



# BYW29E-200

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

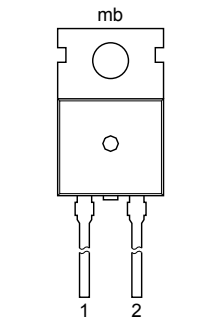
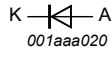
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	200	V
$I_{F(AV)}$	average forward current	SQW; $\delta = 0.5$ ; $T_{mb} \leq 128$ °C; <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/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



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

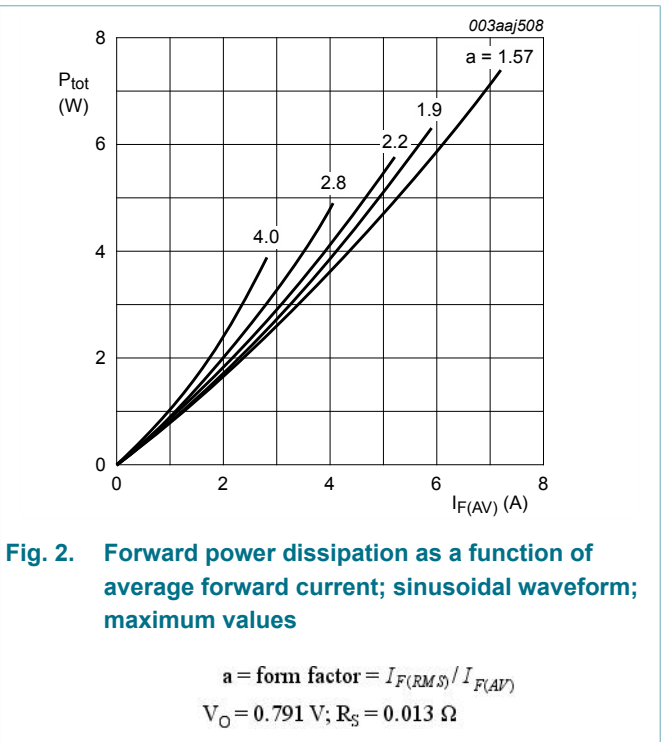
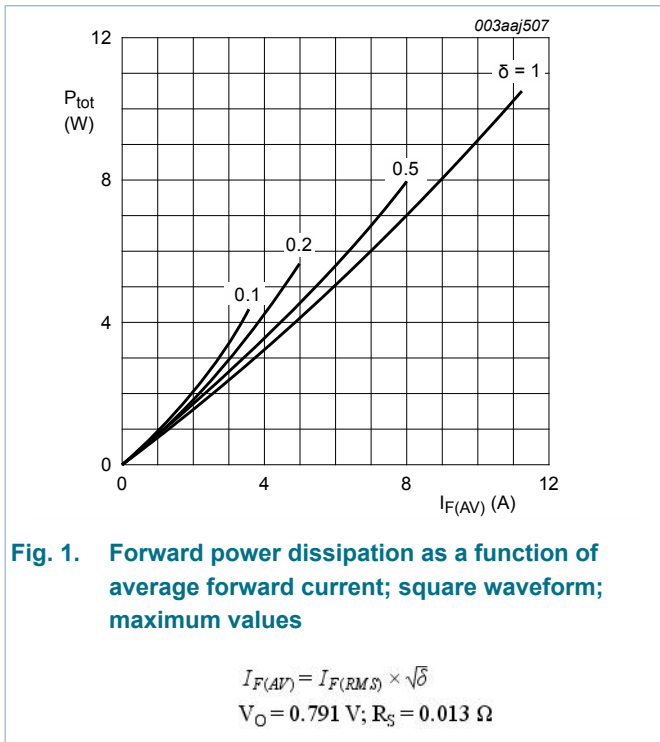
## 7. Limiting values

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		-	200	V
$V_{RWM}$	crest working reverse voltage		-	200	V
$V_R$	reverse voltage		-	200	V
$I_{F(AV)}$	average forward current	SQW; $\delta = 0.5$ ; $T_{mb} \leq 128\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	-	8	A
$I_{FRM}$	repetitive peak forward current	SQW; $\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 128\text{ °C}$	-	16	A
$I_{FSM}$	non-repetitive peak forward current	SIN; $t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$	-	88	A
		SIN; $t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$	-	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

