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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WeEn Semiconductors

BYV29-400

Ultrafast power diode

Rev. 3 — 29 May 2012 **Product data sheet**

1. Product profile

1.1 General description

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

1.2 Features and benefits

- Fast switching
- High thermal cycling performance
- Low forward volt drop
- Low thermal resistance
- Soft recovery minimizes power-consuming oscillations

1.3 Applications

- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)
- Output rectifiers in high-frequency switched-mode power supplies

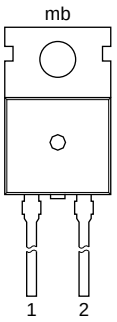
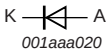
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	400	V
$I_{F(AV)}$	average forward current	square-wave pulse; δ = 0.5 ; T_{mb} ≤ 123 °C; see Figure 1; see Figure 2	-	-	9	A
Static characteristics						
V_F	forward voltage	I_F = 8 A; T_j = 150 °C; see Figure 4	-	0.9	1.03	V
Dynamic characteristics						
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/s; T_j = 25 °C; see Figure 7; see Figure 5	-	50	60	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; cathode		

SOD59 (TO-220AC)

3. Ordering information

Table 3. Ordering information

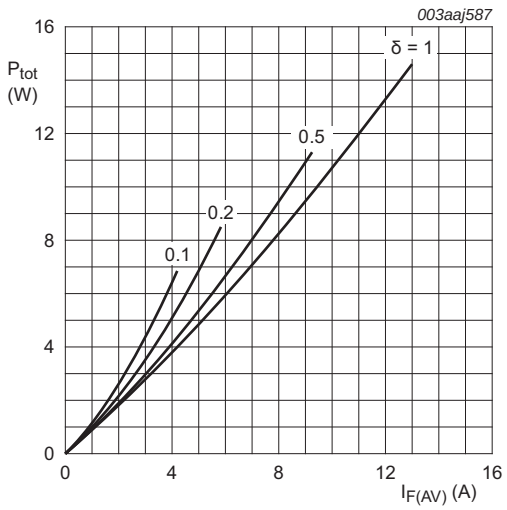
Type number	Package		
	Name	Description	Version
BYV29-400	TO-220AC	plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC	SOD59

4. Limiting values

Table 4. Limiting values

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

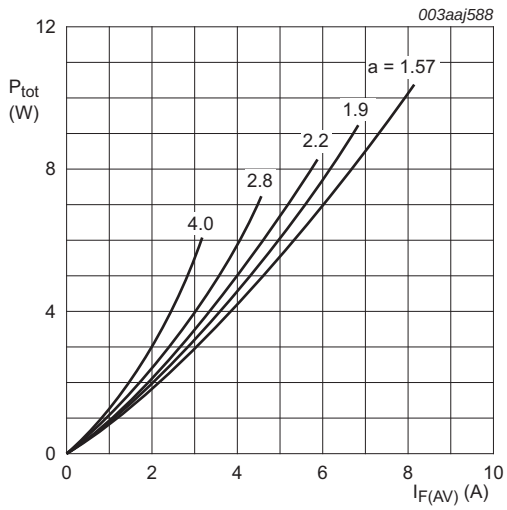
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	400	V
V_{RWM}	crest working reverse voltage		-	400	V
V_R	reverse voltage	DC	-	400	V
$I_{F(AV)}$	average forward current	square-wave pulse; δ = 0.5 ; T_{mb} ≤ 123 °C; see Figure 1; see Figure 2	-	9	A
I_{FRM}	repetitive peak forward current	square-wave pulse; δ = 0.5 ; t_p = 25 µs; T_{mb} ≤ 123 °C	-	18	A
I_{FSM}	non-repetitive peak forward current	sine-wave pulse; t_p = 10 ms; $T_{j(init)}$ = 25 °C	-	100	A
		sine-wave pulse; t_p = 8.3 ms; $T_{j(init)}$ = 25 °C	-	110	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



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

$V_O = 0.890\ V; R_S = 0.019\ \Omega$

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



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

$V_O = 0.890\ V; R_S = 0.019\ \Omega$

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
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	see Figure 3	-	-	2.5	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

