. Package outline

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

SOD59

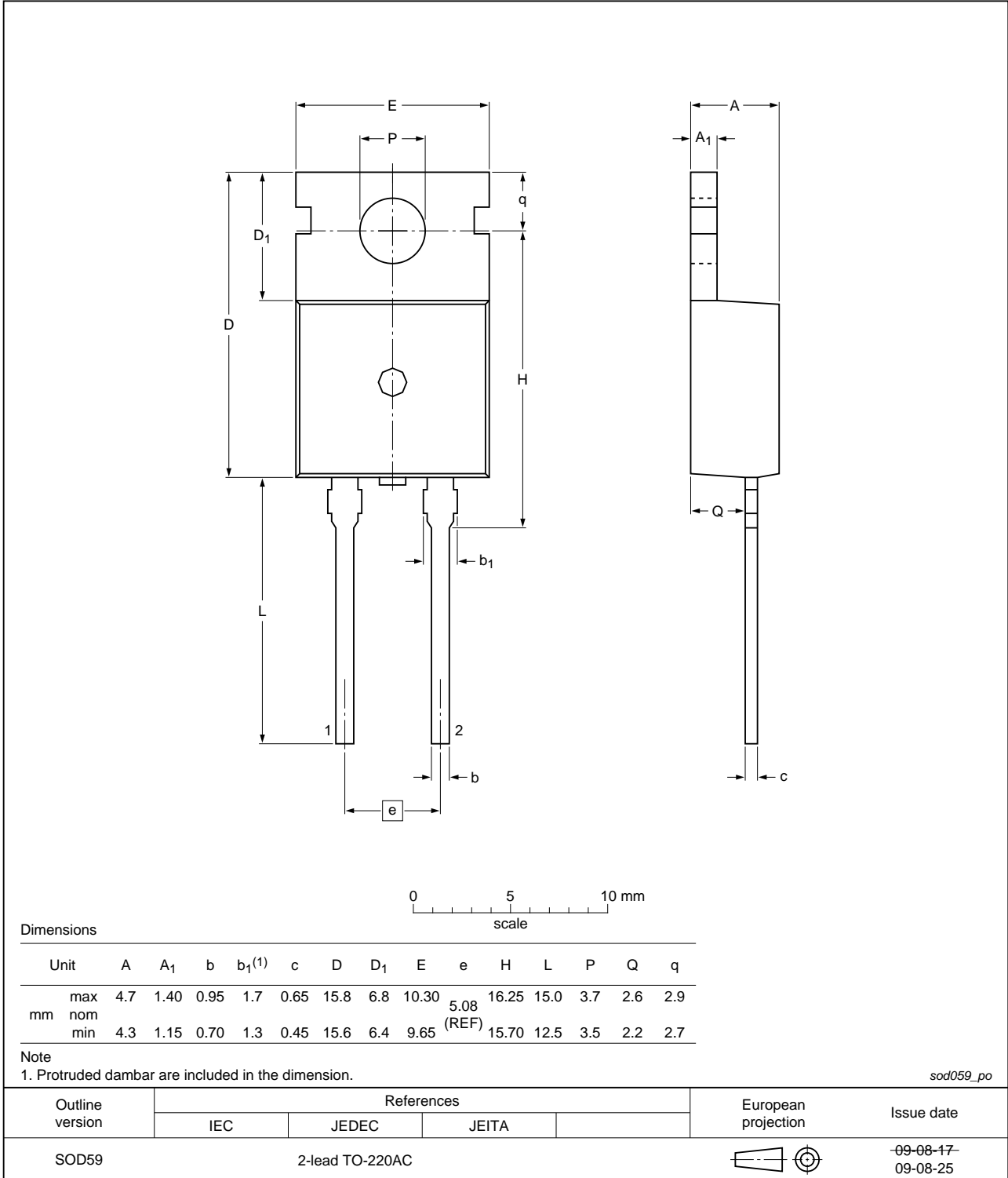


Fig 10. Package outline SOD59 (TO-220AC)

## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV29-400 v.3	20120529	Product data sheet	-	BYV29_SERIES v.2
Modifications:	<ul style="list-style-type: none"><li>Type number BYV29-400 separated from data sheet BYV29_SERIES v.2.</li><li>Various changes to content.</li></ul>			
BYV29_SERIES v.2	19980901	Product specification	-	BYV29_SERIES v.1



## 9. Legal information

### 9.1 Data sheet status

Document status <sup>[1]</sup> <sup>[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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[2] The term 'short data sheet' is explained in section "Definitions".

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