

## 1. General description

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

## 2. Features and benefits

- Extremely fast switching
- Low thermal resistance
- Low reverse recovery current
- Isolated package
- Reduces switching loss in associated MOSFET

## 3. Applications

- Half-bridge or full-bridge switched-mode power supplies
- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge lighting ballasts

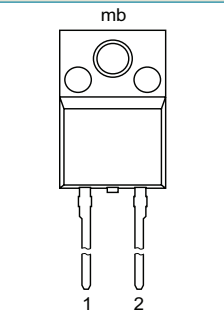
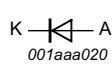
## 4. Quick reference data

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; $T_n \leq 37\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	10			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_n \leq 37\text{ °C}$ ; square-wave pulse	20			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse	91			A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse	100			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 4</a>	-	1.89	2.9	V
		$I_F = 10\text{ A}$ ; $T_j = 150\text{ °C}$ ; <a href="#">Fig. 4</a>	-	1.32	2.03	V
		$I_F = 20\text{ A}$ ; $T_j = 150\text{ °C}$ ; <a href="#">Fig. 4</a>	-	1.64	2.34	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $di_F/dt = 50\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 5</a>	-	35	55	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
BYC10X-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

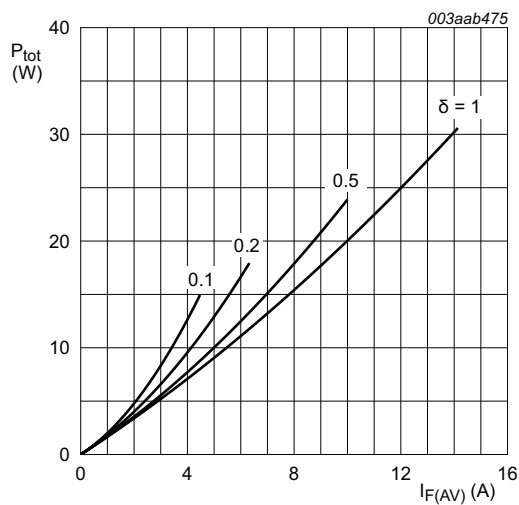
Type number	Marking codes
BYC10X-600	BYC10X-600

## 8. Limiting values

**Table 5. Limiting values**

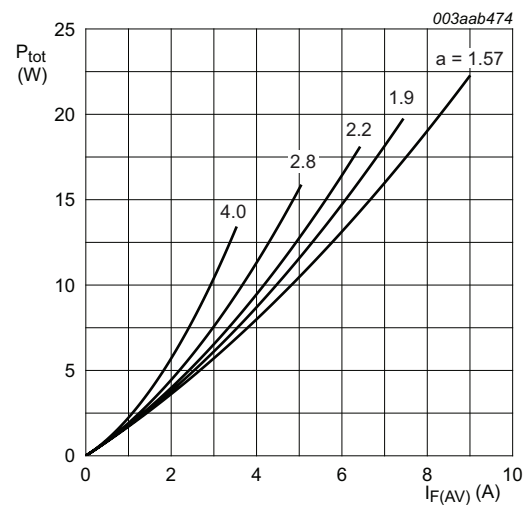
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	$\delta = 1.0$ ; square-wave pulse; $T_h \leq 100$ °C;	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_h \leq 37$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 37$ °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	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



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

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



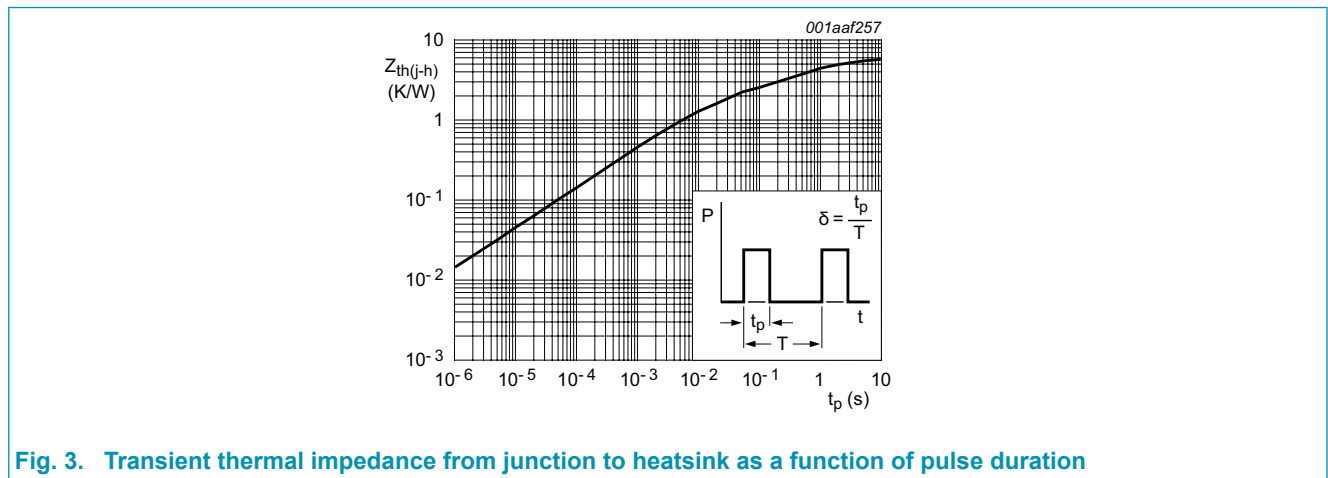
$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$

