



# BYW29E-100

Ultrafast power diode

17 September 2013

Product data sheet

## 1. General description

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

## 2. Features and benefits

- Fast switching
- Guaranteed ESD capability
- High thermal cycling performance
- Low on-state loss
- Low thermal resistance
- Rugged: reverse voltage surge capability
- Soft recovery minimizes power-consuming oscillations

## 3. Applications

- Output rectifiers in high-frequency switched-mode power supplies

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	100	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 128$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	-	-	8	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8$ A; $T_J = 150$ °C; <a href="#">Fig. 4</a>	-	0.8	0.895	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/ $\mu$ s; $T_J = 25$ °C; ramp recovery; <a href="#">Fig. 5</a> ; <a href="#">Fig. 7</a>	-	20	25	ns
<b>Electrostatic discharge</b>						
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k $\Omega$	-	-	8	kV

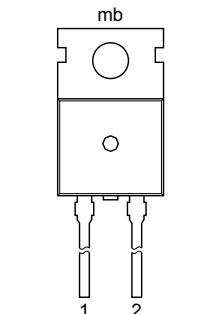
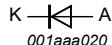


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## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>TO-220AC (SOD59)</p>	 <p>001aaa020</p>
2	A	anode		
mb	mb	mounting base; cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYW29E-100	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

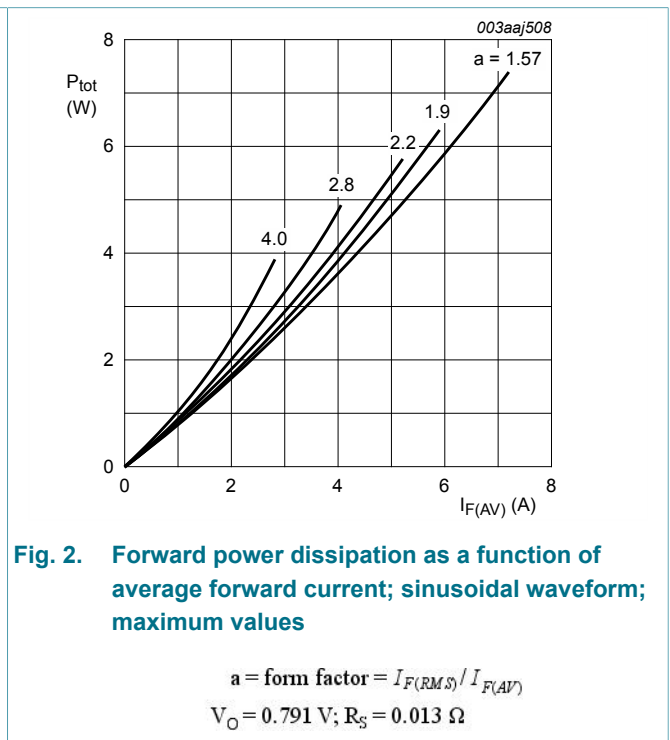
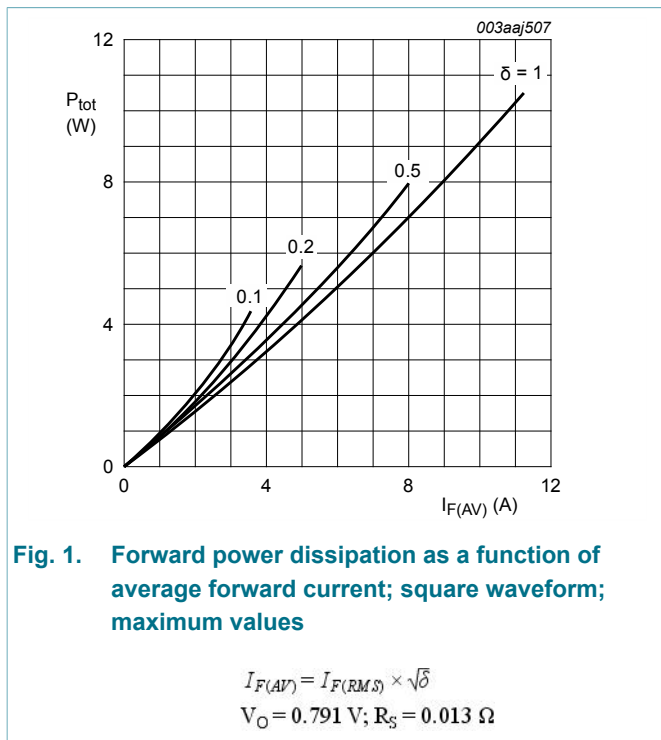
## 7. Limiting values

