



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

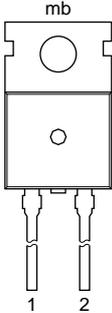
Table 1. Quick reference data

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 Figure 1 ; see Figure 2	-	-	9	A
Static characteristics						
V_F	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see Figure 4	-	0.9	1.03	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/s; $T_j = 25$ °C; see Figure 7 ; see Figure 5	-	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

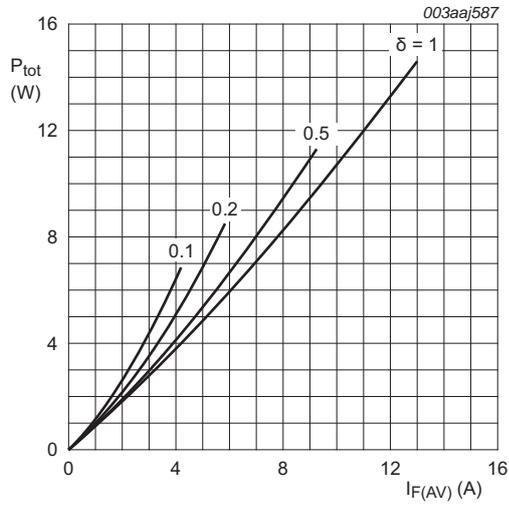
Type number	Package		
	Name	Description	Version
BYV29-400	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

4. Limiting values

Table 4. Limiting values

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

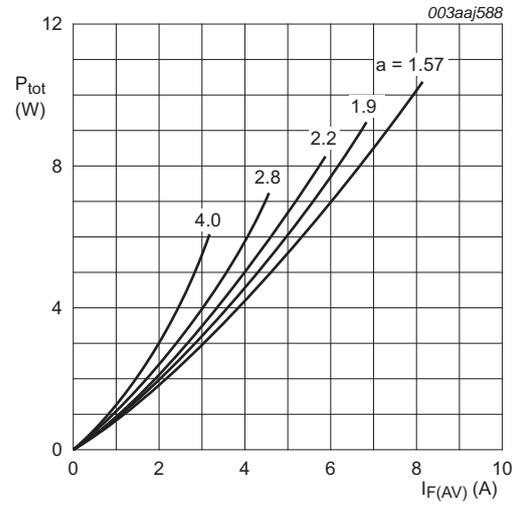
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	400	V
V_{RWM}	crest working reverse voltage		-	400	V
V_R	reverse voltage	DC	-	400	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 123\text{ °C}$; see Figure 1 ; see Figure 2	-	9	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 123\text{ °C}$	-	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



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

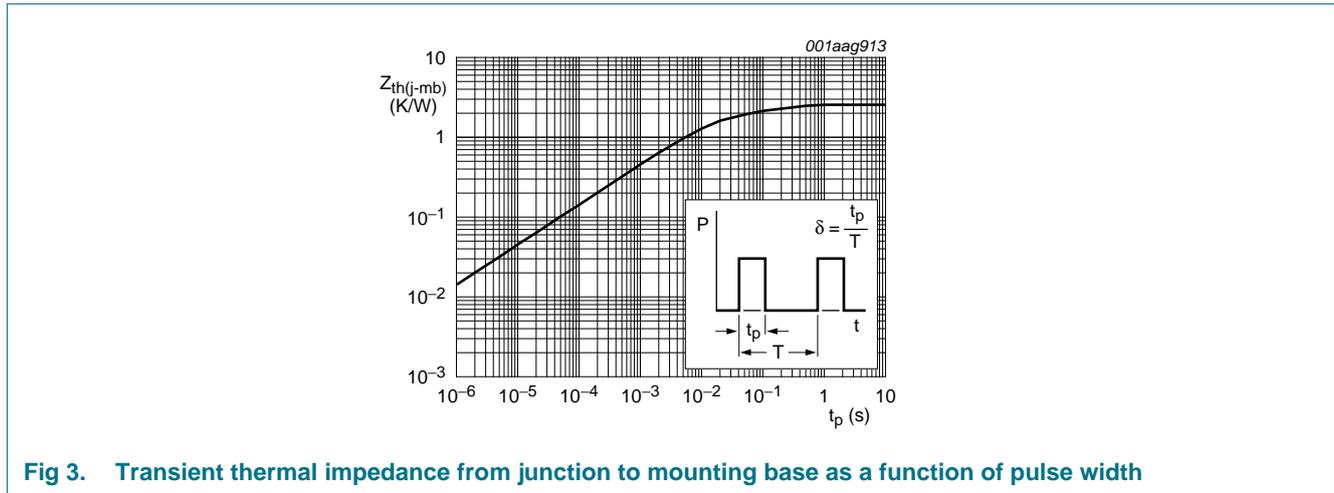
$$V_O = 0.890 \text{ V}; R_S = 0.019 \text{ } \Omega$$