Symbol	Parameter	Conditions	Min	Max	Unit
T <sub>j</sub>	junction temperature		-	150	°C
<b>Electrostatic discharge</b>					
V <sub>ESD</sub>	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 <sub>th(j-mb)</sub>	thermal resistance from junction to mounting base	<a href="#">Fig. 3</a>	-	-	2.7	K/W
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	-	60	-	K/W

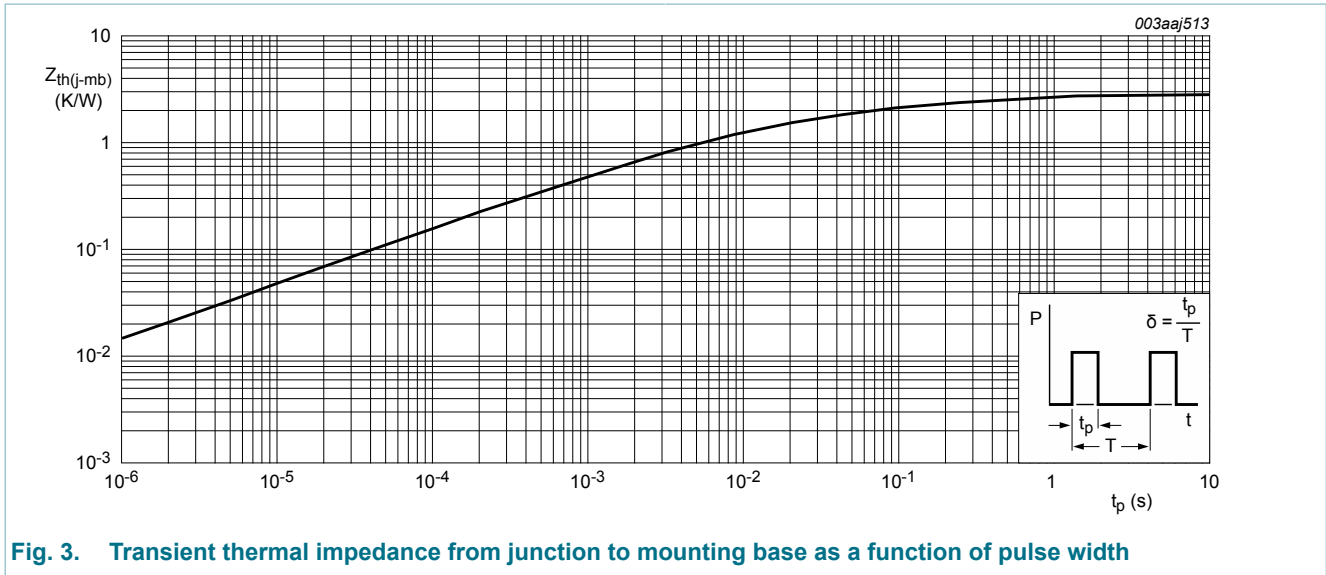
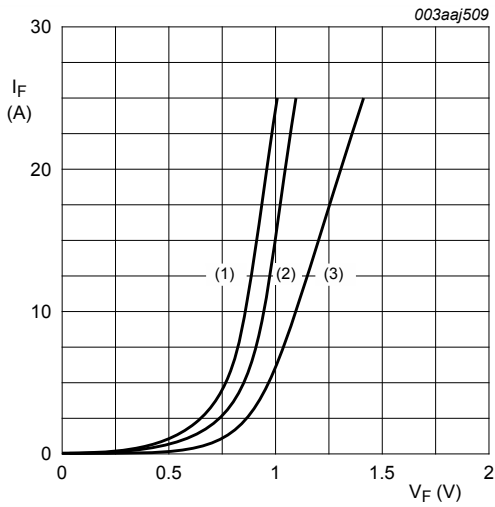


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

## 9. Characteristics

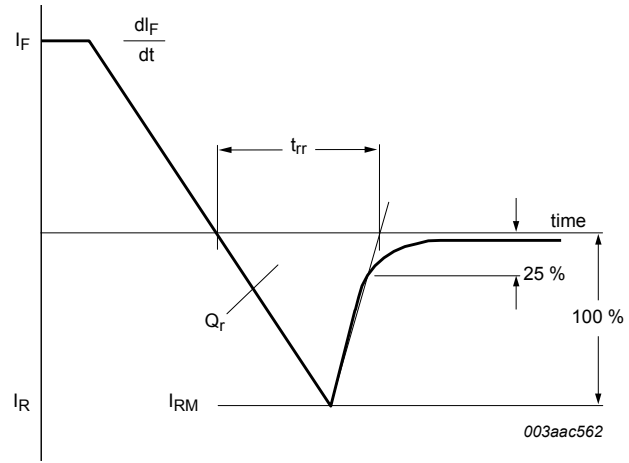
Table 6. Characteristics

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> = 200 V; T <sub>j</sub> = 25 °C	-	2	10	μA
		V <sub>R</sub> = 200 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/s; 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/s; 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/s; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>	-	1	-	V

