



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.

In this document where the previous NXP references remain, please use the new links as shown below.

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Thank you for your cooperation and understanding,

WeEn Semiconductors



BYC58X-600

8 A hyperfast rectifier diode

Rev. 01 — 23 February 2010

Product data sheet

1. Product profile

1.1 General description

Hyperfast epitaxial rectifier diode in a SOD113 (2-lead TO-220F) plastic package specifically for use in CCM PFC applications for reduced switching losses.

1.2 Features and benefits

- Allows use of smaller MOSFETs and heatsinks
- Isolated package
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET
- Superfast switching

1.3 Applications

- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Desk top computer power supplies
- Flat panel TV power supplies
- Power supply adapters
- Server power supplies
- Telecom power supplies

1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_h \leq 93$ °C; see Figure 1 and 2	-	-	8	A
I_{FSM}	non-repetitive peak forward current	$T_{j(init)} = 25$ °C; $t_p = 10$ ms; sine-wave pulse	-	-	110	A
		$T_{j(init)} = 25$ °C; $t_p = 8.3$ ms; sine-wave pulse	-	-	120	A
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; see Figure 3	-	2.5	3	K/W

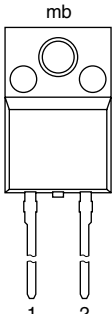



Table 1. Quick reference ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 8\text{ A}; V_R = 400\text{ V};$ $di_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C};$ see Figure 6	-	12.5	-	ns
		$I_F = 8\text{ A}; V_R = 400\text{ V};$ $di_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C};$ see Figure 6 and 7	-	21	-	ns
Q_r	recovered charge	$I_F = 8\text{ A}; V_R = 400\text{ V};$ $di_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C};$ see Figure 5 and 6	-	40	-	nC
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}; T_j = 25\text{ }^\circ\text{C};$ see Figure 4	-	2.35	3.2	V
		$I_F = 8\text{ A}; T_j = 150\text{ }^\circ\text{C};$ see Figure 4	-	2	2.4	V

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

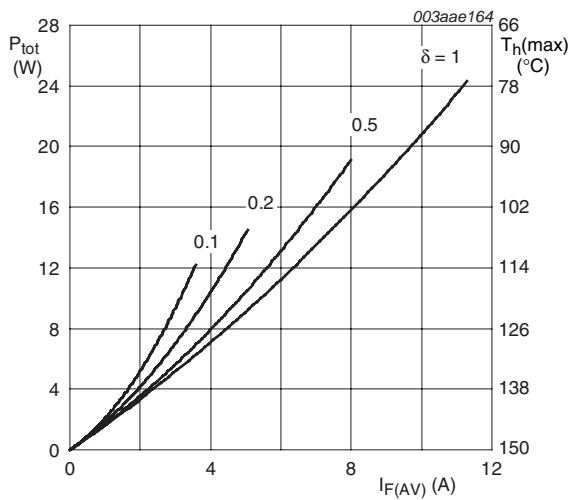
Type number	Package		Version
	Name	Description	
BYC58X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

4. Limiting values

Table 4. Limiting values

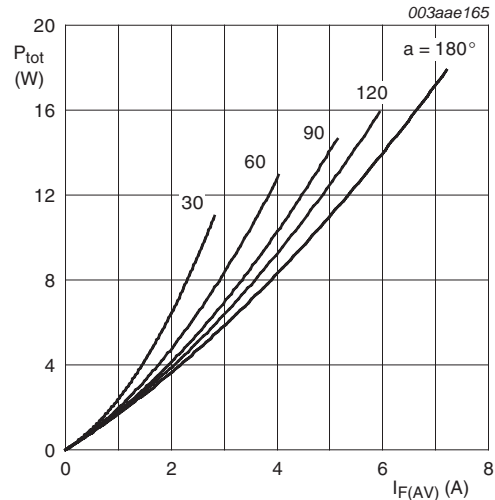
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_h \leq 93\text{ °C}$; see Figure 1 and 2	-	8	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25\ \mu\text{s}$	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ °C}$	-	110	A
		$t_p = 8.3\ \text{ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ °C}$	-	120	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



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

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



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

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	with heatsink compound; see Figure 3	-	2.5	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

