



IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

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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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Thank you for your cooperation and understanding,

WeEn Semiconductors



BYC8X-600P

Hyperfast power diode

3 August 2015

Product data sheet

1. General description

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

2. Features and benefits

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

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

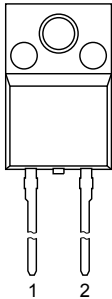
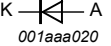
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{RRM}	repetitive peak reverse voltage			-	-	600	V
I _{F(AV)}	average forward current	δ = 0.5 ; T _h ≤ 75 °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3		-	-	8	A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _h ≤ 75 °C; square-wave pulse		-	-	16	A
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; T _{j(init)} = 25 °C; sine-wave pulse; Fig. 4		-	-	91	A
		t _p = 8.3 ms; T _{j(init)} = 25 °C; sine-wave pulse; Fig. 4		-	-	100	A
Static characteristics							
V _F	forward voltage	I _F = 8 A; T _j = 25 °C; Fig. 6		-	-	3.4	V
		I _F = 8 A; T _j = 125 °C; Fig. 6		-	1.5	1.9	V
		I _F = 8 A; T _j = 150 °C		-	1.4	-	V



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 200\text{ A}/\mu\text{s}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7	-	12	18	ns
		$I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 500\text{ A}/\mu\text{s}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7	-	19	-	ns

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYC8X-600P	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 code
BYC8X-600P	BYC8X-600P

8. Limiting values

Table 5. 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	DC	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 75^\circ\text{C}$; square-wave pulse; Fig. 1; Fig. 2; Fig. 3	-	8	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_h \leq 75^\circ\text{C}$; square-wave pulse	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; sine-wave pulse; Fig. 4	-	91	A
		$t_p = 8.3\ \text{ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; sine-wave pulse; Fig. 4	-	100	A
T_{stg}	storage temperature		-65	175	$^\circ\text{C}$
T_j	junction temperature		-	175	$^\circ\text{C}$

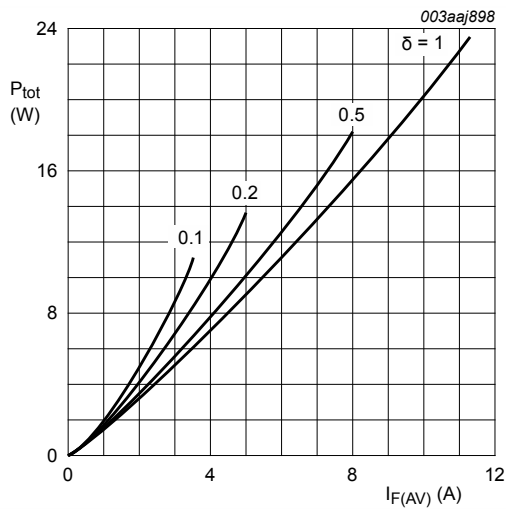


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

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

$$V_O = 1.581\ \text{V}; R_S = 0.043\ \Omega$$

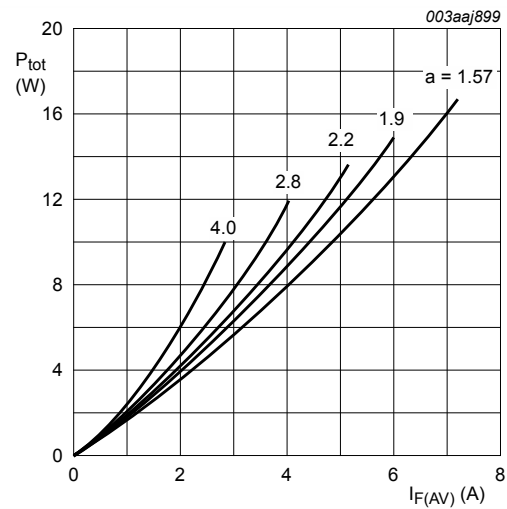


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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

$$V_O = 1.581\ \text{V}; R_S = 0.043\ \Omega$$

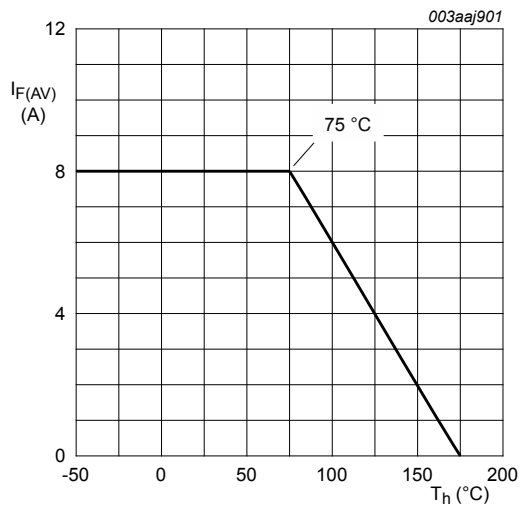


Fig. 3. Average forward current as a function of heatsink temperature; maximum values

