

# BYC5X-600

Rectifier diode hyperfast

Rev. 01 — 3 September 2007

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

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

### 1.3 Applications

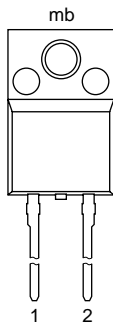
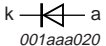
- Half-bridge or full-bridge switched-mode power supplies
- Half-bridge lighting ballasts
- Continuous Current Mode (CCM) Power Factor Correction (PFC)

### 1.4 Quick reference data

- $V_{RRM} \leq 600$  V
- $V_F = 1.40$  V (typ)
- $I_{F(AV)} \leq 5$  A
- $t_{rr} = 19$  ns (typ)

## 2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	cathode (k)		 001aaa020
2	anode (a)		
mb	mounting base; isolated		

SOD113 (2-lead TO-220F)

### 3. Ordering information

**Table 2. Ordering information**

Type number	Package		Version
	Name	Description	
BYC5X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 'full pack'	SOD113

### 4. Limiting values

**Table 3. 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
$V_R$	reverse voltage	square waveform; $\delta = 1.0$ ; $T_h \leq 100$ °C	-	500	V
$I_{F(AV)}$	average forward current	square waveform; $\delta = 0.5$ ; $T_h \leq 87$ °C	-	5	A
$I_{FRM}$	repetitive peak forward current	square waveform; $\delta = 0.5$ ; $T_h \leq 87$ °C	-	10	A
$I_{FSM}$	non-repetitive peak forward current	$t = 10$ ms; sinusoidal waveform	-	40	A
		$t = 8.3$ ms; sinusoidal waveform	-	44	A
$T_{stg}$	storage temperature		-40	+150	°C
$T_j$	junction temperature		-	150	°C

## 5. Thermal characteristics

Table 4. 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 1</a>	-	-	5.5	K/W
		without heatsink compound	-	-	7.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

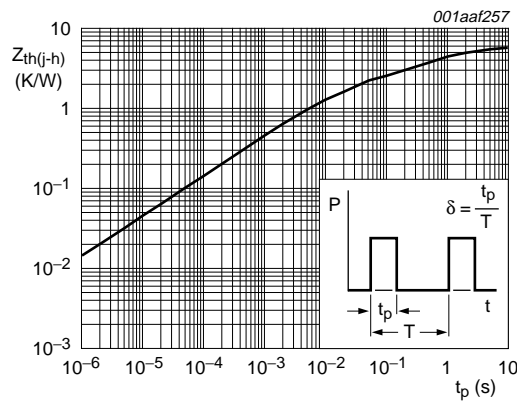


Fig 1. Transient thermal impedance from junction to heatsink as a function of pulse width

## 6. Isolation characteristics

Table 5. Isolation limiting values and characteristics

$T_h = 25^\circ\text{C}$  unless otherwise specified.

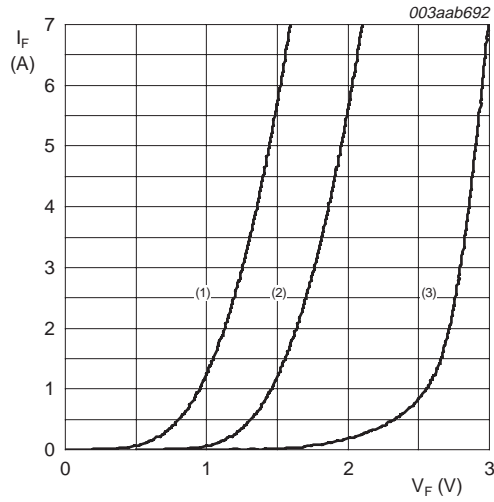
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; $f = 50 \text{ Hz}$ to $60 \text{ Hz}$ ; sinusoidal waveform; relative humidity $\leq 65\%$ ; clean and dust free	-	-	2500	V
$C_{isol}$	isolation capacitance	from cathode to external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

## 7. Characteristics

**Table 6. Characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5\text{ A}$ ; $T_j = 150\text{ °C}$ ; see <a href="#">Figure 2</a>	-	1.40	1.75	V
		$I_F = 10\text{ A}$ ; $T_j = 150\text{ °C}$ ; see <a href="#">Figure 2</a>	-	1.75	2.20	V
		$I_F = 5\text{ A}$ ; see <a href="#">Figure 2</a>	-	2.00	2.90	V
$I_R$	reverse current	$V_R = 600\text{ V}$	-	9	100	$\mu\text{A}$
		$V_R = 500\text{ V}$ ; $T_j = 100\text{ °C}$	-	0.9	3.0	mA
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}$ to $V_R = 30\text{ V}$ ; $di_F/dt = 50\text{ A}/\mu\text{s}$ ; see <a href="#">Figure 3</a>	-	30	50	ns
		$I_F = 5\text{ A}$ to $V_R = 400\text{ V}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$ ; see <a href="#">Figure 3</a>	-	19	-	ns
		$I_F = 5\text{ A}$ to $V_R = 400\text{ V}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 100\text{ °C}$ ; see <a href="#">Figure 3</a>	-	25	30	ns
$I_{RM}$	peak reverse recovery current	$I_F = 5\text{ A}$ to $V_R = 400\text{ V}$ ; $di_F/dt = 50\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ °C}$ ; see <a href="#">Figure 3</a>	-	0.7	3	A
		$I_F = 5\text{ A}$ to $V_R = 400\text{ V}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 100\text{ °C}$ ; see <a href="#">Figure 3</a>	-	8	11	A
$V_{FR}$	forward recovery voltage	$I_F = 10\text{ A}$ ; $di_F/dt = 100\text{ A}/\mu\text{s}$ ; see <a href="#">Figure 4</a>	-	9	11	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 2. Forward current as a function of forward voltage

