



THE DATASHEET OF BYC5X-600PQ





BYC5X-600P

Hyperfast power diode

Rev.01 - 28 April 2018

Product data sheet

1. General description

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

2. Features and benefits

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

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
V_{RRM}	repetitive peak reverse voltage		600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_h \leq 97$ °C; Fig. 1 ; Fig. 2 ; Fig. 3	5			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_h \leq 97$ °C; square-wave pulse	10			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4	60			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	65			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 5$ A; $T_j = 150$ °C; Fig. 6	-	1.35	2.1	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 200$ A/ μ s; $T_j = 25$ °C; Fig. 7	-	11	-	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
BYC5X-600P	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220F "full pack"	SOD113A

7. Marking

Table 4. Marking codes

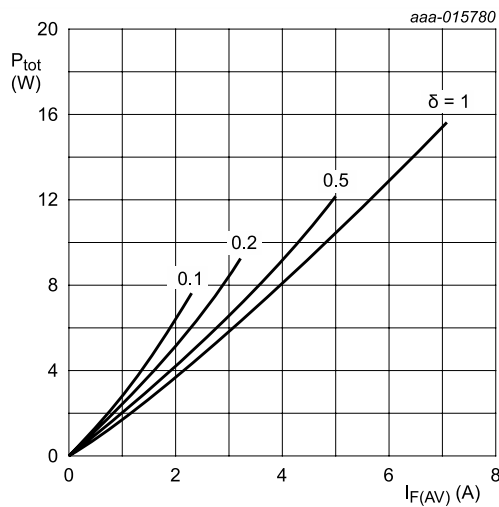
Type number	Marking codes
BYC5X-600P	BYC5X-600P

8. Limiting values

Table 5. Limiting values

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

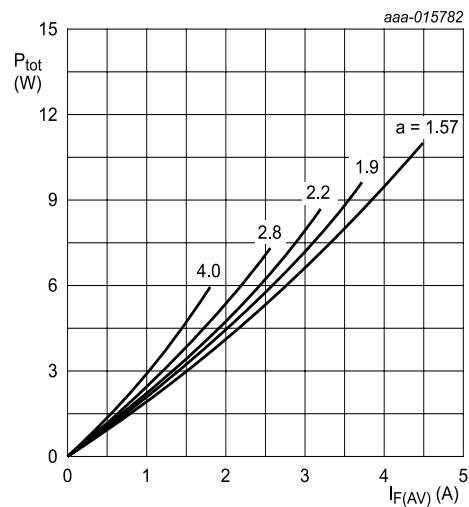
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_h \leq 97\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	5	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 97\text{ }^\circ\text{C}$; square-wave pulse	10	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; Fig. 4	60	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse	65	A
T_{stg}	storage temperature		-65 to 175	$^\circ\text{C}$
T_j	junction temperature		175	$^\circ\text{C}$



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

$$V_o = 1.801\text{ V}; R_s = 0.062\text{ }\Omega$$

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



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

$$V_o = 1.801\text{ V}; R_s = 0.062\text{ }\Omega$$

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

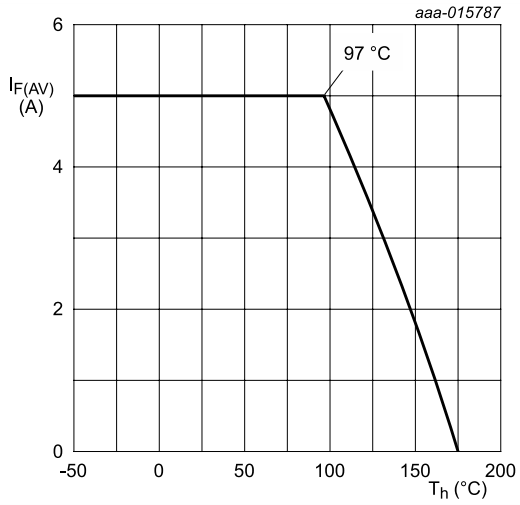


Fig. 3. Forward current as a function of heatsink temperature; maximum values

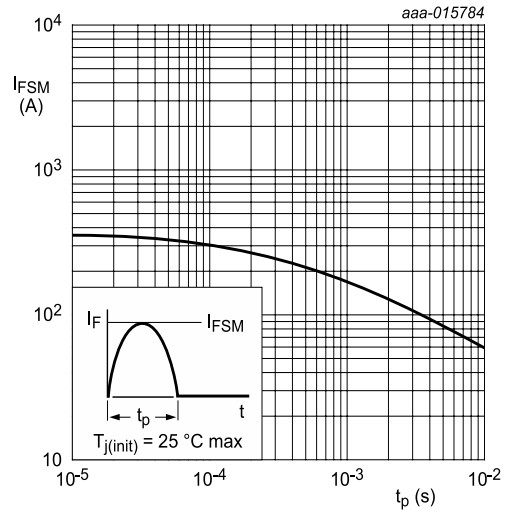


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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; Fig 5	-	-	6.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