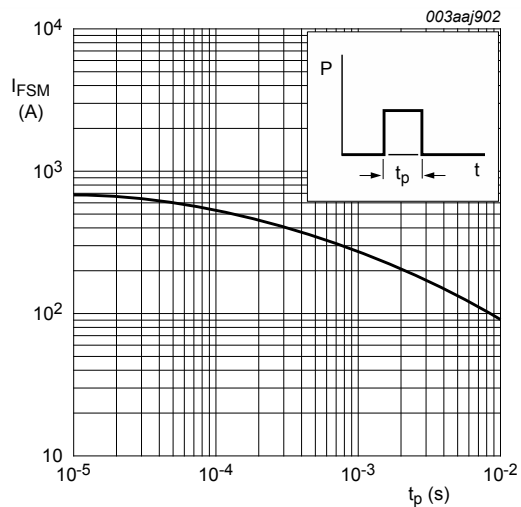


Fig. 4. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	without heatsink compound	-	-	7.2	K/W
		with heatsink compound; Fig. 5	-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	60	-	K/W

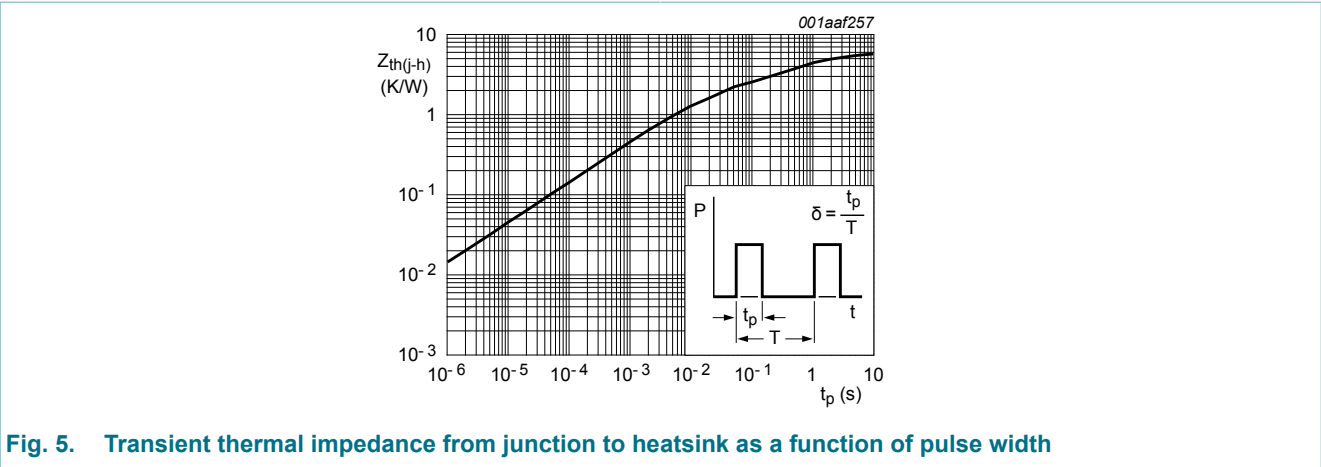


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse width

10. Isolation characteristics

Table 7. 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	from cathode to external heatsink	-	10	-	pF

11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 8 A; T _j = 25 °C; Fig. 6		-	-	3.4	V
		I _F = 8 A; T _j = 125 °C; Fig. 6		-	1.5	1.9	V
		I _F = 8 A; T _j = 150 °C		-	1.4	-	V
I _R	reverse current	V _R = 600 V; T _j = 25 °C		-	-	20	μA
		V _R = 600 V; T _j = 125 °C		-	-	200	μA
Dynamic characteristics							
Q _r	recovered charge	I _F = 8 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	17	-	nC
		I _F = 8 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	90	-	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	12	18	ns
		I _F = 8 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _j = 25 °C; Fig. 7		-	19	-	ns
I _{RM}	peak reverse recovery current	I _F = 8 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	-	2.2	A
		I _F = 8 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	-	6	A

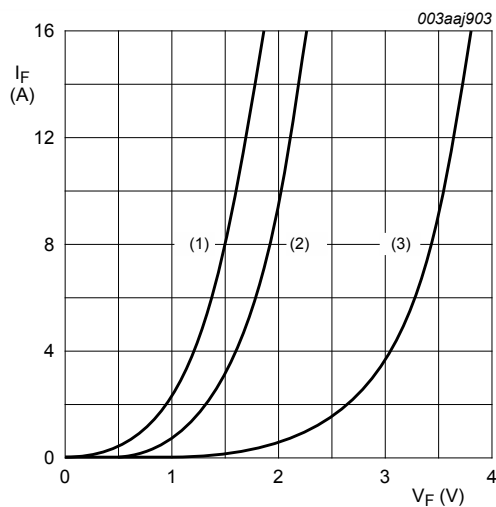


Fig. 6. Forward current as a function of forward voltage

- (1) $T_j = 125\text{ °C}$; typical values;
 - (2) $T_j = 125\text{ °C}$; maximum values;
 - (3) $T_j = 25\text{ °C}$; maximum values;
- $V_O = 1.581\text{ V}$; $R_S = 0.043\text{ }\Omega$