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

## 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.3</a>	-	-	4.8	K/W
		without heatsink compound	-	-	5.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W



**Fig. 3. Transient thermal impedance from junction to heatsink as a function of pulse duration**

## 10. Isolation characteristics

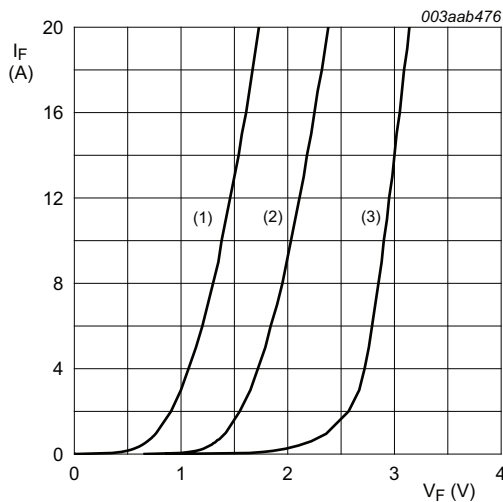
**Table 7. Isolation characteristics**

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; f = 1 MHz	-	10	-	PF

### 11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10\text{ A}; T_j = 25\text{ °C}; \text{Fig. 4}$	-	1.89	2.9	V
		$I_F = 10\text{ A}; T_j = 150\text{ °C}; \text{Fig. 4}$	-	1.32	2.03	V
		$I_F = 20\text{ A}; T_j = 150\text{ °C}; \text{Fig. 4}$	-	1.64	2.34	V
$I_R$	reverse current	$V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	9	200	$\mu\text{A}$
		$V_R = 500\text{ V}; T_j = 100\text{ °C}$	-	1.1	3	mA
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; di_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 5}$	-	35	55	ns
		$I_F = 10\text{ A}; V_R = 400\text{ V}; di_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 5}$	-	19	-	ns
		$I_F = 10\text{ A}; V_R = 400\text{ V}; di_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}; \text{Fig. 5}$	-	32	40	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10\text{ A}; V_R = 400\text{ V}; di_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}; \text{Fig. 5}$	-	9.5	12	A
		$I_F = 10\text{ A}; V_R = 400\text{ V}; di_F/dt = 50\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 5}$	-	3	7.5	A
$V_{FR}$	forward recovery voltage	$I_F = 10\text{ A}; di_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 6}$	-	8	11	V



- (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. 4. Forward current as a function of forward voltage

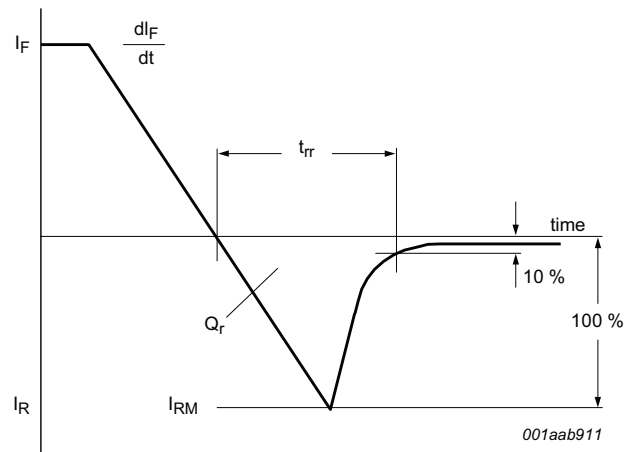
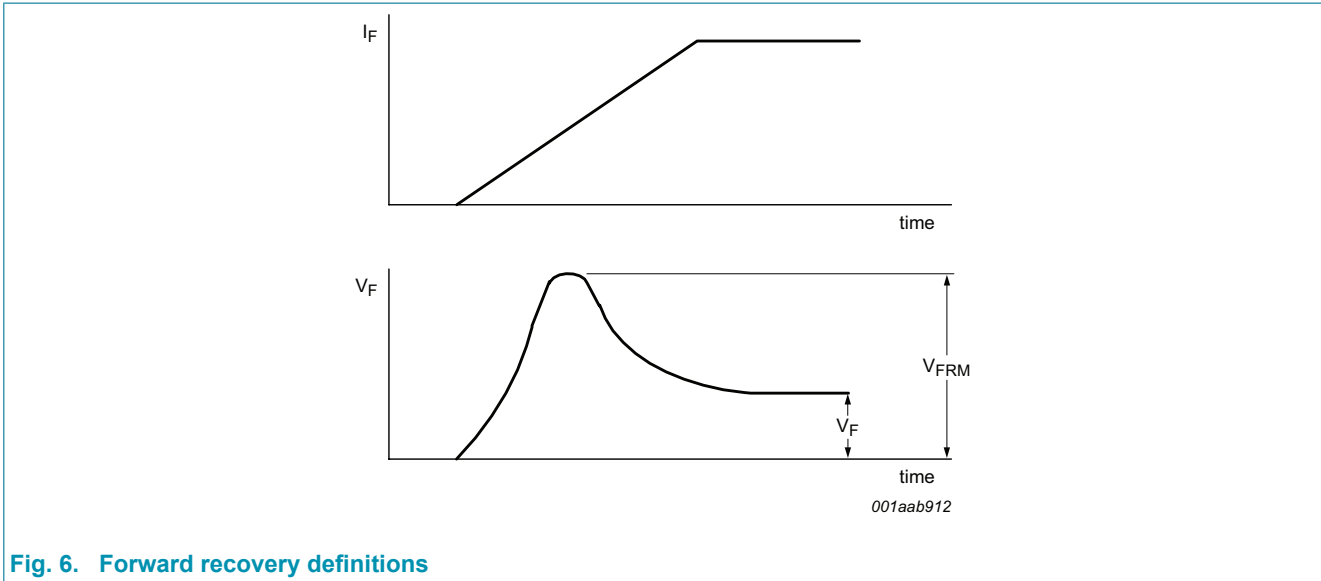


