



# IMPORTANT NOTICE

10 December 2015

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## 1. Global joint venture starts operations as WeEn Semiconductors

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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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Thank you for your cooperation and understanding,

WeEn Semiconductors





# BYC10D-600

## Hyperfast power diode

Rev. 1 — 28 June 2011

Product data sheet

## 1. Product profile

### 1.1 General description

Hyperfast power diode in a SOD59 (2-lead TO-220AC) plastic package.

### 1.2 Features and benefits

- Low reverse recovery current and 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

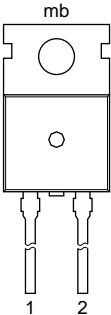

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 93$ °C; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	10	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; see <a href="#">Figure 5</a>	-	2	2.5	V
		$I_F = 10$ A; $T_j = 150$ °C; see <a href="#">Figure 5</a>	-	1.4	1.8	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 10$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ $\mu$ s; $T_j = 25$ °C; see <a href="#">Figure 6</a>	-	18	-	ns



## 2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
mb	mb	mounting base; connected to cathode		

**SOD59 (TO-220AC)**

## 3. Ordering information

Table 3. Ordering information

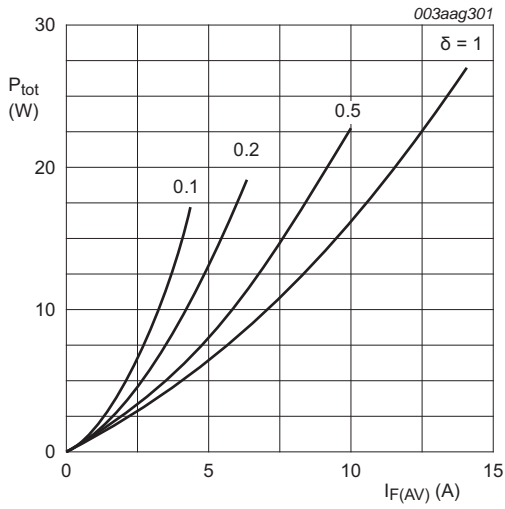
Type number	Package		
	Name	Description	Version
BYC10D-600	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

## 4. Limiting values

Table 4. Limiting values

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

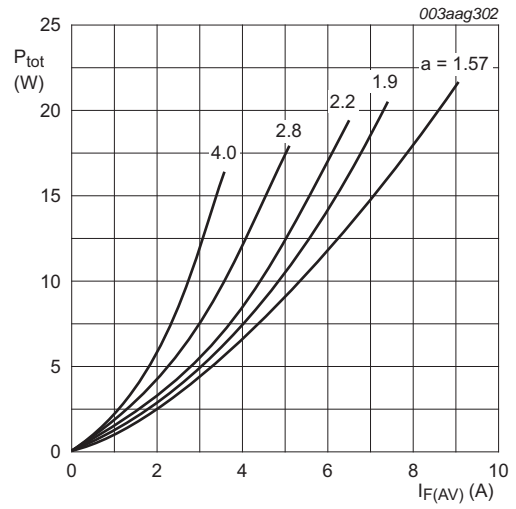
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	600	V
$V_{RWM}$	crest working reverse voltage		-	600	V
$V_R$	reverse voltage	DC	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 93\text{ °C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	10	A
$I_{FRM}$	repetitive peak forward current	square-wave pulse; $\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 93\text{ °C}$	-	20	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ °C}$ ; see <a href="#">Figure 3</a>	-	71	A
		$t_p = 10\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ °C}$ ; see <a href="#">Figure 3</a>	-	65	A
$T_{stg}$	storage temperature		-40	150	°C
$T_j$	junction temperature		-	150	°C



