Product data sheet

1. General description

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

2. Features and benefits

- Isolated plastic package
- Low thermal resistance
- · Low reverse recovery current
- Reduces switching losses in associated MOSFET

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	V	alues		Unit
Absolute	maximum rating					
V_{RRM}	repetitive peak reverse voltage		500		V	
I _{F(AV)}	average forward current	$δ = 0.5$; square-wave pulse; $T_h \le 103$ °C; Fig. 1; Fig. 2	5			А
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 μs; T_h ≤ 103 °C; square-wave pulse	10		А	
I _{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 3				А
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse			А	
Symbol	Parameter	Conditions	Min Typ Max		Unit	
Static ch	aracteristics					
V _F	forward voltage	I _F = 5 A; T _j = 25 °C; <u>Fig. 5</u>	-	1.5	2	V
		I _F = 5 A; T _j = 150 °C; <u>Fig. 5</u>	-	1.15	1.45	V
		I _F = 10 A; T _j = 150 °C; <u>Fig. 5</u>	-	1.4	1.7	V
Dynamic	characteristics					
t _{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A}/\mu\text{s};$ $T_j = 25 \text{ °C}; Fig. 6$	-	15	30	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	mb	
2	Α	anode		K — A
mb	n.c.	mounting base; isolated	1 2 SOD113 (2-lead TO-220F)	001aaa020

6. 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			

7. Marking

Table 4. Marking codes

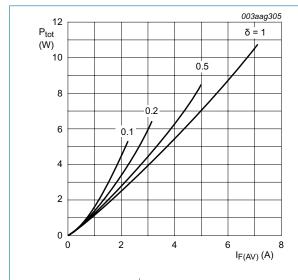
Type number	Marking codes
BYC5DX-500	BYC5DX-500

8. Limiting values

Table 5. Limiting values

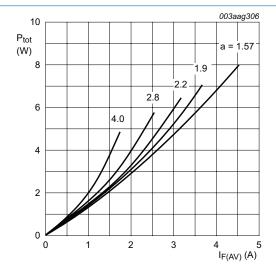
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Values	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	$δ = 0.5$; square-wave pulse; $T_h \le 103$ °C; Fig. 1; Fig. 2	5	Α
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _h ≤ 103 °C; square-wave pulse	10	А
I _{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 3	40	Α
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	44	Α
T _{stg}	storage temperature		-40 to 150	°C
T _j	junction temperature		150	°C



$$\begin{split} I_{\text{F(AV)}} &= I_{\text{F(RMS)}} \times \sqrt{\delta} \\ V_{\text{o}} &= 1.141 \text{ V; } R_{\text{s}} = 0.057 \text{ } \Omega \end{split}$$

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



a = form factor = $I_{F(RMS)}/I_{F(AV)}$ V_o = 1.141 V; R_s = 0.057 Ω

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

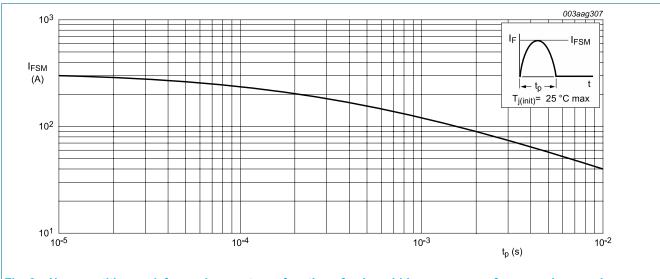


Fig. 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
R _{th(j-h)} thermal resistance		with heatsink compound; Fig 4	-	-	5.5	K/W
	from junction to heatsink	without heatsink compound	-	-	7.2	K/W
R _{th(j-a)}	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

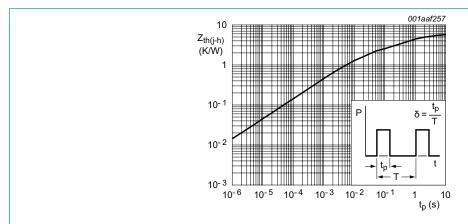


Fig. 4. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

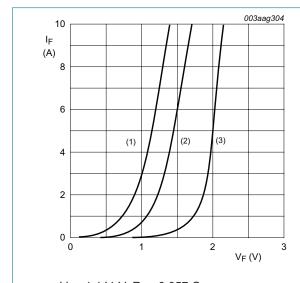
Table 7. Isolation characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{isol(RMS)}	RMS isolation voltage	50 Hz ≤ f ≤ 60 Hz; RH ≤ 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

