



# 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





# BYC30-600P

Hyperfast power diode

10 September 2014

Product data sheet

## 1. General description

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

## 2. Features and benefits

- Fast switching
- Low leakage current
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET or IGBT

## 3. Applications

- Active PFC in air conditioner
- High frequency switched-mode power supplies
- Continuous Current Mode (CCM) Power Factor Correction (PFC)

## 4. Quick reference data

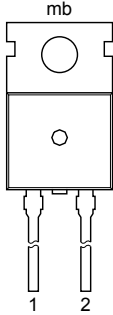
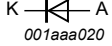
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 104$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	30	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 30$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	1.38	1.8	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 50$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	-	35	ns



## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p style="text-align: center;">TO-220AC (SOD59)</p>	
2	A	anode		
mb	mb	mounting base; connected to cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYC30-600P	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

## 7. Marking

Table 4. Marking codes

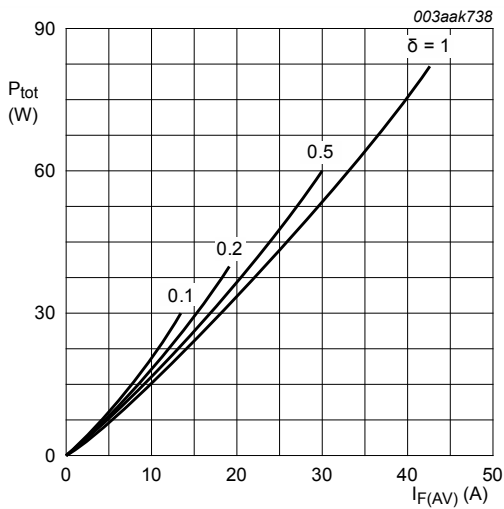
Type number	Marking code
BYC30-600P	BYC30-600P

## 8. Limiting values

**Table 5. Limiting values**

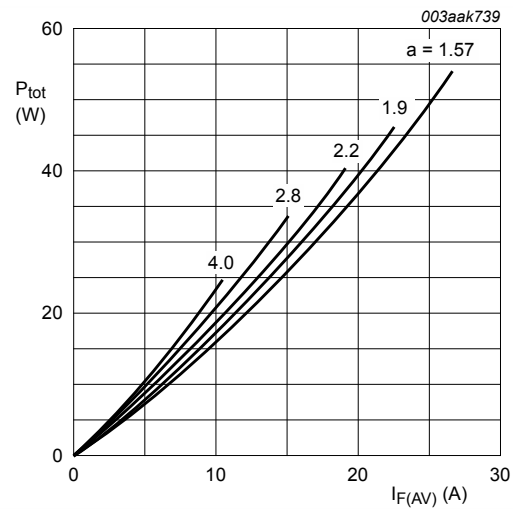
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	$\delta = 0.5$ ; $T_{mb} \leq 104\text{ °C}$ ; square-wave pulse; Fig. 1; Fig. 2; Fig. 3	-	30	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 104\text{ °C}$ ; square-wave pulse	-	60	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse; Fig. 4	-	200	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse; Fig. 4	-	220	A
$T_{stg}$	storage temperature		-65	175	°C
$T_j$	junction temperature		-	175	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$   
 $V_o = 1.798\text{ V}$ ;  $R_s = 0.003\ \Omega$

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



$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$   
 $V_o = 1.798\text{ V}$ ;  $R_s = 0.003\ \Omega$

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

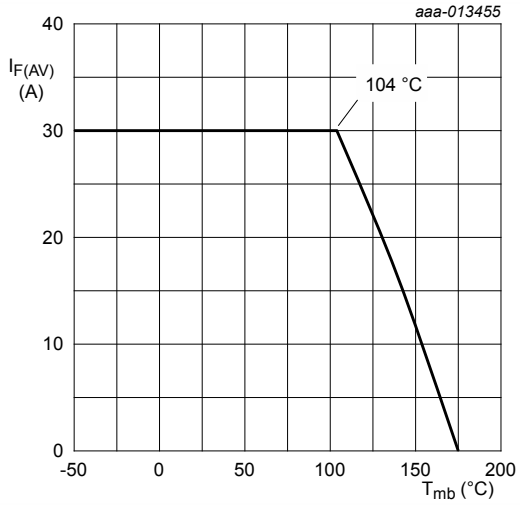


Fig. 3. Forward current as a function of mounting base temperature; maximum values

