



# BYV29-400

## Ultrafast power diode

Rev.04 - 5 March 2018

Product data sheet

## 1. General description

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

## 2. Features and benefits

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

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		400			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 123\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	9			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 123\text{ °C}$ ; square-wave pulse	18			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse;	100			A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse;	110			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8\text{ A}$ ; $T_j = 150\text{ °C}$ ; <a href="#">Fig. 4</a>	-	0.9	1.03	V
		$I_F = 8\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 4</a>	-	1.05	1.25	V
		$I_F = 20\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 4</a>	-	1.2	1.4	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $di_F/dt = 100\text{ A/s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 5</a> ; <a href="#">Fig. 7</a>	-	50	60	ns

## 5. Pinning information

Table 2. Pinning information

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

## 6. 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

## 7. Marking

Table 4. Marking codes

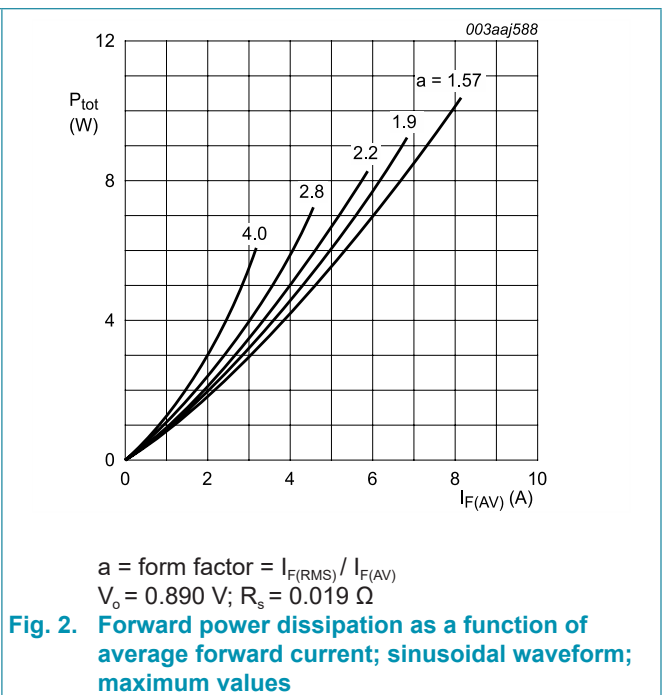
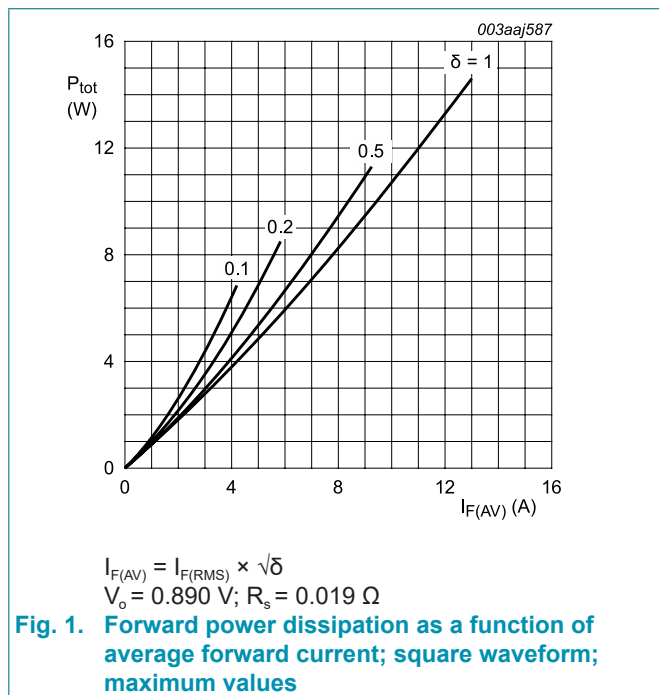
Type number	Marking codes
BYV29-400	BYV29-400

## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Values	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	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 123\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	9	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 123\text{ }^\circ\text{C}$ ; square-wave pulse	18	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse;	100	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse;	110	A
$T_{stg}$	storage temperature		-40 to 150	$^\circ\text{C}$
$T_j$	junction temperature		150	$^\circ\text{C}$



