



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_{RRM}	repetitive peak reverse voltage		-	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_h = 103\text{ }^\circ\text{C}$; see Figure 1 ; see Figure 2	-	-	5	A
Static characteristics						
V_F	forward voltage	$I_F = 5\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; see Figure 5	-	1.5	2	V
		$I_F = 5\text{ A}$; $T_j = 150\text{ }^\circ\text{C}$; see Figure 5	-	1.15	1.45	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 5\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$; see Figure 6	-	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

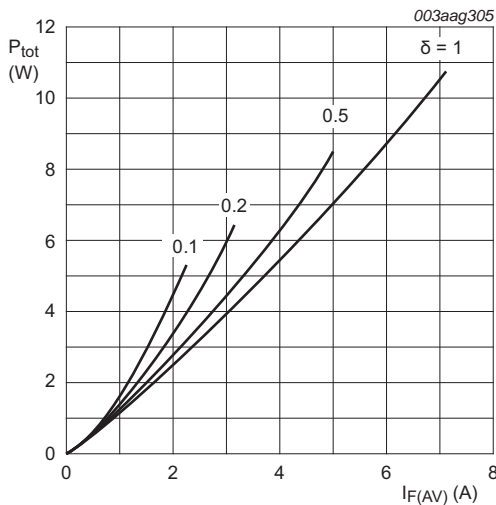
Type number	Package		
	Name	Description	Version
BYC5DX-500	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

4. Limiting values

Table 4. Limiting values

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

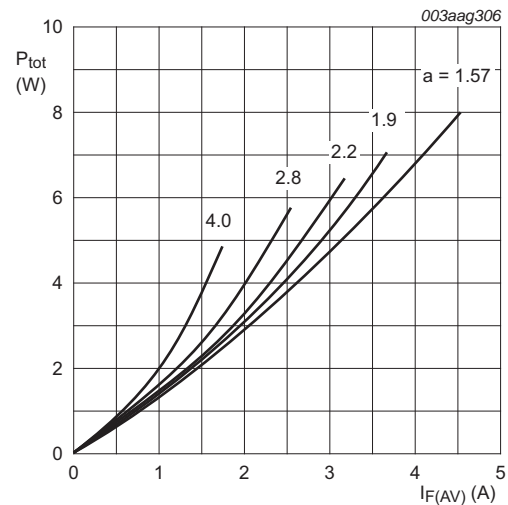
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	500	V
V_{RWM}	crest working reverse voltage		-	500	V
V_R	reverse voltage	DC	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_h = 103\text{ }^\circ\text{C}$; see Figure 1 ; see Figure 2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



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

$$V_o = 1.141\text{ V}; R_s = 0.057\text{ }\Omega$$

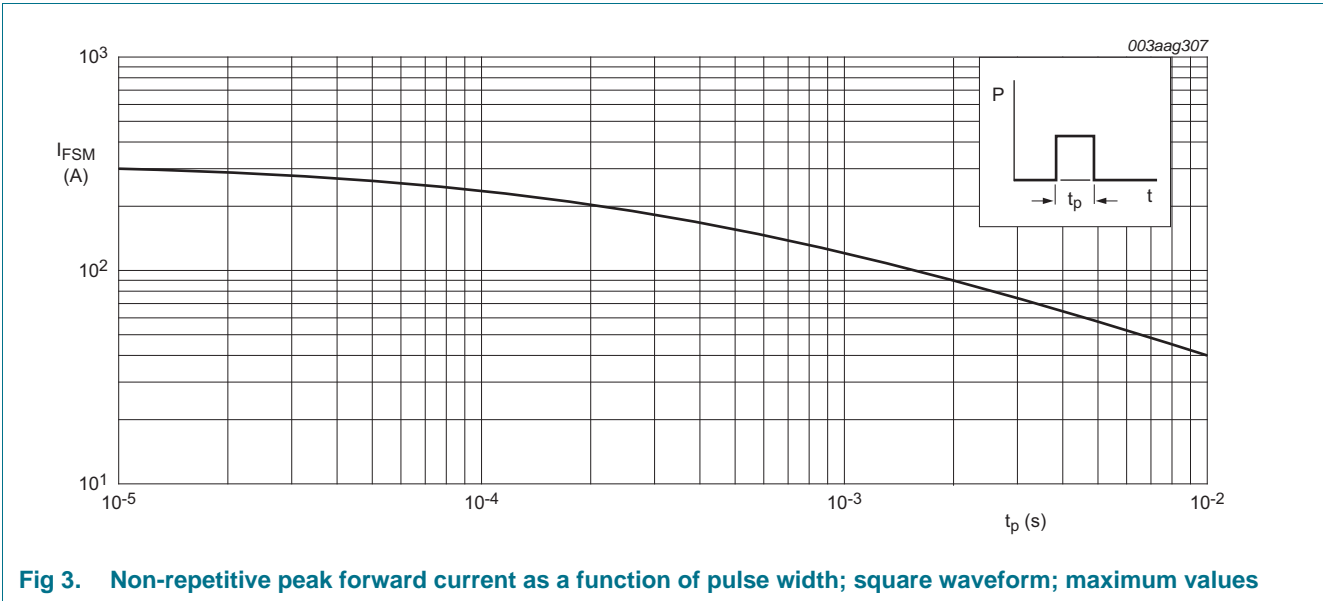
Fig 1. Forward power dissipation as a function of average forward current; square waveform; maximum values