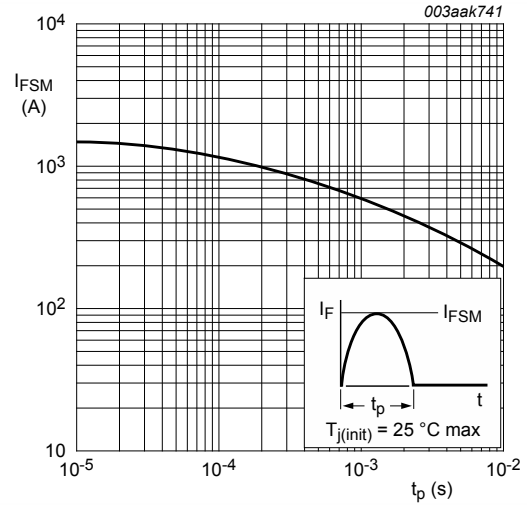


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

### 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; <a href="#">Fig. 5</a>	-	-	1.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

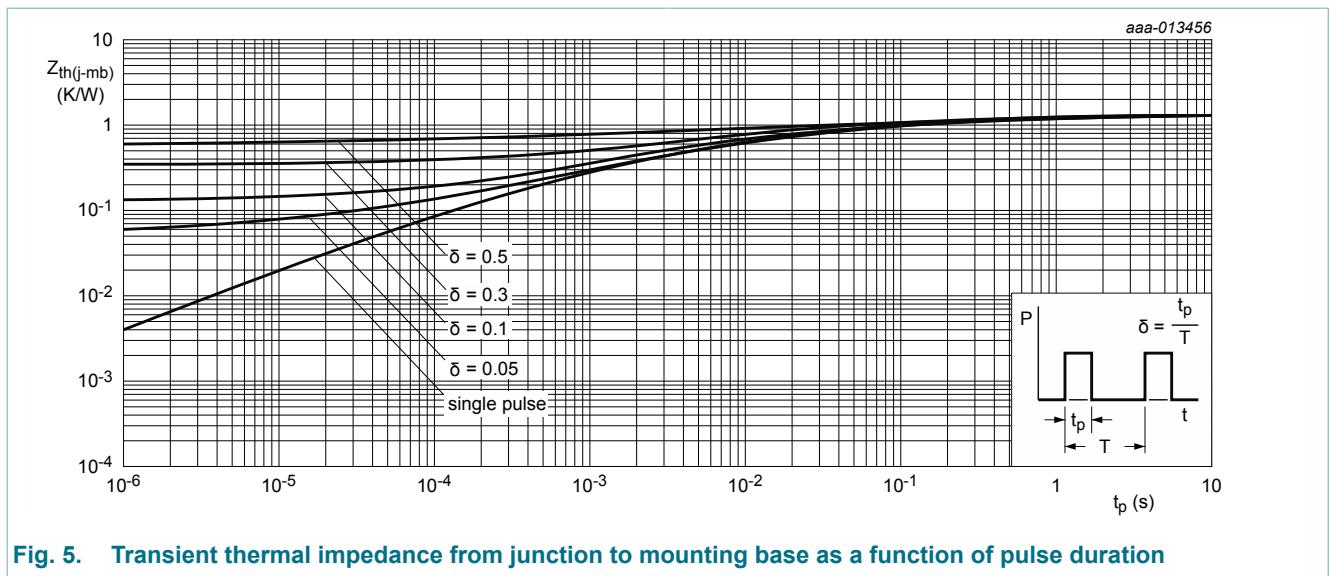
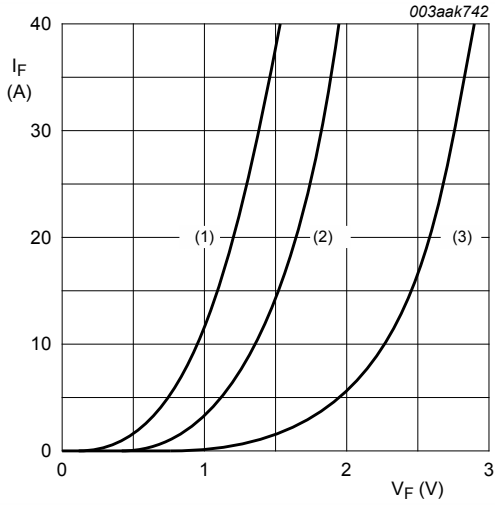