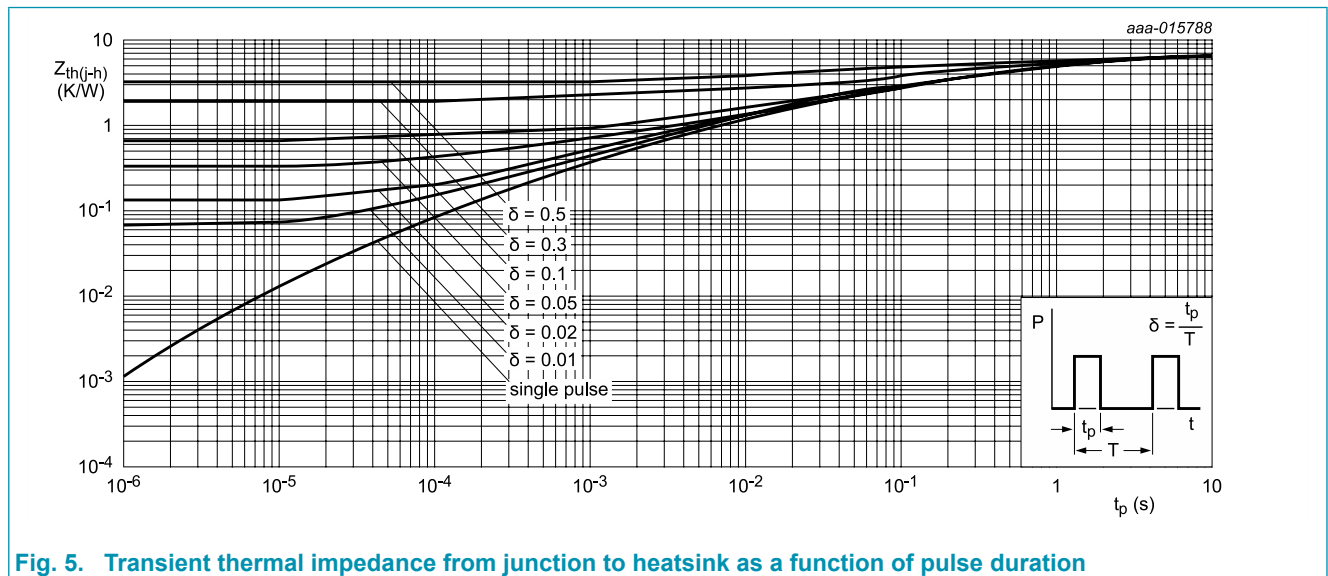


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

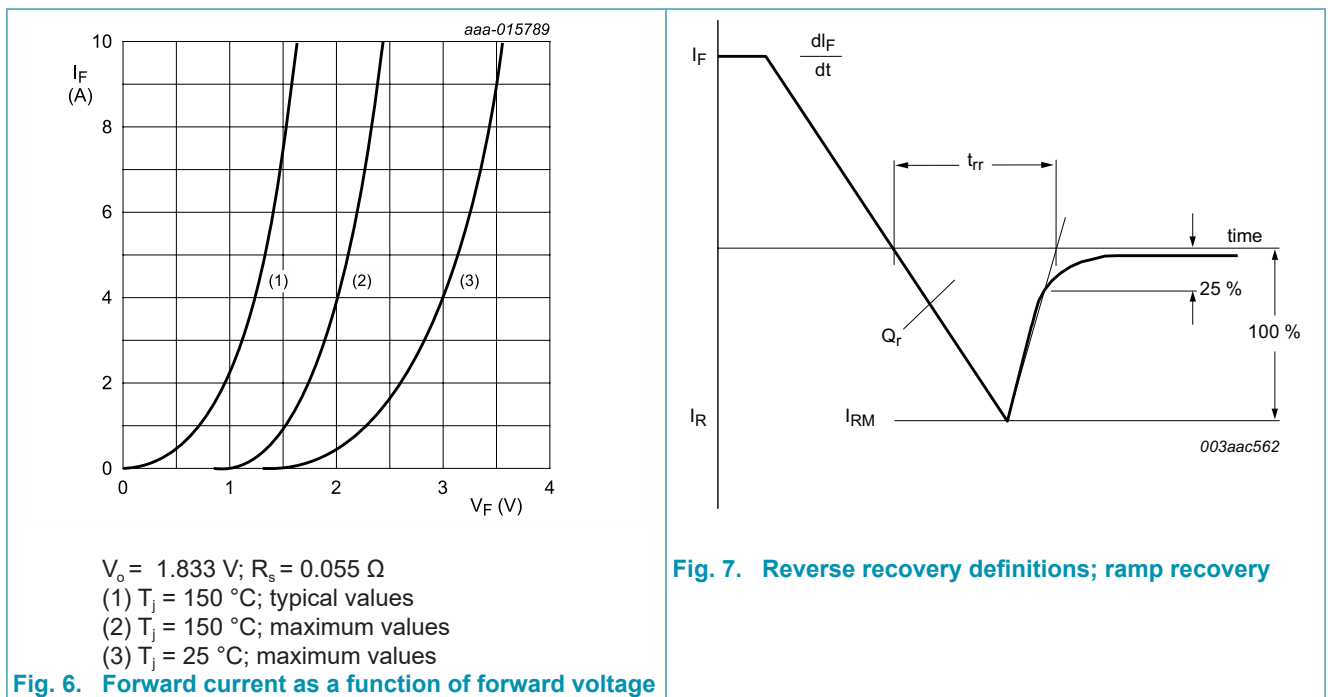
Table 7. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all pins to external heatsink; sinusoidal waveform; clean and dust free; $50 \text{ Hz} \leq f \leq 60 \text{ Hz}$; $RH \leq 65 \%$	-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external heatsink; $f = 1 \text{ MHz}$	-	10	-	pF

