

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

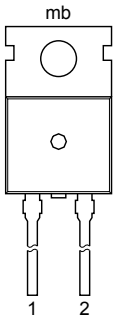
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	-	100	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; T_{mb} ≤ 128 °C; square-wave pulse; Fig. 1; Fig. 2		-	-	8	A
Static characteristics							
V_F	forward voltage	I_F = 8 A; T_j = 150 °C; Fig. 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/µs; T_j = 25 °C; ramp recovery; Fig. 5; Fig. 7		-	20	25	ns
Electrostatic discharge							
V_{ESD}	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 kΩ		-	-	8	kV

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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO-220AC (SOD59)	
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	$\delta = 0.5$; $T_{mb} \leq 128$ °C; square-wave pulse; Fig. 1; Fig. 2		-	8	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 128$ °C; square-wave pulse		-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		-	88	A
		$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		-	80	A
I_{RRM}	repetitive peak reverse current	$\delta = 0.001$; $t_p = 2$ µs		-	0.2	A

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Symbol	Parameter	Conditions		Min	Max	Unit
I_{RSM}	non-repetitive peak reverse current	t_p = 100 µs		-	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

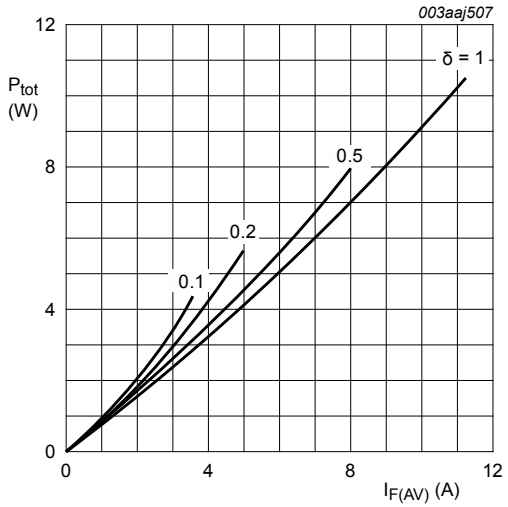


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

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

$V_O = 0.791$ V; $R_S = 0.013$ Ω

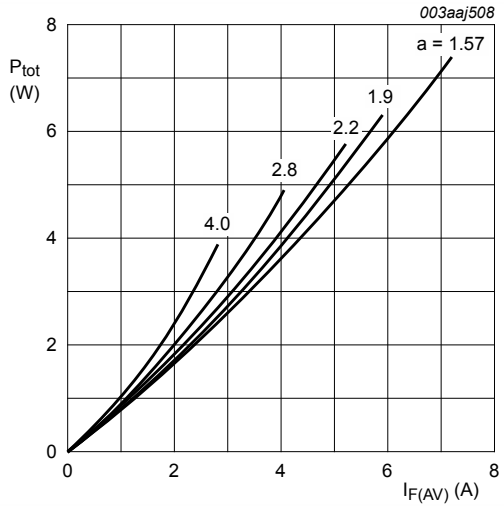


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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

$V_O = 0.791$ V; $R_S = 0.013$ Ω

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	Fig. 3		-	-	2.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W

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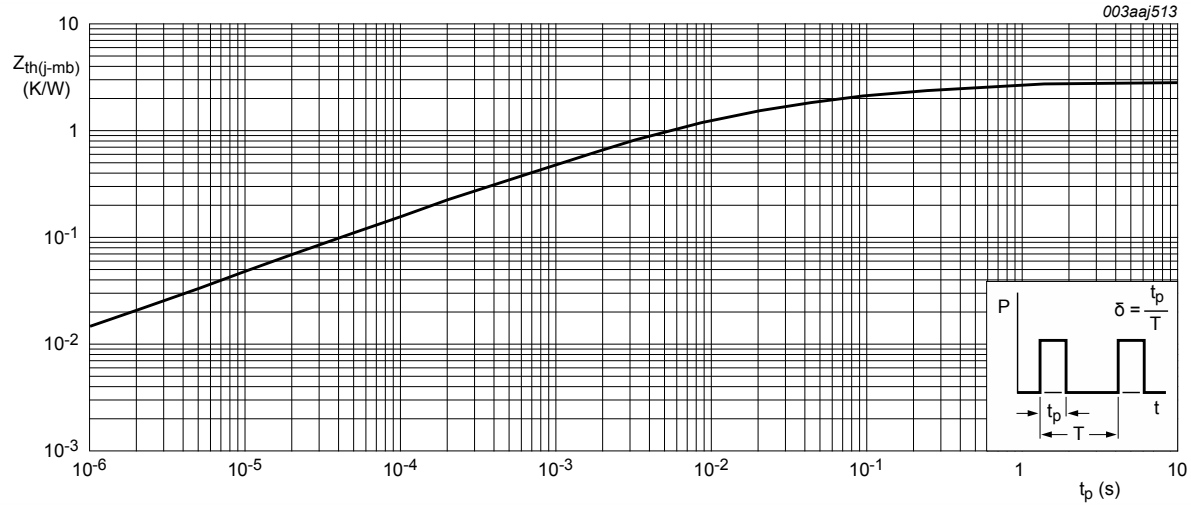


