



# BYC5DX-500

## Hyperfast power diode

Rev. 1 — 6 July 2011

Product data sheet

## 1. Product profile

### 1.1 General description

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

### 1.2 Features and benefits

- Isolated plastic package
- Low reverse recovery current
- 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

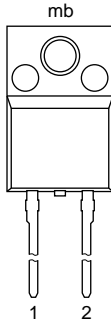

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	repetitive peak reverse voltage		-	-	500	V
I <sub>F(AV)</sub>	average forward current	square-wave pulse; δ = 0.5; T <sub>h</sub> = 103 °C; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	5	A
Static characteristics						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 5 A; T <sub>j</sub> = 25 °C; see <a href="#">Figure 5</a>	-	1.5	2	V
		I <sub>F</sub> = 5 A; T <sub>j</sub> = 150 °C; see <a href="#">Figure 5</a>	-	1.15	1.45	V
Dynamic characteristics						
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 5 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 6</a>	-	16	-	ns



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

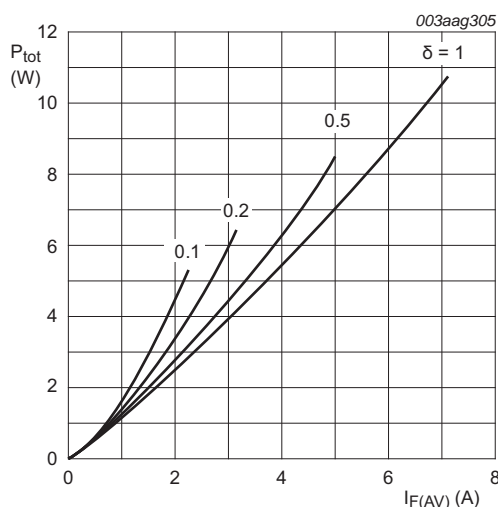
Type number	Package		
	Name	Description	Version
BYC5DX-500	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