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		-	100	V
$V_{RWM}$	crest working reverse voltage		-	100	V
$V_R$	reverse voltage		-	100	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 128\text{ }^\circ\text{C}$ ; square-wave pulse; Fig. 1; Fig. 2	-	8	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 128\text{ }^\circ\text{C}$ ; square-wave pulse	-	16	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse	-	88	A
		$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse	-	80	A
$I_{RRM}$	repetitive peak reverse current	$\delta = 0.001$ ; $t_p = 2\text{ }\mu\text{s}$	-	0.2	A

Symbol	Parameter	Conditions	Min	Max	Unit
$I_{RSM}$	non-repetitive peak reverse current	$t_p = 100 \mu s$	-	0.2	A
$T_{stg}$	storage temperature		-40	150	°C
$T_j$	junction temperature		-	150	°C
<b>Electrostatic discharge</b>					
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 kΩ	-	8	kV



## 8. Thermal characteristics

Table 5. 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>	-	-	2.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

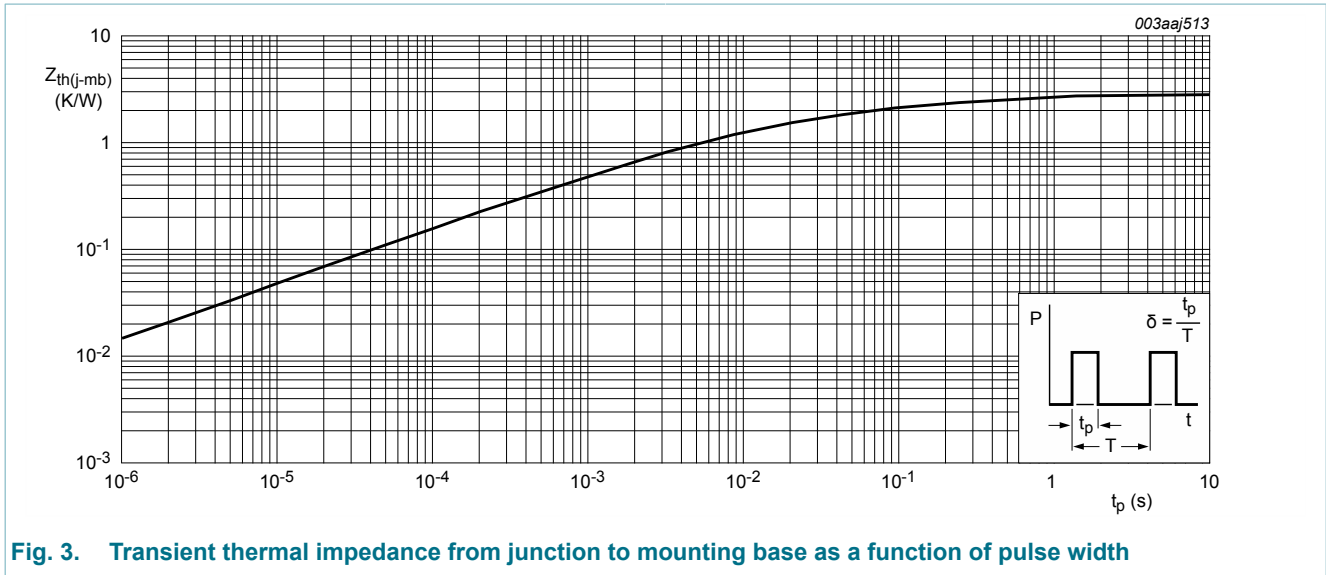
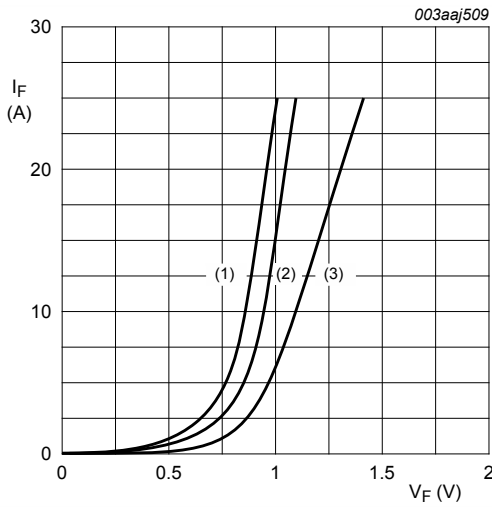


