

## 1. General description

Ultrafast, epitaxial rectifier diode in a SOD113 (TO-220F) plastic package.

## 2. Features and benefits

- Fast switching
- Low thermal resistance
- Soft recovery characteristic
- Isolated package
- Low forward voltage drop
- High thermal cycling performance

## 3. Applications

- Output rectifiers in high frequency switched-mode power supplies
- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)

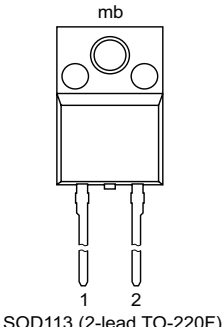
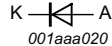
## 4. Quick reference data

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; $T_h \leq 85$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	9			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 85$ °C; square-wave pulse	18			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>	91			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	100			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	1.12	1.26	V
		$I_F = 8$ A; $T_j = 125$ °C	-	1.03	-	V
		$I_F = 8$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	0.97	1.11	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	32	60	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>SOD113 (2-lead TO-220F)</p>	
2	A	anode		
mb	mb	mounting base; isolated		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BYV29X-600	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

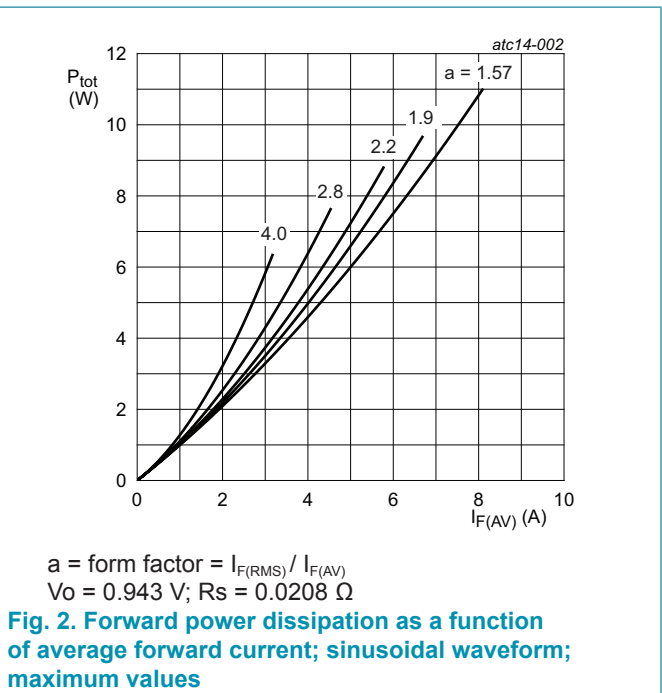
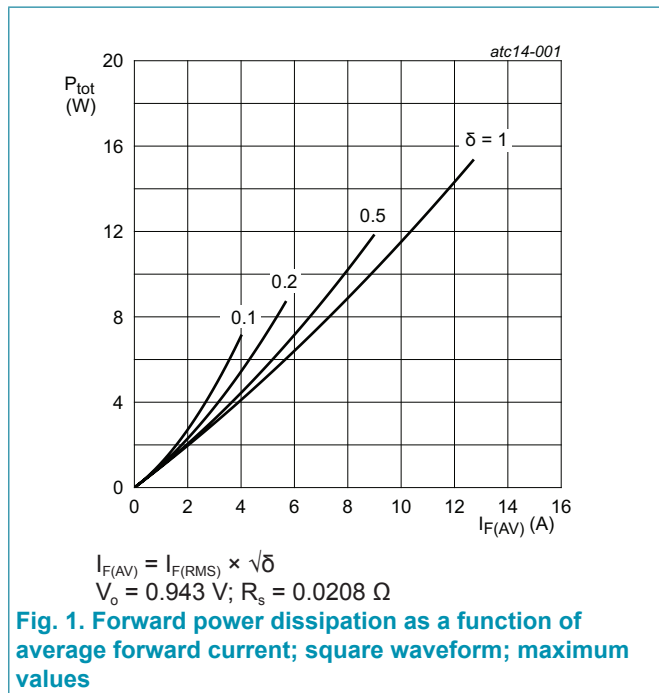
Type number	Marking codes
BYV29X-600	BYV29X-600