## 4. Limiting values

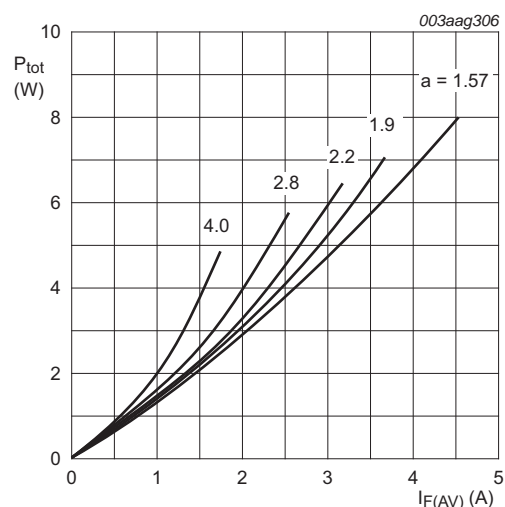
**Table 4. Limiting values**

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

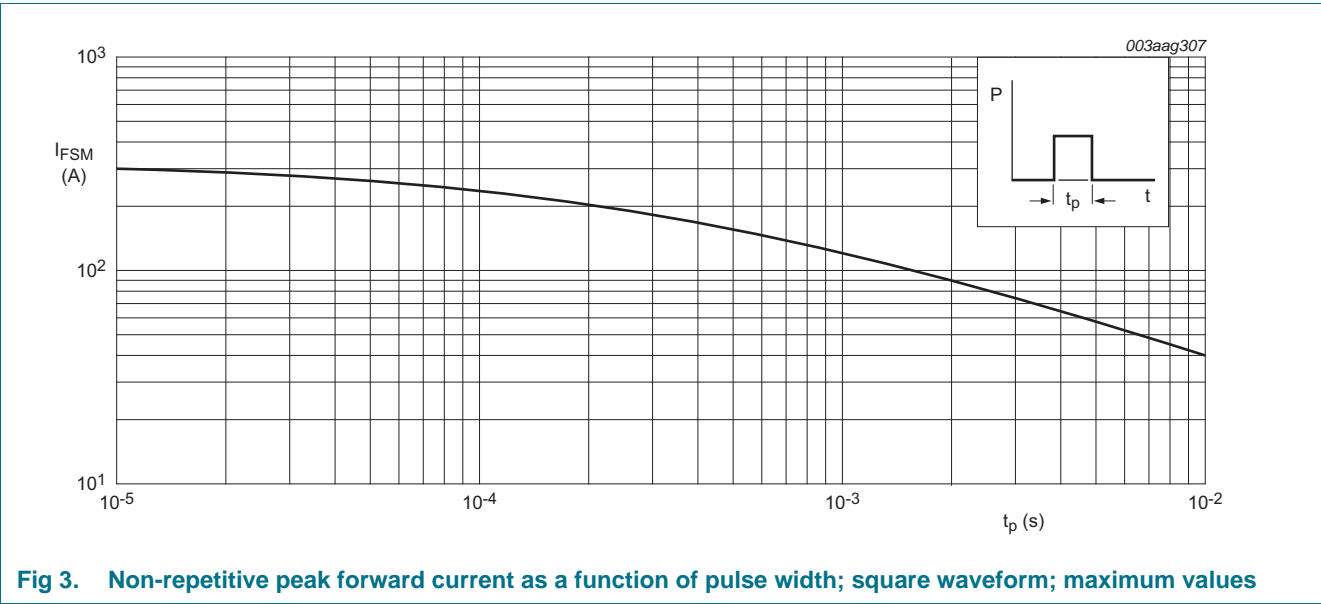
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	500	V
$V_{RWM}$	crest working reverse voltage		-	500	V
$V_R$	reverse voltage	DC	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_h = 103\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	5	A
$I_{FRM}$	repetitive peak forward current	square-wave pulse; $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_h = 103\text{ }^{\circ}\text{C}$	-	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 3</a>	-	40	A
		$t_p = 8.3\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 3</a>	-	44	A
$T_{\text{stg}}$	storage temperature		-40	150	$^{\circ}\text{C}$
$T_j$	junction temperature		-	150	$^{\circ}\text{C}$



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



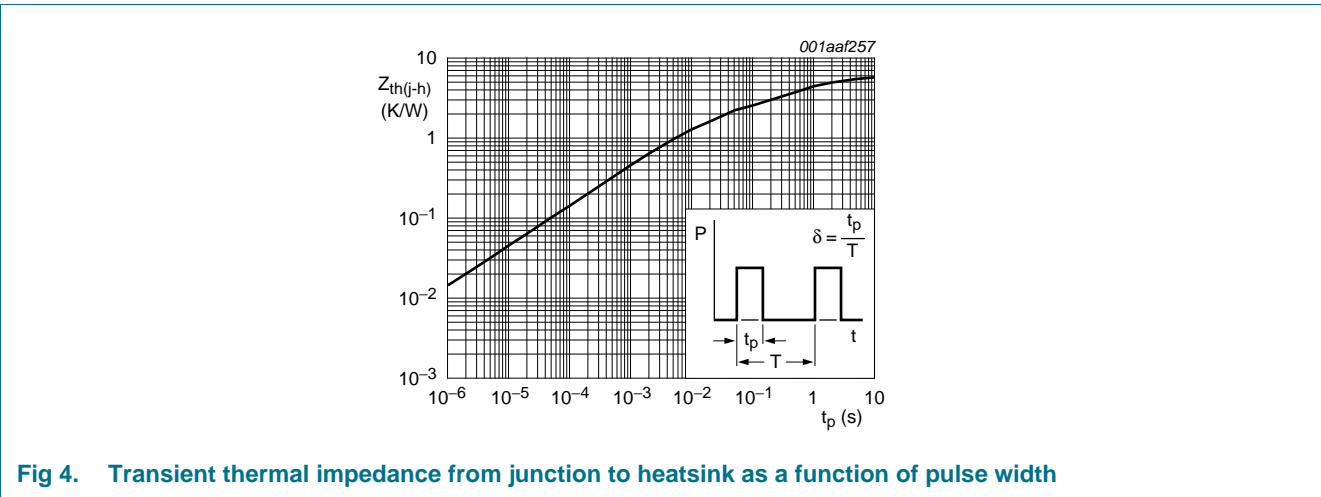
**Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values**



5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-h)</sub>	thermal resistance from junction to heatsink	without heatsink compound	-	-	7.2	K/W
		with heatsink compound; see <a href="#">Figure 4</a>	-	-	5.5	K/W
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient free air		-	60	-	K/W



