



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

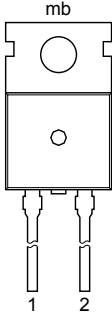
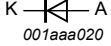
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	100	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 128^\circ\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2	-	-	8	A
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}$; $T_J = 150^\circ\text{C}$;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



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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 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	$\delta = 0.5$; $T_{mb} \leq 128\text{ }^{\circ}\text{C}$; 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
Electrostatic discharge						
V_{ESD}	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 kΩ		-	8	kV

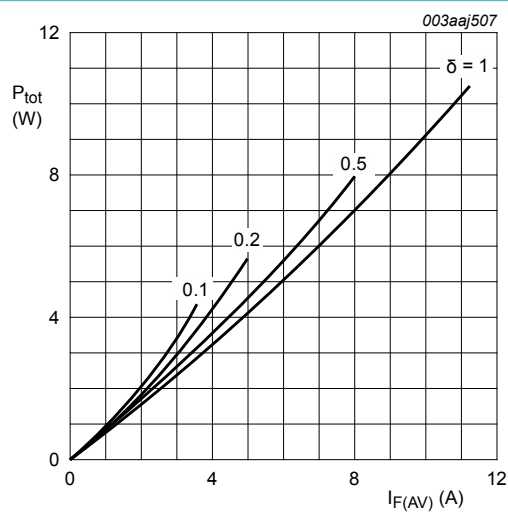


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

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

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

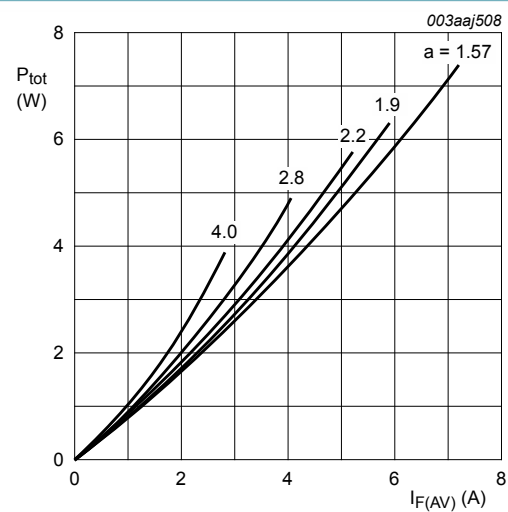


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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

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

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

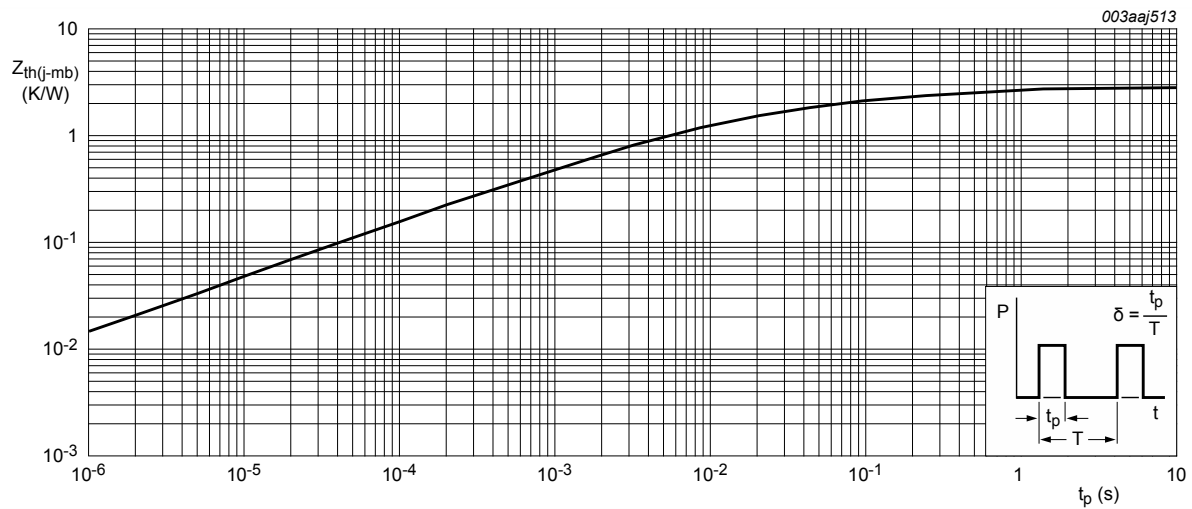


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

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

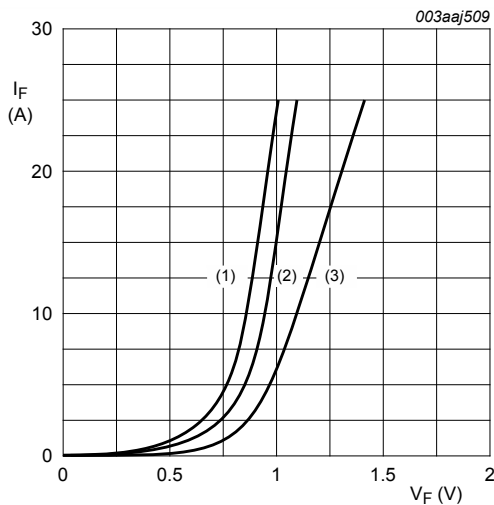


Fig. 4. Forward current as a function of forward voltage

- (1) $T_j = 150\text{ °C}$; typical values;
 - (2) $T_j = 150\text{ °C}$; maximum values;
 - (3) $T_j = 25\text{ °C}$; maximum values;
- $V_O = 0.791\text{ V}$; $R_S = 0.013\text{ }\Omega$