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

$$V_o = 1.141\text{ V}; R_s = 0.057\text{ }\Omega$$

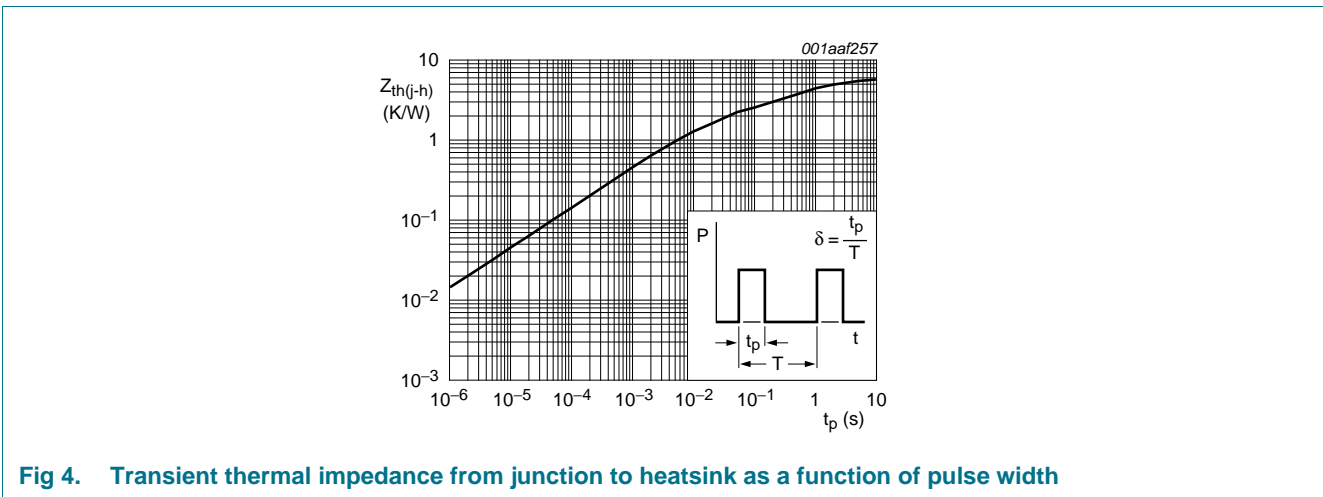
Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values



5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	without heatsink compound	-	-	7.2	K/W
		with heatsink compound; see Figure 4	-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	60	-	K/W



