

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

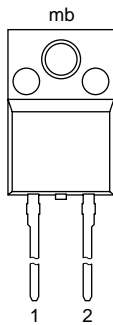
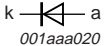
- Half-bridge or full-bridge switched-mode power supplies
- Half-bridge lighting ballasts
- Continuous Current Mode (CCM) Power Factor Correction (PFC)

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 Figure 1	-	-	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

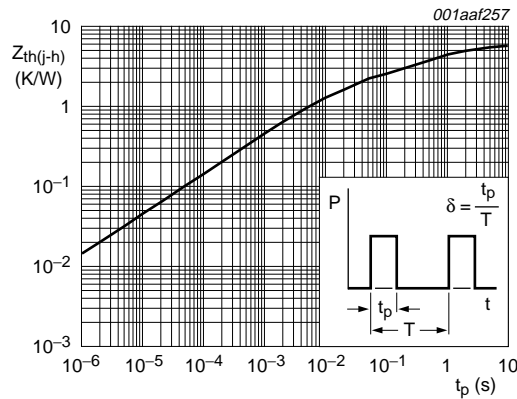


Fig 1. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

Table 5. Isolation limiting values and characteristics

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

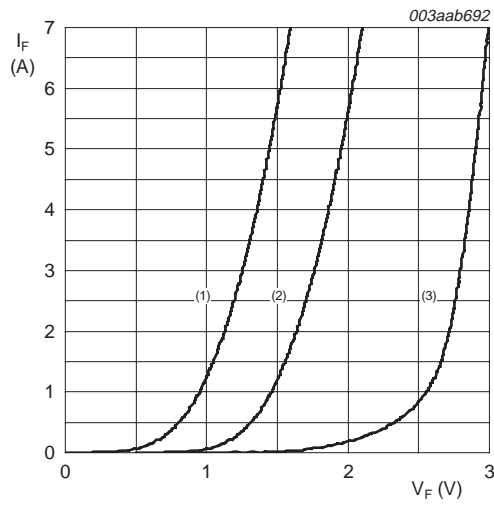
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; $f = 50 \text{ Hz to } 60 \text{ Hz}$; sinusoidal waveform; relative humidity $\leq 65 \%$; clean and dust free	-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external 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
Static characteristics						
V_F	forward voltage	$I_F = 5\text{ A}$; $T_j = 150\text{ °C}$; see Figure 2	-	1.40	1.75	V
		$I_F = 10\text{ A}$; $T_j = 150\text{ °C}$; see Figure 2	-	1.75	2.20	V
		$I_F = 5\text{ A}$; see Figure 2	-	2.00	2.90	V
I_R	reverse current	$V_R = 600\text{ V}$	-	9	100	μA
		$V_R = 500\text{ V}$; $T_j = 100\text{ °C}$	-	0.9	3.0	mA
Dynamic characteristics						
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 Figure 3	-	30	50	ns
		$I_F = 5\text{ A}$ to $V_R = 400\text{ V}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; see Figure 3	-	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 Figure 3	-	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 Figure 3	-	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 Figure 3	-	8	11	A
V_{FR}	forward recovery voltage	$I_F = 10\text{ A}$; $di_F/dt = 100\text{ A}/\mu\text{s}$; see Figure 4	-	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