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

$V_o = 0.987 \text{ V}; R_s = 0.065 \Omega$

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



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

$V_o = 0.987 \text{ V}; R_s = 0.065 \Omega$

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

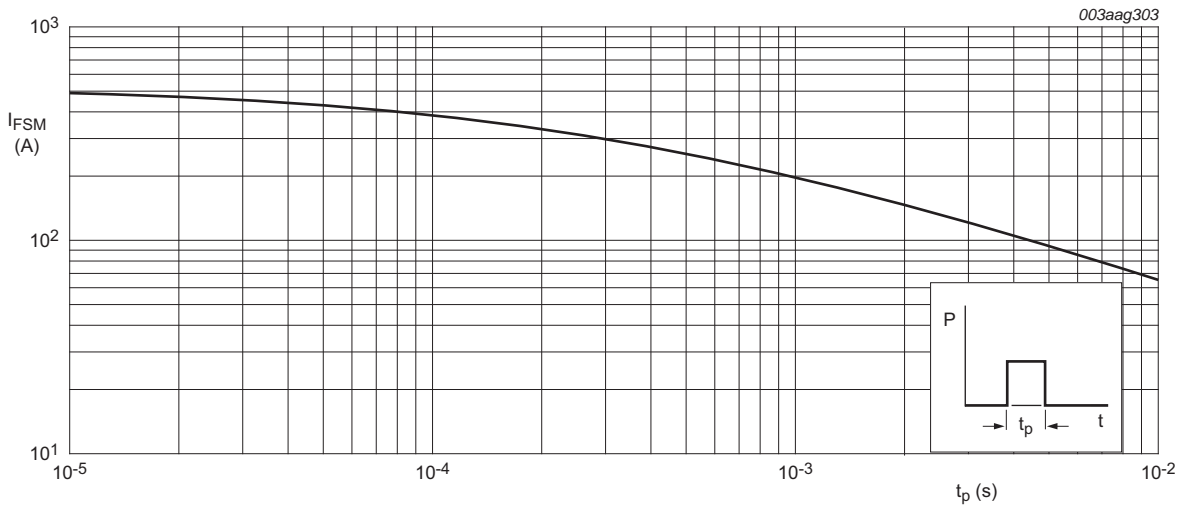
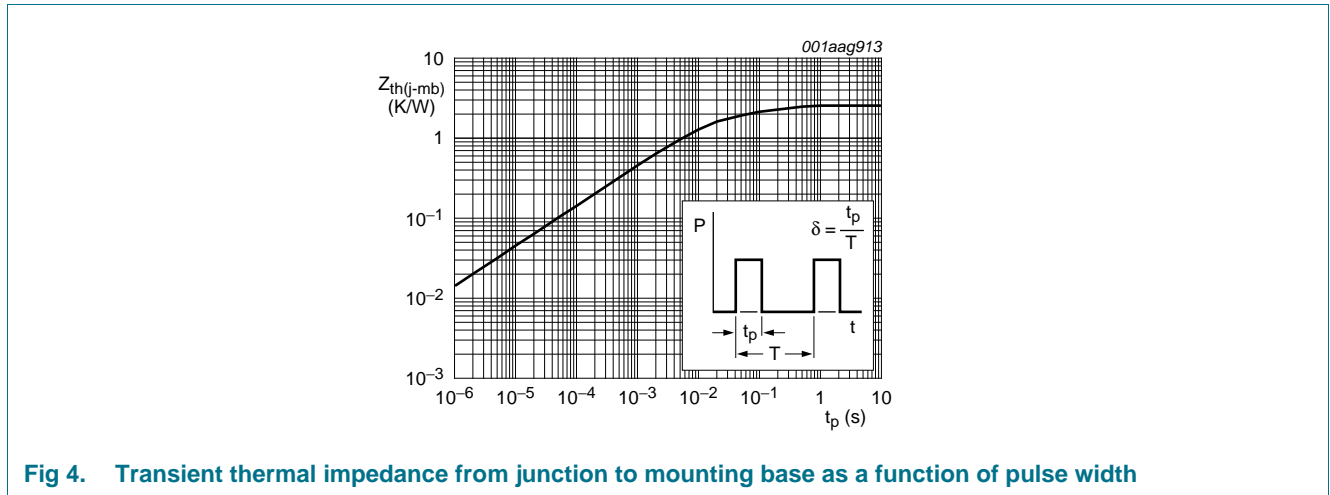


Fig 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

### 5. Thermal characteristics

Table 5. Thermal characteristics

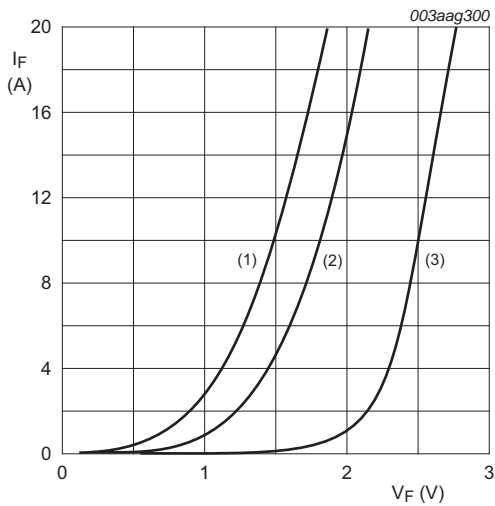
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see <a href="#">Figure 4</a>	-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W