6. Isolation characteristics

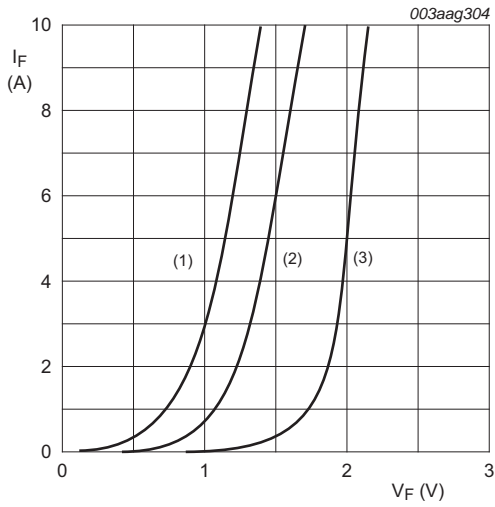
Table 6. Isolation characteristics

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_{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_F	forward voltage	$I_F = 5$ A; $T_j = 25$ °C; see Figure 5	-	1.5	2	V
		$I_F = 5$ A; $T_j = 150$ °C; see Figure 5	-	1.15	1.45	V
		$I_F = 10$ A; $T_j = 150$ °C; see Figure 5	-	1.4	1.7	V
I_R	reverse current	$V_R = 500$ V; $T_j = 100$ °C	-	0.9	3	mA
		$V_R = 500$ V	-	9	40	μ A
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 50$ A/ μ s; $T_j = 25$ °C; see Figure 6	-	15	30	ns
		$I_F = 5$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ μ s; $T_j = 25$ °C; see Figure 6	-	16	-	ns
I_{RM}	peak reverse recovery current	$I_F = 5$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ μ s; $T_j = 100$ °C; see Figure 6	-	9.5	11	A
		$I_F = 5$ A; $V_R = 400$ V; $di_F/dt = 50$ A/ μ s; $T_j = 125$ °C; see Figure 6	-	0.9	3	A
V_{FR}	forward recovery voltage	$I_F = 5$ A; $di_F/dt = 100$ A/ μ s; $T_j = 25$ °C; see Figure 7	-	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

