



**THE DATASHEET OF  
BYC15X-600PQ**



## 1. General description

Hyperfast power diode in a SOD113A (2-lead TO-220-F) plastic package.

## 2. Features and benefits

- Fast switching
- Isolated plastic package
- Low leakage current
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET or IGBT

## 3. Applications

- Active PFC in air conditioner
- High frequency switched-mode power supplies
- Continuous Current Mode (CCM) Power Factor Correction (PFC)

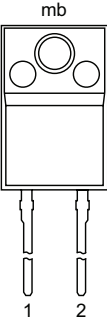
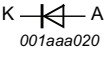
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage	DC	600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	15			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25 \mu s$ ; square-wave pulse	30			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10 ms$ ; $T_{j(imit)} = 25 \text{ }^\circ\text{C}$ ; sine-wave pulse; <a href="#">Fig. 3</a>	180			A
		$t_p = 8.3 ms$ ; $T_{j(imit)} = 25 \text{ }^\circ\text{C}$ ; sine-wave pulse	200			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 15 A$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>	-	2.7	3.2	V
		$I_F = 15 A$ ; $T_j = 150 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>	-	1.4	2	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1 A$ ; $V_R = 30 V$ ; $di_F/dt = 200 A/\mu s$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; <a href="#">Fig. 6</a>	-	13	18	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		
	Name	Description	Version
BYC15X-600P	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113A

## 7. Marking

Table 4. Marking codes

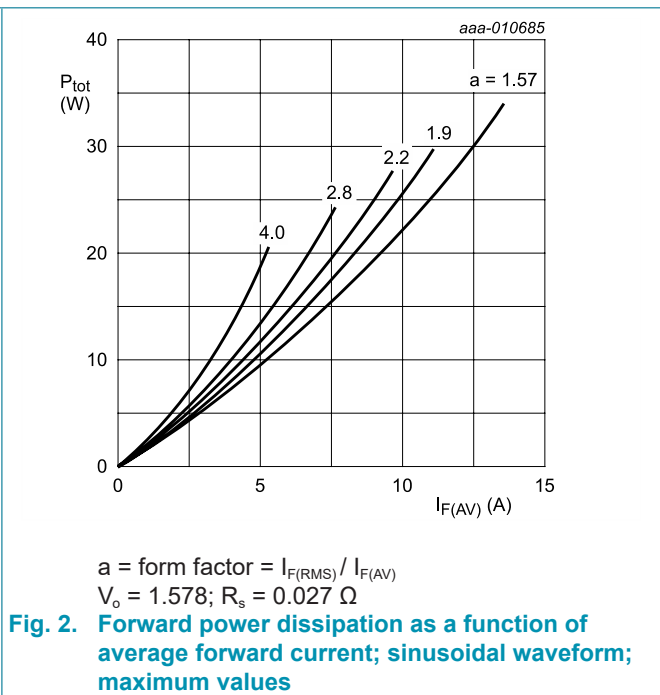
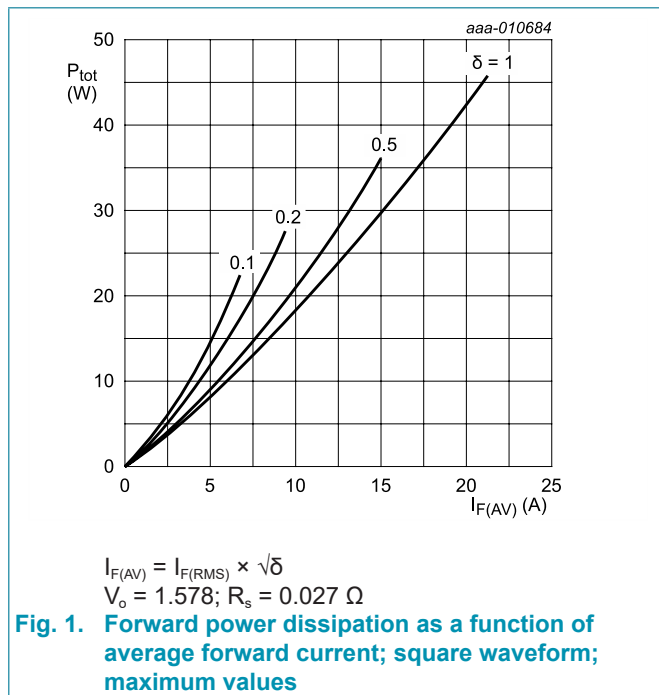
Type number	Marking codes
BYC15X-600P	BYC15X-600P

