



IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

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WeEn Semiconductors





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

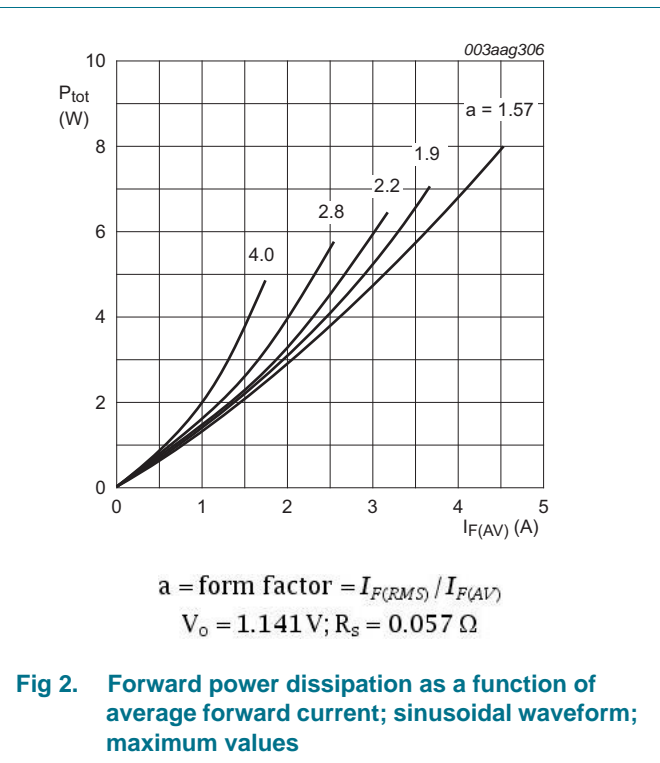
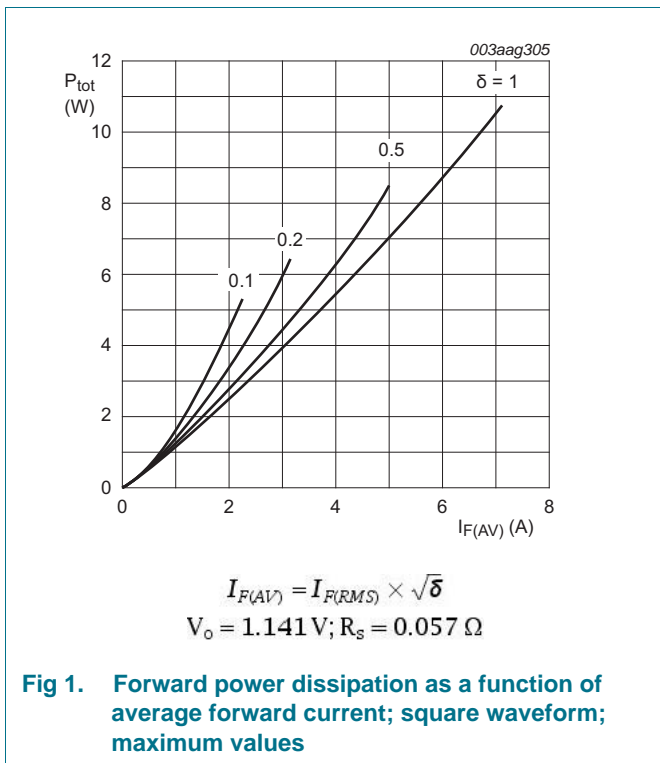
Type number	Package		
	Name	Description	Version
BYC5DX-500	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