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

5. Thermal characteristics

Table 5. Thermal characteristics

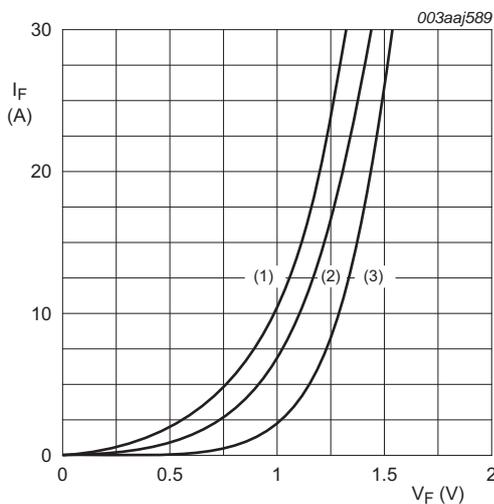
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 3	-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W



6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}; T_j = 150\text{ °C};$ see Figure 4	-	0.9	1.03	V
		$I_F = 8\text{ A}; T_j = 25\text{ °C};$ see Figure 4	-	1.05	1.25	V
		$I_F = 20\text{ A}; T_j = 25\text{ °C};$ see Figure 4	-	1.2	1.4	V
I_R	reverse current	$V_R = 400\text{ V}; T_j = 25\text{ °C}$	-	2	50	μA
		$V_R = 400\text{ V}; T_j = 100\text{ °C}$	-	0.1	0.35	mA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 2\text{ A}; V_R = 30\text{ V}; dI_F/dt = 20\text{ A/s}; T_j = 25\text{ °C};$ see Figure 5 ; see Figure 6	-	40	60	nC
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A/s}; T_j = 25\text{ °C};$ see Figure 7 ; see Figure 5	-	50	60	ns
I_{RM}	peak reverse recovery current	$I_F = 10\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A/s}; T_j = 100\text{ °C};$ see Figure 8 ; see Figure 5	-	4	5.5	A
V_{FRM}	forward recovery voltage	$I_F = 10\text{ A}; dI_F/dt = 10\text{ A/s}; T_j = 25\text{ °C};$ see Figure 9	-	2.5	-	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;
 $V_O = 0.890\text{ V}; R_S = 0.019\ \Omega$