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

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

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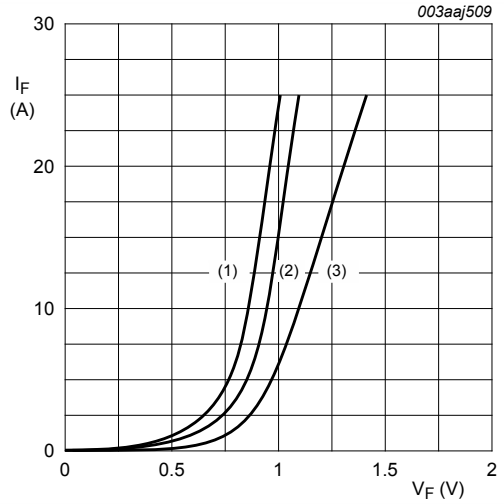


Fig. 4. Forward current as a function of forward voltage

(1) $T_j = 150$ °C; typical values;
(2) $T_j = 150$ °C; maximum values;
(3) $T_j = 25$ °C; maximum values;
$V_O = 0.791$ V; $R_S = 0.013$ Ω

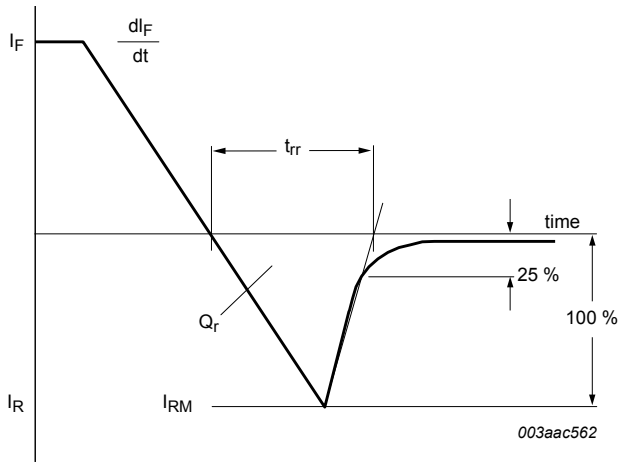


Fig. 5. Reverse recovery definitions; ramp recovery

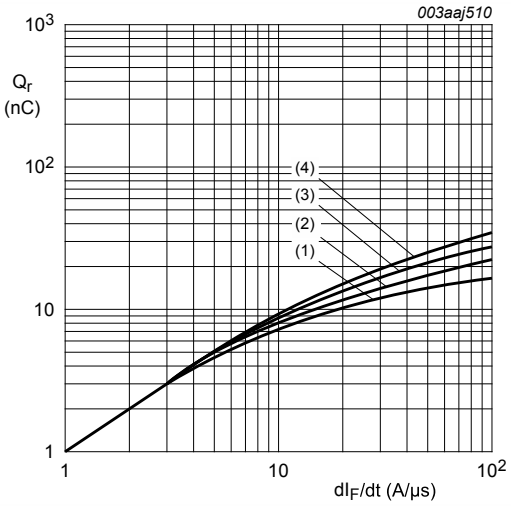


Fig. 6. Recovered charge as a function of rate of change of forward current; maximum values

(1) $I_F = 1$ 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

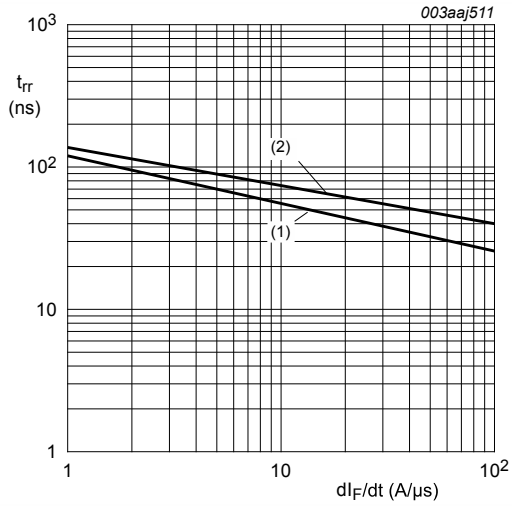


Fig. 7. Reverse recovery time as a function of rate of change of forward current; maximum values