## 9. Thermal characteristics

Table 6. Thermal characteristics

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

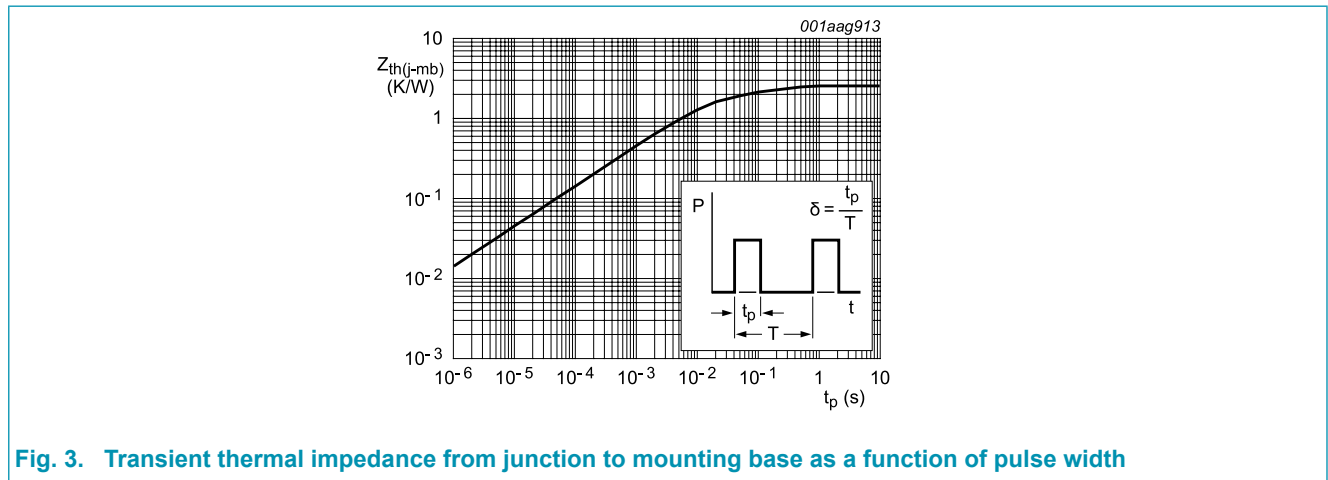
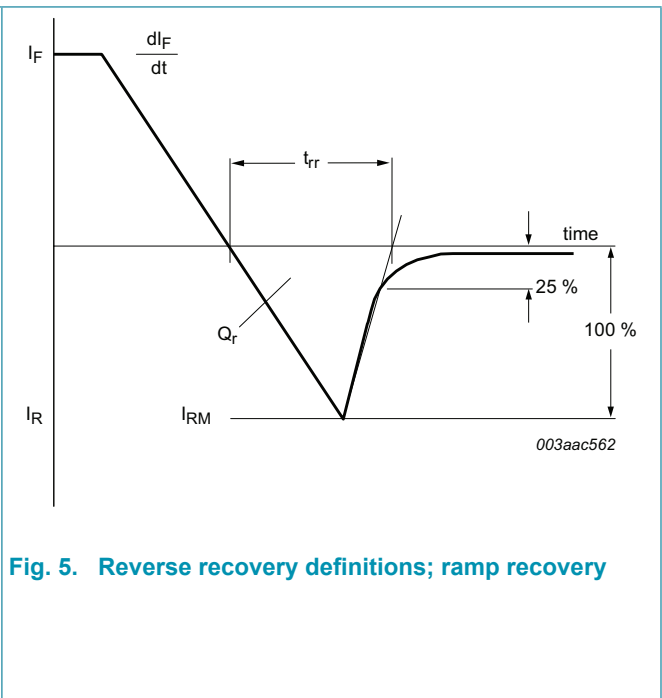
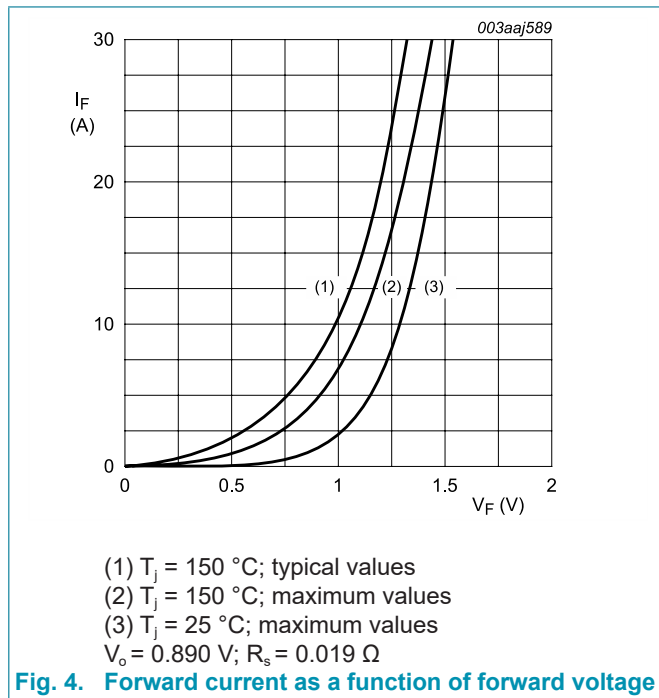


