

## 1. General description

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

## 2. Features and benefits

- Fast switching
- Low leakage current
- Low forward voltage drop
- Low thermal resistance
- Soft recovery characteristic

## 3. Applications

- High frequency switched-mode power supplies
- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)

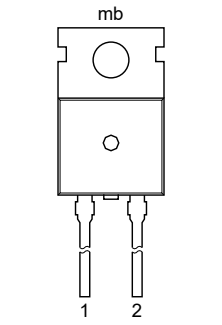
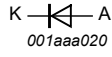
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_R$	reverse voltage	DC	-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 109$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>	-	-	80	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	-	-	88	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	1.5	2	V
		$I_F = 10$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	-	1.6	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 50$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	35	50	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p style="text-align: center;"><b>TO-220AC (SOD59)</b></p>	
2	A	anode		
mb	mb	mounting base; connected to cathode		

## 6. Ordering information

Table 3. Ordering information

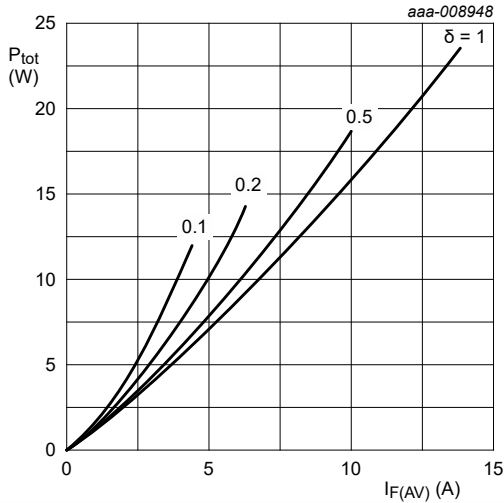
Type number	Package		
	Name	Description	Version
BYV10-600P	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

## 7. Limiting values

**Table 4. Limiting values**

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

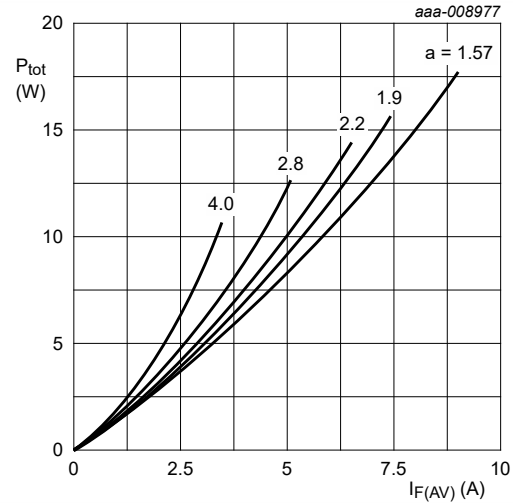
Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>RRM</sub>	repetitive peak reverse voltage		-	600	V
V <sub>RWM</sub>	crest working reverse voltage		-	600	V
V <sub>R</sub>	reverse voltage	DC	-	600	V
I <sub>F(AV)</sub>	average forward current	$\delta = 0.5$ ; T <sub>mb</sub> ≤ 109 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3	-	10	A
I <sub>FRM</sub>	repetitive peak forward current	$\delta = 0.5$ ; t <sub>p</sub> = 25 μs; T <sub>mb</sub> ≤ 109 °C; square-wave pulse	-	20	A
I <sub>FSM</sub>	non-repetitive peak forward current	t <sub>p</sub> = 10 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse; Fig. 4	-	80	A
		t <sub>p</sub> = 8.3 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse	-	88	A
T <sub>stg</sub>	storage temperature		-65	175	°C
T <sub>j</sub>	junction temperature		-	175	°C



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

$$V_o = 1.268 \text{ V}; R_s = 0.031 \text{ } \Omega$$

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



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

$$V_o = 1.268 \text{ V}; R_s = 0.031 \text{ } \Omega$$

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

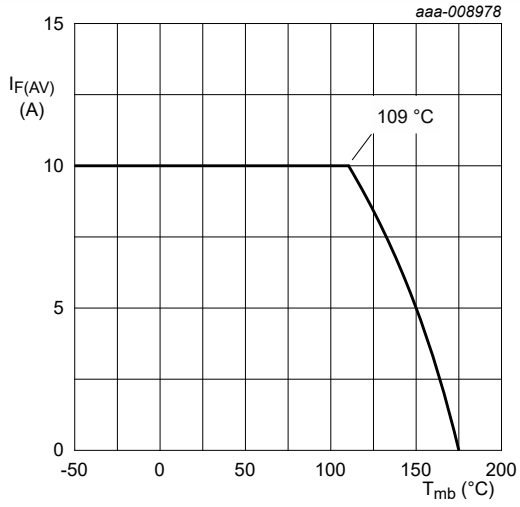


Fig. 3. Forward current as a function of mounting base temperature; maximum values