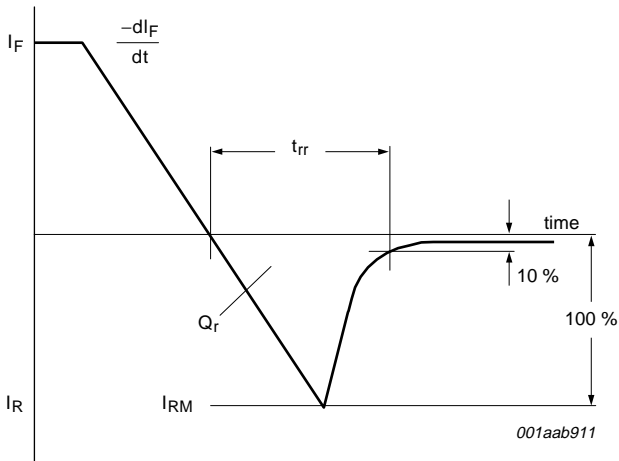


Fig 3. Reverse recovery definitions

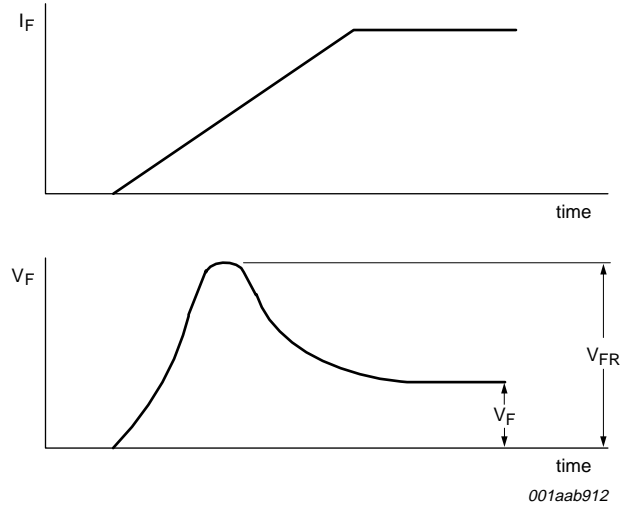
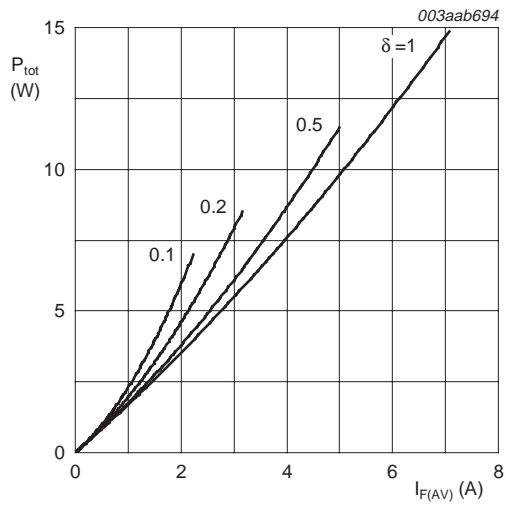
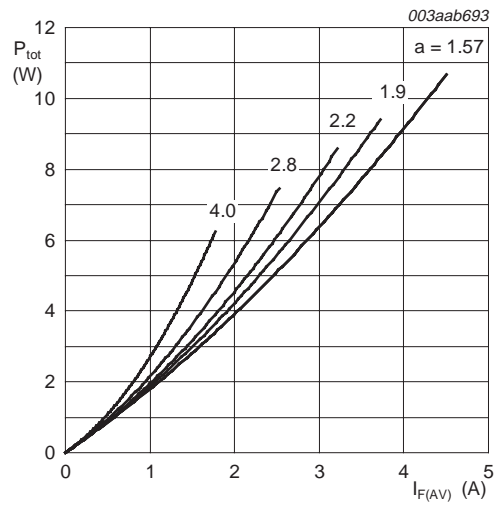


Fig 4. Forward recovery definitions



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

**Fig 5. 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 6. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values**