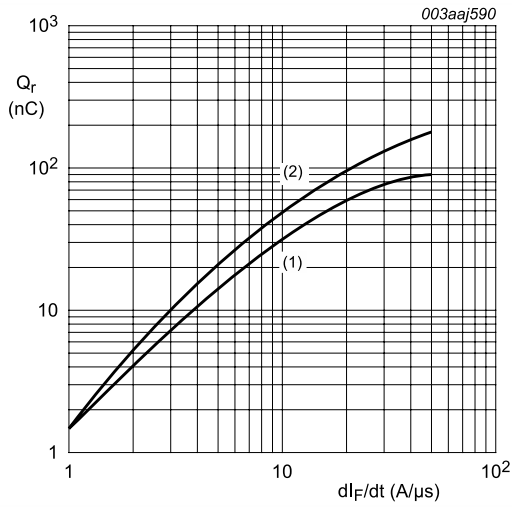
Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

### 10. Characteristics

Table 7. Characteristics

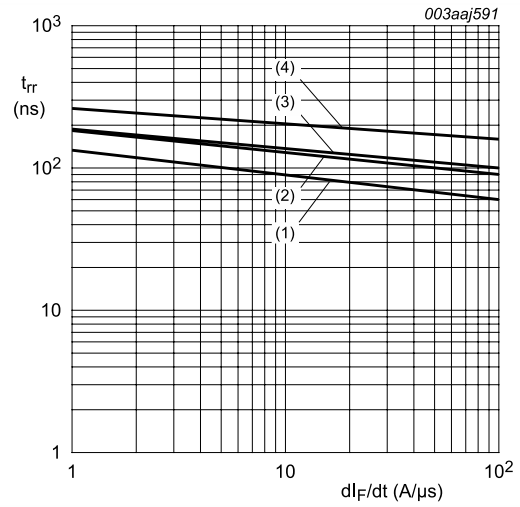
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 4}$	-	1.05	1.25	V
		$I_F = 8 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{Fig. 4}$	-	0.9	1.03	V
		$I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 4}$	-	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	$I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 5}; \text{Fig. 6}$	-	40	60	nC
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 5}; \text{Fig. 7}$	-	50	60	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A/s}; T_j = 100 \text{ }^\circ\text{C}; \text{Fig. 5}; \text{Fig. 8}$	-	4	5.5	A
$V_{FRM}$	forward recovery voltage	$I_F = 10 \text{ A}; dI_F/dt = 10 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 9}$	-	2.5	-	V





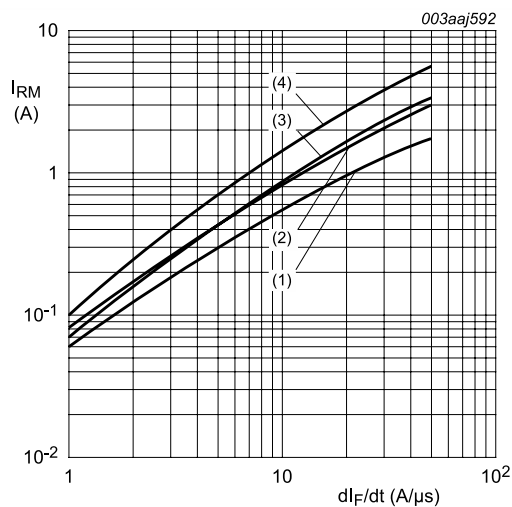
- (1)  $I_F = 2$  A;  $T_j = 25$  °C
- (2)  $I_F = 10$  A;  $T_j = 25$  °C

