

# BYC8X-600

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Hyperfast rectifier diode, low switching loss

Rev. 02 — 13 March 2009

Product data sheet

## 1. Product profile

### 1.1 General description

Hyperfast epitaxial rectifier diode in a SOD113 (2-lead TO-220F) plastic package.

### 1.2 Features and benefits

- Low reverse recovery current and low thermal resistance
- Reduces switching losses in associated MOSFET

### 1.3 Applications

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

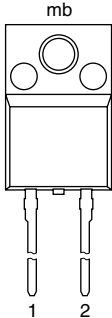

### 1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_h = 59\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	8	A
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 8\text{ A}$ ; $V_R = 400\text{ V}$ ; $dI_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 5</a>	-	19	-	ns
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8\text{ A}$ ; $T_j = 150\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 4</a>	-	1.4	1.85	V

2. 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		

SOD113  
(TO-220F)

3. Ordering information

Table 3. Ordering information

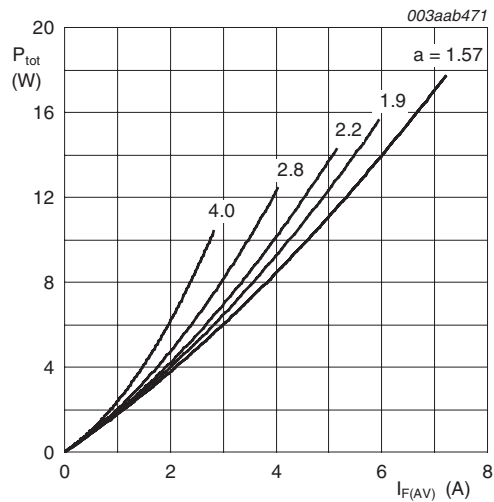
Type number	Package		Version
	Name	Description	
BYC8X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

4. Limiting values

Table 4. Limiting values

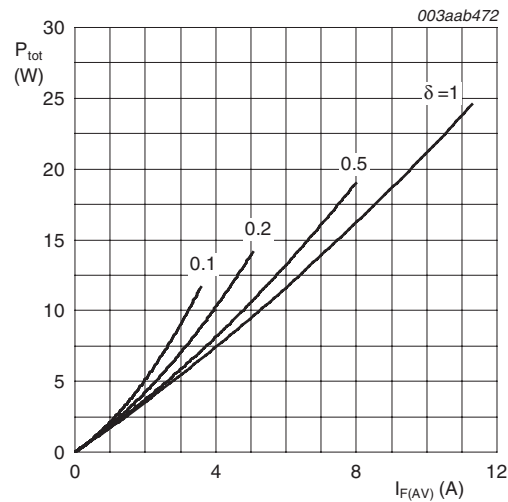
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	600	V
$V_{RWM}$	crest working reverse voltage		-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_h = 59\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	8	A
$I_{FRM}$	repetitive peak forward current	square-wave pulse; $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_h = 59\text{ }^{\circ}\text{C}$	-	16	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; sine-wave pulse; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$	-	80	A
		$t_p = 8.3\text{ ms}$ ; sine-wave pulse; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$	-	88	A
$T_{stg}$	storage temperature		-40	150	$^{\circ}\text{C}$
$T_j$	junction temperature		-	150	$^{\circ}\text{C}$



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

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



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

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

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; see <a href="#">Figure 3</a>	-	-	4.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	55	-	K/W

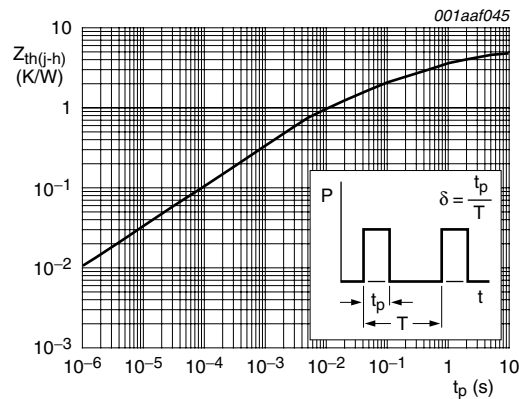


Fig 3. Transient thermal impedance from junction to heatsink as a function of pulse width