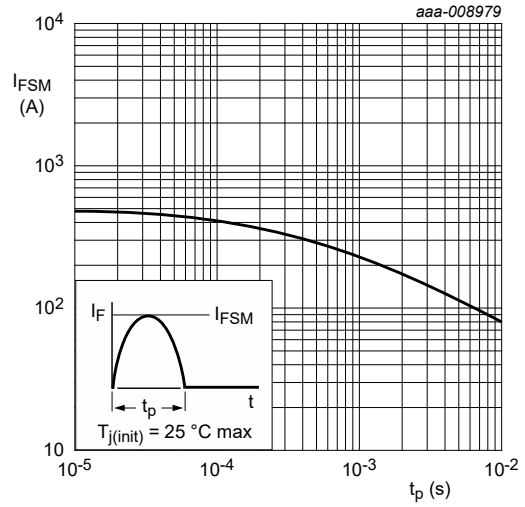


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

### 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. 5</a>	-	-	3.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

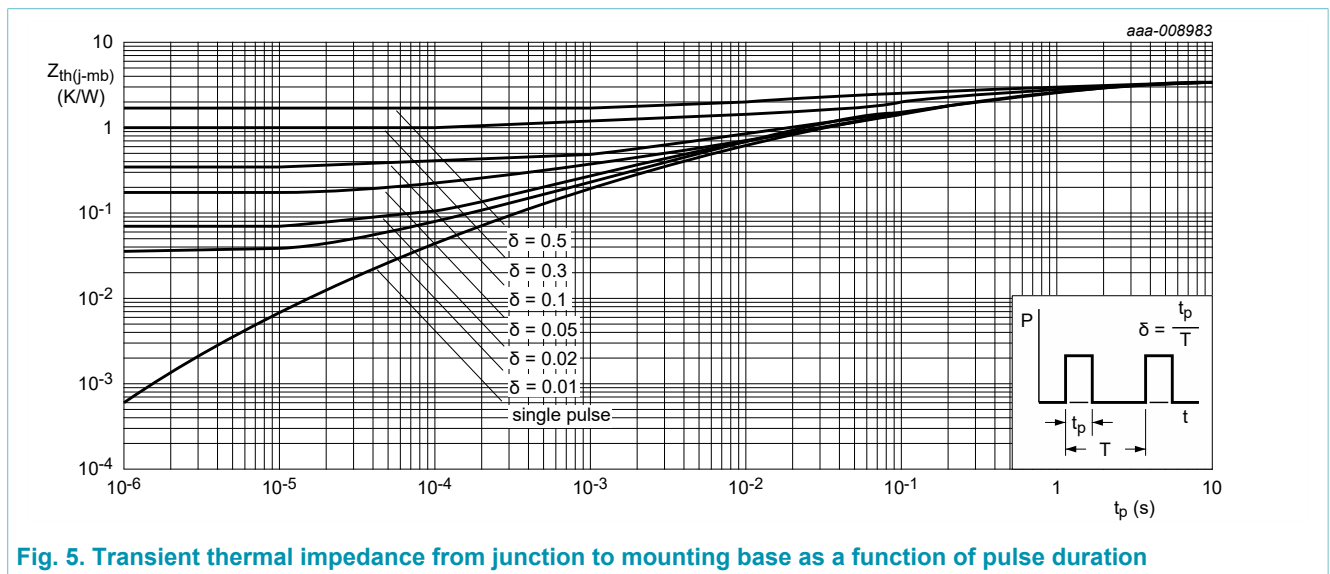
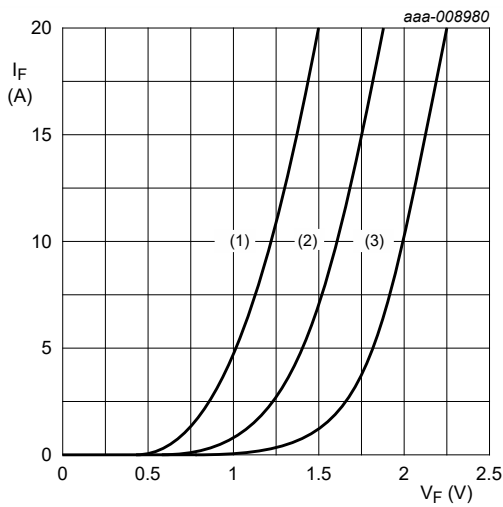