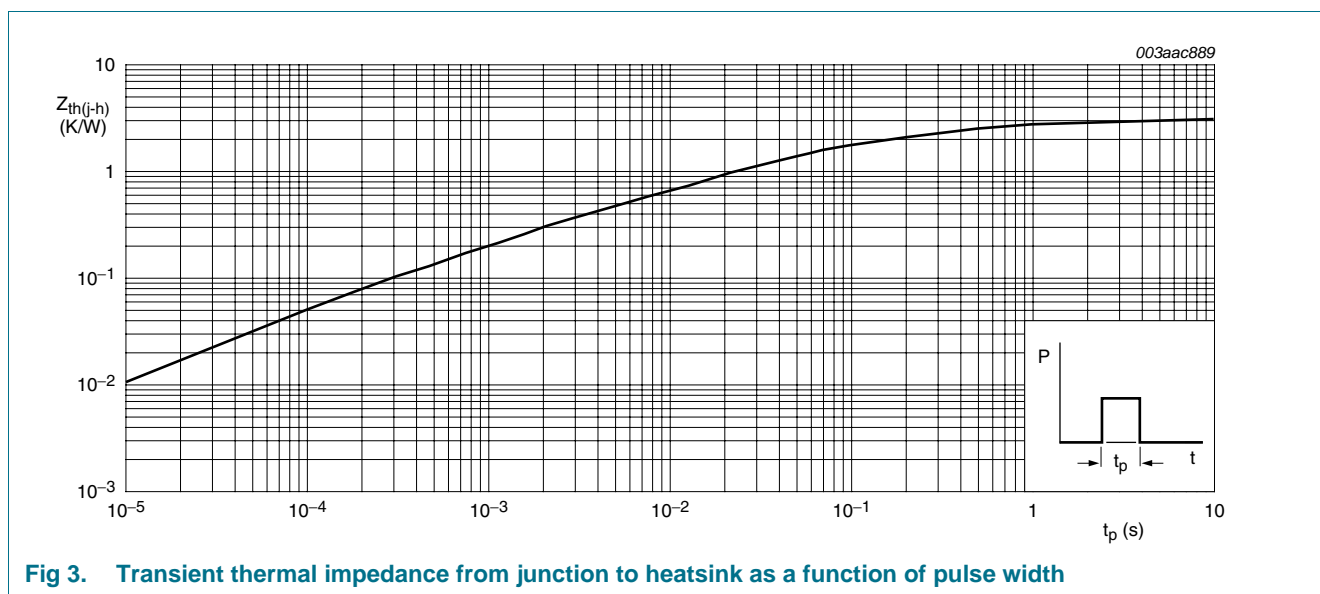


Fig 3. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

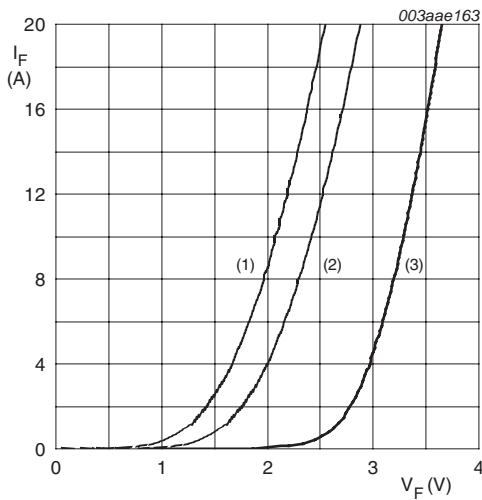
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	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

7. Characteristics

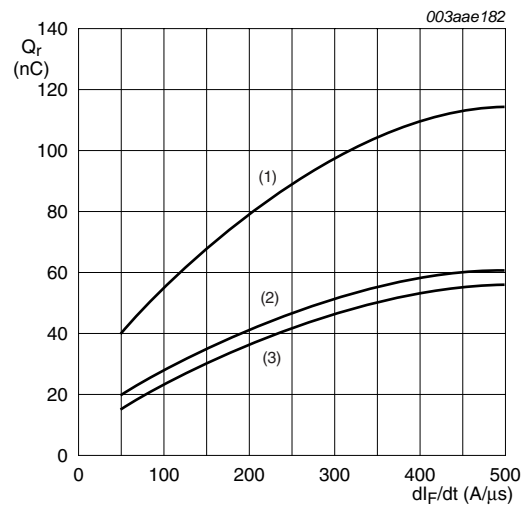
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}; T_j = 25\text{ °C};$ see Figure 4	-	2.35	3.2	V
		$I_F = 8\text{ A}; T_j = 150\text{ °C};$ see Figure 4	-	2	2.4	V
I_R	reverse current	$V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	-	150	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ see Figure 5 and 6	-	40	-	nC
t_{rr}	reverse recovery time	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see Figure 6	-	12.5	-	ns
		$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ see Figure 6 and 7	-	21	-	ns
I_{RM}	peak reverse recovery current	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}$	-	4	5.5	A



