



BYW29E-200

Ultrafast power diode

Rev. 5 — 20 March 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
- 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

1.3 Applications

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

1.4 Quick reference data

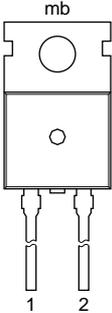
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	200	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 128$ °C; see Figure 1 ; see Figure 2	-	-	8	A
Static characteristics						
V_F	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see Figure 4	-	0.8	0.895	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; ramp recovery; see Figure 5 ; see Figure 7	-	20	25	ns
Electrostatic discharge						
V_{ESD}	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k Ω	-	-	8	kV



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
BYW29E-200	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

4. Limiting values

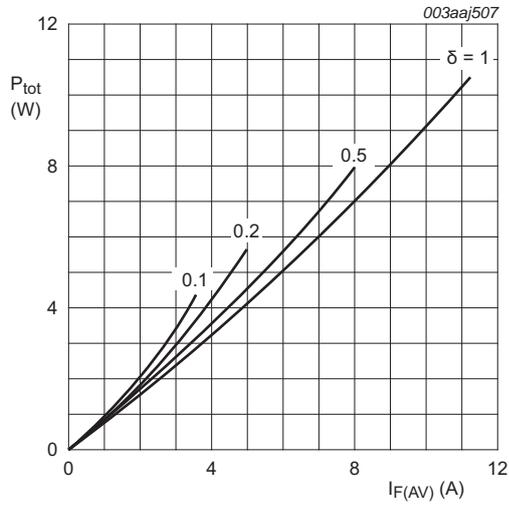
Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	200	V
V_{RWM}	crest working reverse voltage		-	200	V
V_R	reverse voltage		-	200	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 128\text{ °C}$; see Figure 1 ; see Figure 2	-	8	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 128\text{ °C}$	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ °C}$	-	88	A
		$t_p = 10\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ °C}$	-	80	A
I_{RRM}	repetitive peak reverse current	$\delta = 0.001$; $t_p = 2\ \mu\text{s}$	-	0.2	A
I_{RSM}	non-repetitive peak reverse current	$t_p = 100\ \mu\text{s}$	-	0.2	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C

Electrostatic discharge

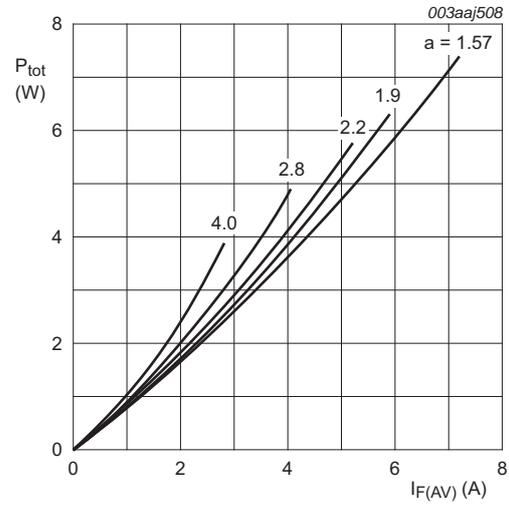
V_{ESD}	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 kΩ	-	8	kV
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$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