## 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; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	15	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25 \mu s$ ; $T_h \leq 25 \text{ }^\circ\text{C}$ ; square-wave pulse	30	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10 \text{ ms}$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; sine-wave pulse; <a href="#">Fig. 3</a>	180	A
		$t_p = 8.3 \text{ ms}$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; sine-wave pulse	200	A
$T_{stg}$	storage temperature		-65 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



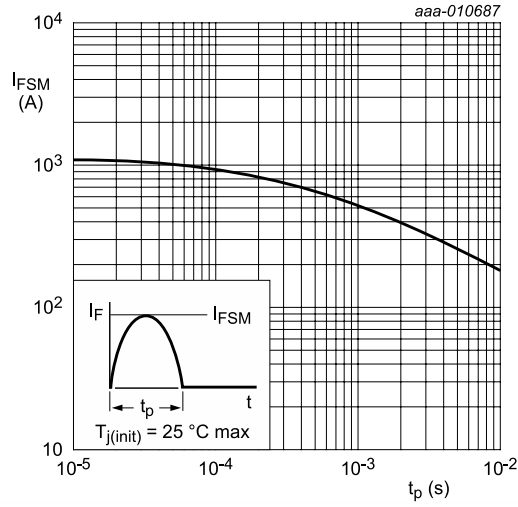


Fig. 3. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

## 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; <a href="#">Fig 4</a>	-	-	4.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