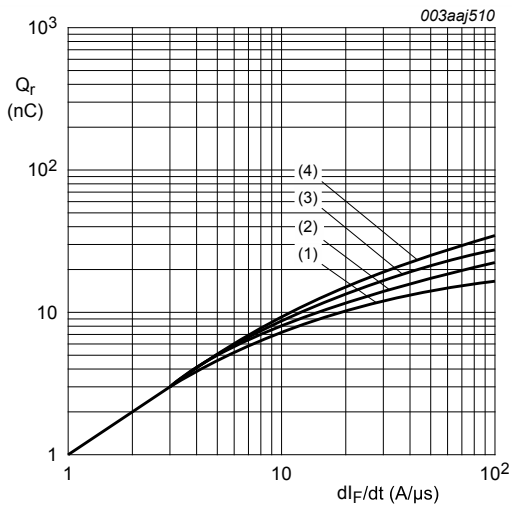


**Fig. 4. Forward current as a function of forward voltage**

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

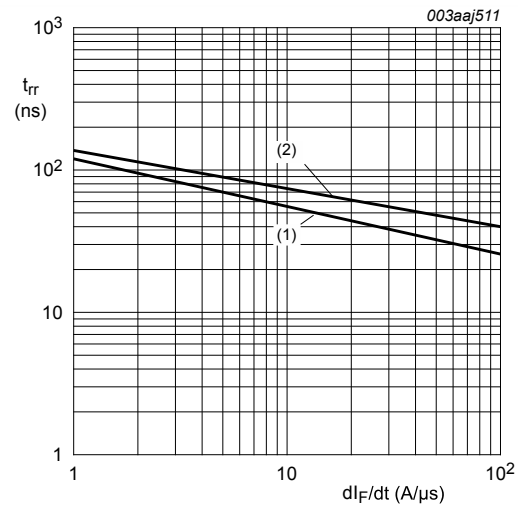


**Fig. 5. Reverse recovery definitions; ramp recovery**



**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)  $I_F = 10\text{ A}$ ;  $T_j = 25\text{ }^\circ\text{C}$

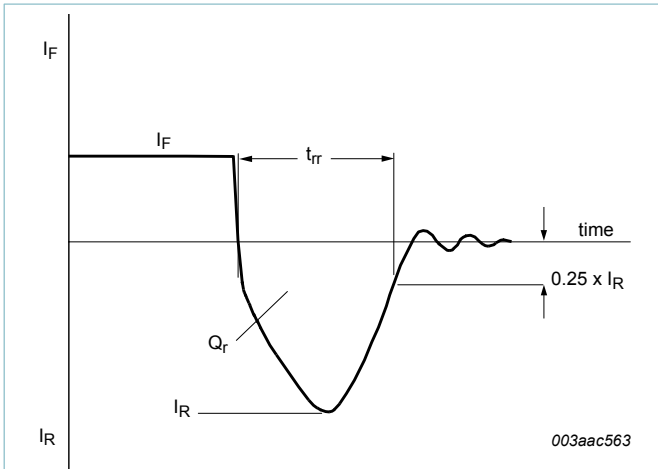