## 6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 20\text{ A}; T_j = 150\text{ °C};$ see <a href="#">Figure 5</a>	-	1.7	2.2	V
		$I_F = 10\text{ A}; T_j = 25\text{ °C};$ see <a href="#">Figure 5</a>	-	2	2.5	V
		$I_F = 10\text{ A}; T_j = 150\text{ °C};$ see <a href="#">Figure 5</a>	-	1.4	1.8	V
$I_R$	reverse current	$V_R = 600\text{ V}$	-	9	200	$\mu\text{A}$
		$V_R = 500\text{ V}; T_j = 100\text{ °C}$	-	1.1	3	mA
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see <a href="#">Figure 6</a>	-	15	30	ns
		$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see <a href="#">Figure 6</a>	-	18	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 125\text{ °C};$ see <a href="#">Figure 6</a>	-	3	7.5	A
		$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C};$ see <a href="#">Figure 6</a>	-	9.5	12	A
$V_{FR}$	forward recovery voltage	$I_F = 10\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see <a href="#">Figure 7</a>	-	8	11	V



(1)  $T_j = 150\text{ °C};$  typical values;  
 (2)  $T_j = 150\text{ °C};$  maximum values;  
 (3)  $T_j = 25\text{ °C};$  maximum values;  
 $V_o = 0.987\text{ V}; R_s = 0.065\text{ }\Omega$

