



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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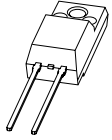
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Thank you for your cooperation and understanding,

WeEn Semiconductors





BYC20X-600

Rectifier diode, hyperfast

Rev. 02 — 19 October 2017

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

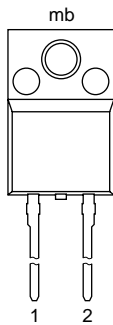
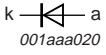
- Half-bridge or full-bridge switched-mode power supplies
- Half-bridge lighting ballasts
- Continuous Current Mode (CCM) Power Factor Correction (PFC)

1.4 Quick reference data

- $V_{RRM} \leq 600$ V
- $V_F = 1.54$ V (typ)
- $I_{F(AV)} \leq 20$ A
- $t_{rr} = 19$ ns (typ)

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	cathode (k)		
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	
BYC20X-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; $\delta = 0.5$; $T_h \leq 25$ °C	-	20	A
I_{FRM}	repetitive peak forward current	square waveform; $\delta = 0.5$; $T_h \leq 25$ °C; $t_p = 25$ μ s	-	40	A
I_{FSM}	non-repetitive peak forward current	$t = 10$ ms; sinusoidal waveform	-	250	A
		$t = 8.3$ ms; sinusoidal waveform	-	274	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	-	-	2.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

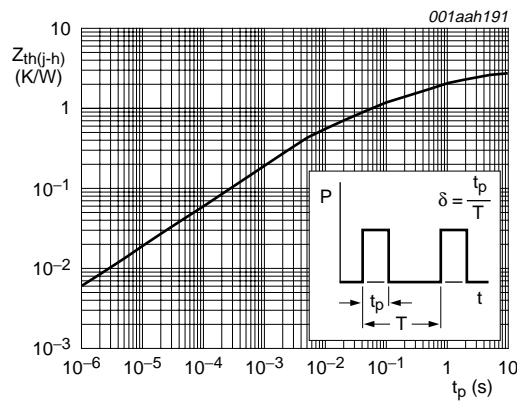


Fig 1. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

Table 5. Isolation limiting values and characteristics

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

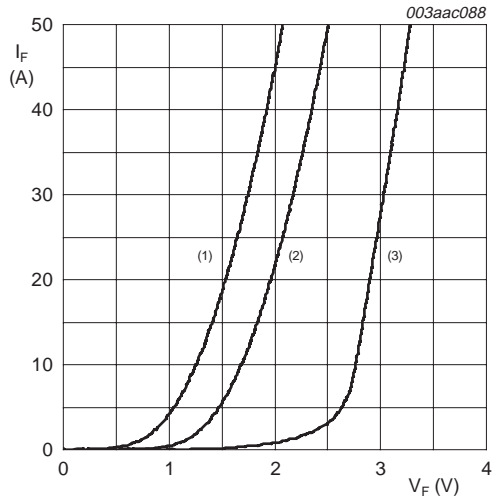
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; $f = 50\text{ Hz to }60\text{ Hz}$; sinusoidal waveform; relative humidity $\leq 65\%$; clean and dust free	-	-	2500	V
C_{isol}	isolation capacitance	from pin 1 (cathode) to external 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	$I_F = 20\text{ A}$; $T_j = 150\text{ °C}$; see Figure 2	-	1.54	1.97	V
		$I_F = 40\text{ A}$; $T_j = 150\text{ °C}$; see Figure 2	-	1.95	2.34	V
		$I_F = 20\text{ A}$; see Figure 2	-	1.89	2.9	V
I_R	reverse current	$V_R = 600\text{ V}$	-	16	200	μA
		$V_R = 500\text{ V}$; $T_j = 100\text{ °C}$	-	1.6	3.0	mA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$ to $V_R = 30\text{ V}$; $dl_F/dt = 50\text{ A}/\mu\text{s}$; see Figure 3	-	35	55	ns
		$I_F = 20\text{ A}$ to $V_R = 400\text{ V}$; $dl_F/dt = 500\text{ A}/\mu\text{s}$; see Figure 3	-			
		$T_j = 25\text{ °C}$	-	19	-	ns
		$T_j = 100\text{ °C}$	-	32	40	ns
I_{RM}	peak reverse recovery current	$I_F = 20\text{ A}$ to $V_R = 400\text{ V}$; $T_j = 125\text{ °C}$; see Figure 3	-			
		$dl_F/dt = 50\text{ A}/\mu\text{s}$	-	3.0	7.5	A
		$dl_F/dt = 500\text{ A}/\mu\text{s}$	-	9.5	12	A
V_{FR}	forward recovery voltage	$I_F = 20\text{ A}$; $dl_F/dt = 100\text{ A}/\mu\text{s}$; see Figure 4	-	8	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