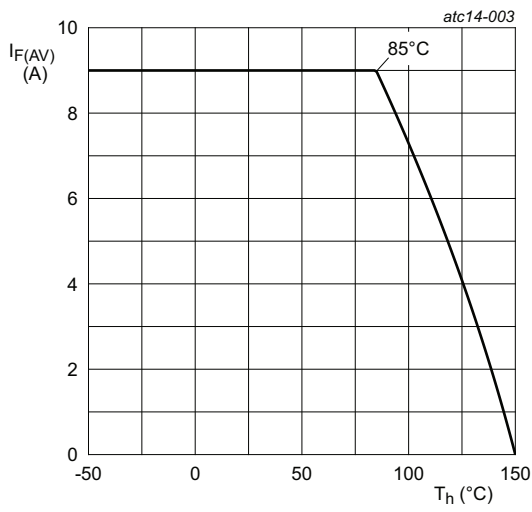
## 8. Limiting values

**Table 5. Limiting values**

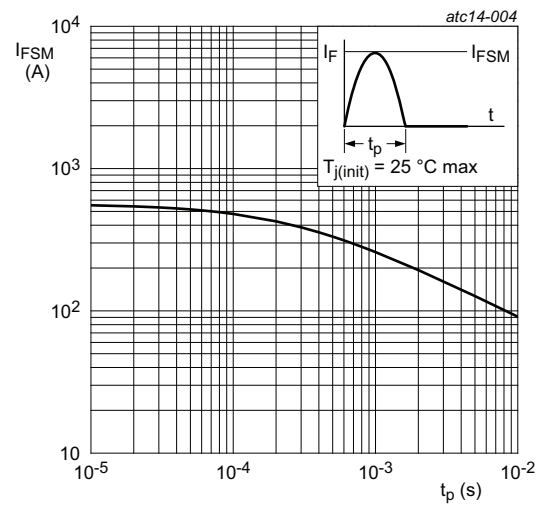
In accordance with the Absolute Maximum Rating System (IEC 60134).

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; $T_h \leq 85$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	9	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 85$ °C; square-wave pulse	18	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>	91	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	100	A
$T_{stg}$	storage temperature		-40 to 150	°C
$T_j$	junction temperature		150	°C





