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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





BYC10-600

Hyperfast power diode

27 May 2013

Product data sheet

1. General description

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

2. Features and benefits

- Extremely fast switching
- 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
- Half-bridge lighting ballasts

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	$\delta = 0.5$; $T_{mb} \leq 78$ °C; square-wave pulse; Fig. 1 ; Fig. 2	-	-	10	A
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 150$ °C; Fig. 4	-	1.4	1.8	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 10$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ μ s; $T_j = 25$ °C; Fig. 6	-	19	-	ns

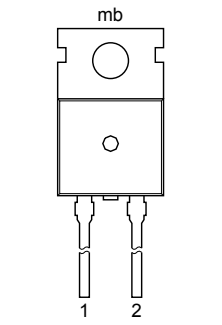
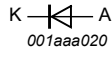


Scan or click this QR code to view the latest information for this product



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>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
BYC10-600	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

7. 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	$T_{mb} \leq 114\text{ °C}$	-	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 78\text{ °C}$; square-wave pulse; Fig. 1 ; Fig. 2	-	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $T_{mb} \leq 78\text{ °C}$; square-wave pulse	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse	-	65	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse	-	71	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C

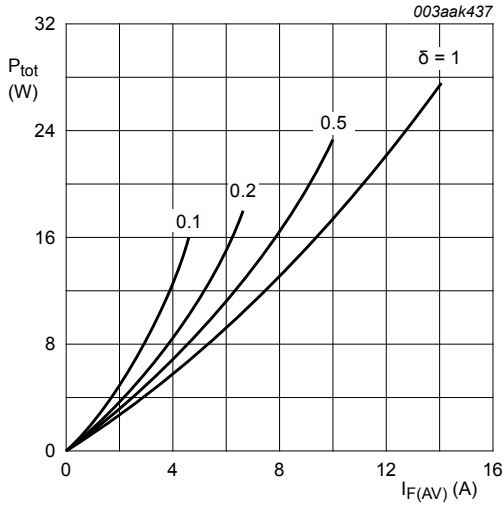


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

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

$V_O = 1.300 \text{ V}; R_S = 0.050 \Omega$

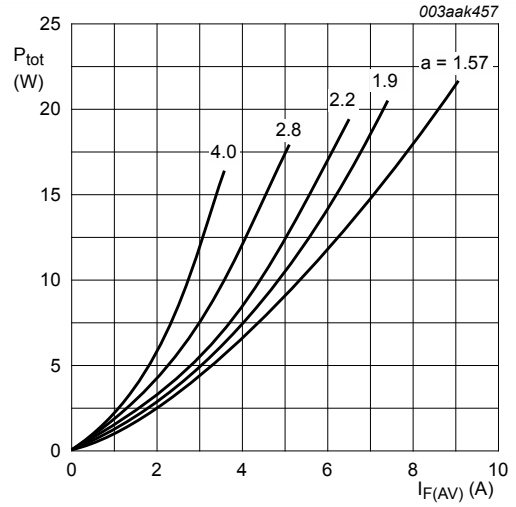


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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

$V_O = 1.300 \text{ V}; R_S = 0.050 \Omega$

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 3	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

