

BYC8X-600

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

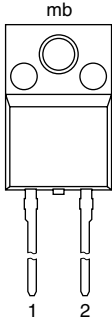

1.4 Quick reference data

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 Figure 1 ; see Figure 2	-	-	8	A
Dynamic characteristics						
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 Figure 5	-	19	-	ns
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}$; $T_j = 150\text{ }^\circ\text{C}$; see Figure 4	-	1.4	1.85	V

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p style="text-align: center;">SOD113 (TO-220F)</p>	 <p style="text-align: center;">001aaa020</p>
2	A	anode		
mb	n.c.	mounting base; isolated		

3. Ordering information

Table 3. Ordering information

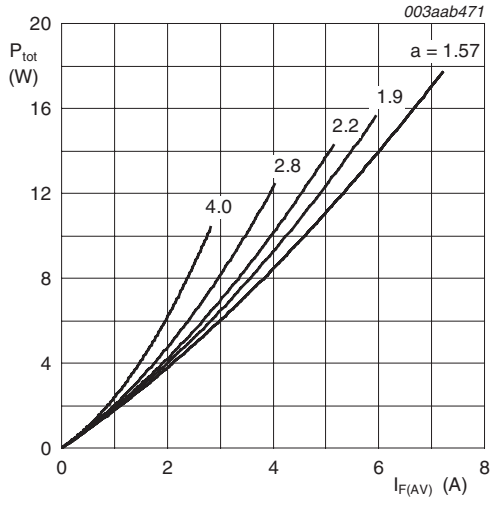
Type number	Package		Version
	Name	Description	
BYC8X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

4. Limiting values

Table 4. Limiting values

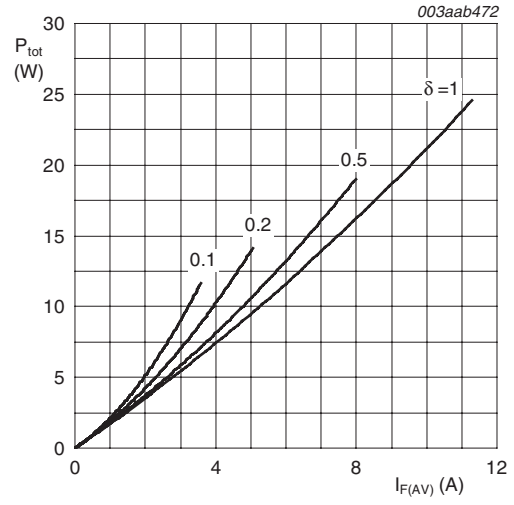
In accordance with the Absolute Maximum Rating System (IEC 60134).

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 Figure 1 ; see Figure 2	-	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; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$	-	80	A
		$t_p = 8.3\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$	-	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 Figure 3	-	-	4.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	55	-	K/W