Fig. 8. Reverse recovery definitions; step recovery

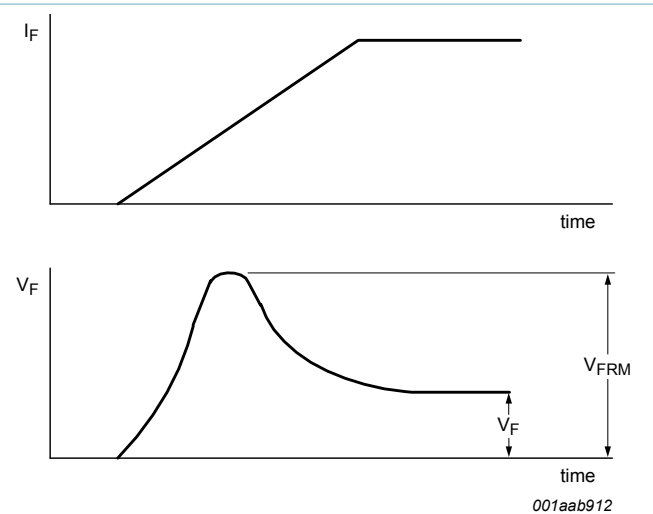


Fig. 9. Forward recovery definitions

### 10. Package outline

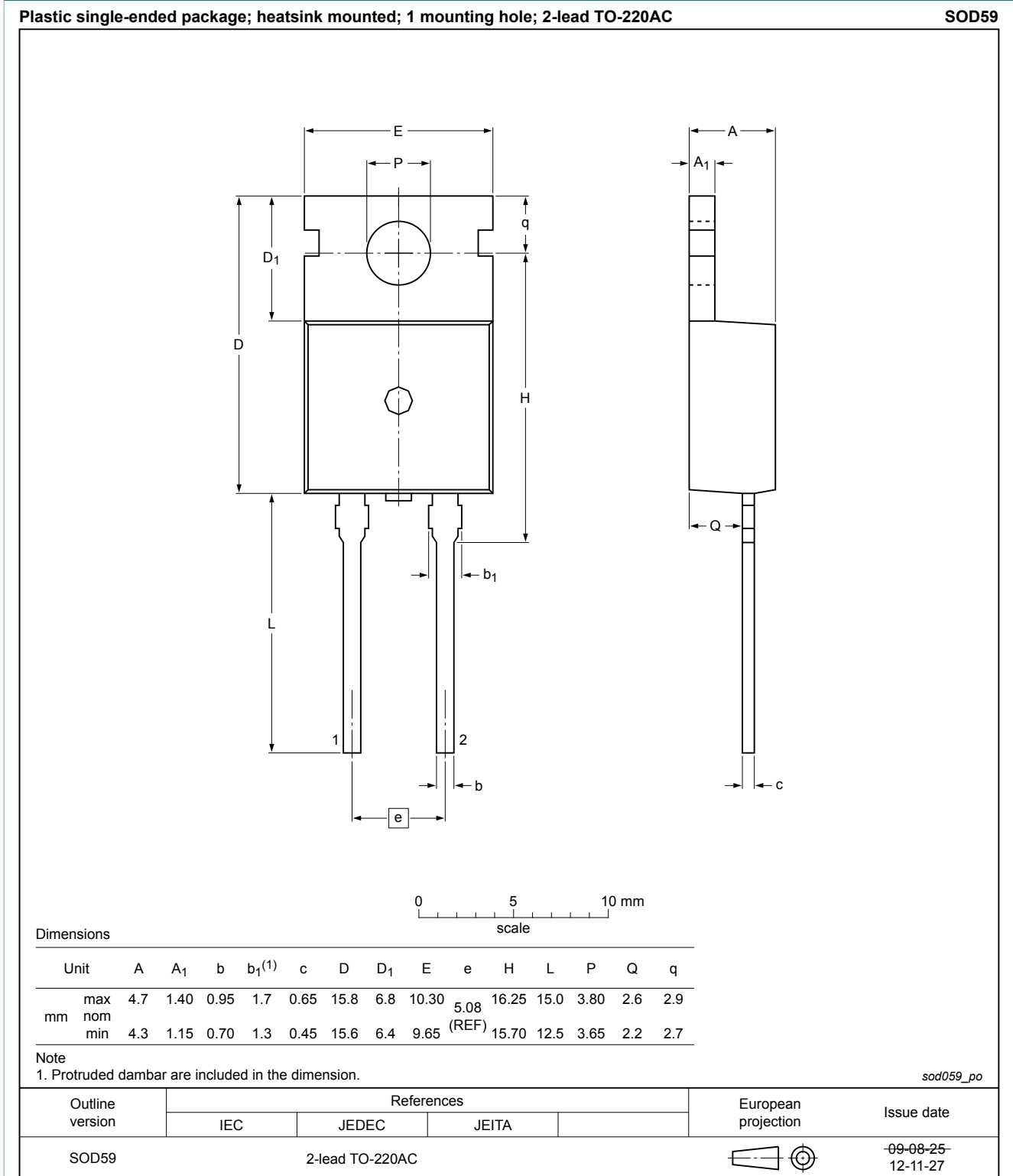


Fig. 10. Package outline TO-220AC (SOD59)

## 11. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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