

## 1. General description

Ultrafast power diode in a SOD113 (2-lead TO-220F) plastic package.

## 2. Features and benefits

- Fast switching
- Isolated plastic package
- Low leakage current
- Low forward voltage drop
- Low thermal resistance
- Soft recovery characteristic
- Enhanced avalanche energy capability

## 3. Applications

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

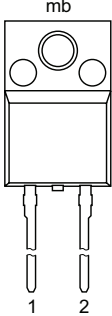
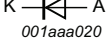
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_h \leq 71$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	10			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 71$ °C; square-wave pulse	20			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>	75			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse;	83			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	1.55	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
		$I_F = 10$ A; $V_R = 200$ V; $di_F/dt = 200$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	50	-	ns
		$I_F = 10$ A; $V_R = 200$ V; $di_F/dt = 200$ A/ $\mu$ s; $T_j = 125$ °C; <a href="#">Fig. 7</a>	-	78	-	ns
		$I_F = 10$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	42	-	ns

## 5. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
mb	n.c.	mounting base; isolated		

## 6. Ordering information

**Table 3. Ordering information**

Type number	Package		Version
	Name	Description	
BYV10EX-600P	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

## 7. Marking

**Table 4. Marking codes**

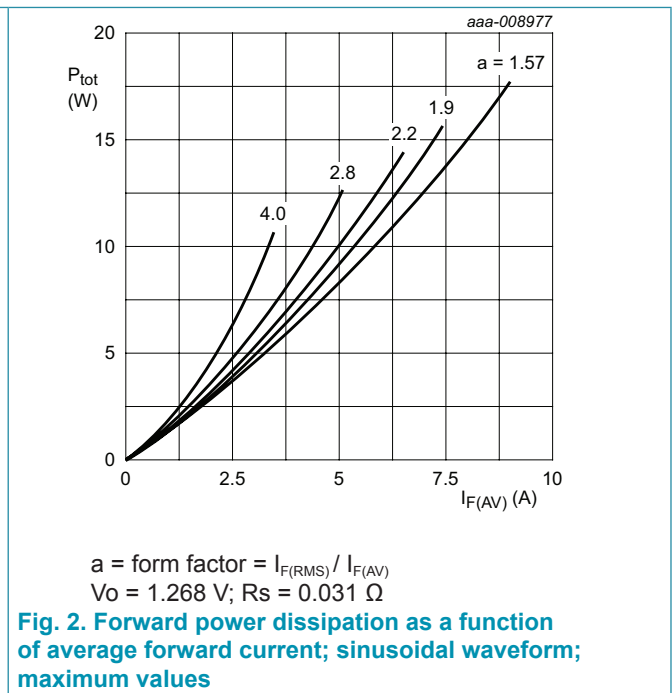
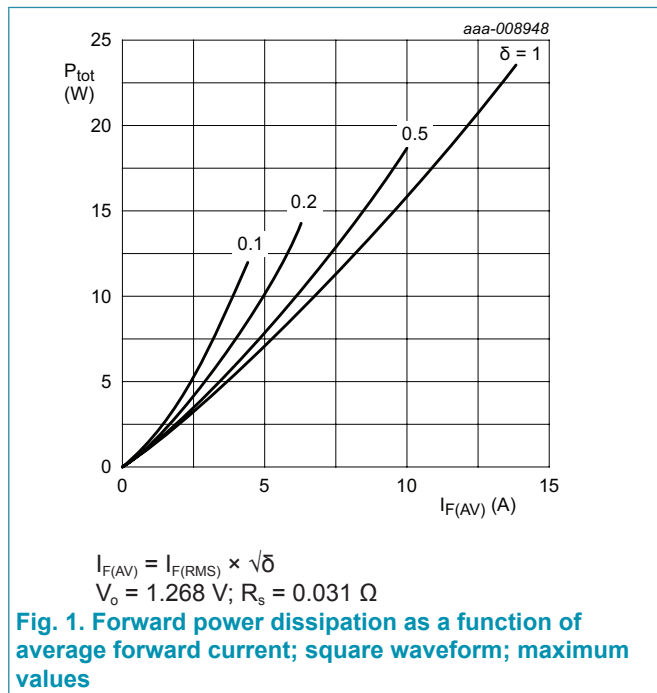
Type number	Marking codes
BYV10EX-600P	BYV10EX-600P