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	1.5	2	V
		$I_F = 10\text{ A}; T_j = 150\text{ }^\circ\text{C}; \text{Fig. 6}$	-	-	1.6	V
$I_R$	reverse current	$V_R = 600\text{ V}; T_j = 25\text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_R = 500\text{ V}; T_j = 150\text{ }^\circ\text{C}$	-	-	250	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	-	35	50	ns
		$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	-	20	-	ns
		$I_F = 10\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	-	40	-	ns



$V_o = 1.268\text{ V}; R_s = 0.031\ \Omega$   
 (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

Fig. 6. Forward current as a function of forward voltage

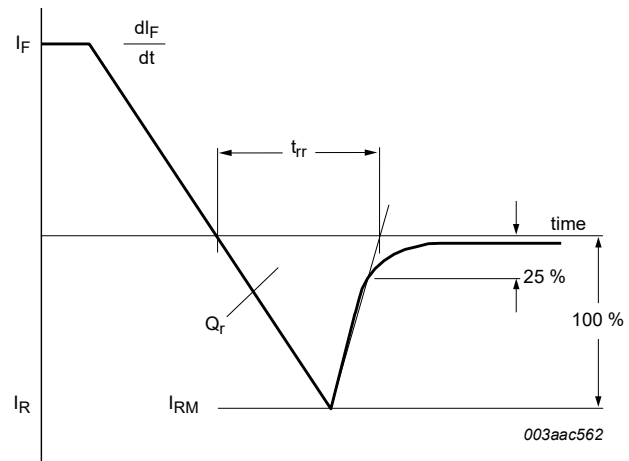
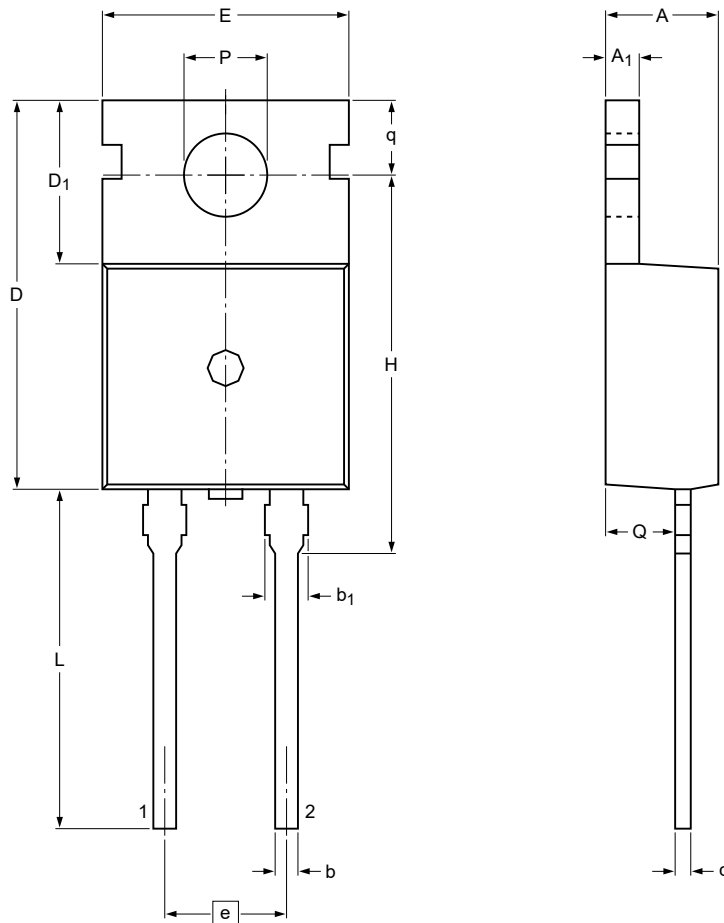


Fig. 7. Reverse recovery definitions; ramp recovery

### 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. 8. Package outline TO-220AC (SOD59)

## 11. Legal information

### 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.
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Product [short] data sheet	Production	This document contains the product specification.

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