

## 1. General description

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

## 2. Features and benefits

- Isolated package
- Low thermal resistance
- Low on-state losses
- High thermal cycling performance
- Soft recovery characteristic

## 3. Applications

- Dual Mode (DCM and CCM) PFC
- Power Factor Correction (PFC) for Interleaved Topology

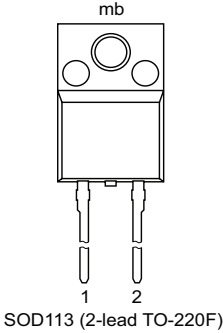
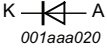
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values				Unit
Absolute maximum rating							
V <sub>RRM</sub>	repetitive peak reverse voltage		600				V
I <sub>F(AV)</sub>	average forward current	δ = 0.5; square-wave pulse; T <sub>h</sub> ≤ 72 °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	9				A
I <sub>FRM</sub>	repetitive peak forward current	δ = 0.5; t <sub>p</sub> = 25 μs; T <sub>h</sub> ≤ 72 °C; square-wave pulse	18				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; <a href="#">Fig. 3</a>	91				A
		t <sub>p</sub> = 8.3 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse	100				A
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 8 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a>		-	1.45	1.9	V
		I <sub>F</sub> = 8 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 5</a>		-	1.25	1.7	V
Dynamic characteristics							
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; <a href="#">Fig. 6</a>		-	17.5	35	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	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYV29FX-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

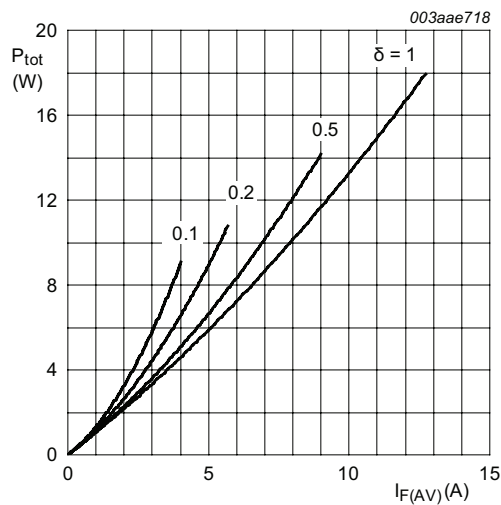
Type number	Marking codes
BYV29FX-600	BYV29FX-600

## 8. Limiting values

**Table 5. Limiting values**

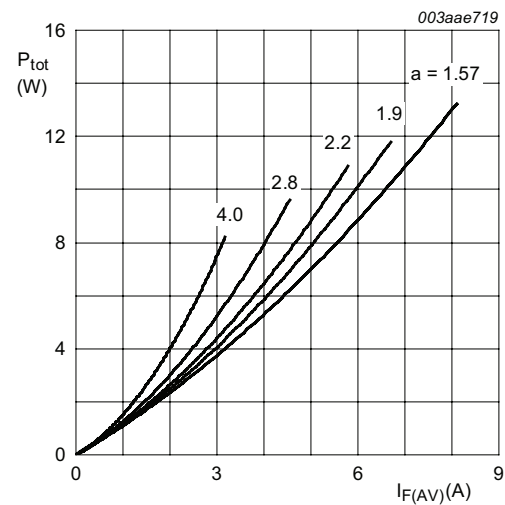
In accordance with the Absolute Maximum Rating System (IEC 60134).

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; $T_h \leq 72^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	9	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_h \leq 72^\circ\text{C}$ ; square-wave pulse	18	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\ \text{ms}$ ; $T_{j(\text{init})} = 25^\circ\text{C}$ ; sine-wave pulse; <a href="#">Fig. 3</a>	91	A
		$t_p = 8.3\ \text{ms}$ ; $T_{j(\text{init})} = 25^\circ\text{C}$ ; sine-wave pulse	100	A
$T_{stg}$	storage temperature		-40 to 150	$^\circ\text{C}$
$T_j$	junction temperature		150	$^\circ\text{C}$