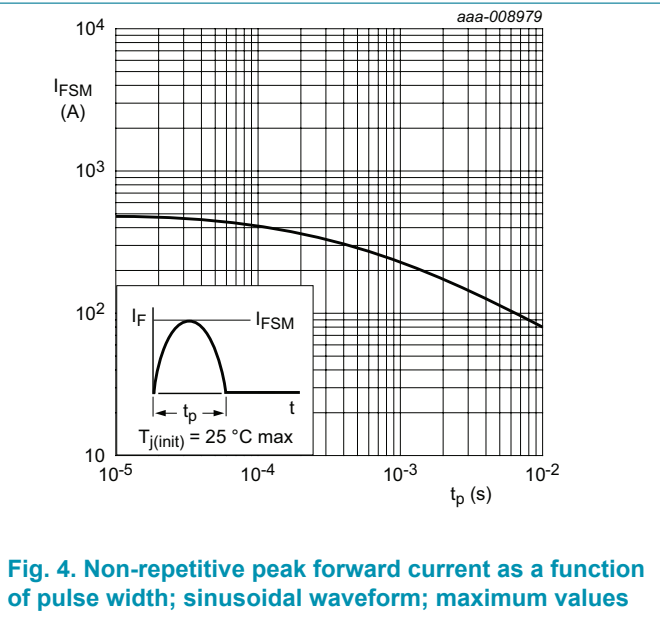
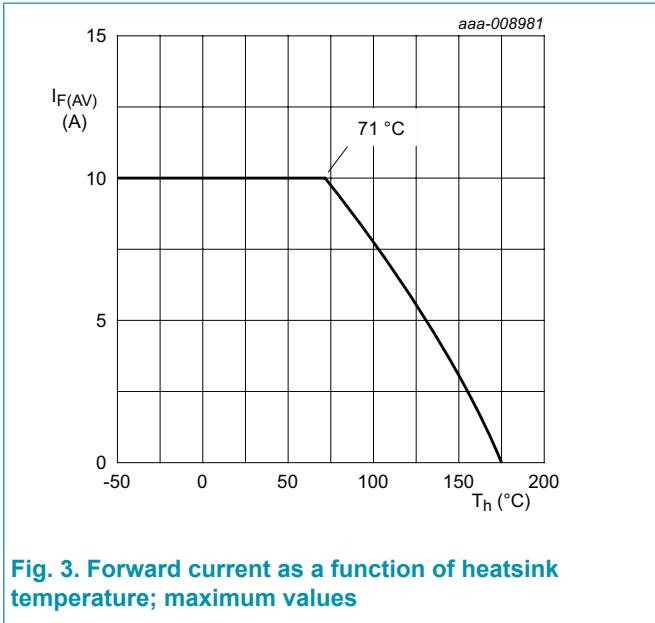
## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		600	V
$V_{RWM}$	crest working reverse voltage		600	V
$V_R$	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_h \leq 71$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 71$ °C; square-wave pulse	20	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>	75	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse;	83	A
$T_{stg}$	storage temperature		-65 to 175	°C
$T_j$	junction temperature		175	°C





### 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	With heatsink compound; <a href="#">Fig. 5</a>	-	-	5.5	K/W
		Without heatsink compound	-	-	7.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