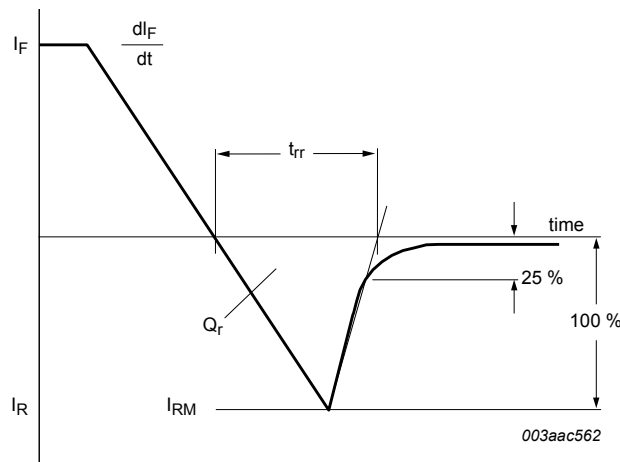


Fig. 7. Reverse recovery definitions; ramp recovery

12. Package outline

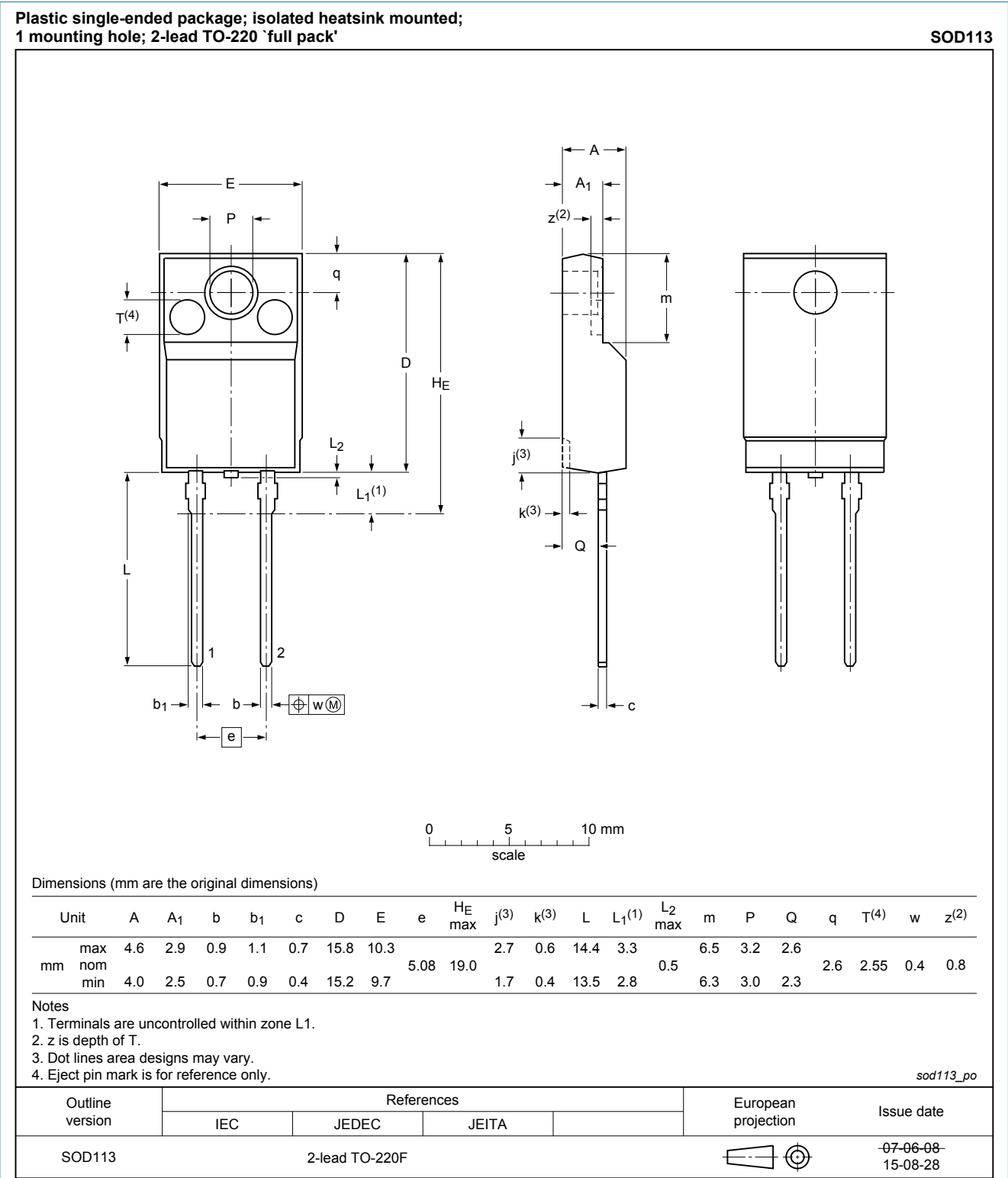


Fig. 8. Package outline TO-220F (SOD113)

13. Legal information

13.1 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.
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