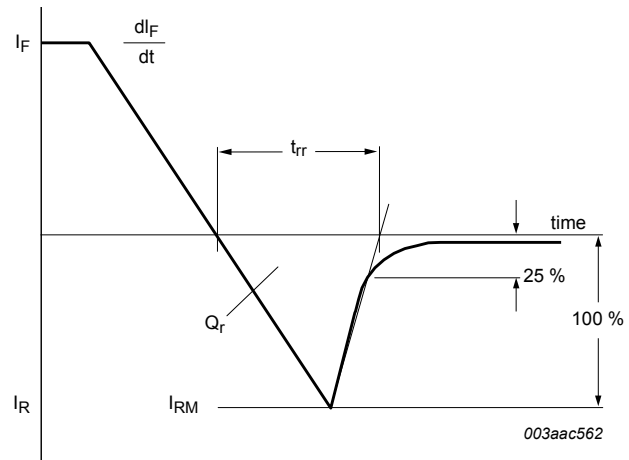


Fig. 5. Reverse recovery definitions; ramp recovery

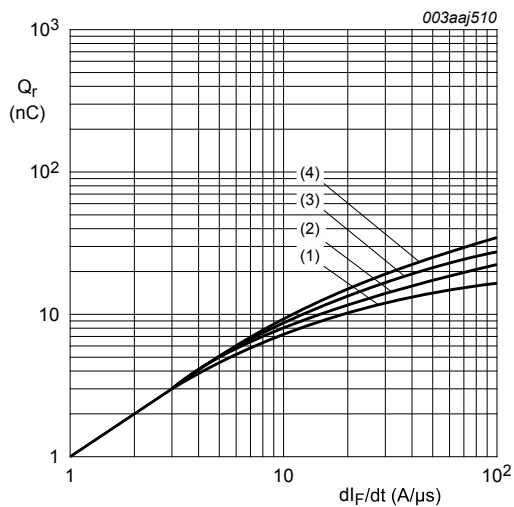


Fig. 6. Recovered charge as a function of rate of change of forward current; maximum values

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

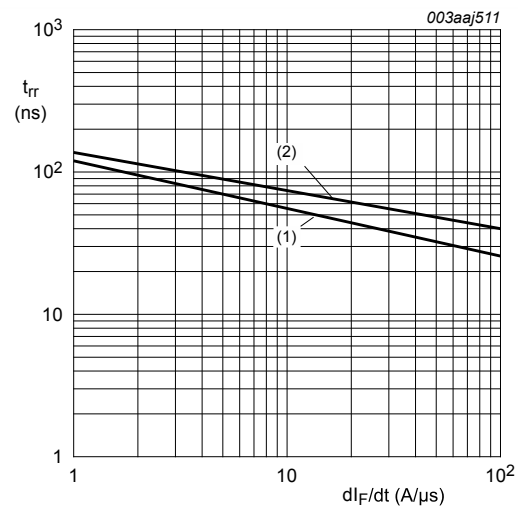
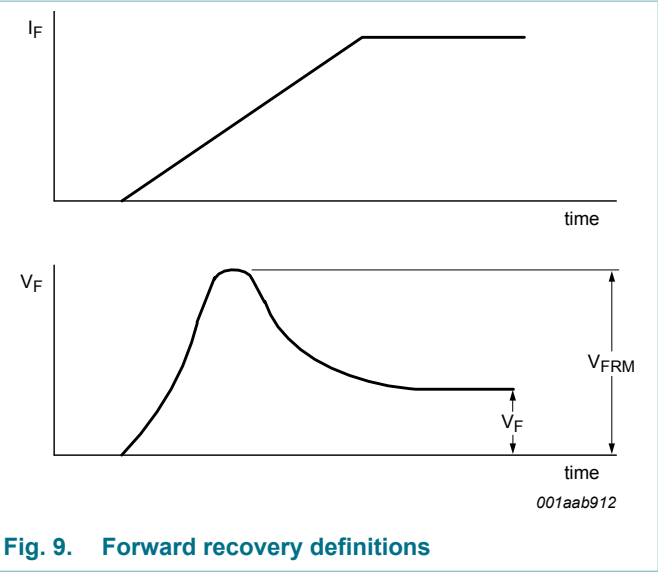
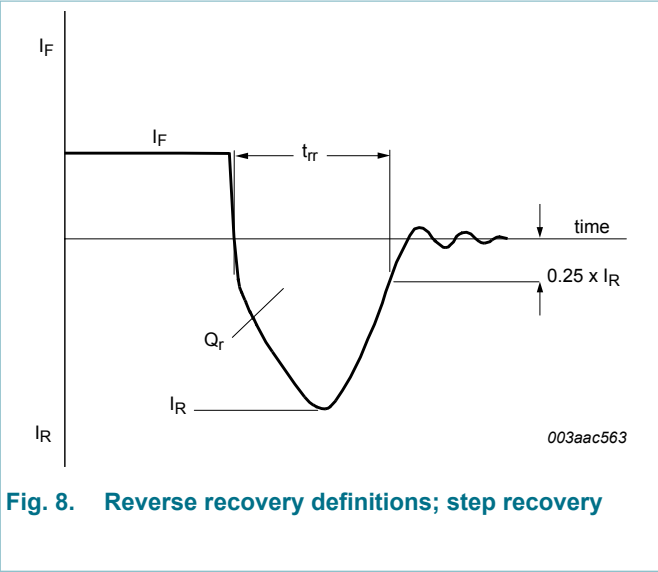