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

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



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

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

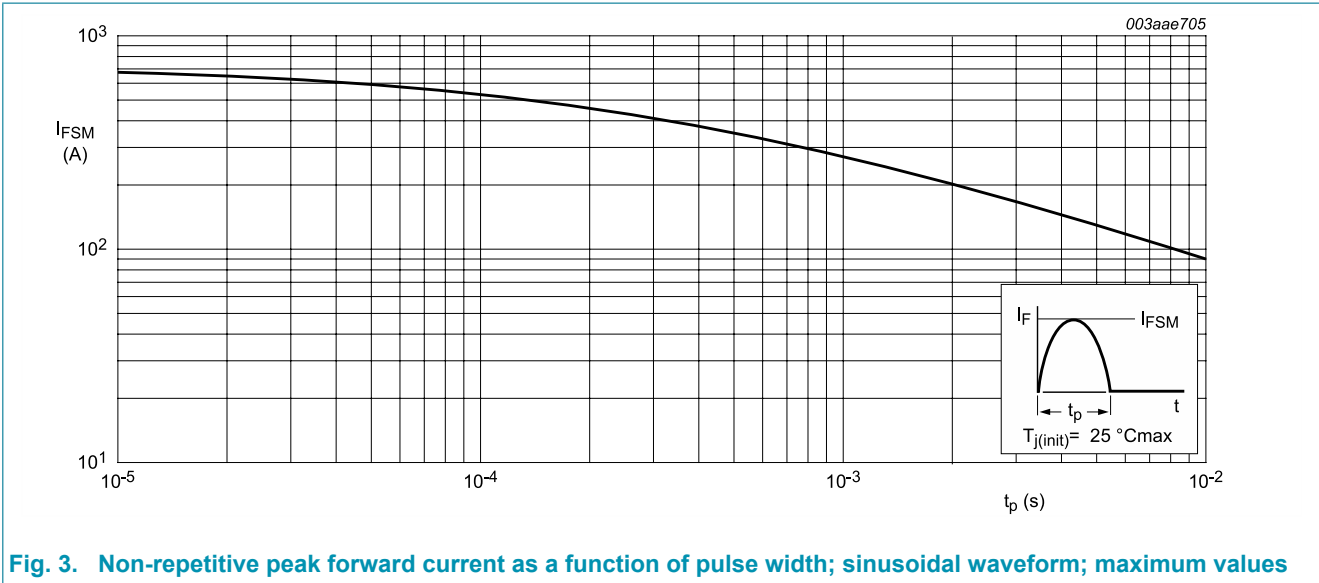


Fig. 3. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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; Fig 4		-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	55	-	K/W

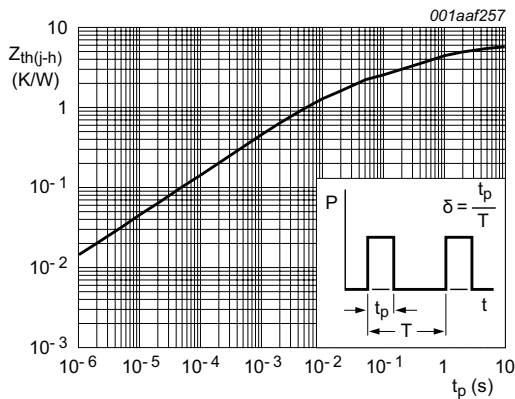


Fig. 4. Transient thermal impedance from junction to heatsink as a function of pulse width

10. Isolation characteristics

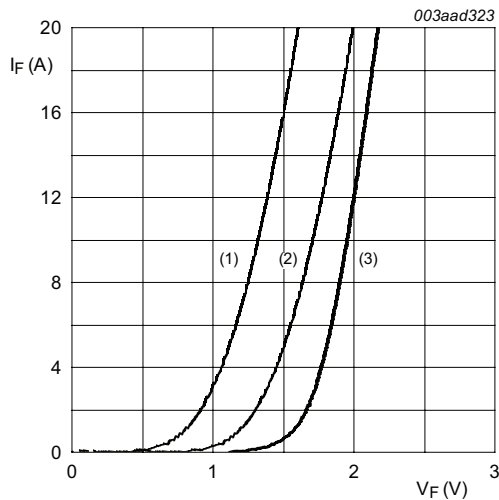
Table 7. Isolation characteristics

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	f = 1 MHz; from cathode to external heatsink		-	10	-	pF