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 10. Characteristics

Table 7. Characteristics

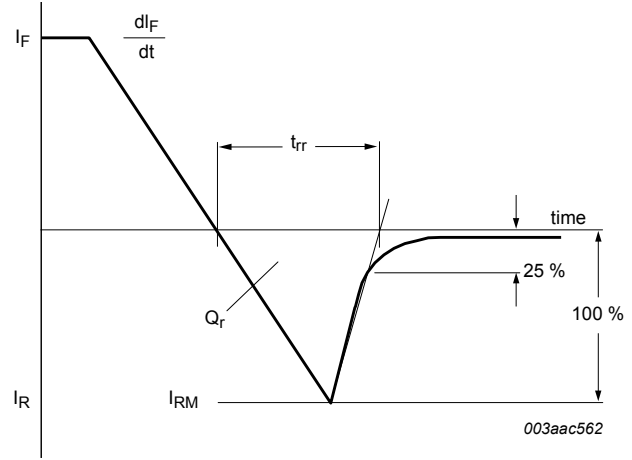
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 30 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>	-	2	2.75	V
		I <sub>F</sub> = 30 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>	-	1.38	1.8	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C	-	-	10	μA
		V <sub>R</sub> = 600 V; T <sub>j</sub> = 150 °C	-	-	1	mA
<b>Dynamic characteristics</b>						
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 30 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	-	50	-	nC
		I <sub>F</sub> = 30 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 125 °C; <a href="#">Fig. 7</a>	-	280	-	nC
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 50 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	-	-	35	ns
		I <sub>F</sub> = 30 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	-	-	35	ns
		I <sub>F</sub> = 30 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 125 °C; <a href="#">Fig. 7</a>	-	70	-	ns
I <sub>RM</sub>	peak reverse recovery current	I <sub>F</sub> = 30 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	-	3.5	-	A
		I <sub>F</sub> = 30 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 125 °C; <a href="#">Fig. 7</a>	-	7.6	-	A



$V_o = 1.798 \text{ V}; R_s = 0.003 \Omega$

- (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. 6. Forward current as a function of forward voltage**

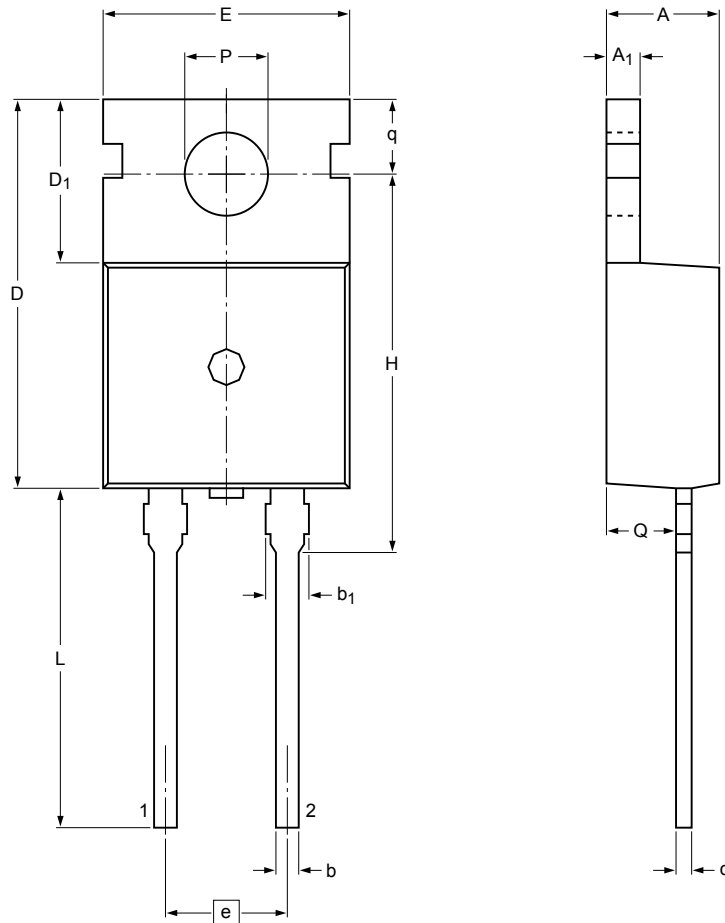


**Fig. 7. Reverse recovery definitions; ramp recovery**



### 11. 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> <sup>(1)</sup>	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	3.80	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	3.65	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				09-08-25 12-11-27

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

## 12. Legal information

### 12.1 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.

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