## 6. Isolation characteristics

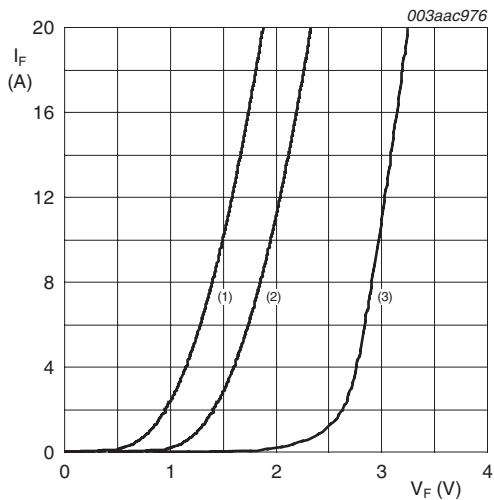
Table 6. Isolation characteristics

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

## 7. Characteristics

Table 7. Characteristics

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> = 150 °C; see <a href="#">Figure 4</a>	-	1.4	1.85	V
		I <sub>F</sub> = 8 A; T <sub>j</sub> = 25 °C	-	2	2.9	V
		I <sub>F</sub> = 16 A; T <sub>j</sub> = 150 °C	-	1.7	2.3	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 500 V; T <sub>j</sub> = 100 °C	-	1.1	3	mA
		V <sub>R</sub> = 600 V	-	9	150	μA
Dynamic characteristics						
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 1 A; dI <sub>F</sub> /dt = 100 A/μs	-	12	-	nC
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 8 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 500 A/μs; T <sub>j</sub> = 100 °C	-	32	40	ns
		I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 50 A/μs; T <sub>j</sub> = 25 °C	-	30	52	ns
		I <sub>F</sub> = 8 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 500 A/μs; T <sub>j</sub> = 25 °C; see <a href="#">Figure 5</a>	-	19	-	ns
I <sub>RM</sub>	peak reverse recovery current	I <sub>F</sub> = 10 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 500 A/μs; T <sub>j</sub> = 100 °C	-	9.5	12	A
		I <sub>F</sub> = 8 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 50 A/μs; T <sub>j</sub> = 125 °C	-	1.5	5.5	A
V <sub>FR</sub>	forward recovery voltage	I <sub>F</sub> = 10 A; dI <sub>F</sub> /dt = 100 A/μs; T <sub>j</sub> = 25 °C; see <a href="#">Figure 6</a>	-	8	10	V