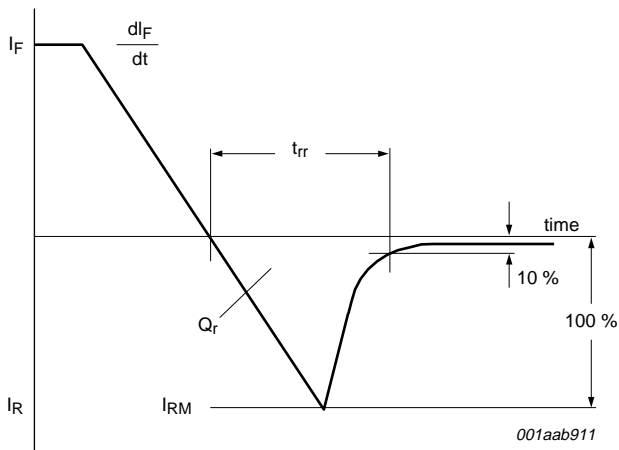


Fig 3. Reverse recovery definitions

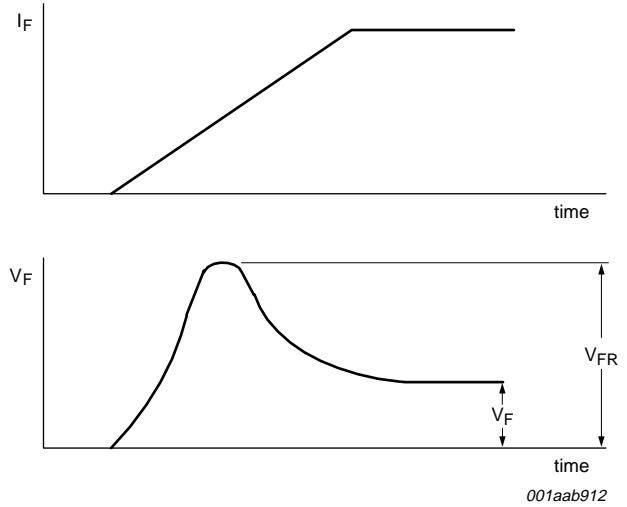
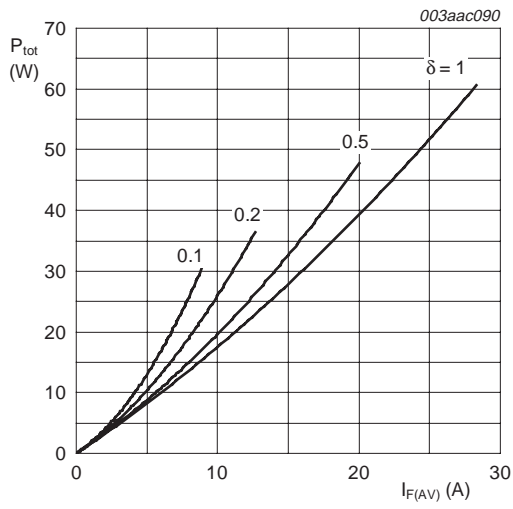
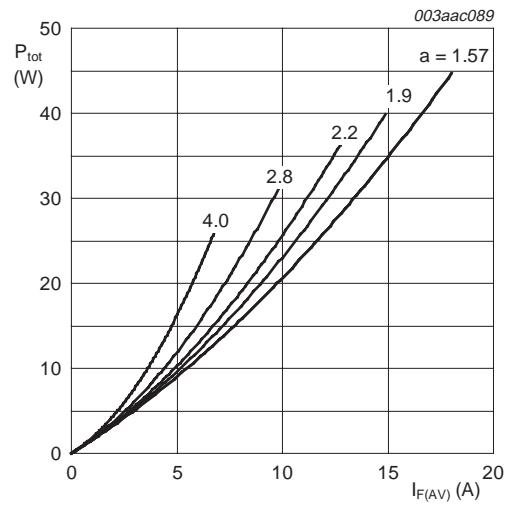