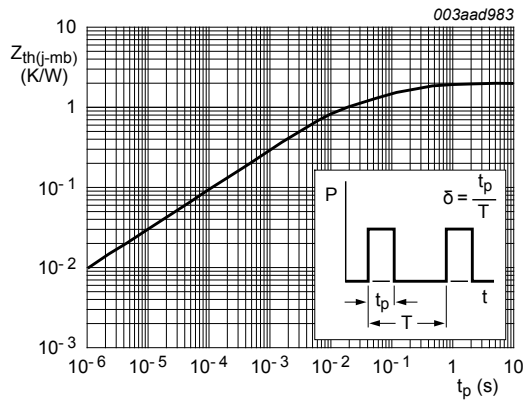


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 10\text{ A}$; $T_j = 25\text{ °C}$; Fig. 4	-	2	2.9	V
		$I_F = 10\text{ A}$; $T_j = 150\text{ °C}$; Fig. 4	-	1.4	1.8	V
		$I_F = 20\text{ A}$; $T_j = 150\text{ °C}$; Fig. 4	-	1.7	2.3	V
I_R	reverse current	$V_R = 600\text{ V}$; $T_j = 25\text{ °C}$; Fig. 5	-	9	200	μA
		$V_R = 500\text{ V}$; $T_j = 100\text{ °C}$; Fig. 5	-	1.1	3	mA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 50\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 6	-	35	55	ns
		$I_F = 10\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 6	-	19	-	ns
		$I_F = 10\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 100\text{ °C}$; Fig. 6	-	32	40	ns
I_{RM}	peak reverse recovery current	$I_F = 10\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 6	-	3	7.5	A
		$I_F = 10\text{ A}$; $V_R = 400\text{ V}$; $dI_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 6	-	9.5	12	A
V_{FRM}	forward recovery voltage	$I_F = 10\text{ A}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	8	11	V

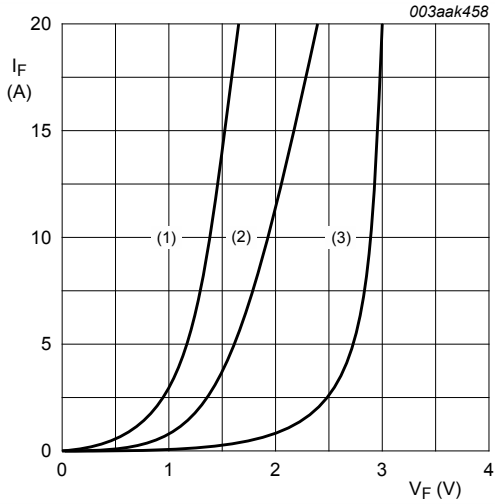


Fig. 4. Forward current as a function of forward voltage

- (1) $T_j = 150^\circ\text{C}$; typical values;
 - (2) $T_j = 150^\circ\text{C}$; maximum values;
 - (3) $T_j = 25^\circ\text{C}$; maximum values;
- $V_O = 1.300\text{ V}$; $R_S = 0.050\ \Omega$

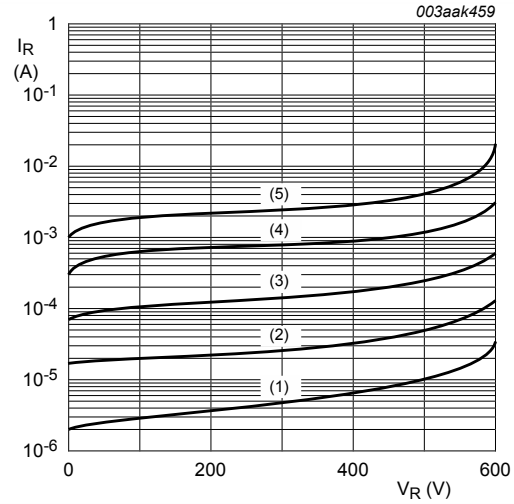


Fig. 5. Reverse leakage current as a function of reverse voltage; typical values

- (1) $T_j = 25^\circ\text{C}$; typical values;
- (2) $T_j = 50^\circ\text{C}$; typical values;
- (3) $T_j = 75^\circ\text{C}$; typical values;
- (4) $T_j = 100^\circ\text{C}$; typical values;
- (5) $T_j = 125^\circ\text{C}$; typical value