Fig 4. Forward current as a function of forward voltage

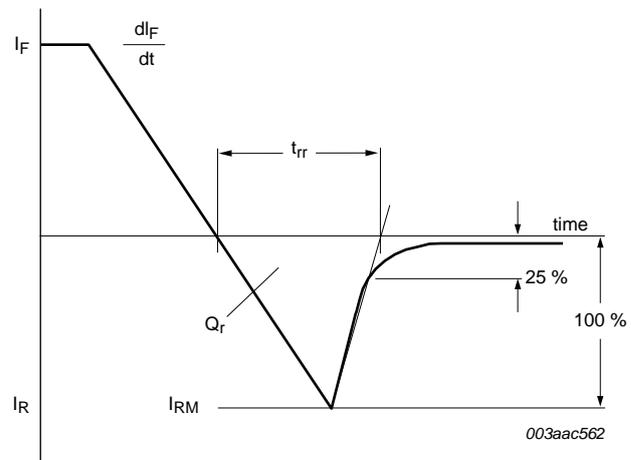
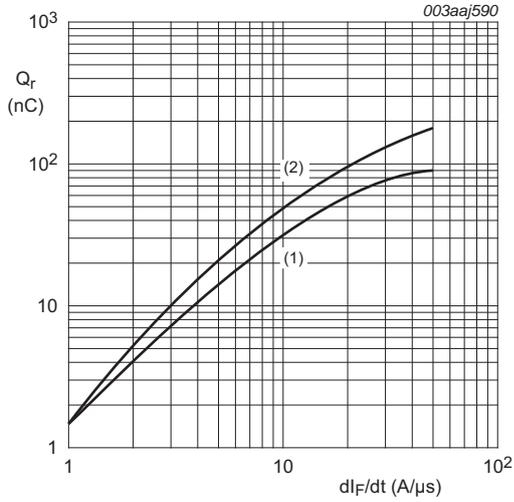
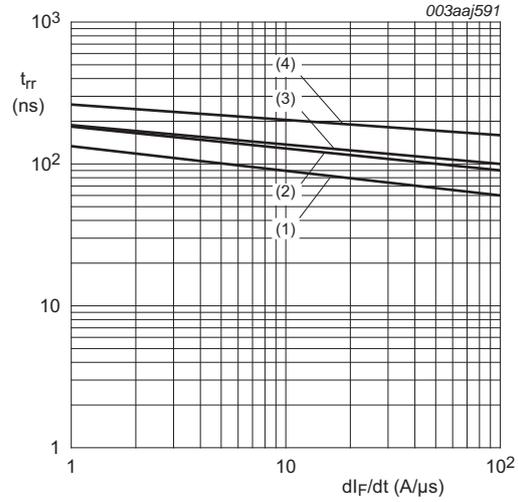


Fig 5. Reverse recovery definitions; ramp recovery



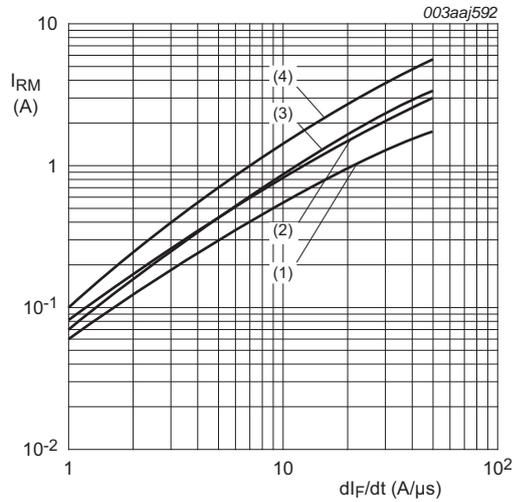
(1) $I_F = 2 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
 (2) $I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$

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



(1) $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
 (2) $I_F = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C};$
 (3) $I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
 (4) $I_F = 10 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

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



(1) $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
 (2) $I_F = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C};$
 (3) $I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
 (4) $I_F = 10 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