Fig. 7. Reverse recovery time as a function of rate of change of forward current; maximum values

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



10. Package outline

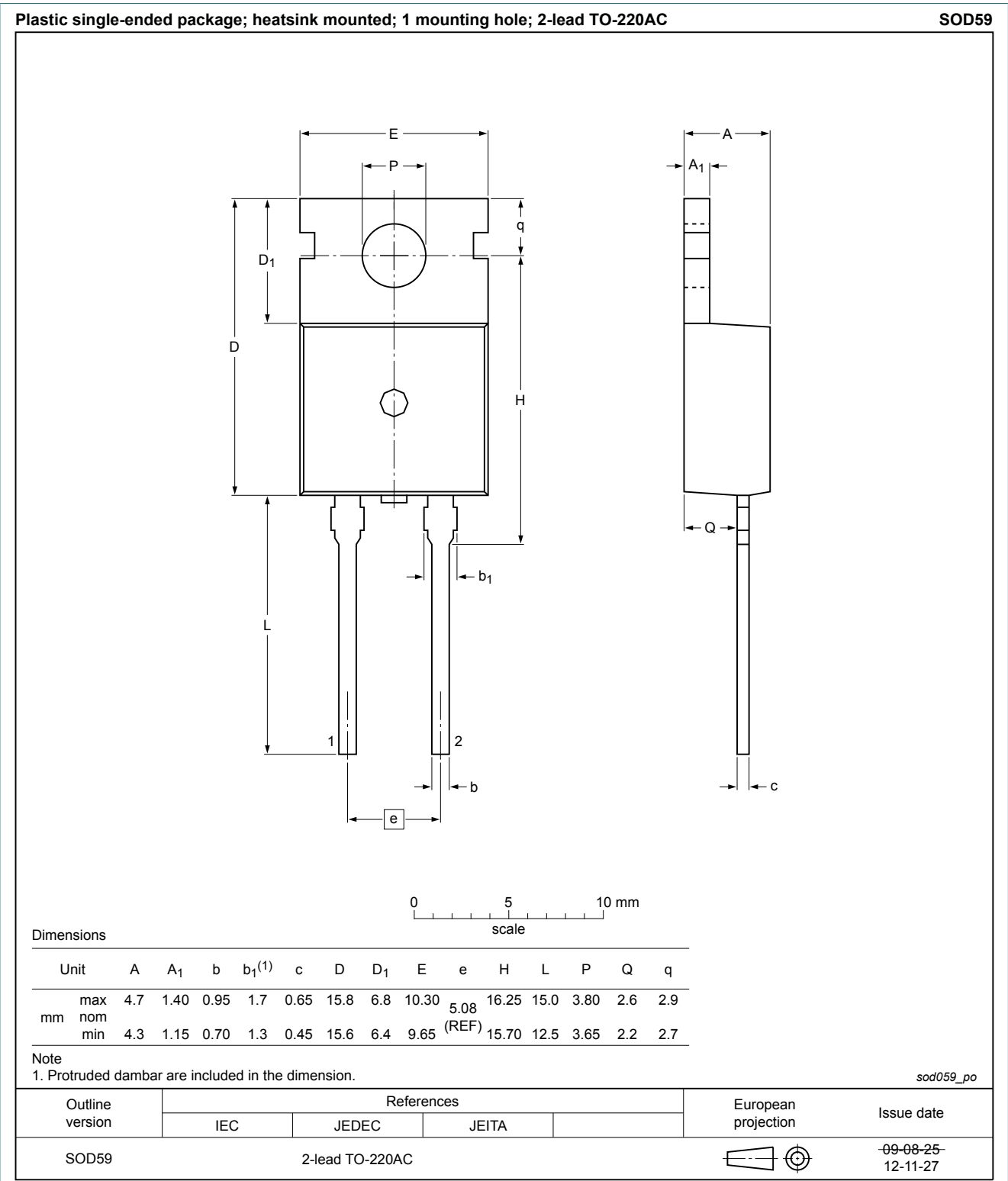


Fig. 10. Package outline TO-220AC (SOD59)

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