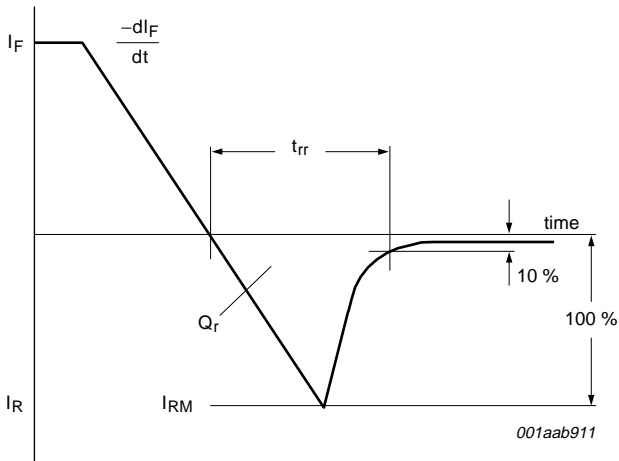


Fig 3. Reverse recovery definitions

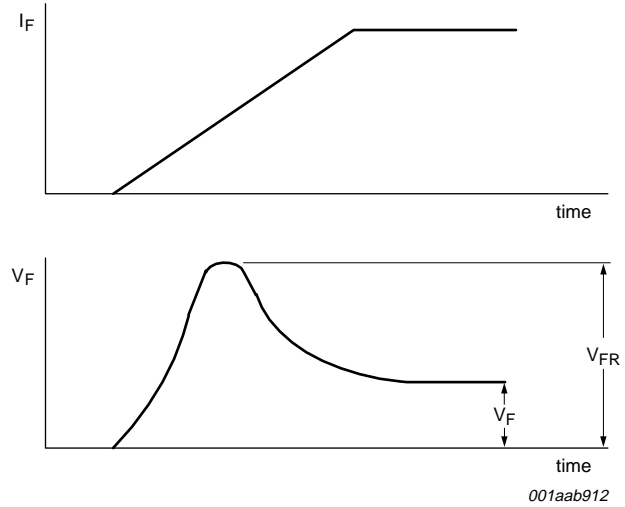
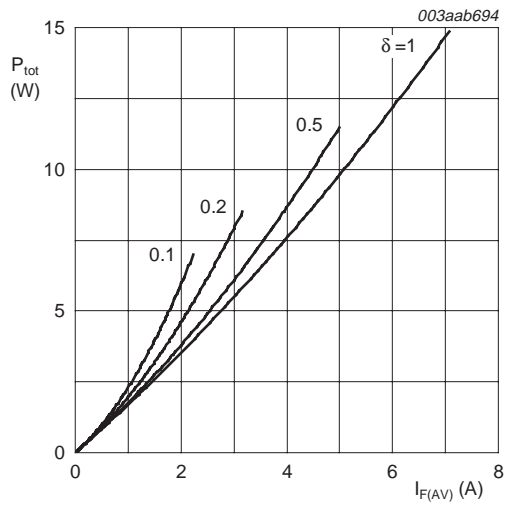
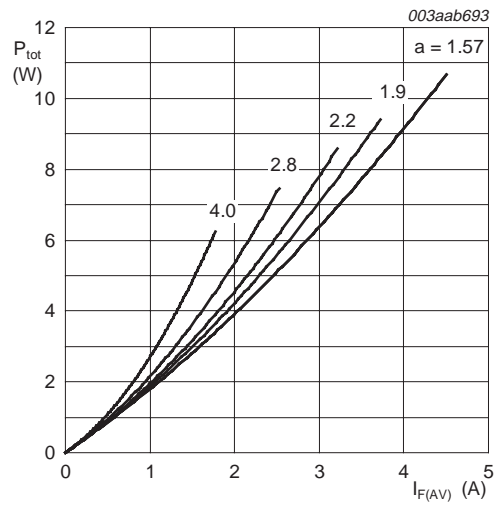


Fig 4. Forward recovery definitions



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

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

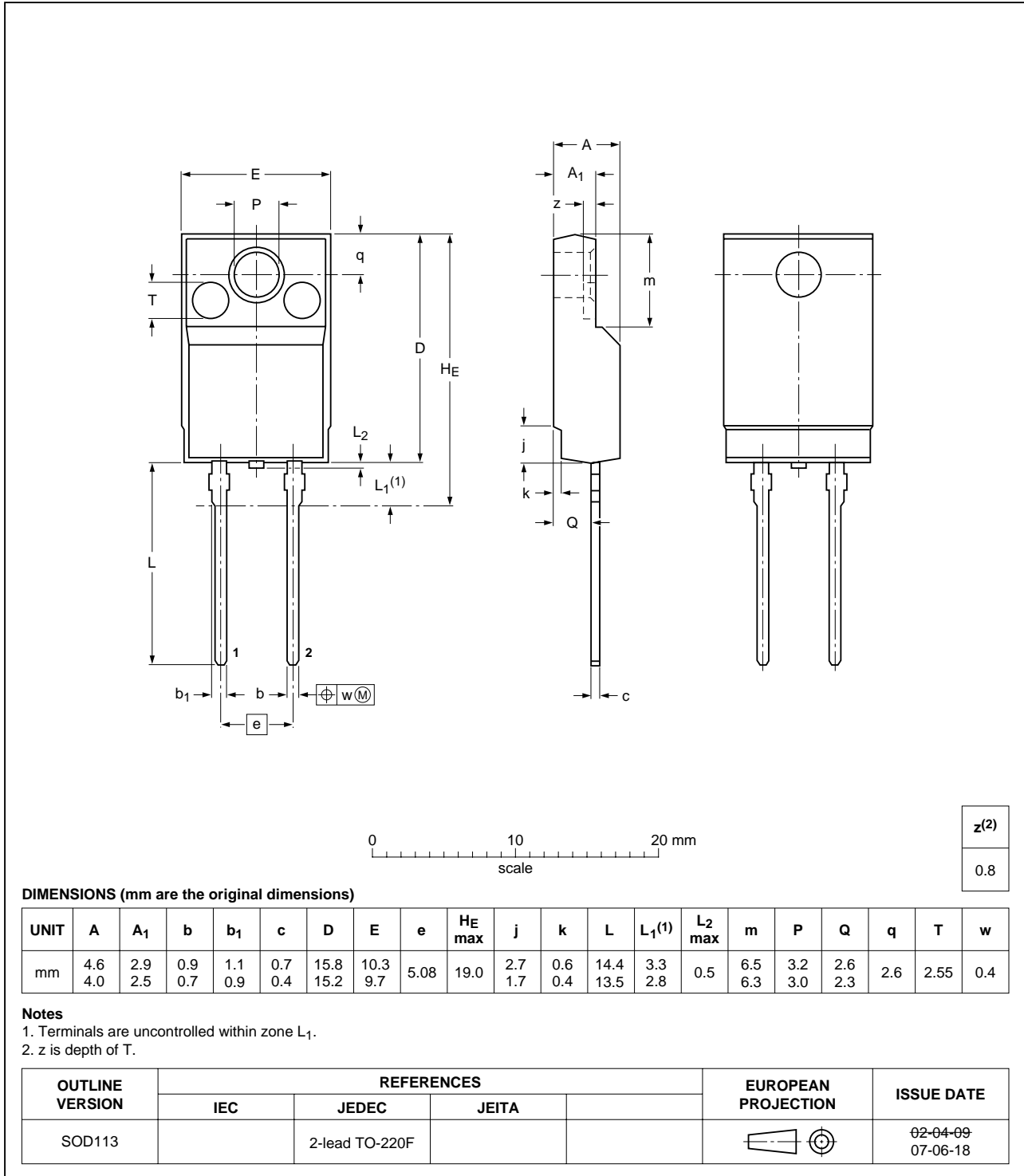


Fig 7. Package outline SOD113 (2-lead TO-220F)

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

10.1 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.

[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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