**Fig. 3. Forward current as a function of heatsink temperature; maximum values**



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

## 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	-	-	5.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

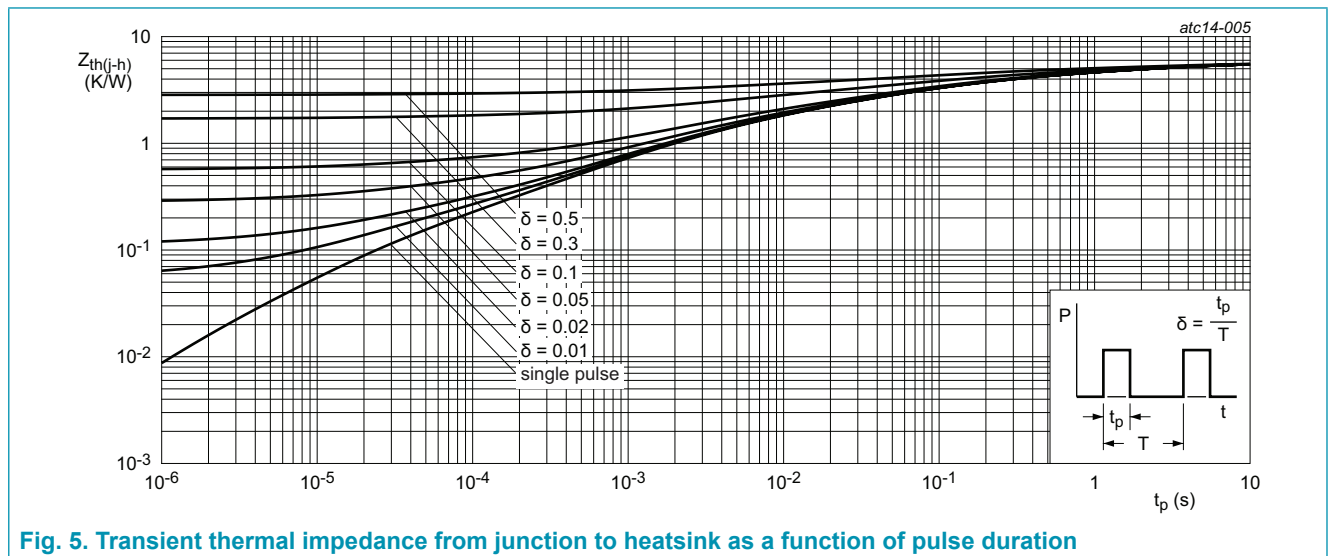


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

## 10. Isolation characteristics

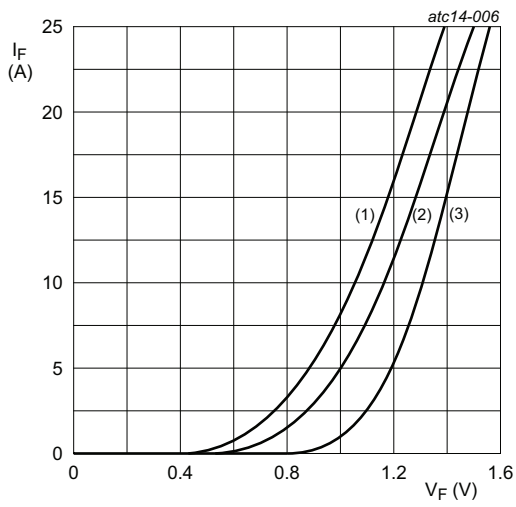
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz $\leq$ f $\leq$ 60 Hz; RH $\leq$ 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

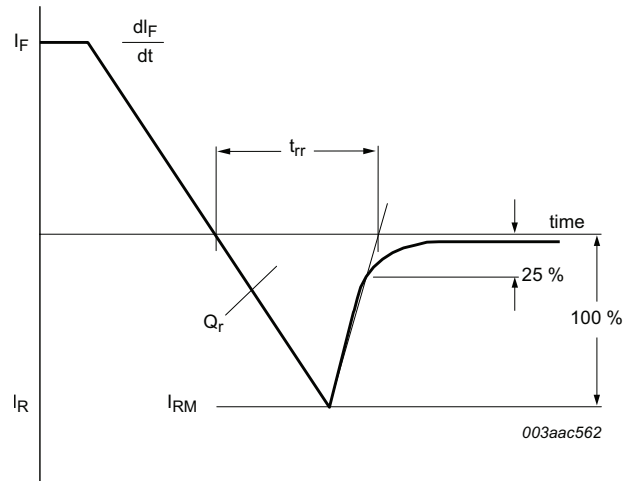
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 8\text{ A}; T_j = 25\text{ °C}; \text{Fig. 6}$	-	1.12	1.26	V
		$I_F = 8\text{ A}; T_j = 125\text{ °C}$	-	1.03	-	V
		$I_F = 8\text{ A}; T_j = 150\text{ °C}; \text{Fig. 6}$	-	0.97	1.11	V
$I_R$	reverse current	$V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	2	50	$\mu\text{A}$
		$V_R = 600\text{ V}; T_j = 100\text{ °C}$	-	0.3	-	$\text{mA}$
		$V_R = 600\text{ V}; T_j = 125\text{ °C}$	-	-	3	$\text{mA}$
<b>Dynamic characteristics</b>						
$Q_f$	reverse charge	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	37	-	$\text{nC}$
$t_{rr}$	reverse recovery time		-	32	60	$\text{ns}$
$I_{RM}$	peak reverse recovery current		-	2.3	-	A
$dI_{rr}/dt$	peak rate of fall of reverse recovery current		-	297	-	$\text{A}/\mu\text{s}$
$Q_f$	reverse charge	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	220	-	$\text{nC}$
$t_{rr}$	reverse recovery time		-	43	-	$\text{ns}$
$I_{RM}$	peak reverse recovery current		-	10	-	A
$dI_{rr}/dt$	peak rate of fall of reverse recovery current		-	655	-	$\text{A}/\mu\text{s}$
$Q_f$	reverse charge	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	165	-	$\text{nC}$
$t_{rr}$	reverse recovery time		-	59	-	$\text{ns}$
$I_{RM}$	peak reverse recovery current		-	5.6	-	A
$dI_{rr}/dt$	peak rate of fall of reverse recovery current		-	215	-	$\text{A}/\mu\text{s}$
$Q_f$	reverse charge	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$	-	425	-	$\text{nC}$
$t_{rr}$	reverse recovery time		-	57	-	$\text{ns}$
$I_{RM}$	peak reverse recovery current		-	15	-	A
$dI_{rr}/dt$	peak rate of fall of reverse recovery current		-	1661	-	$\text{A}/\mu\text{s}$
$Q_f$	reverse charge	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$	-	315	-	$\text{nC}$
$t_{rr}$	reverse recovery time		-	70	-	$\text{ns}$
$I_{RM}$	peak reverse recovery current		-	9	-	A
$dI_{rr}/dt$	peak rate of fall of reverse recovery current		-	1181	-	$\text{A}/\mu\text{s}$