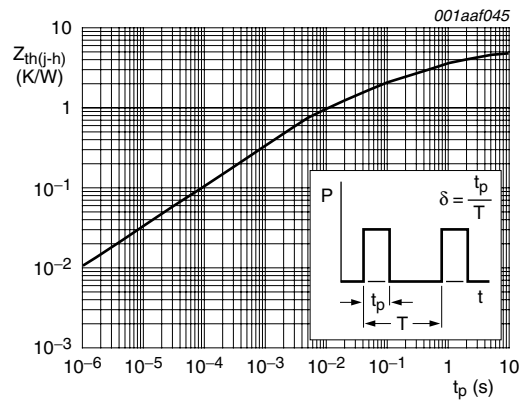


Fig 3. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

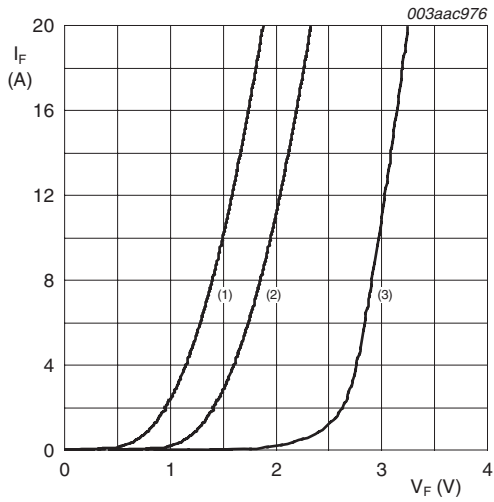
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{\text{isol(RMS)}}$	RMS isolation voltage	$f = 1 \text{ MHz}$; $\text{RH} = 65 \%$; between all pins and external heatsink	-	-	2500	V
C_{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_F	forward voltage	$I_F = 8 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$; see Figure 4	-	1.4	1.85	V
		$I_F = 8 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	2	2.9	V
		$I_F = 16 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$	-	1.7	2.3	V
I_R	reverse current	$V_R = 500 \text{ V}$; $T_j = 100 \text{ }^\circ\text{C}$	-	1.1	3	mA
		$V_R = 600 \text{ V}$	-	9	150	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 1 \text{ A}$; $di_F/dt = 100 \text{ A}/\mu\text{s}$	-	12	-	nC
t_{rr}	reverse recovery time	$I_F = 8 \text{ A}$; $V_R = 400 \text{ V}$; $di_F/dt = 500 \text{ A}/\mu\text{s}$; $T_j = 100 \text{ }^\circ\text{C}$	-	32	40	ns
		$I_F = 1 \text{ A}$; $V_R = 30 \text{ V}$; $di_F/dt = 50 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$	-	30	52	ns
		$I_F = 8 \text{ A}$; $V_R = 400 \text{ V}$; $di_F/dt = 500 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 5	-	19	-	ns
I_{RM}	peak reverse recovery current	$I_F = 10 \text{ A}$; $V_R = 400 \text{ V}$; $di_F/dt = 500 \text{ A}/\mu\text{s}$; $T_j = 100 \text{ }^\circ\text{C}$	-	9.5	12	A
		$I_F = 8 \text{ A}$; $V_R = 400 \text{ V}$; $di_F/dt = 50 \text{ A}/\mu\text{s}$; $T_j = 125 \text{ }^\circ\text{C}$	-	1.5	5.5	A
V_{FR}	forward recovery voltage	$I_F = 10 \text{ A}$; $di_F/dt = 100 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 6	-	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