- (1) $T_j = 150\text{ °C};$ typical values
- (2) $T_j = 150\text{ °C};$ maximum values
- (3) $T_j = 25\text{ °C};$ maximum values

Fig 4. Forward current as a function of forward voltage



- (1) $I_F = 16\text{ A}$ (2) $I_F = 8\text{ A}$ (3) $I_F = 4\text{ A}$

Fig 5. Recovered charge as a function of rate of change of forward current; $T_j = 125\text{ °C};$ typical values

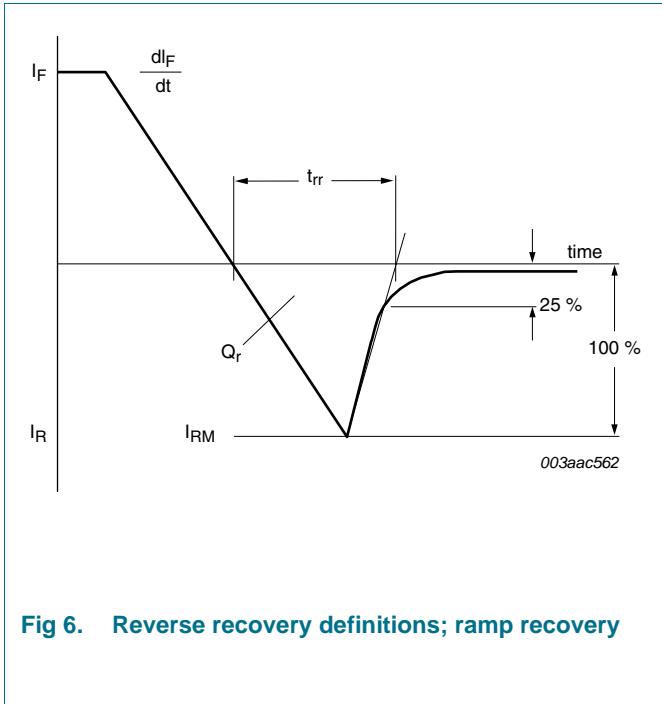


Fig 6. Reverse recovery definitions; ramp recovery

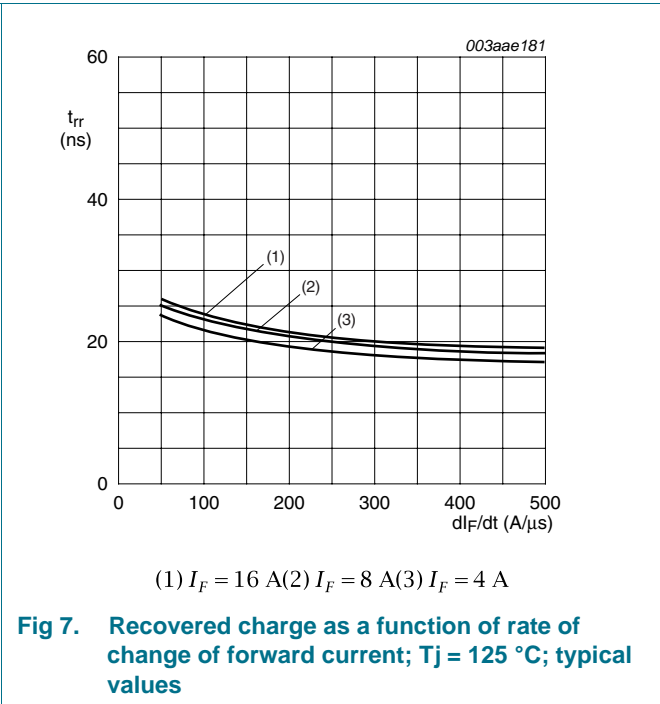


Fig 7. Recovered charge as a function of rate of change of forward current; T_j = 125 °C; typical values