11. Characteristics

Table 8. Characteristics

	laracteristics					
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static cha	racteristics					
V_{F}	forward voltage	I _F = 5 A; T _j = 25 °C; <u>Fig. 5</u>	-	1.5	2	V
		I _F = 5 A; T _j = 150 °C; <u>Fig. 5</u>	-	1.15	1.45	V
		I _F = 10 A; T _j = 150 °C; <u>Fig. 5</u>	-	1.4	1.7	V
I _R	reverse current	V _R = 500 V; T _j = 25 °C	-	9	40	μA
		V _R = 500 V; T _j = 100 °C	-	0.9	3	mA
Dynamic	characteristics			'		
t _{rr}	reverse recovery time	$I_F = 1 \text{ A; } V_R = 30 \text{ V; } dI_F/dt = 50 \text{ A/}\mu\text{s;}$ $T_j = 25 \text{ °C; } Fig. 6$	-	15	30	ns
		$I_F = 5 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A/}\mu\text{s};$ $T_j = 25 \text{ °C}; \frac{\text{Fig. 6}}{}$		16	-	ns
I _{RM} peak reverse recovery current		$I_F = 5 \text{ A}$; $V_R = 400 \text{ V}$; $dI_F/dt = 500 \text{ A/}\mu\text{s}$; $T_j = 100 ^{\circ}\text{C}$; Fig. 6	-	9.5	11	А
		$I_F = 5 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 50 \text{ A/}\mu\text{s};$ $T_j = 125 \text{ °C}; Fig. 6$	-	0.9	3	А
V_{FR}	forward recovery voltage	I _F = 5 A; dI _F /dt = 100 A/μs; T _i = 25 °C; <u>Fig. 7</u>	-	9	11	V



 $V_o = 1.141 \text{ V}; R_s = 0.057 \Omega$ (1) $T_j = 150 \,^{\circ}\text{C}; \text{ typical values}$

(2) T_j = 150 °C; maximum values (3) T_j = 25 °C; maximum values

Fig. 5. Forward current as a function of forward voltage

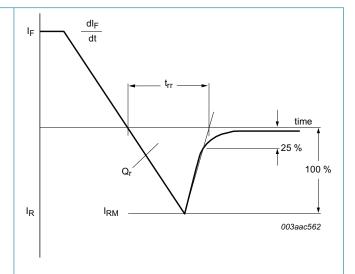
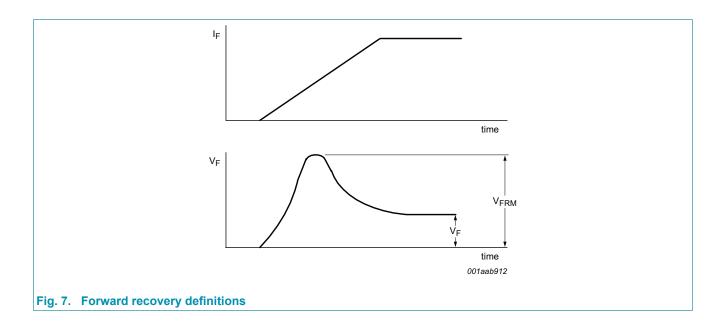
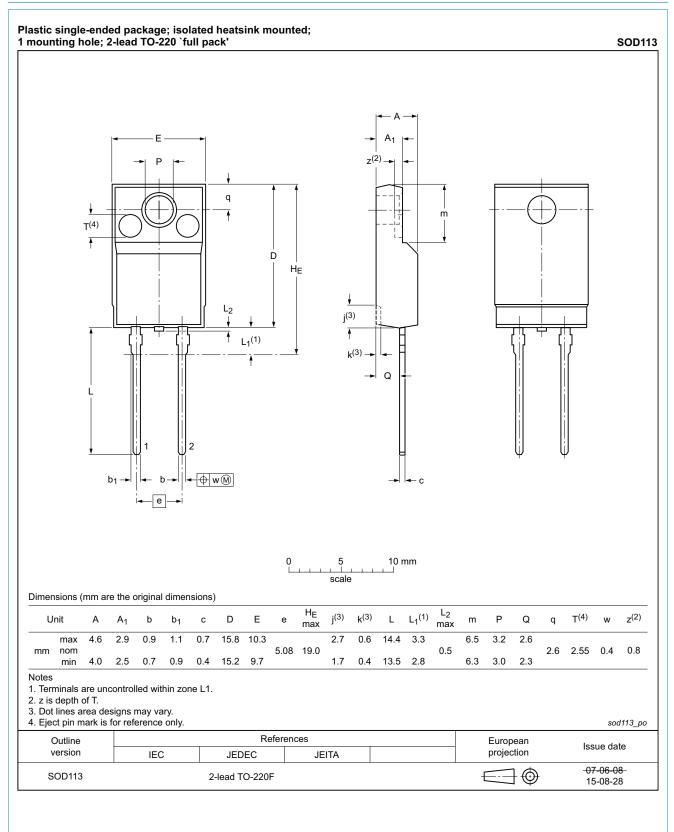


Fig. 6. Reverse recovery definitions; ramp recovery



12. Package outline



13. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes		
BYC5DX-500 v.2	20180129	Product data sheet	-	BYC5DX-500 v.1		
Modifications:	Modifications: Change from NXP version to WeEn version					
BYC5DX-500 v.1	20110706	Product data sheet	-	-		

14. Legal information

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.

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