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

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



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

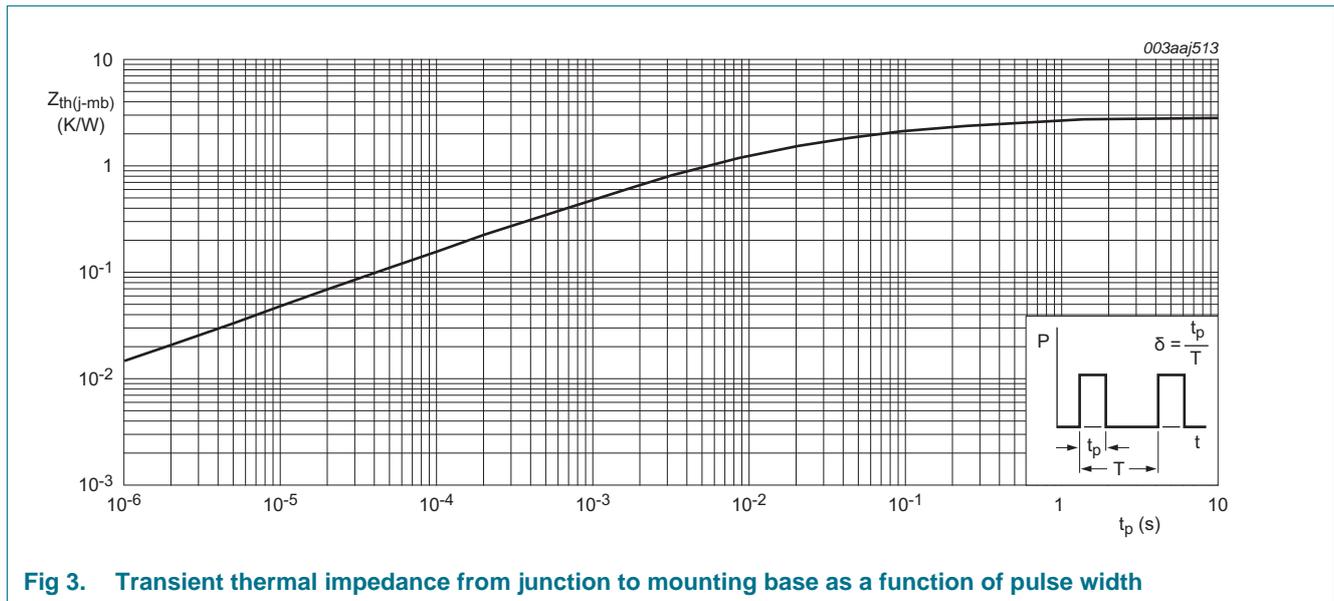
$$V_O = 0.791 \text{ V}; R_S = 0.013 \text{ } \Omega$$

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

5. Thermal characteristics

Table 5. Thermal characteristics

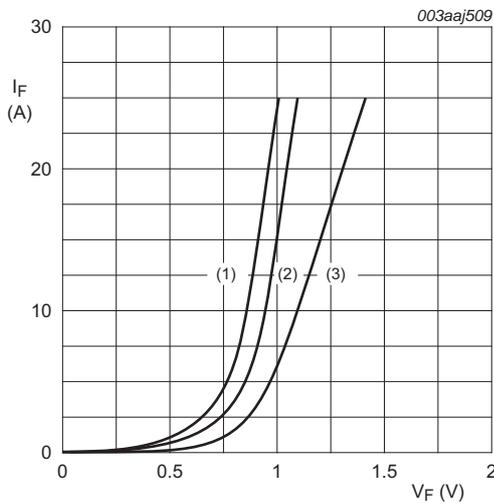
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 3	-	-	2.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 4	-	0.92	1.05	V
		$I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 4	-	1.1	1.3	V
		$I_F = 8 \text{ A}; T_j = 150 \text{ }^\circ\text{C};$ see Figure 4	-	0.8	0.895	V
I_R	reverse current	$V_R = 200 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	2	10	μA
		$V_R = 200 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	0.2	0.6	mA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A/s};$ $T_j = 25 \text{ }^\circ\text{C};$ see Figure 5 ; see Figure 6	-	4	11	nC
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A/s};$ ramp recovery; $T_j = 25 \text{ }^\circ\text{C};$ see Figure 5 ; see Figure 7	-	20	25	ns
		$I_F = 0.5 \text{ A}; I_R = 1 \text{ A};$ step recovery; $I_{R(\text{meas})} = 0.25 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 8	-	15	20	ns
V_{FRM}	forward recovery voltage	$I_F = 1 \text{ A}; dI_F/dt = 10 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 9	-	1	-	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;
 $V_O = 0.791 \text{ V}; R_S = 0.013 \text{ } \Omega$