$V_o = 0.943 \text{ V}; R_s = 0.0208 \Omega$   
 (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**

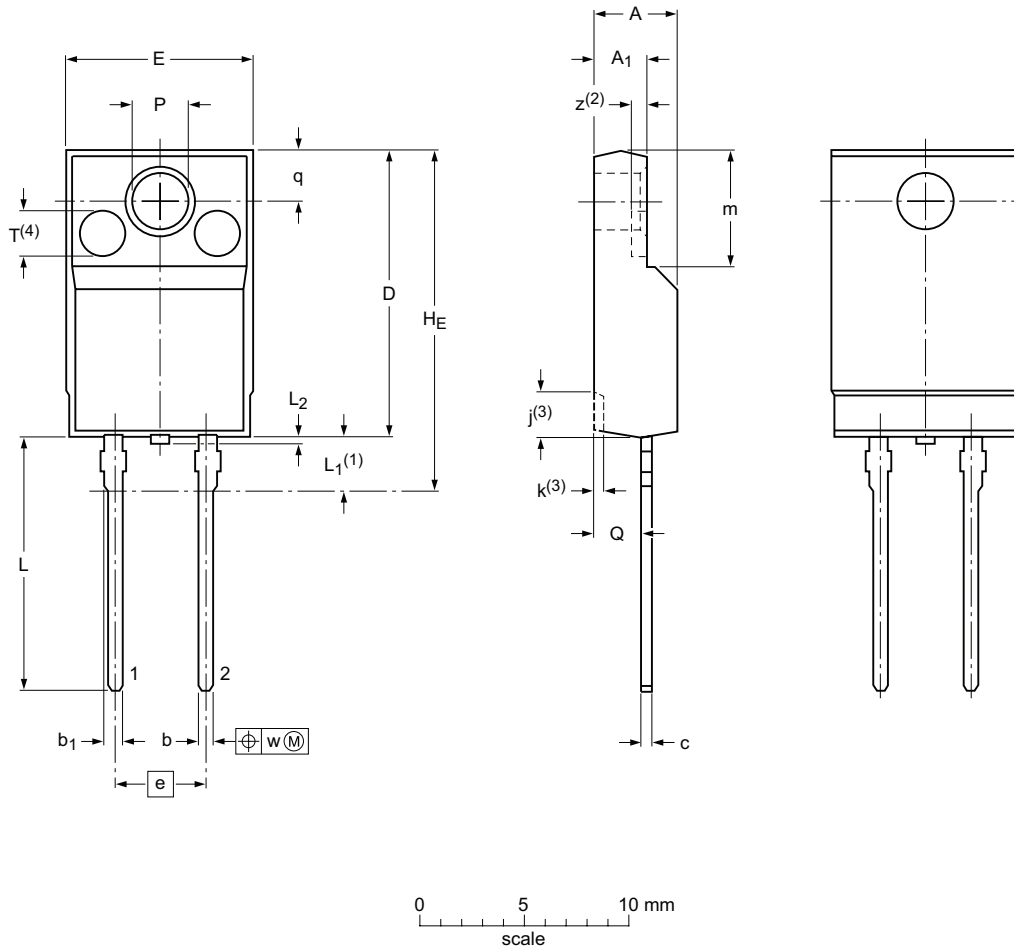


**Fig. 7. Reverse recovery definitions; ramp recovery**

## 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



## 13. 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 7 November 2017

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