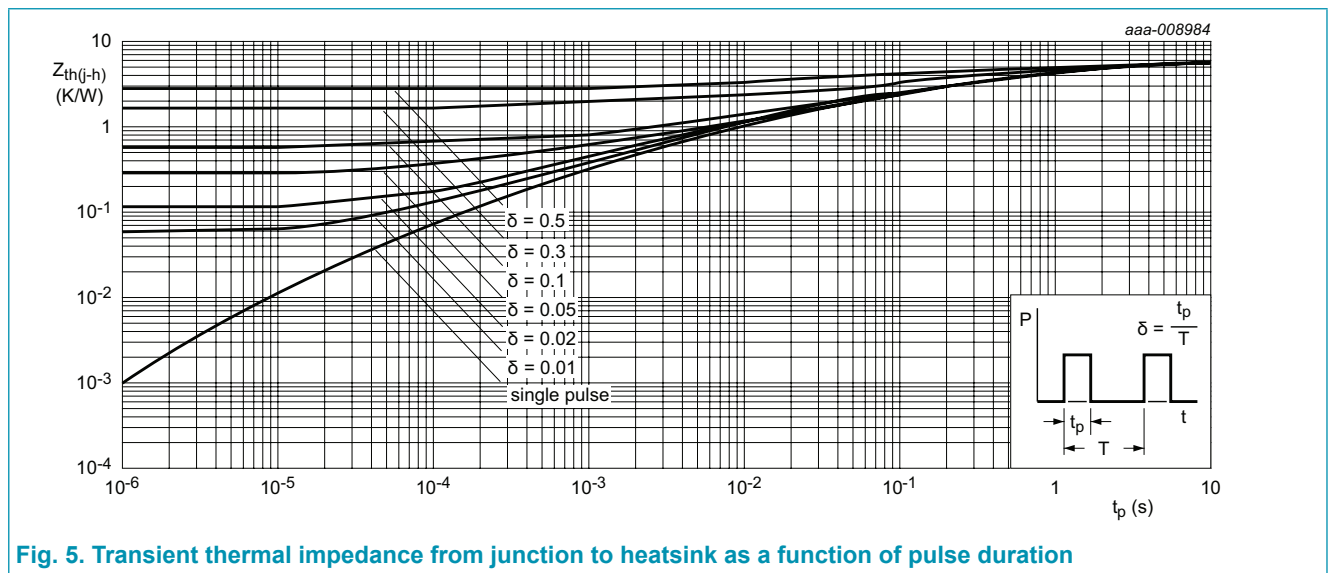


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

### 10. Isolation characteristics

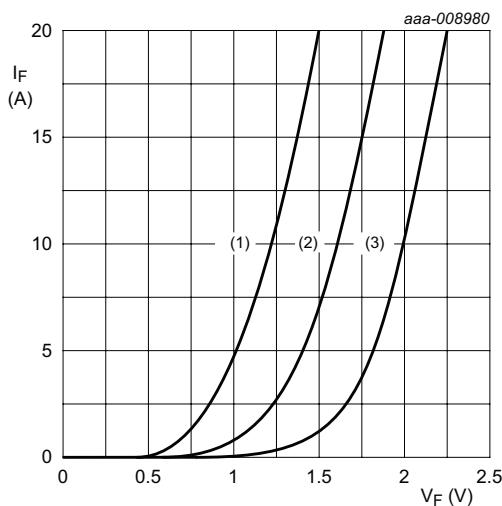
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free	-	-	2500	V
$C_{isol}$	isolation capacitance	from cathode to external heatsink	-	10	-	PF

### 11. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 6}$	-	1.55	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	$\mu\text{A}$
		$V_R = 600 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	250	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	reverse charge	$I_F = 10 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	123	-	nC
		$I_F = 10 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	305	-	nC
$t_{rr}$	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
		$I_F = 10 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	50	-	ns
		$I_F = 10 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	78	-	ns
		$I_F = 10 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	42	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	4.9	-	A
		$I_F = 10 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	7.8	-	A
$E_{as}$	non-repetitive avalanche energy	$I_R = 1.2 \text{ A}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C}; L = 15 \text{ mH}$	10.8	-	-	mJ



$V_0 = 1.268 \text{ V}; R_s = 0.031 \text{ } \Omega$   
 (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