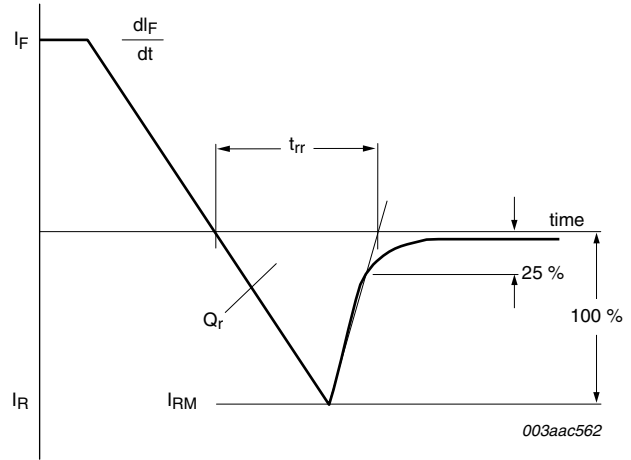


Fig 5. Reverse recovery definitions; ramp recovery

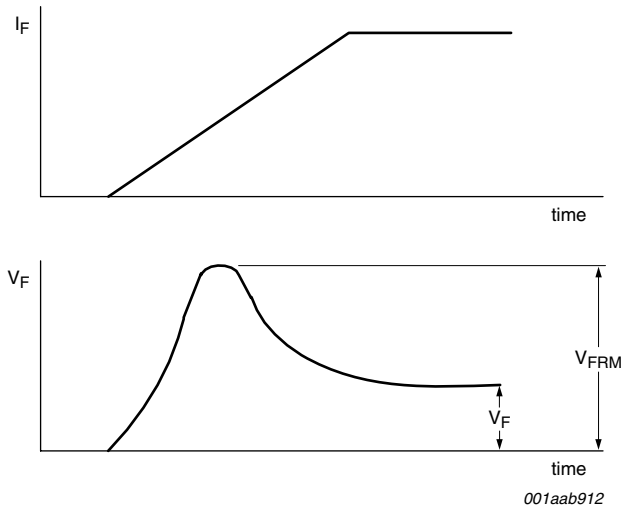


Fig 6. Forward recovery definitions

8. Package outline

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

SOD113

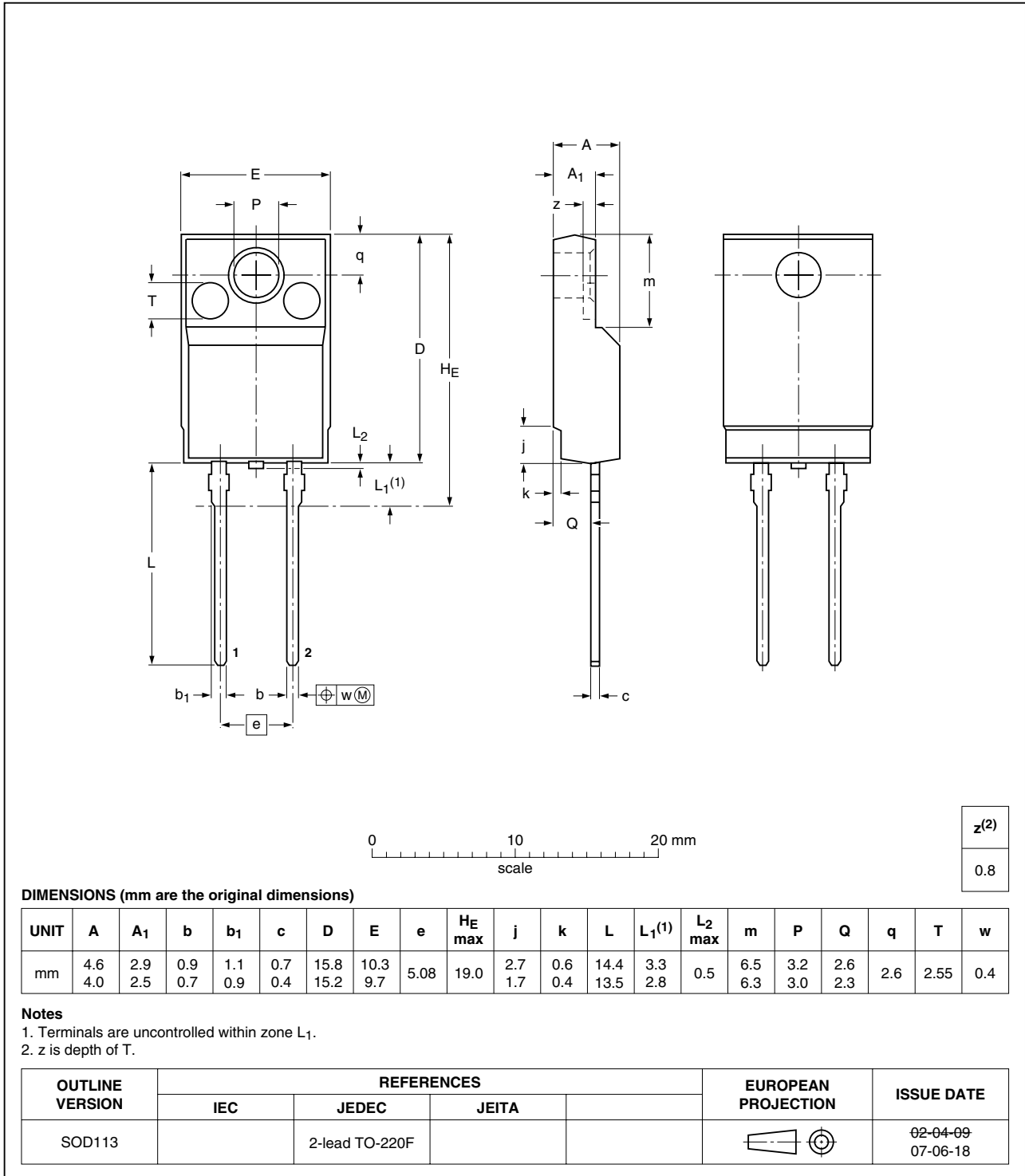


Fig 7. Package outline SOD113 (TO-220F)

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">• Forward voltage values updated in characteristics.• Recovered charge parameter added in characteristics.		
BYC8X-600_1	20070905	Product data sheet	-	-

10. Legal information

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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.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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