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

## 9. Characteristics

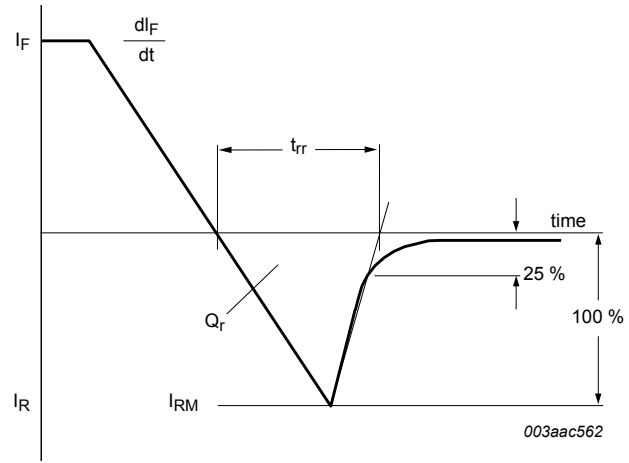
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 8 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 4</a>	-	0.92	1.05	V
		I <sub>F</sub> = 20 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 4</a>	-	1.1	1.3	V
		I <sub>F</sub> = 8 A; T <sub>J</sub> = 150 °C; <a href="#">Fig. 4</a>	-	0.8	0.895	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 100 V; T <sub>J</sub> = 25 °C	-	2	10	μA
		V <sub>R</sub> = 100 V; T <sub>J</sub> = 100 °C	-	0.2	0.6	mA
<b>Dynamic characteristics</b>						
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 2 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 20 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	-	4	11	nC
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; T <sub>J</sub> = 25 °C; ramp recovery; <a href="#">Fig. 5</a> ; <a href="#">Fig. 7</a>	-	20	25	ns
		I <sub>F</sub> = 0.5 A; I <sub>R</sub> = 1 A; I <sub>R(meas)</sub> = 0.25 A; T <sub>J</sub> = 25 °C; step recovery; <a href="#">Fig. 8</a>	-	15	20	ns
V <sub>FRM</sub>	forward recovery voltage	I <sub>F</sub> = 1 A; dI <sub>F</sub> /dt = 10 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 9</a>	-	1	-	V

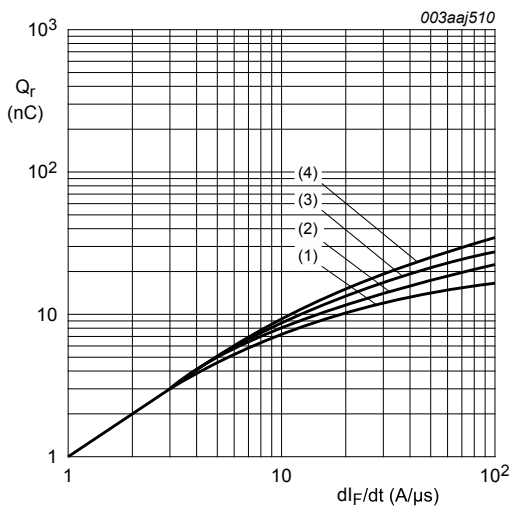


**Fig. 4. Forward current as a function of forward voltage**

- (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;
- $V_O = 0.791\text{ V}$ ;  $R_S = 0.013\text{ }\Omega$