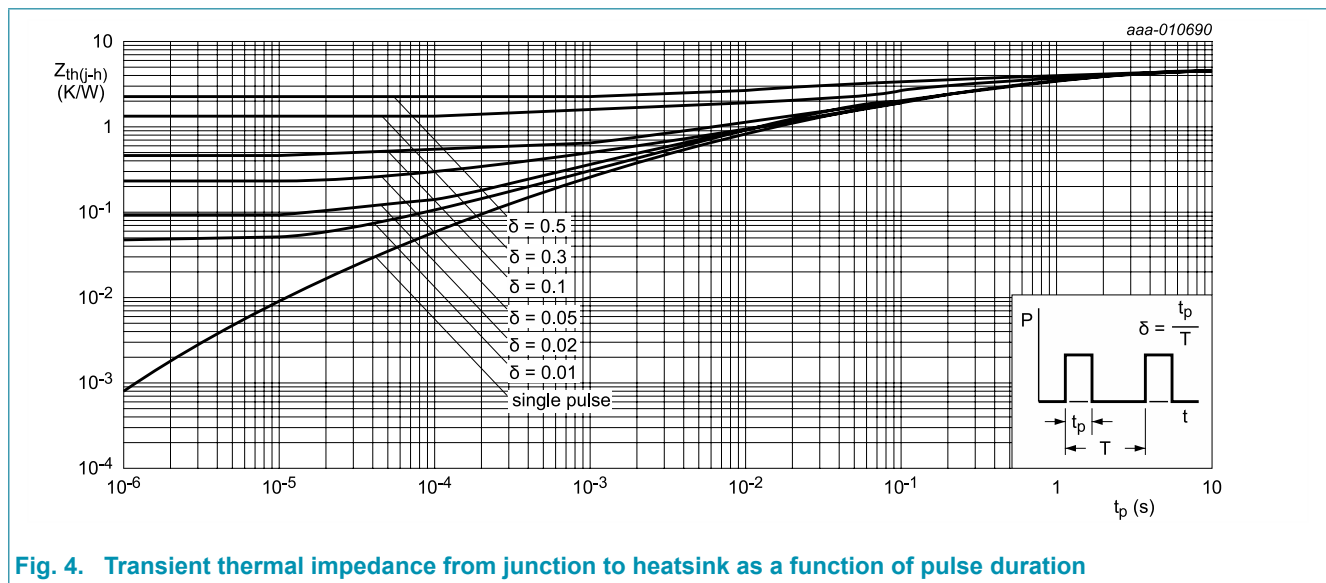


Fig. 4. Transient thermal impedance from junction to heatsink as a function of pulse duration