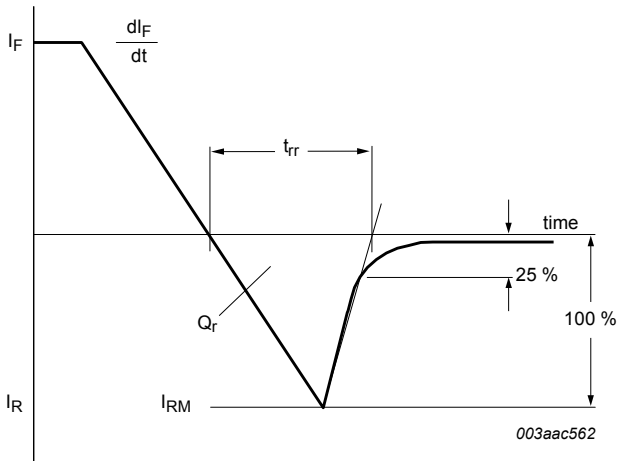


Fig. 6. Reverse recovery definitions; ramp recovery

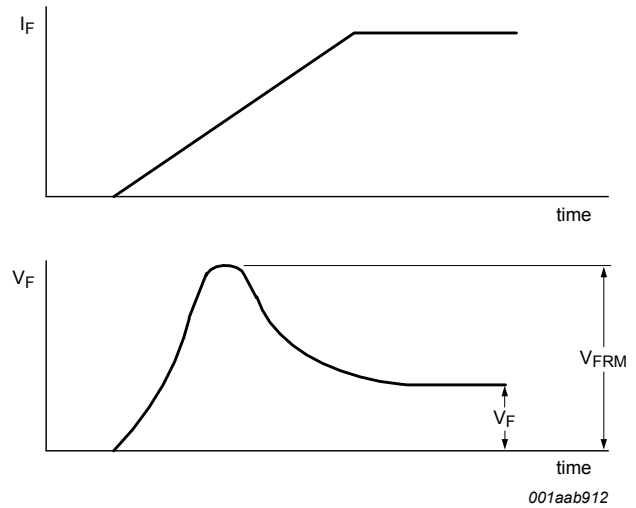
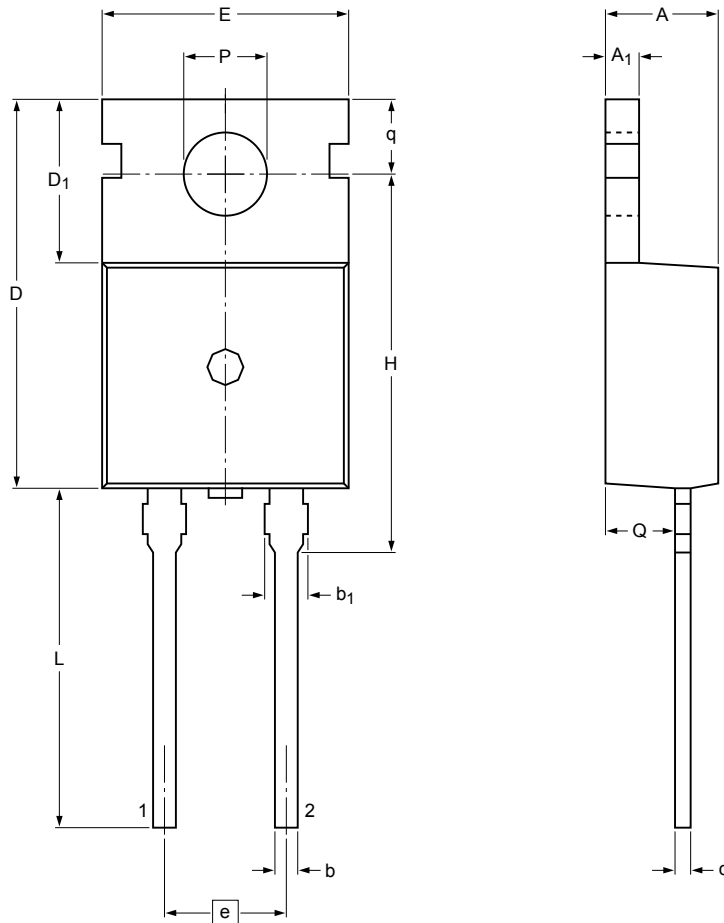


Fig. 7. Forward recovery definitions

10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC SOD59



Dimensions

Unit	A	A ₁	b	b ₁ ⁽¹⁾	c	D	D ₁	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)

11. Legal information

11.1 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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Date of release: 27 May 2013