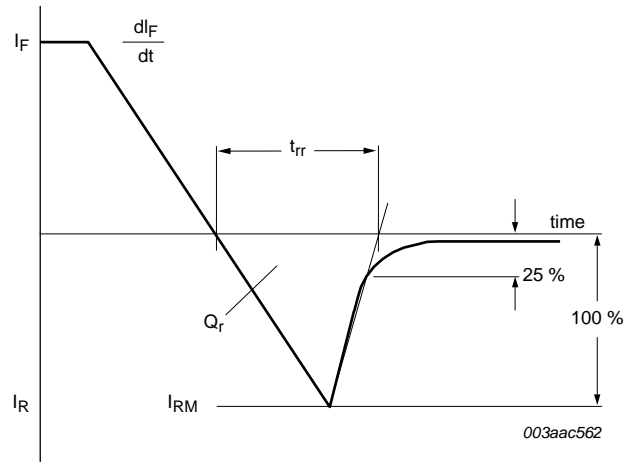


Fig 6. Reverse recovery definitions; ramp recovery

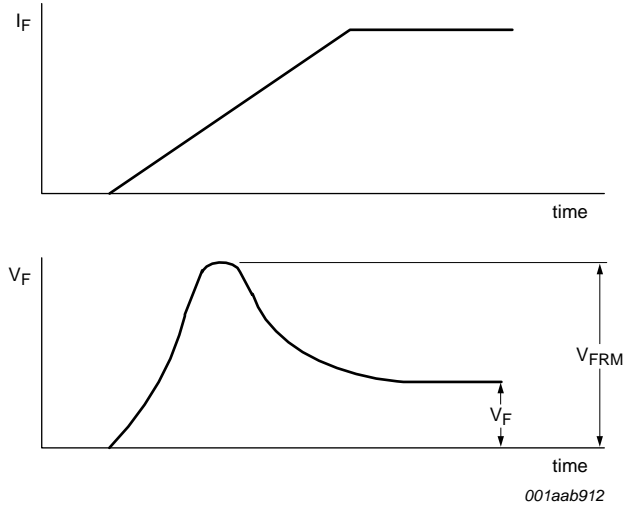


Fig 7. Forward recovery definitions

8. Package outline

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

SOD113

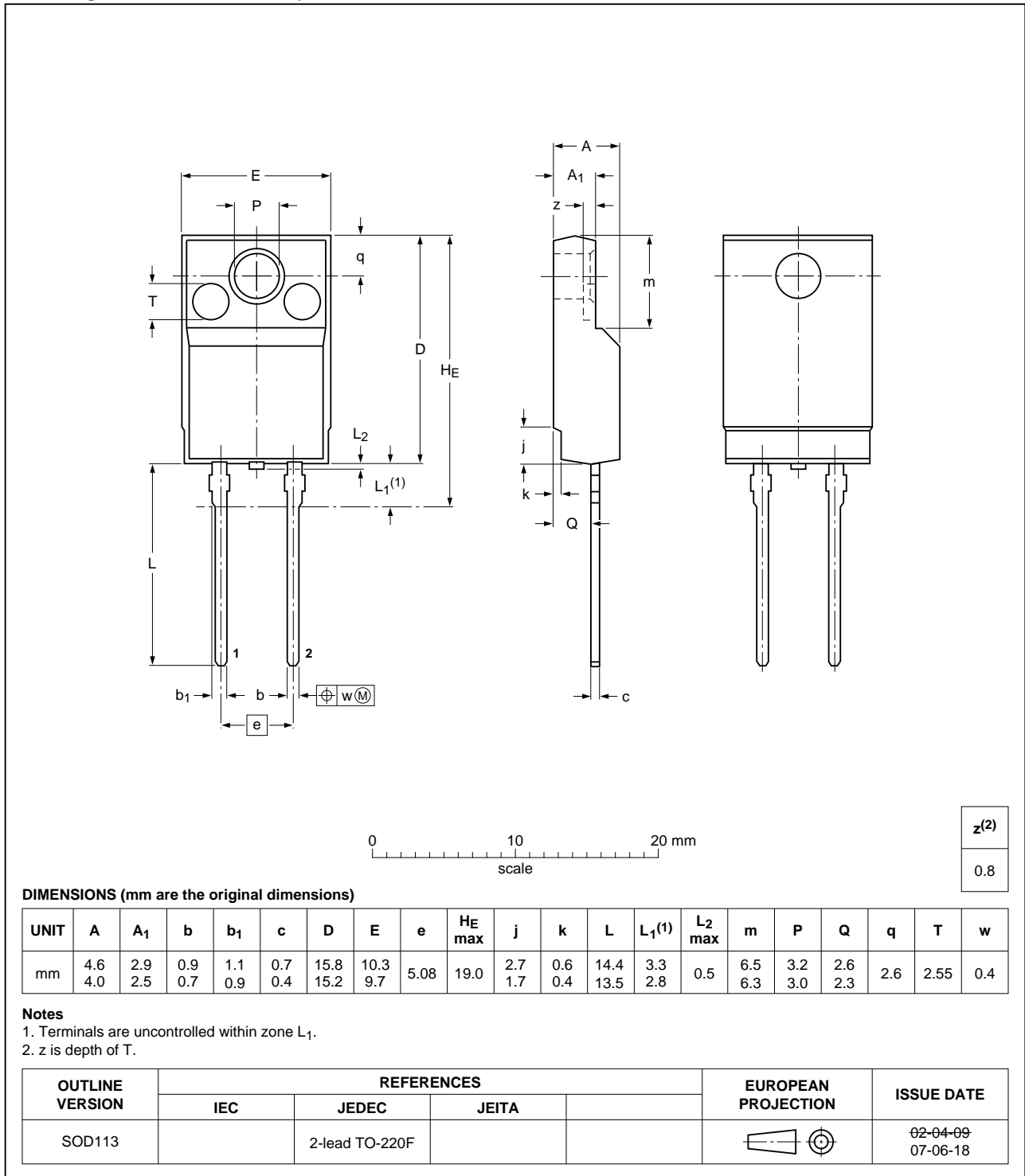


Fig 8. Package outline SOD113 (TO-220F)

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

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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.

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

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12. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Limiting values	3
5	Thermal characteristics	4
6	Isolation characteristics	5
7	Characteristics	5
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	10
11	Contact information	10

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