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



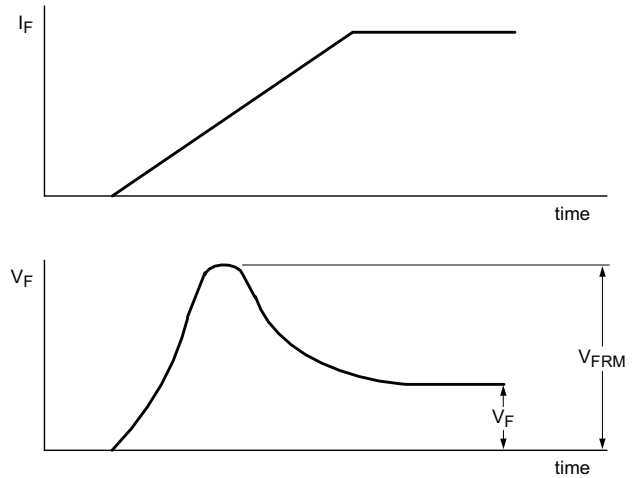
- (1)  $I_F = 1$  A;  $T_j = 25$  °C
- (2)  $I_F = 1$  A;  $T_j = 100$  °C
- (3)  $I_F = 10$  A;  $T_j = 25$  °C
- (4)  $I_F = 10$  A;  $T_j = 100$  °C

**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**

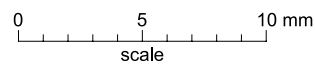
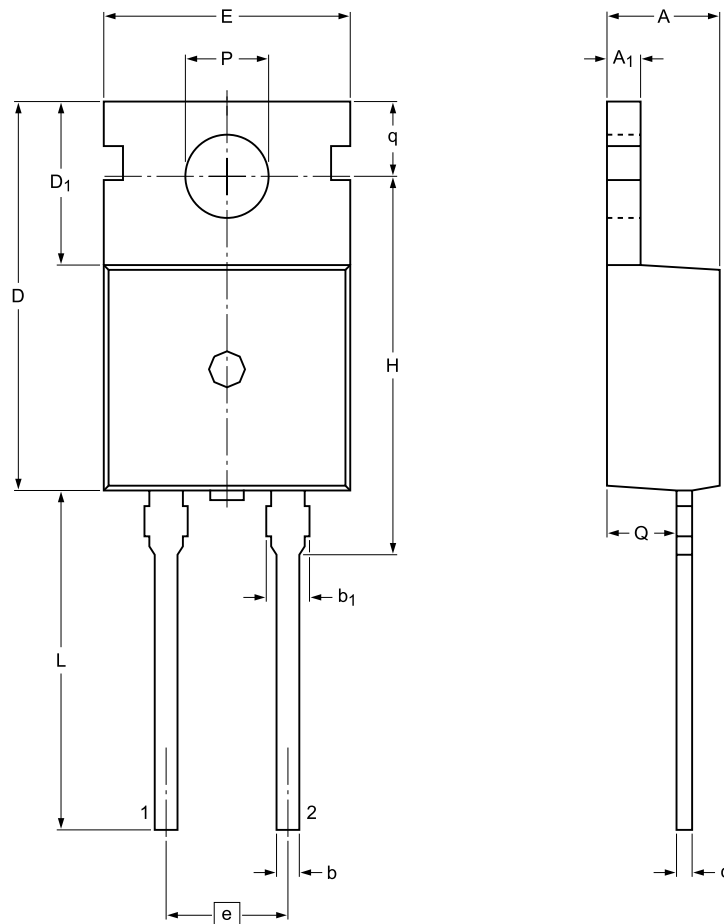


**Fig. 9. Forward recovery definitions**

### 11. 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				<del>09-08-25</del> 12-11-27

## 12. Revision history

**Table 8. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV29-400 v.4	20180305	Product data sheet	-	BYV29-400 v.3
Modifications:	Change from NXP version to WeEn version			
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



## 13. Legal information

### 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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