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

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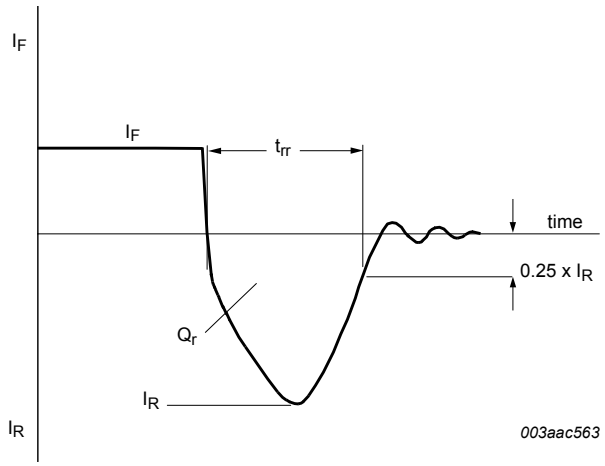


Fig. 8. Reverse recovery definitions; step recovery

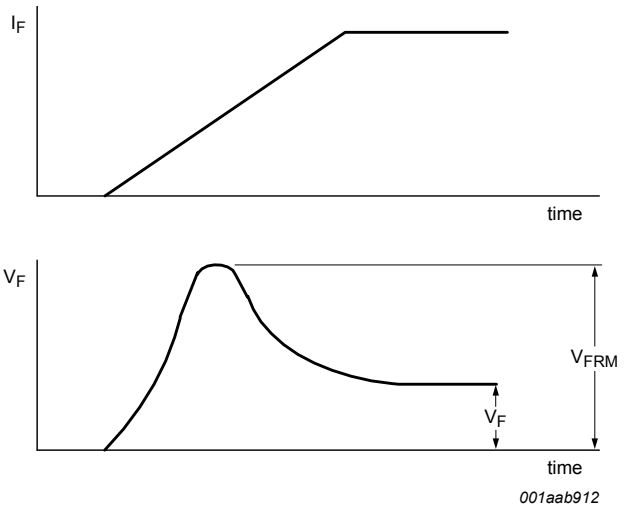


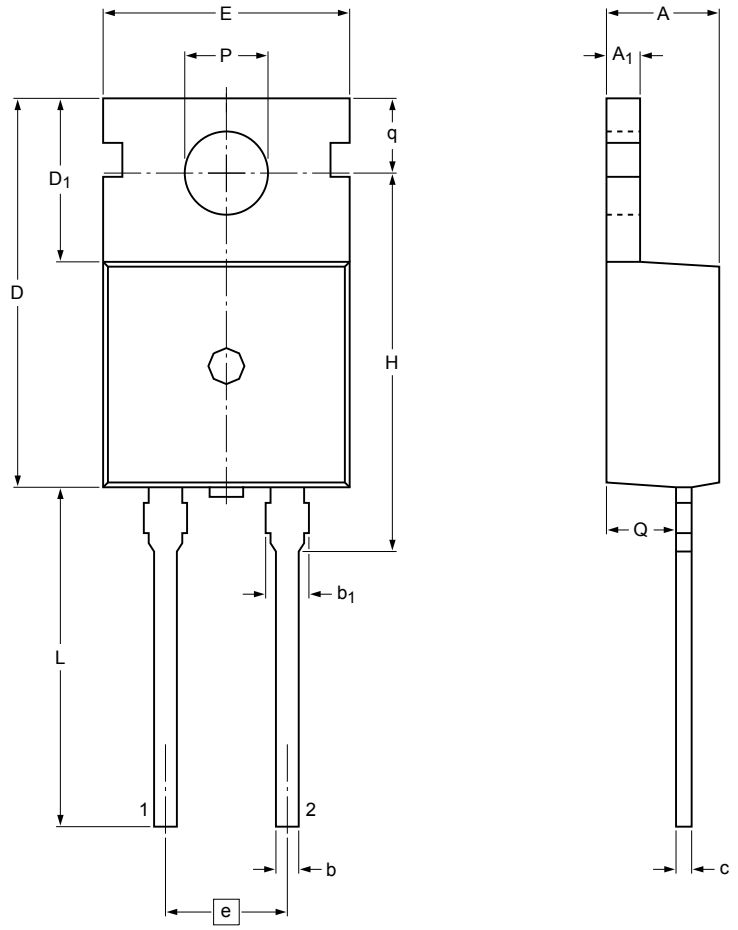
Fig. 9. Forward recovery definitions

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10. 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
mm	max	4.7	1.40	0.95	1.7	0.65	15.8	6.8	10.30	5.08 (REF)	16.25	15.0	3.80	2.6	2.9
	nom														
	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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12. Contents

1 General description 1
2 Features and benefits 1
3 Applications 1
4 Quick reference data 1
5 Pinning information 2
6 Ordering information 2
7 Limiting values 2
8 Thermal characteristics 3
9 Characteristics 4
10 Package outline 7
11 Legal information 8
11.1 Data sheet status 8
11.2 Definitions 8
11.3 Disclaimers 8
11.4 Trademarks 9

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