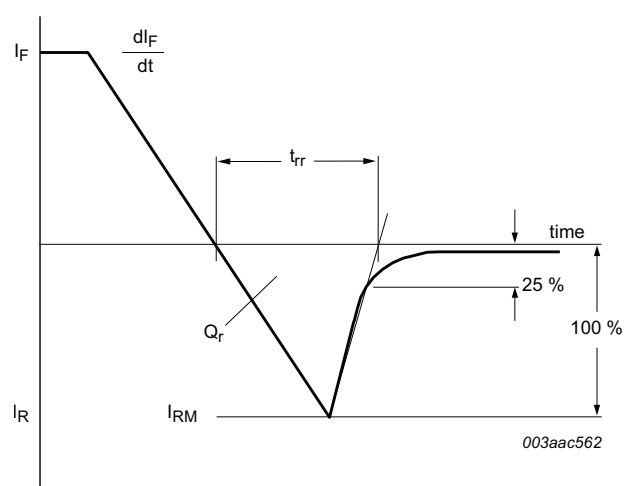
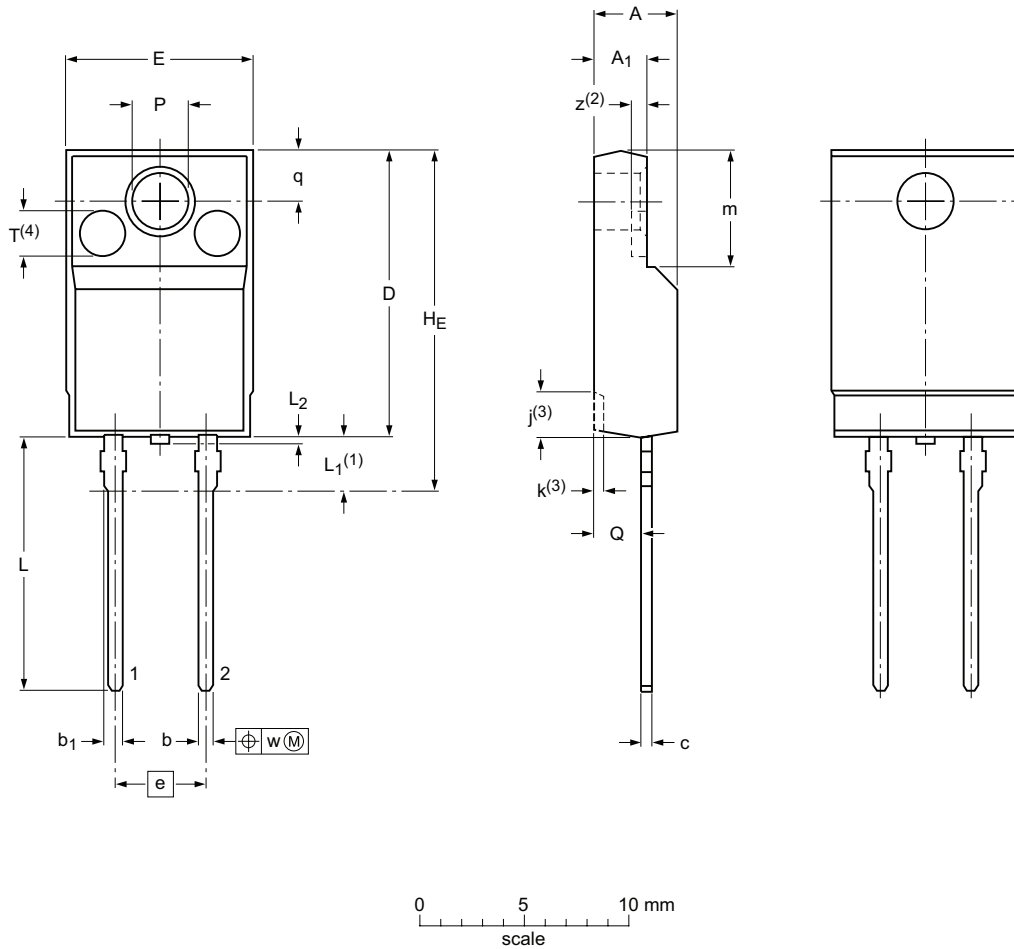


Fig. 7. Reverse recovery definitions; ramp recovery

## 12. Package outline

Plastic single-ended package; isolated heatsink mounted;  
1 mounting hole; 2-lead TO-220 `full pack`

SOD113



Dimensions (mm are the original dimensions)

Unit	A	A <sub>1</sub>	b	b <sub>1</sub>	c	D	E	e	H <sub>E</sub> max	j <sup>(3)</sup>	k <sup>(3)</sup>	L	L <sub>1</sub> <sup>(1)</sup>	L <sub>2</sub> max	m	P	Q	q	T <sup>(4)</sup>	w	z <sup>(2)</sup>	
max	4.6	2.9	0.9	1.1	0.7	15.8	10.3		19.0	2.7	0.6	14.4	3.3	0.5	6.5	3.2	2.6		2.6	2.55	0.4	0.8
nom								5.08														
min	4.0	2.5	0.7	0.9	0.4	15.2	9.7			1.7	0.4	13.5	2.8		6.3	3.0	2.3					

Notes

1. Terminals are uncontrolled within zone L1.
2. z is depth of T.
3. Dot lines area designs may vary.
4. Eject pin mark is for reference only.

sod113\_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOD113		2-lead TO-220F			07-06-08 15-08-28

Fig. 8. Package outline SOD113 (TO-220F)

## 13. 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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