## 10. Isolation characteristics

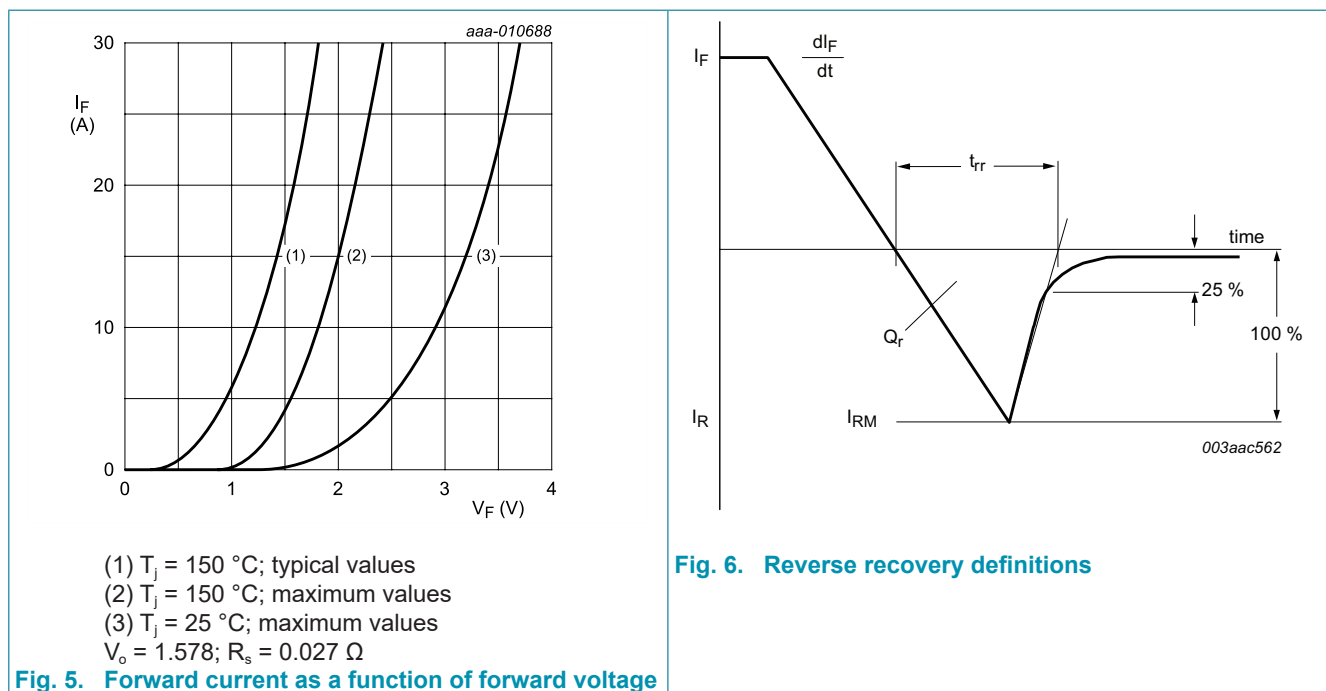
Table 7. Isolation characteristics

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

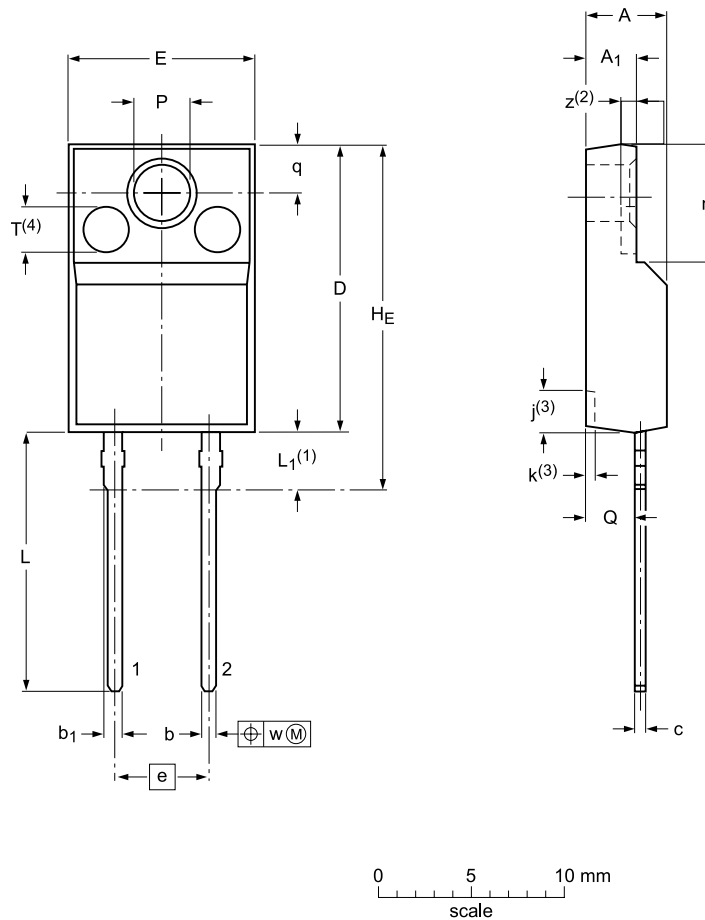
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 15\text{ A}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 5}$	-	2.7	3.2	V
		$I_F = 15\text{ A}; T_J = 150\text{ }^\circ\text{C}; \text{Fig. 5}$	-	1.4	2	V
$I_R$	reverse current	$V_R = 600\text{ V}; T_J = 25\text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_R = 500\text{ V}; T_J = 150\text{ }^\circ\text{C}$	-	-	1	mA
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	13	18	ns
		$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 500\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	22	-	ns
		$I_F = 15\text{ A}; V_R = 200\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	28	-	ns
		$I_F = 15\text{ A}; V_R = 200\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ }^\circ\text{C}; \text{Fig. 6}$	-	39	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 15\text{ A}; V_R = 200\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	2.1	-	A
		$I_F = 15\text{ A}; V_R = 200\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ }^\circ\text{C}; \text{Fig. 6}$	-	5.8	-	A
$Q_r$	recovered charge	$I_F = 15\text{ A}; di_F/dt = 200\text{ A}/\mu\text{s}; di_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	30	-	V
		$I_F = 15\text{ A}; di_F/dt = 100\text{ A}/\mu\text{s}; di_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	115	-	V



## 12. Package outline

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

SOD113A



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>	m	P	Q	q	T <sup>(4)</sup>	W	z <sup>(2)</sup>	
mm	max	4.6	3.1	0.9	1.1	0.7	15.8	10.3		2.7	0.8	14.4	3.3	6.5	3.2	2.8		2.6	2.55	0.4	0.8
	nom							5.08	19.0												
	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					

Note

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.

sod113a\_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOD113A	2 LEADS TO220F				14-01-14 14-04-10

## 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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## 14. Contents

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1. General description.....	1
2. Features and benefits .....	1
3. Applications .....	1
4. Quick reference data .....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values .....	3
9. Thermal characteristics .....	4
10. Isolation characteristics .....	4
11. Characteristics.....	5
12. Package outline .....	7
13. Legal information .....	8
14. Contents .....	10

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