## 6. Isolation characteristics

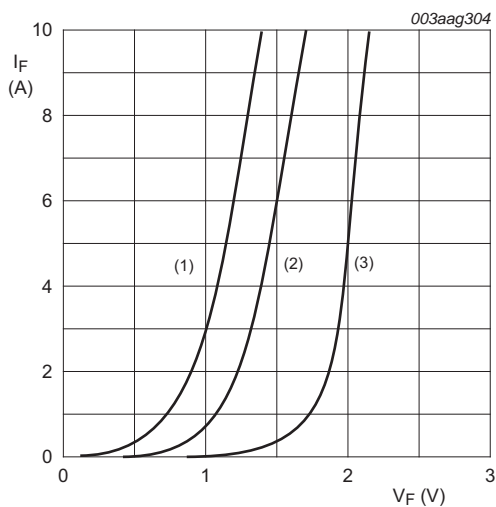
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{\text{isol(RMS)}}$	RMS isolation voltage	50 Hz $\leq f \leq$ 60 Hz; RH $\leq$ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free	-	-	2500	V
$C_{\text{isol}}$	isolation capacitance	f = 1 MHz; 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> = 5 A; T <sub>j</sub> = 25 °C; see <a href="#">Figure 5</a>	-	1.5	2	V
		I <sub>F</sub> = 5 A; T <sub>j</sub> = 150 °C; see <a href="#">Figure 5</a>	-	1.15	1.45	V
		I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; see <a href="#">Figure 5</a>	-	1.4	1.7	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 500 V; T <sub>j</sub> = 100 °C	-	0.9	3	mA
		V <sub>R</sub> = 500 V	-	9	40	μA
Dynamic characteristics						
t <sub>rr</sub>	reverse recovery time	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; see <a href="#">Figure 6</a>	-	15	30	ns
		I <sub>F</sub> = 5 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 6</a>	-	16	-	ns
I <sub>RM</sub>	peak reverse recovery current	I <sub>F</sub> = 5 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 500 A/μs; T <sub>j</sub> = 100 °C; see <a href="#">Figure 6</a>	-	9.5	11	A
		I <sub>F</sub> = 5 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 50 A/μs; T <sub>j</sub> = 125 °C; see <a href="#">Figure 6</a>	-	0.9	3	A
V <sub>FR</sub>	forward recovery voltage	I <sub>F</sub> = 5 A; dI <sub>F</sub> /dt = 100 A/μs; T <sub>j</sub> = 25 °C; see <a href="#">Figure 7</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;  
 $V_o = 1.141\text{ V}$ ;  $R_s = 0.057\text{ }\Omega$