Fig 4. Forward current as a function of forward voltage

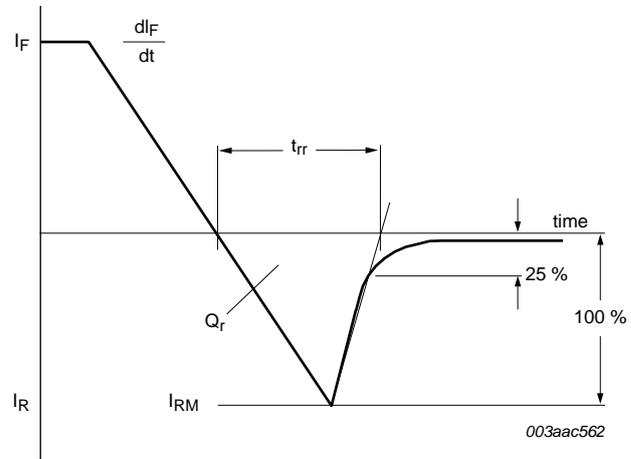
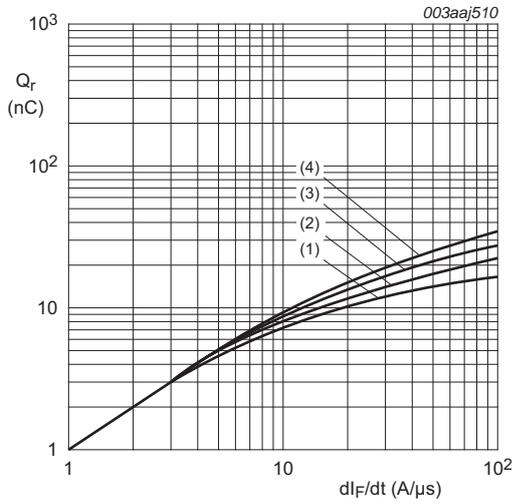
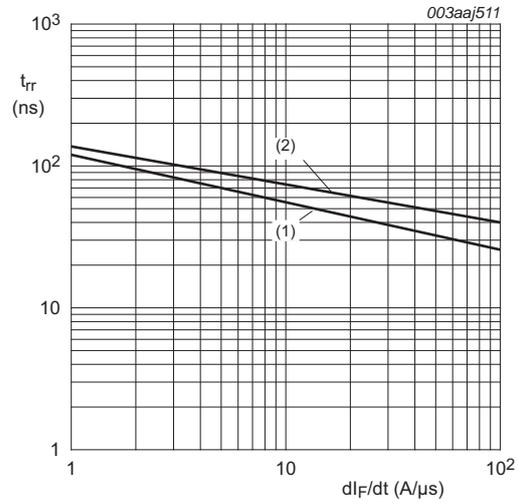


Fig 5. Reverse recovery definitions; ramp recovery



- (1) $I_F = 1$ A; $T_j = 25$ °C
- (2) $I_F = 2$ A; $T_j = 25$ °C
- (3) $I_F = 5$ A; $T_j = 25$ °C
- (4) $I_F = 10$ 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) $I_F = 10$ A; $T_j = 25$ °C