8. Package outline

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

SOD113

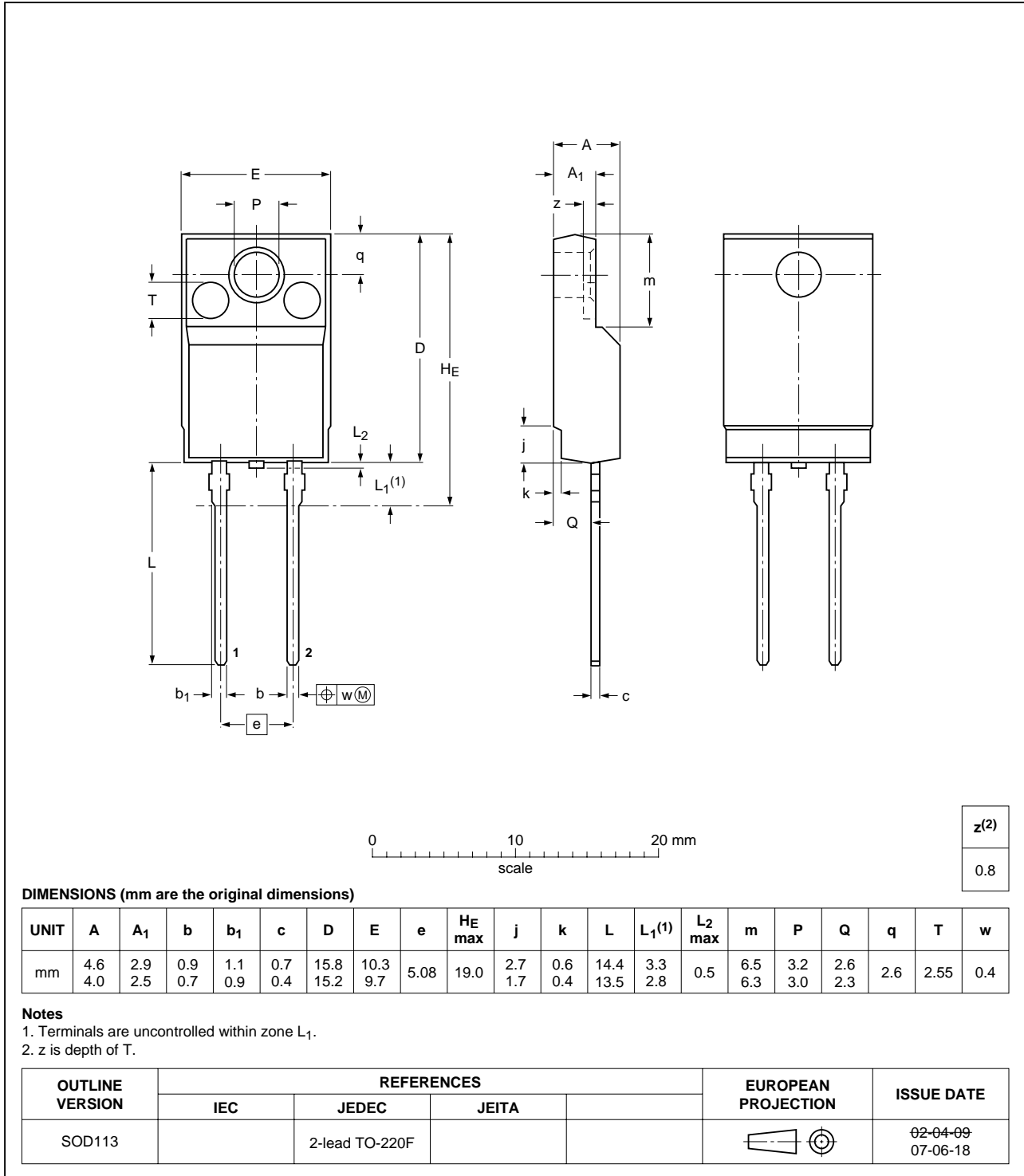


Fig 7. Package outline SOD113 (2-lead TO-220F)

## 9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC5X-600_1	20070903	Product data sheet	-	-



## 10. Legal information

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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.
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**12. Contents**

**1 Product profile . . . . . 1**

1.1 General description . . . . . 1

1.2 Features . . . . . 1

1.3 Applications . . . . . 1

1.4 Quick reference data . . . . . 1

**2 Pinning information . . . . . 1**

**3 Ordering information . . . . . 2**

**4 Limiting values . . . . . 2**

**5 Thermal characteristics . . . . . 3**

**6 Isolation characteristics . . . . . 3**

**7 Characteristics . . . . . 4**

**8 Package outline . . . . . 7**

**9 Revision history . . . . . 8**

**10 Legal information . . . . . 9**

10.1 Data sheet status . . . . . 9

10.2 Definitions . . . . . 9

10.3 Disclaimers . . . . . 9

10.4 Trademarks . . . . . 9

**11 Contact information . . . . . 9**

**12 Contents . . . . . 10**

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