Fig 5. Forward current as a function of forward voltage

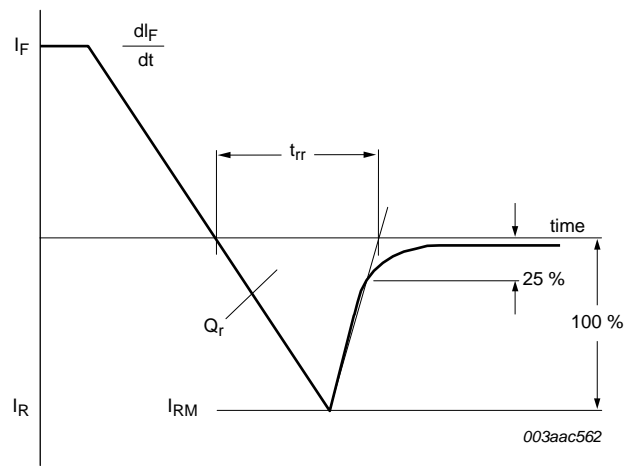


Fig 6. Reverse recovery definitions; ramp recovery

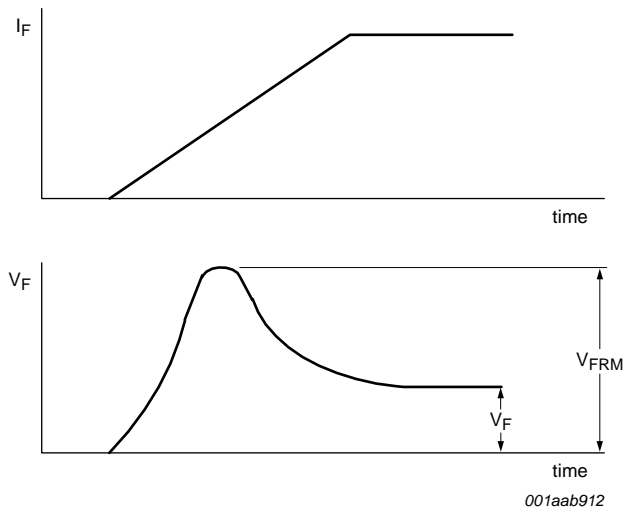


Fig 7. Forward recovery definitions

8. Package outline

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

SOD113

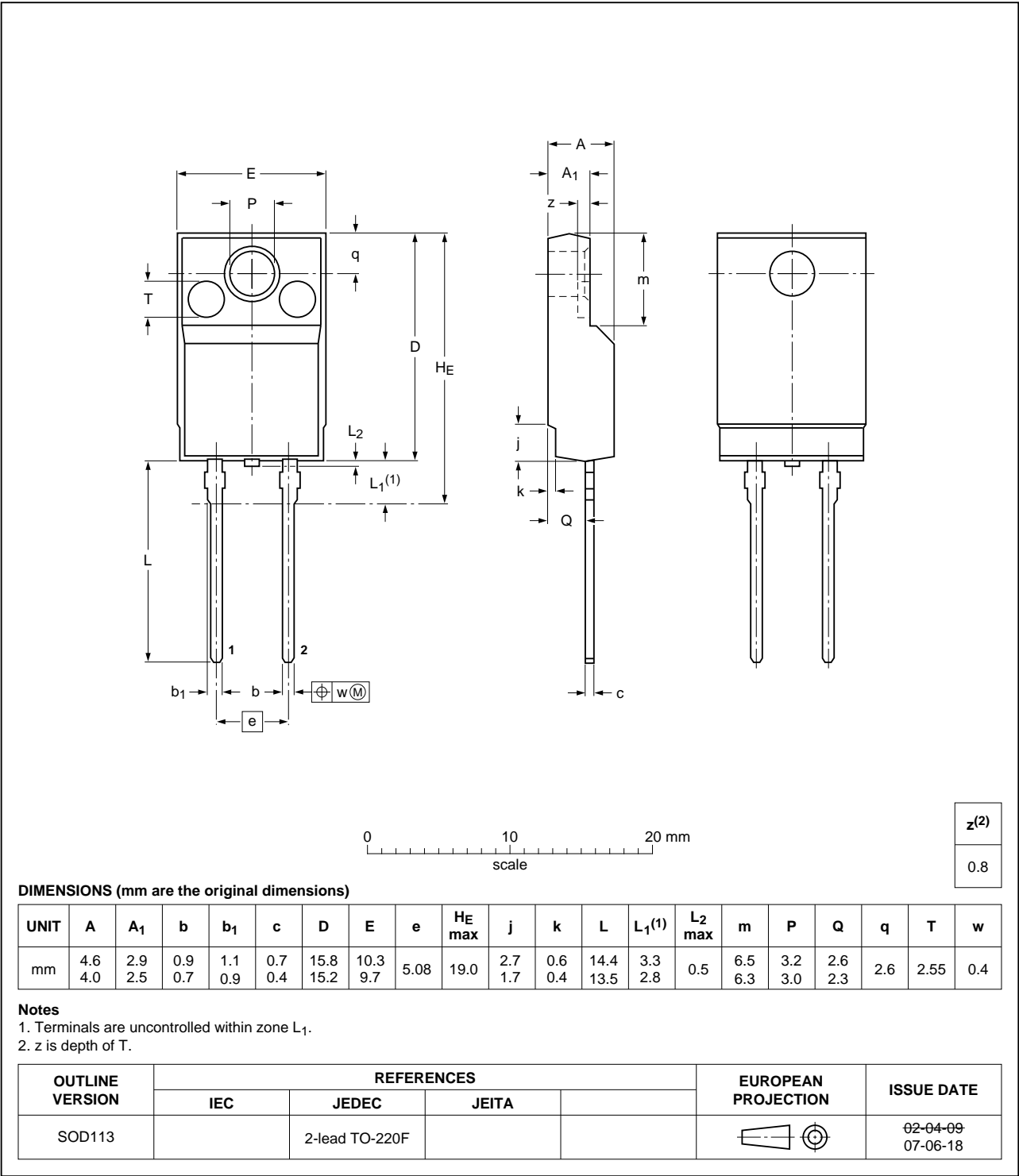


Fig 8. Package outline SOD113 (TO-220F)

## 9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC5DX-500 v.1	20110706	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.
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