Fig 4. Forward recovery definitions



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

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

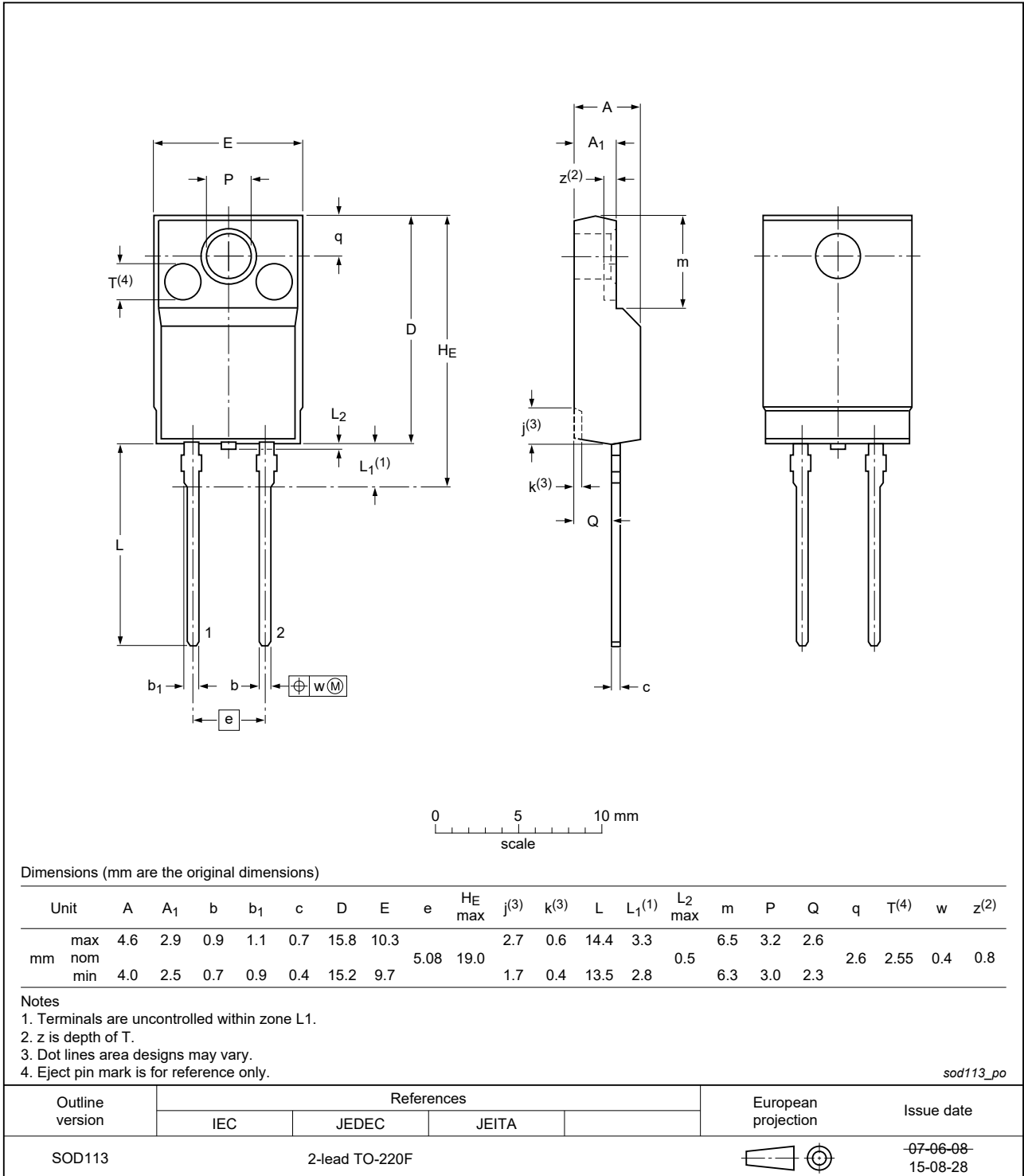


Fig 7. Package outline SOD113 (2-lead TO-220F)

9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC20X-600_1	20071129	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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