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	$^\circ\text{C}$



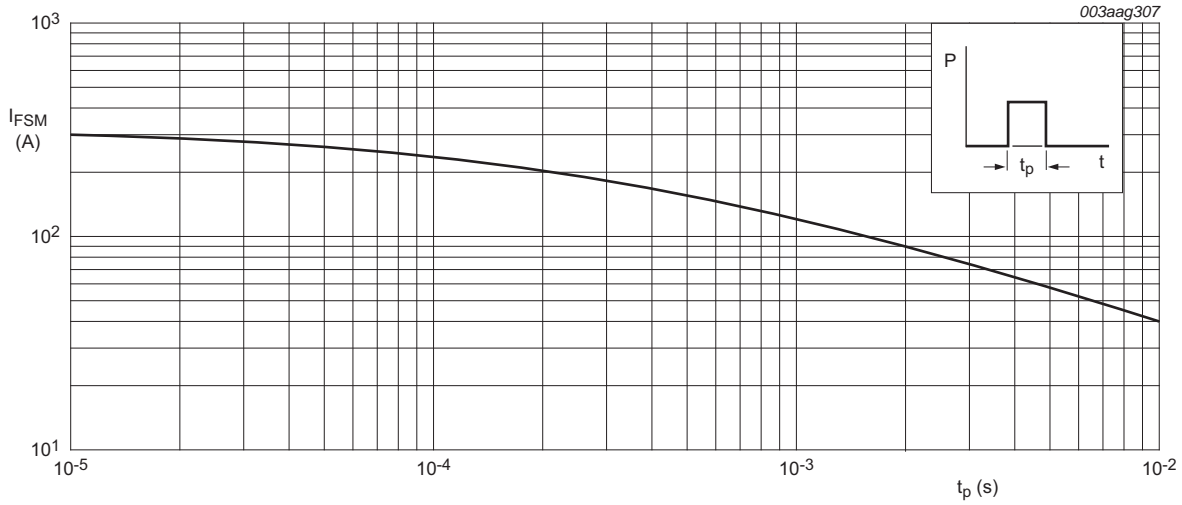


Fig 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

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

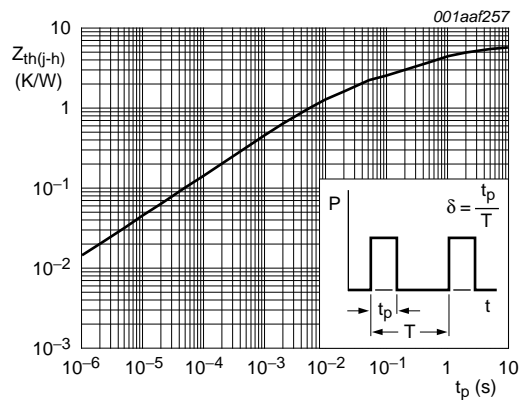


Fig 4. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

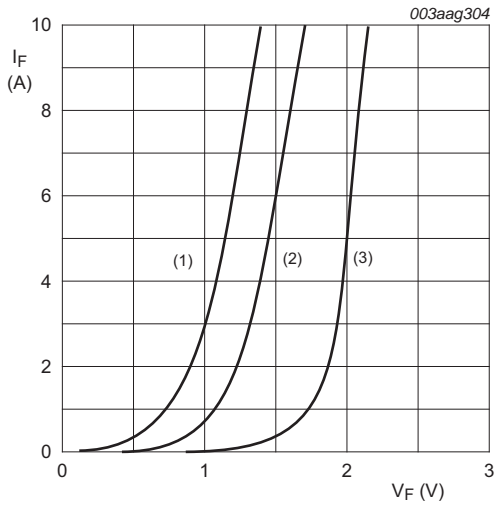
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{\text{isol(RMS)}}$	RMS isolation voltage	$50 \text{ Hz} \leq f \leq 60 \text{ Hz}$; $\text{RH} \leq 65 \%$; from all pins to external heatsink; sinusoidal waveform; clean and dust free	-	-	2500	V
C_{isol}	isolation capacitance	$f = 1 \text{ MHz}$; 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	$I_F = 5 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; 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
		$I_F = 10 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$; see Figure 5	-	1.4	1.7	V
I_R	reverse current	$V_R = 500 \text{ V}$; $T_j = 100 \text{ }^\circ\text{C}$	-	0.9	3	mA
		$V_R = 500 \text{ V}$	-	9	40	μA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}$; $V_R = 30 \text{ V}$; $di_F/dt = 50 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 6	-	15	30	ns
		$I_F = 5 \text{ A}$; $V_R = 400 \text{ V}$; $di_F/dt = 500 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 6	-	16	-	ns
I_{RM}	peak reverse recovery current	$I_F = 5 \text{ A}$; $V_R = 400 \text{ V}$; $di_F/dt = 500 \text{ A}/\mu\text{s}$; $T_j = 100 \text{ }^\circ\text{C}$; see Figure 6	-	9.5	11	A
		$I_F = 5 \text{ A}$; $V_R = 400 \text{ V}$; $di_F/dt = 50 \text{ A}/\mu\text{s}$; $T_j = 125 \text{ }^\circ\text{C}$; see Figure 6	-	0.9	3	A
V_{FR}	forward recovery voltage	$I_F = 5 \text{ A}$; $di_F/dt = 100 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$; 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