11. Characteristics

Table 8. Characteristics

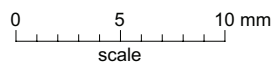
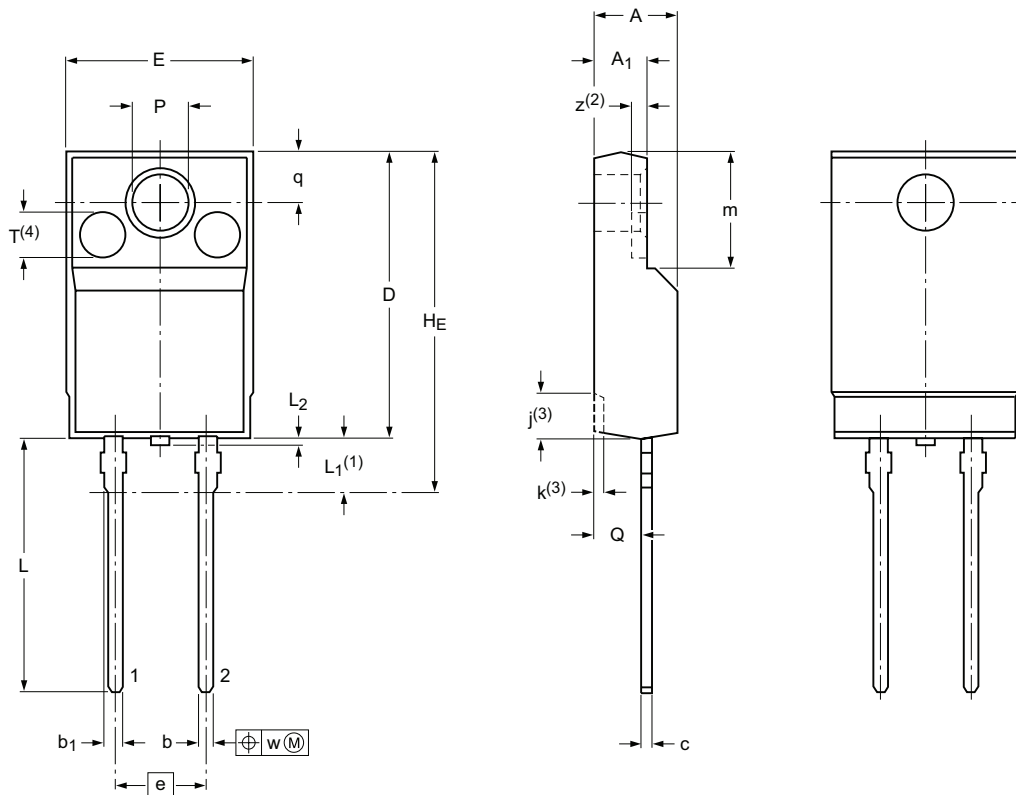
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 5\text{ A}; T_J = 25\text{ °C}; \text{Fig. 6}$	-	2.5	3.3	V
		$I_F = 5\text{ A}; T_J = 150\text{ °C}; \text{Fig. 6}$	-	1.35	2.1	V
I_R	reverse current	$V_R = 600\text{ V}; T_J = 25\text{ °C}$	-	-	10	μA
		$V_R = 600\text{ V}; T_J = 150\text{ °C}$	-	-	0.6	mA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 5\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	19	-	nC
		$I_F = 5\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ °C}; \text{Fig. 7}$	-	45	-	nC
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	11	-	ns
		$I_F = 5\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	23	-	ns
		$I_F = 5\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ °C}; \text{Fig. 7}$	-	28	-	ns
		$I_F = 5\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	13	25	ns
I_{RM}	peak reverse recovery current	$I_F = 5\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$	-	1.7	-	A
		$I_F = 5\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ °C}; \text{Fig. 7}$	-	3.2	-	A



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 ₁	b	b ₁	c	D	E	e	H _E max	j ⁽³⁾	k ⁽³⁾	L	L ₁ ⁽¹⁾	L ₂ max	m	P	Q	q	T ⁽⁴⁾	w	z ⁽²⁾	
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				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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