(1) $I_F = 16\text{ A}$ (2) $I_F = 8\text{ A}$ (3) $I_F = 4\text{ A}$

8. Package outline

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

SOD113

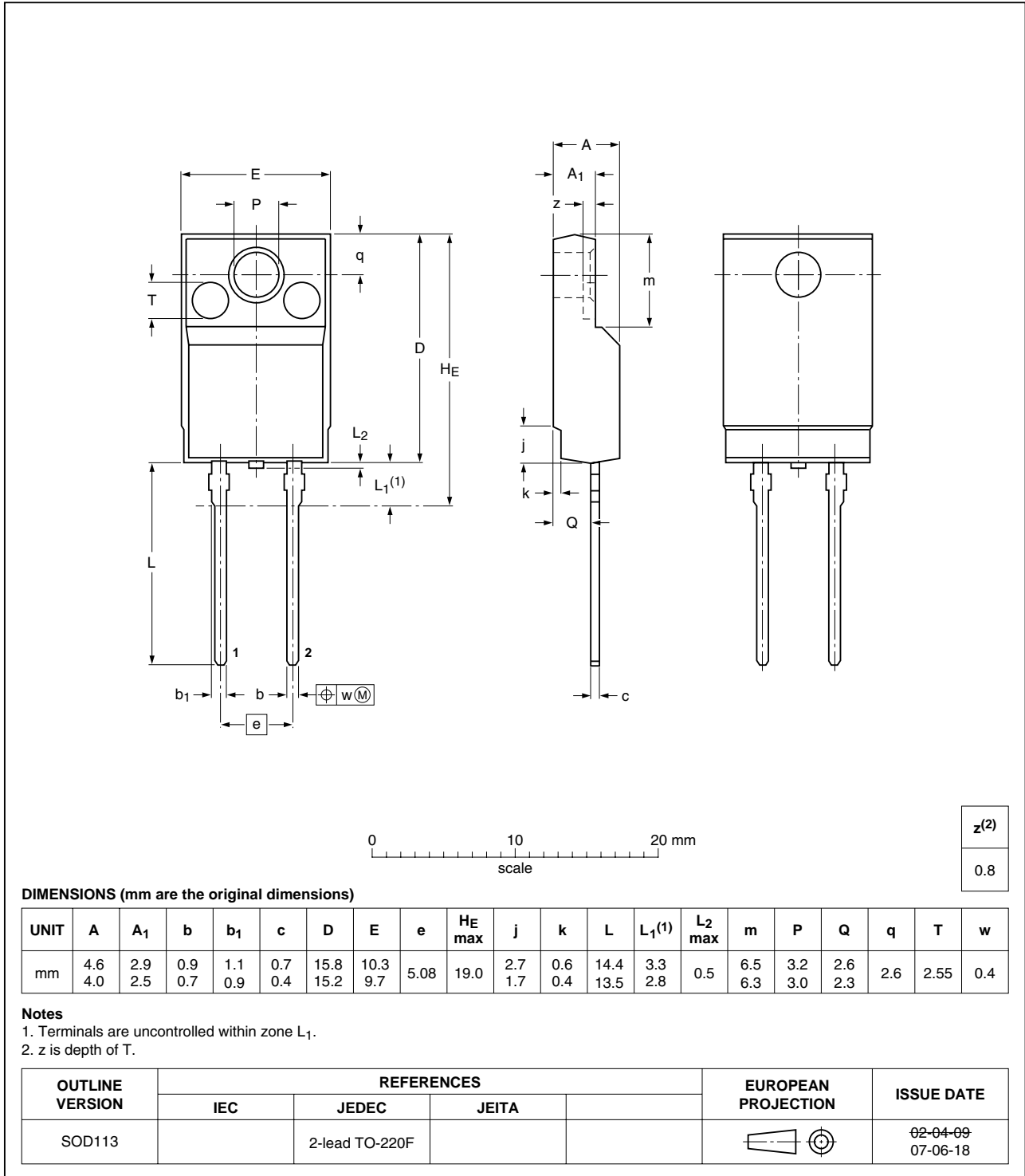


Fig 8. Package outline SOD113 (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC58X-600_1	20100223	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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