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

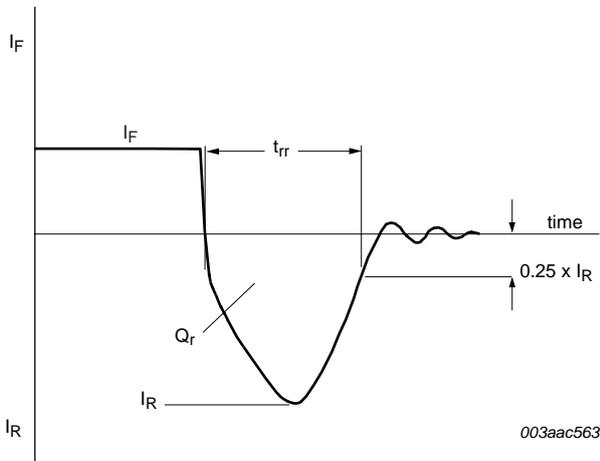


Fig 8. Reverse recovery definitions; step recovery

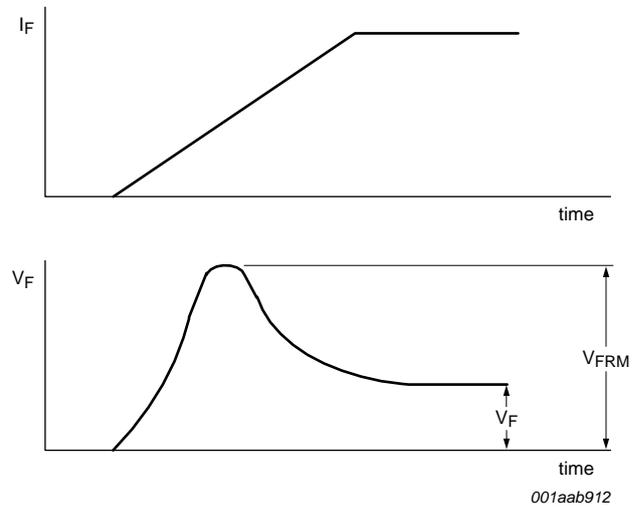
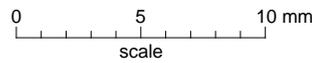
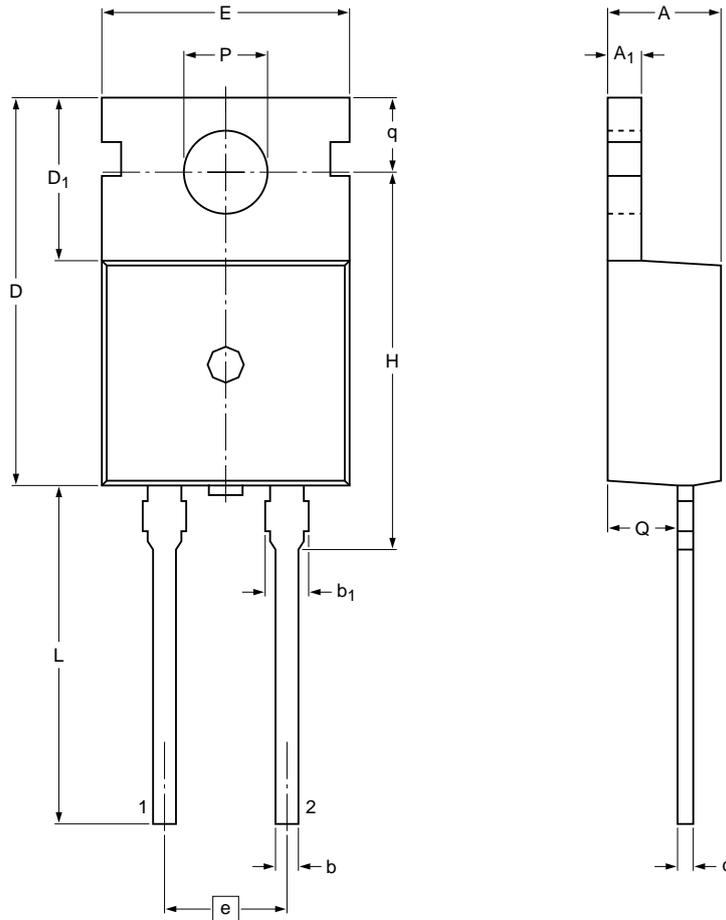


Fig 9. Forward recovery definitions

7. Package outline

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

SOD59



Dimensions

Unit	A	A ₁	b	b ₁ (1)	c	D	D ₁	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	3.7	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	3.5	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				-09-08-17- 09-08-25

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

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYW29E-200 v.5	20120320	Product data sheet	-	BYW29E_SERIES v.4
Modifications:	<ul style="list-style-type: none">• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.• Legal texts have been adapted to the new company name where appropriate.			
BYW29E_SERIES v.4	20010801	Product data sheet	-	BYW29E_SERIES v.3

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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.

[1] Please consult the most recently issued document before initiating or completing a design.

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

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