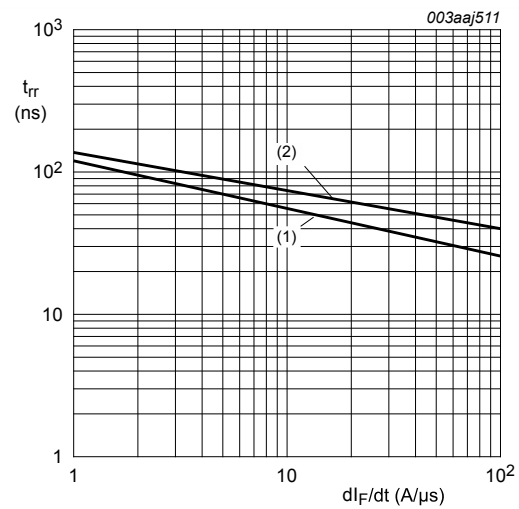


**Fig. 5. Reverse recovery definitions; ramp recovery**



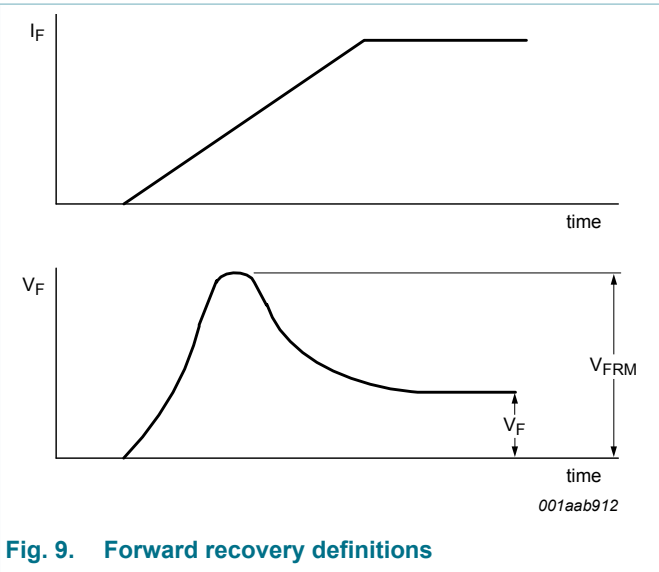
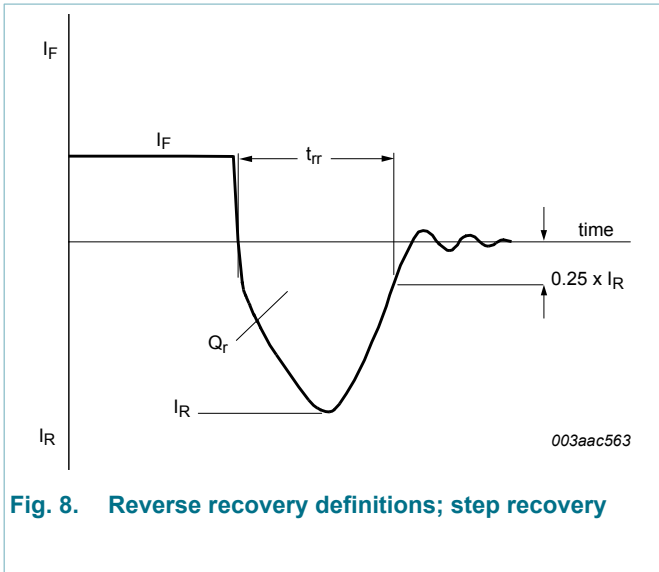
**Fig. 6. Recovered charge as a function of rate of change of forward current; maximum values**

- (1)  $I_F = 1\text{ A}$ ;  $T_j = 25\text{ }^\circ\text{C}$
- (2)  $I_F = 2\text{ A}$ ;  $T_j = 25\text{ }^\circ\text{C}$
- (3)  $I_F = 5\text{ A}$ ;  $T_j = 25\text{ }^\circ\text{C}$
- (4)  $I_F = 10\text{ A}$ ;  $T_j = 25\text{ }^\circ\text{C}$



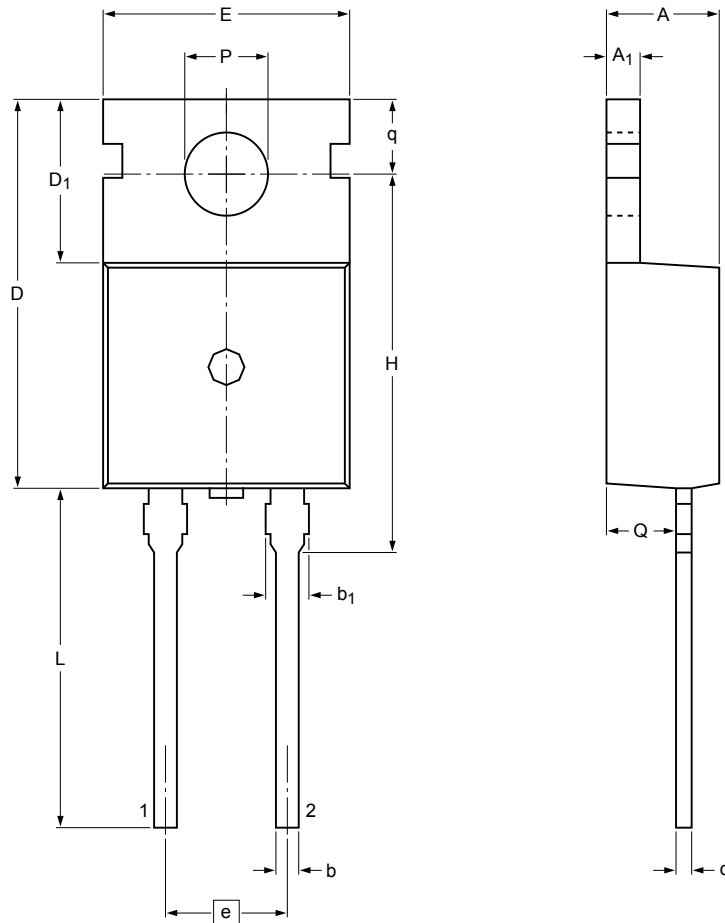
**Fig. 7. Reverse recovery time as a function of rate of change of forward current; maximum values**

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



10. 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				09-08-25 12-11-27

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

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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.
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