## 11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 8A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a>		-	1.45	1.9	V
		I <sub>F</sub> = 8 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 5</a>		-	1.25	1.7	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C		-	-	50	μA
		V <sub>R</sub> = 600 V; T <sub>j</sub> = 100 °C		-	-	1.5	mA
Dynamic characteristics							
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; <a href="#">Fig. 6</a>		-	17.5	35	ns
I <sub>RM</sub>	peak reverse recovery current	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; <a href="#">Fig. 6</a>		-	1.5	-	A
V <sub>FRM</sub>	forward recovery voltage	I <sub>F</sub> = 1 A; dI <sub>F</sub> /dt = 100 A/s; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	3.2	-	V
Q <sub>r</sub>	recovered charge	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; <a href="#">Fig. 6</a>		-	13	-	nC



- (1)  $T_J = 150\text{ °C}$ ; typical values  
 (2)  $T_J = 150\text{ °C}$ ; maximum values  
 (3)  $T_J = 25\text{ °C}$ ; maximum values

Fig. 5. Forward current as a function of forward voltage

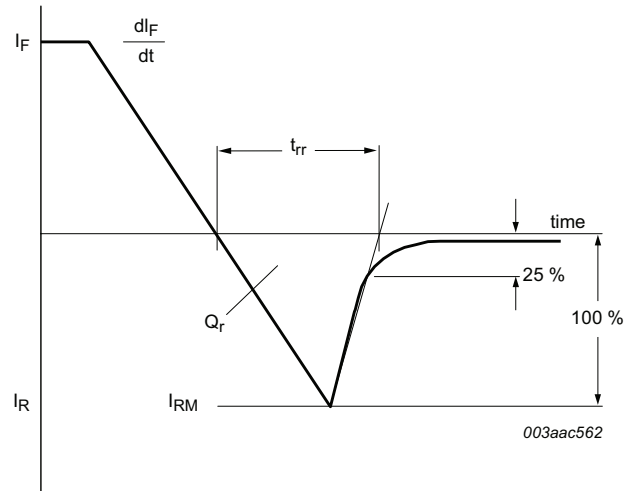


Fig. 6. Reverse recovery definitions; ramp recovery

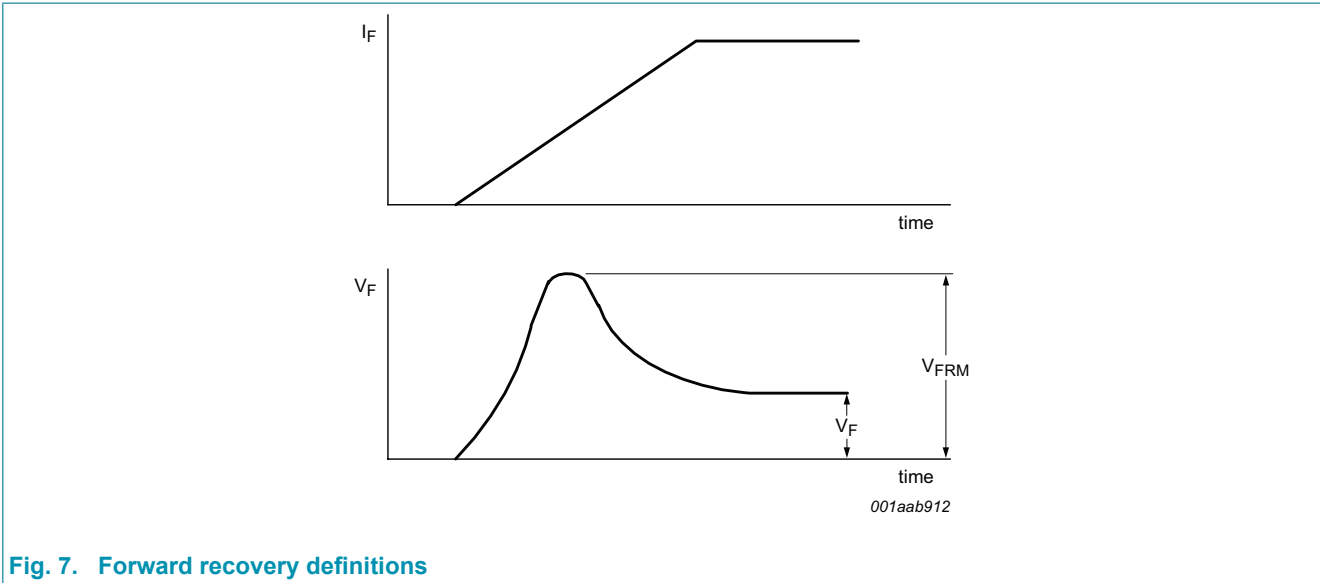
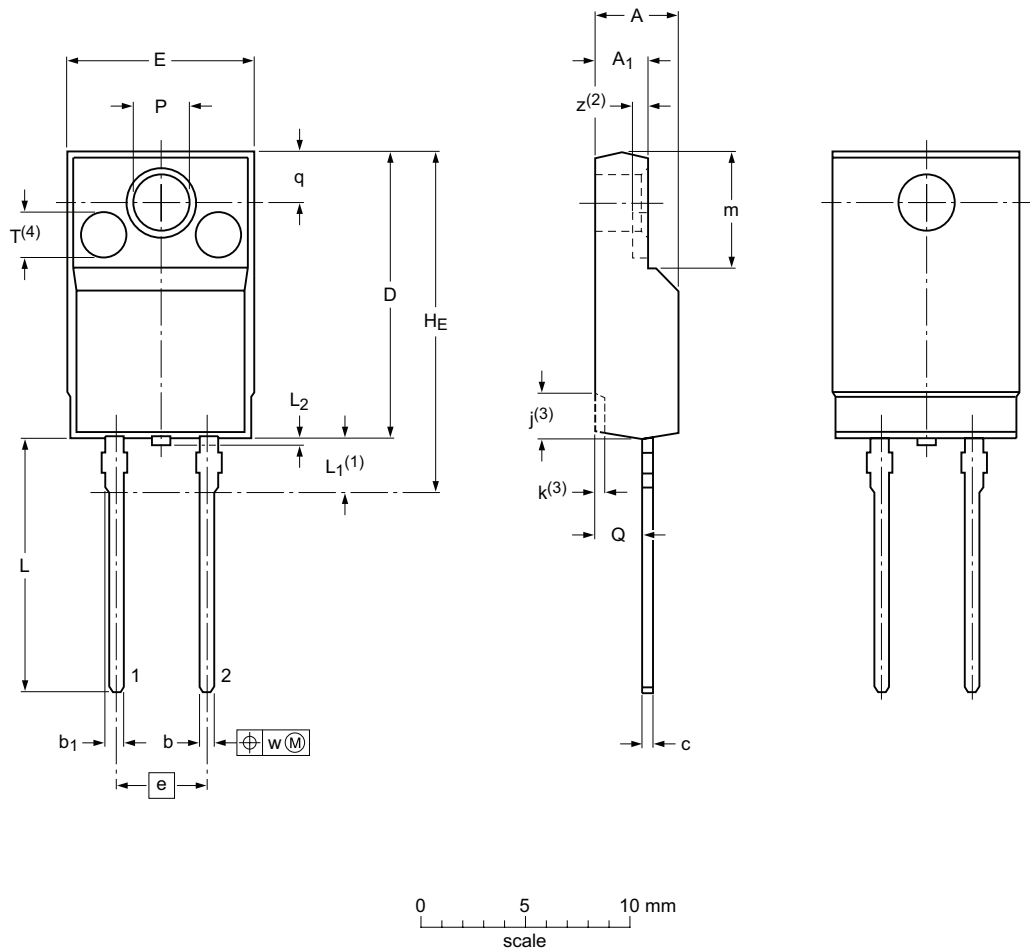


Fig. 7. Forward recovery definitions

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			2.7	0.6	14.4	3.3		6.5	3.2	2.6				
nom								5.08	19.0					0.5				2.6	2.55	0.4	0.8
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				<del>07-06-08</del> 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.
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