Fig. 5. Reverse recovery definitions; ramp recovery

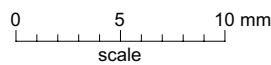
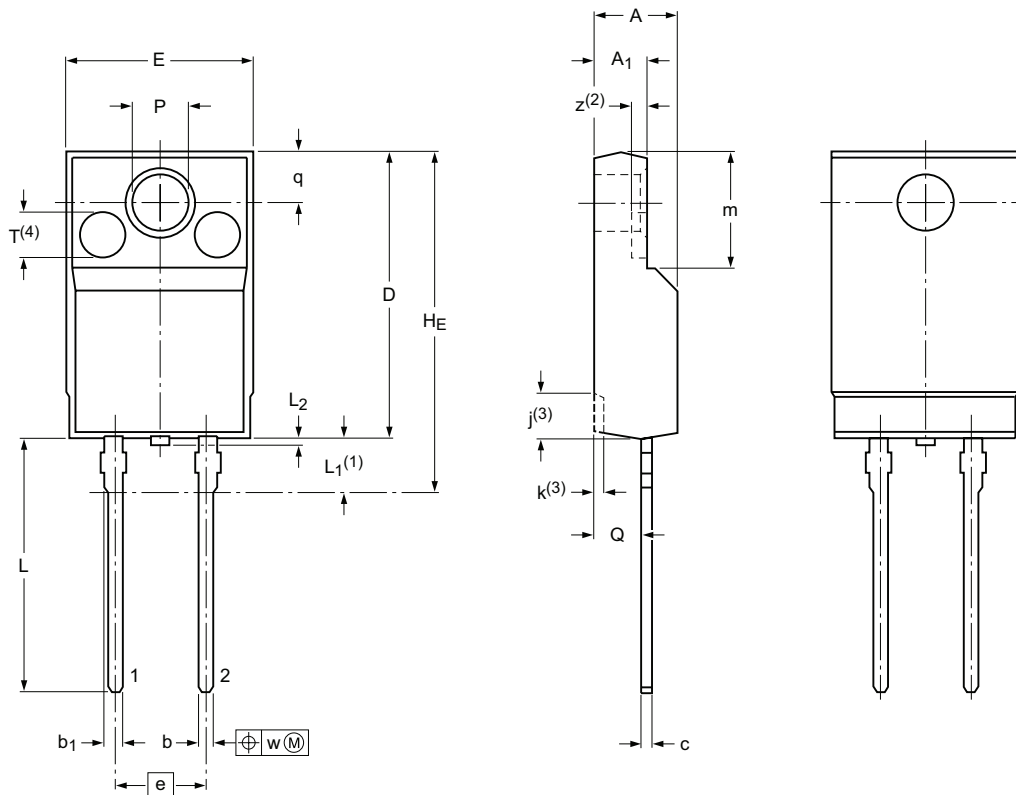


**Fig. 6. Forward recovery definitions**

## 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.

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

## 13. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC10X-600 v.3	20180926	Product data sheet	-	BYC10X-600_2
Modifications:	Change from NXP version to WeEn version			
BYC10X-600_2	20080116	Product data sheet	-	BYC10X-600_1
Modifications:	"Limiting values", $I_{F(AV)}$ and $I_{FRM}$ conditions for $T_h$ changed to 37 °C.			
BYC10X-600_1	20070831	Product data sheet	-	-



## 14. 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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