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

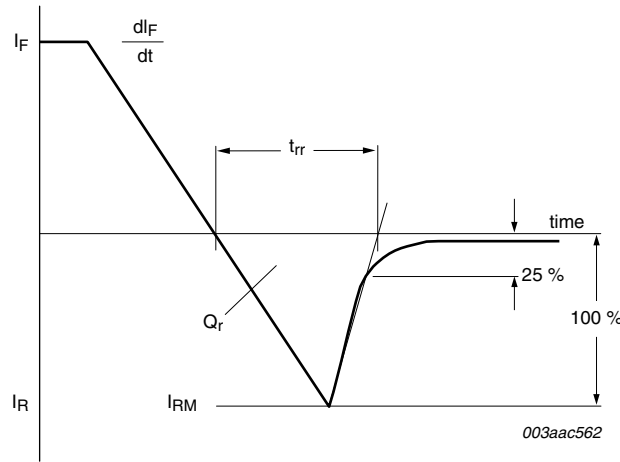


Fig 5. Reverse recovery definitions; ramp recovery

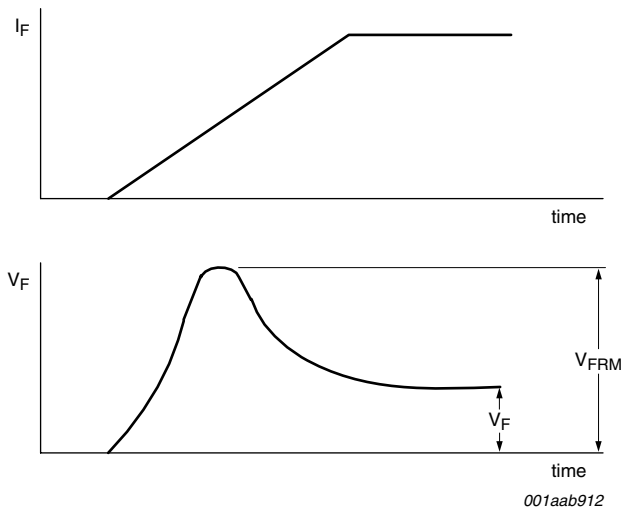


Fig 6. Forward recovery definitions

8. Package outline

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

SOD113

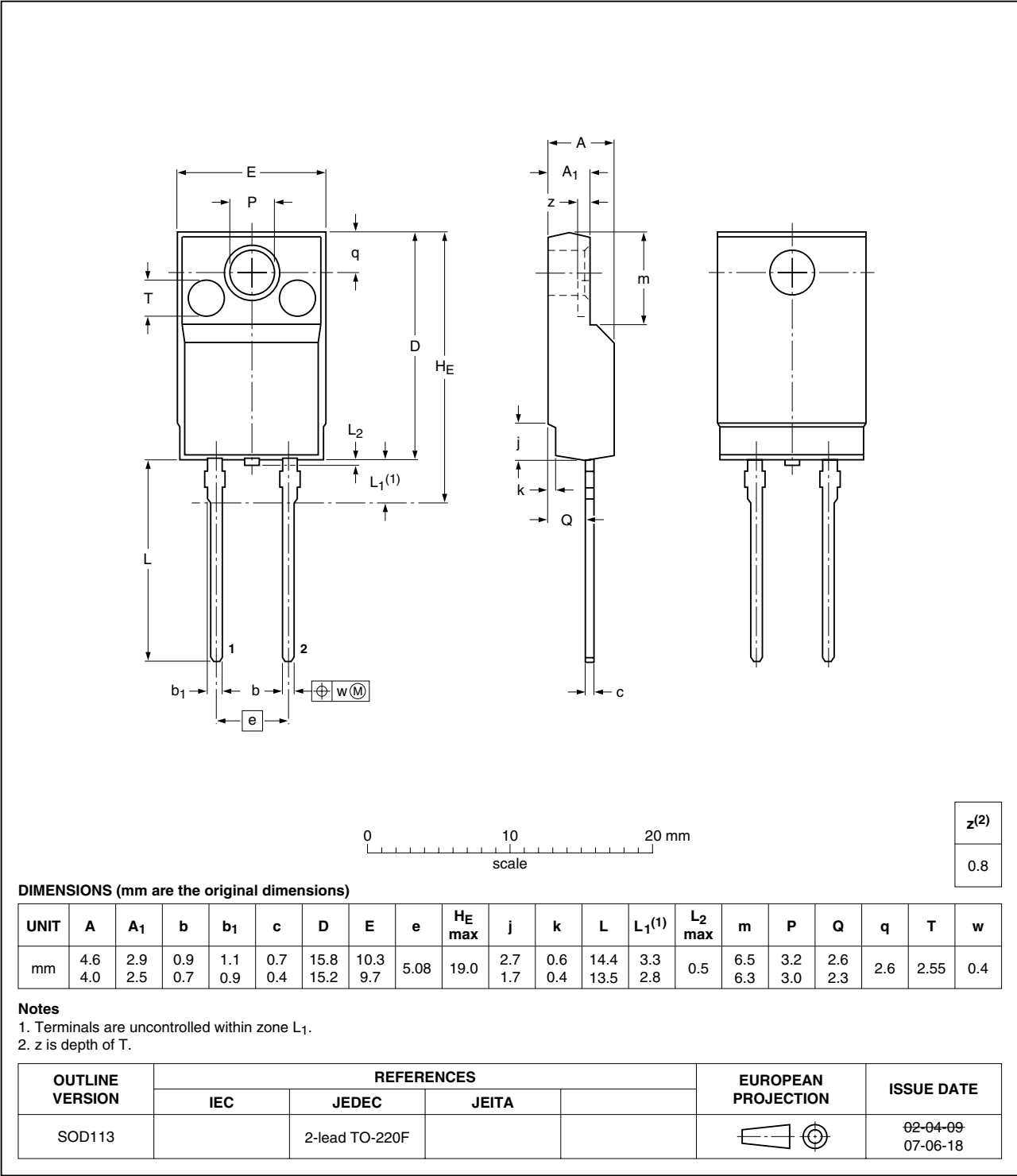


Fig 7. Package outline SOD113 (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC8X-600_2	20090313	Product data sheet	-	BYC8X-600_1
Modifications:	<ul style="list-style-type: none"><li>Forward voltage values updated in characteristics.</li><li>Recovered charge parameter added in characteristics.</li></ul>			
BYC8X-600_1	20070905	Product data sheet	-	-

## 10. Legal information

### 10.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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