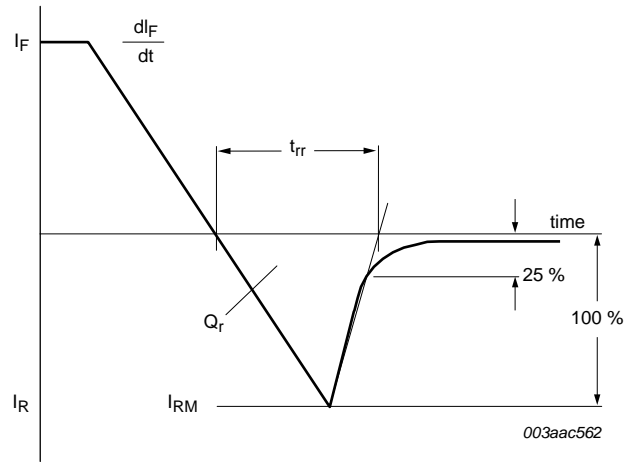


Fig 6. Reverse recovery definitions; ramp recovery

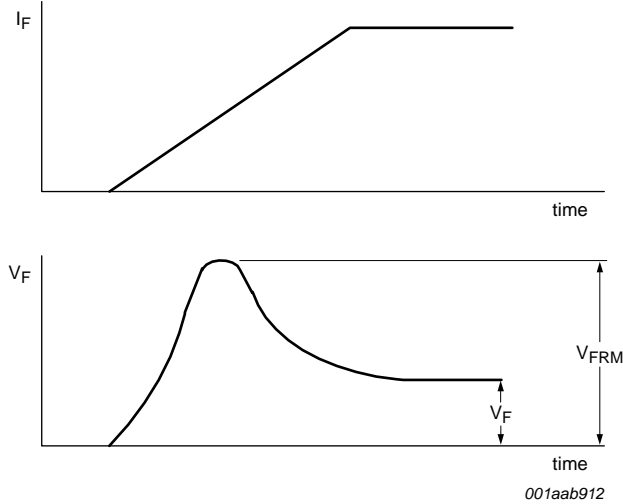


Fig 7. Forward recovery definitions

8. Package outline

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

SOD113

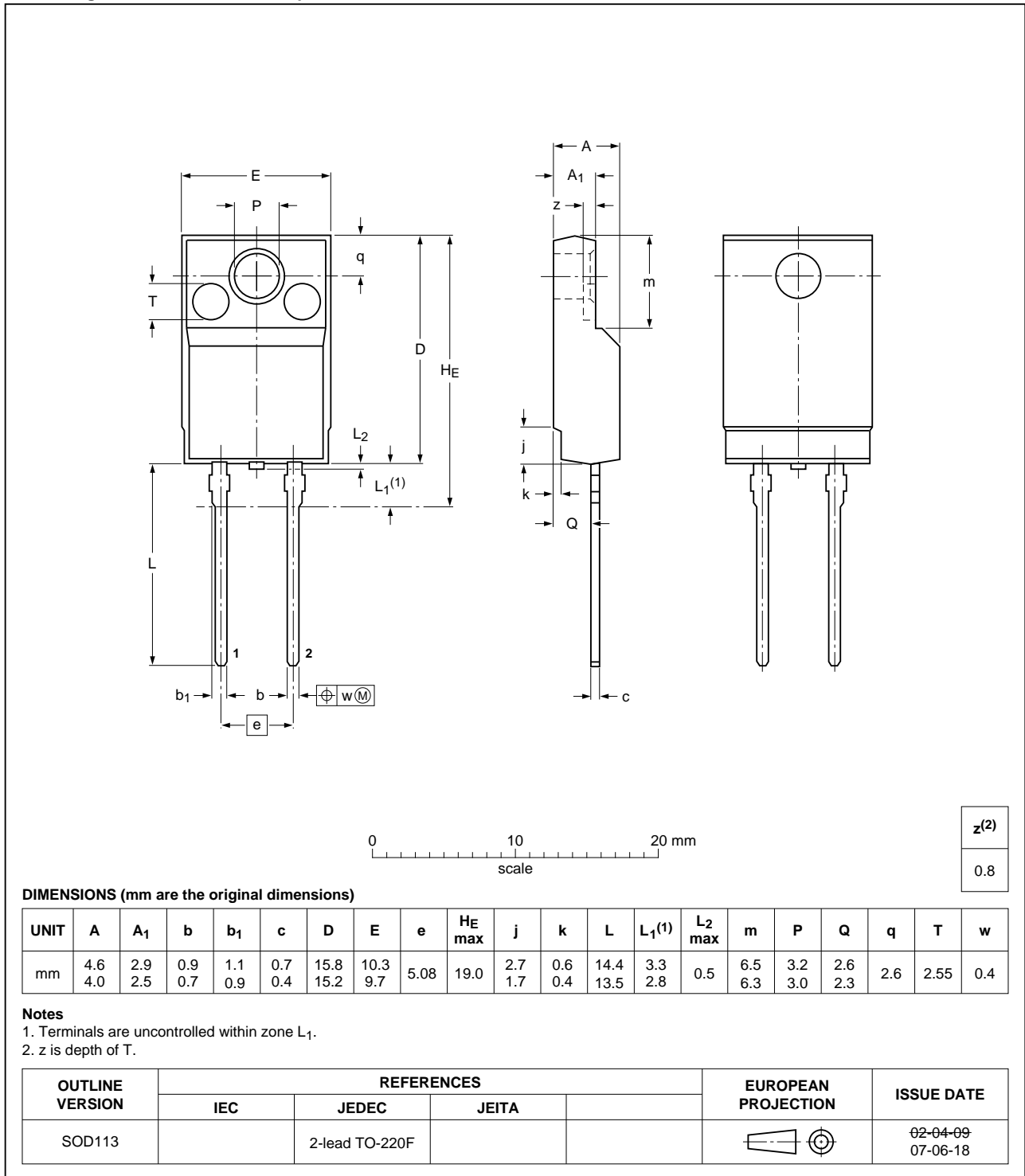


Fig 8. Package outline SOD113 (TO-220F)

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

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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