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

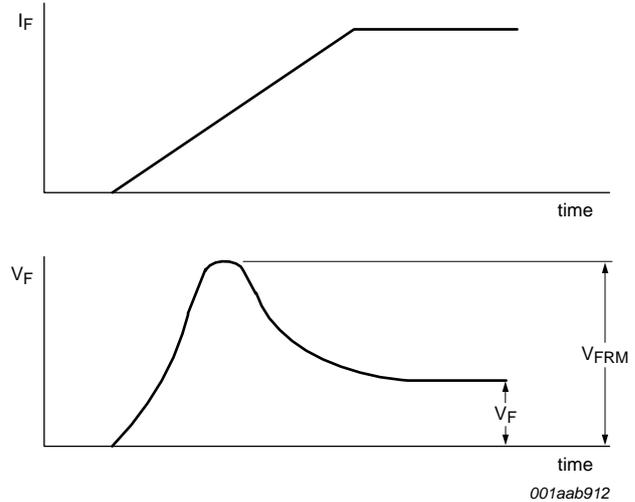


Fig 9. Forward recovery definitions

7. Package outline

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

SOD59

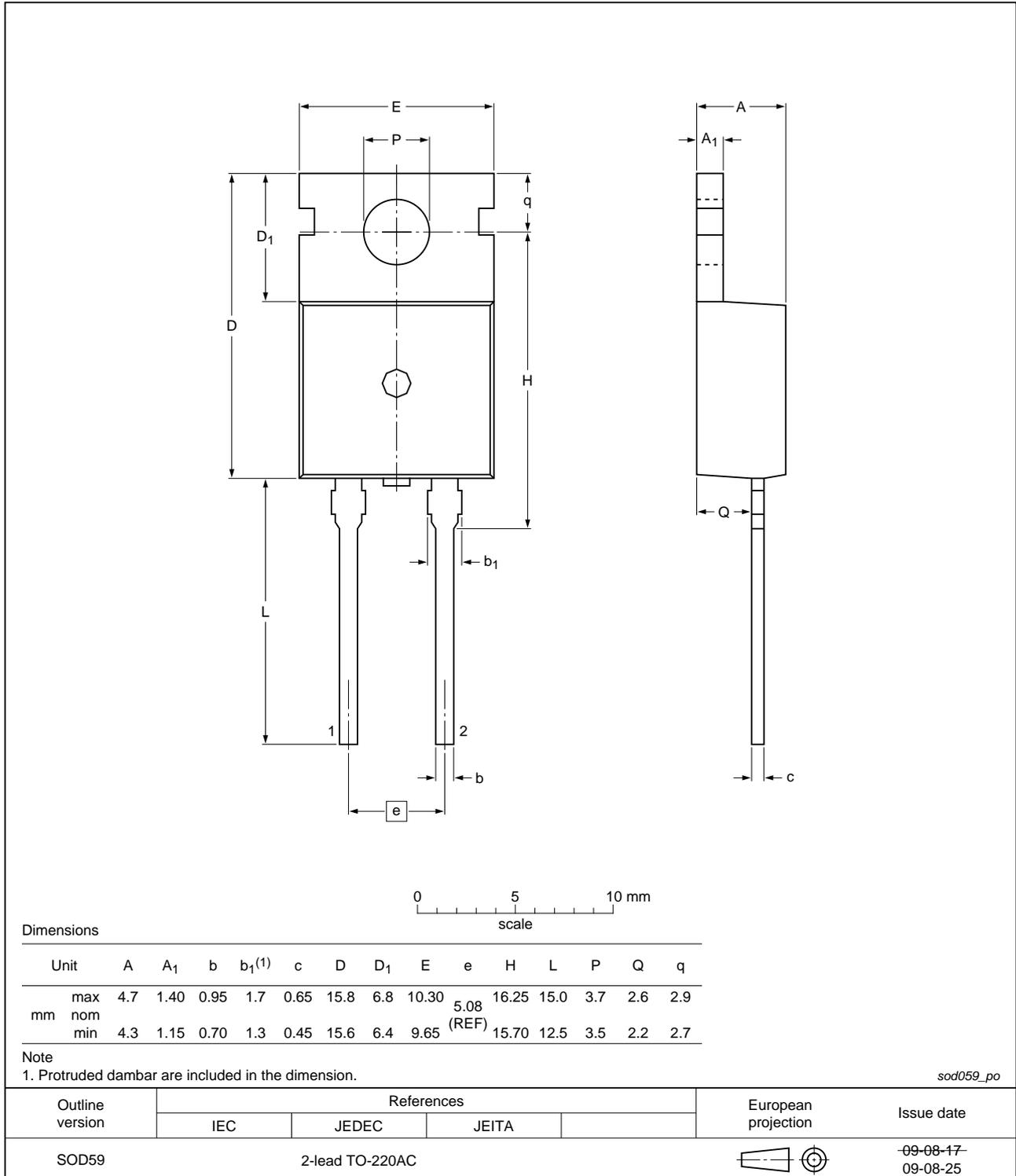


Fig 10. Package outline SOD59 (TO-220AC)

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">Type number BYV29-400 separated from data sheet BYV29_SERIES v.2.Various changes to content.			
BYV29_SERIES v.2	19980901	Product specification	-	BYV29_SERIES v.1

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.

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

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