Fig 5. Forward current as a function of forward voltage

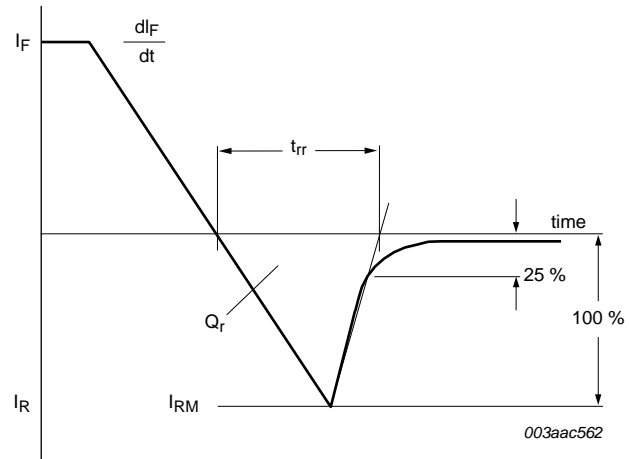


Fig 6. Reverse recovery definitions; ramp recovery

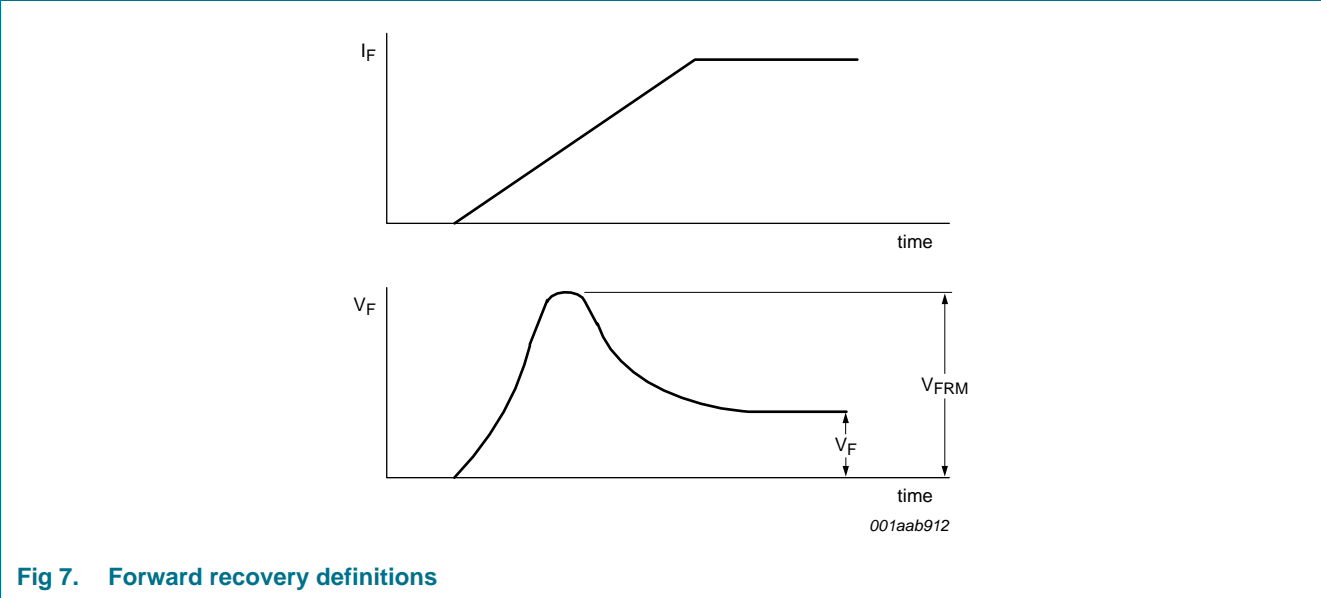
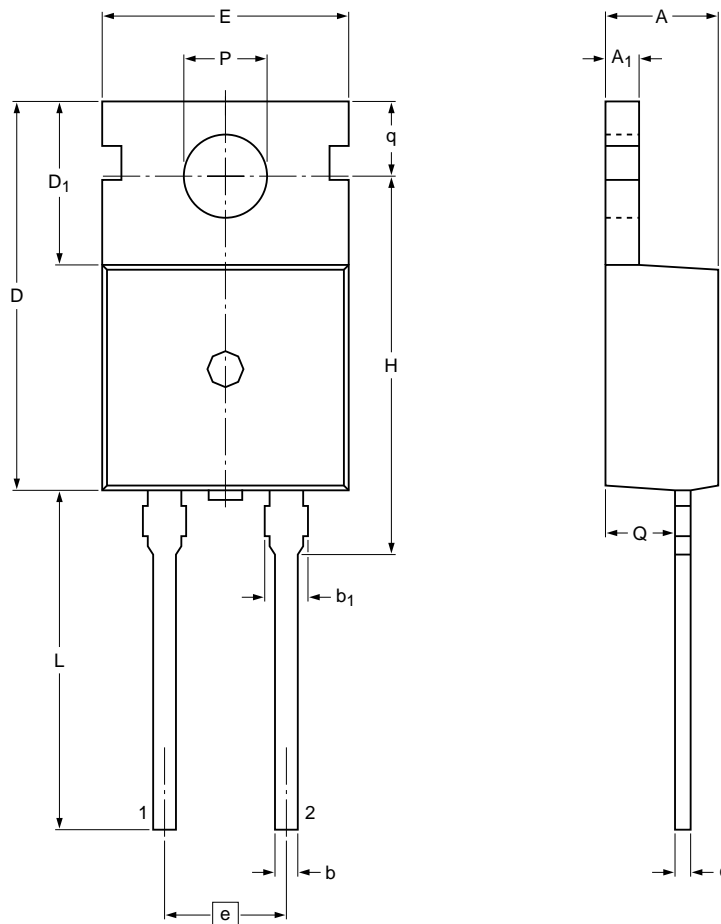


Fig 7. Forward recovery definitions

7. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC

SOD59



Dimensions

Unit	A	A <sub>1</sub>	b	b <sub>1</sub> (1)	c	D	D <sub>1</sub>	E	e	H	L	P	Q	q
max	4.7	1.40	0.95	1.7	0.65	15.8	6.8	10.30	5.08	16.25	15.0	3.7	2.6	2.9
nom									(REF)					
min	4.3	1.15	0.70	1.3	0.45	15.6	6.4	9.65		15.70	12.5	3.5	2.2	2.7

Note

1. Protruded dambar are included in the dimension.

sod059\_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOD59	2-lead TO-220AC				-09-08-17- 09-08-25

Fig 8. Package outline SOD59 (TO-220AC)



## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYC10D-600 v.1	20110628	Product data sheet	-	-

## 9. Legal information

### 9.1 Data sheet status

Document status <sup>[1]</sup> <sup>[2]</sup>	Product status <sup>[3]</sup>	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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