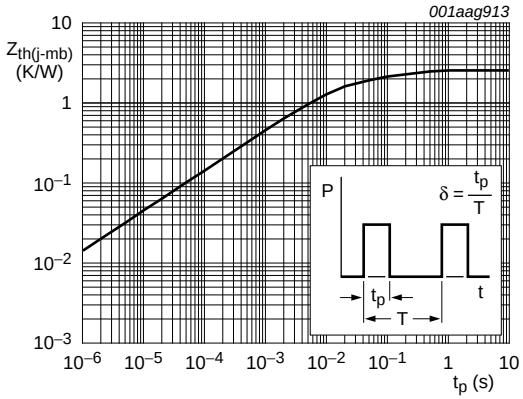
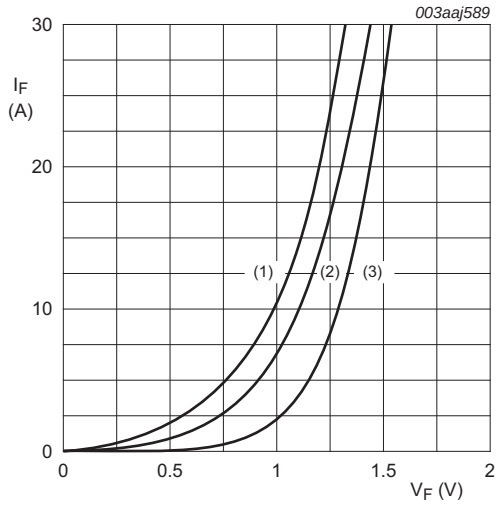


Fig 3. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 8 A; T_j = 150 °C; see Figure 4	-	0.9	1.03	V
		I_F = 8 A; T_j = 25 °C; see Figure 4	-	1.05	1.25	V
		I_F = 20 A; T_j = 25 °C; see Figure 4	-	1.2	1.4	V
I_R	reverse current	V_R = 400 V; T_j = 25 °C	-	2	50	µA
		V_R = 400 V; T_j = 100 °C	-	0.1	0.35	mA
Dynamic characteristics						
Q_r	recovered charge	I_F = 2 A; V_R = 30 V; dI_F/dt = 20 A/s; T_j = 25 °C; see Figure 5; see Figure 6	-	40	60	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/s; T_j = 25 °C; see Figure 7; see Figure 5	-	50	60	ns
I_{RM}	peak reverse recovery current	I_F = 10 A; V_R = 30 V; dI_F/dt = 50 A/s; T_j = 100 °C; see Figure 8; see Figure 5	-	4	5.5	A
V_{FRM}	forward recovery voltage	I_F = 10 A; dI_F/dt = 10 A/s; T_j = 25 °C; see Figure 9	-	2.5	-	V



(1) T_j = 150 °C; typical values;
(2) T_j = 150 °C; maximum values;
(3) T_j = 25 °C; maximum values;
V_O = 0.890 V; R_S = 0.019 Ω

Fig 4. Forward current as a function of forward voltage

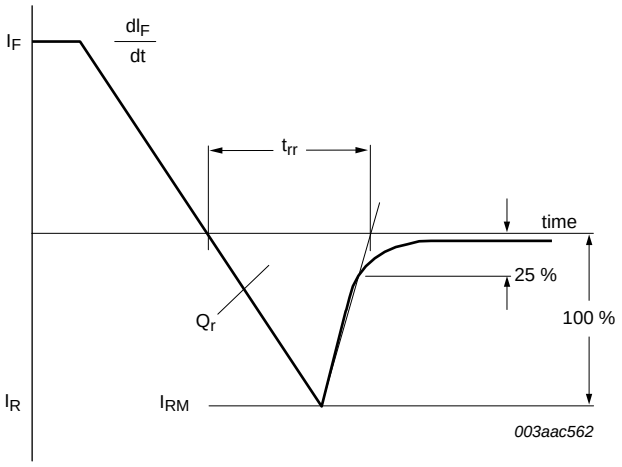
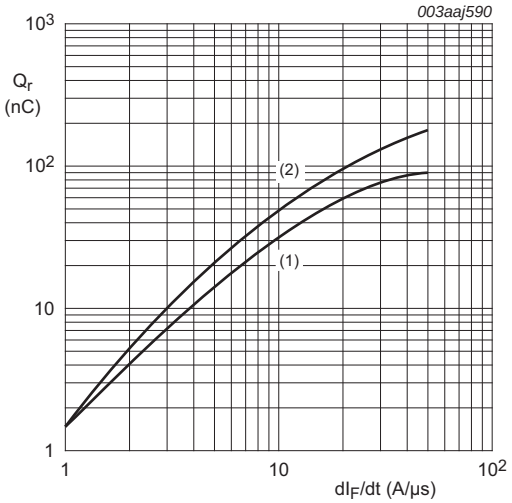
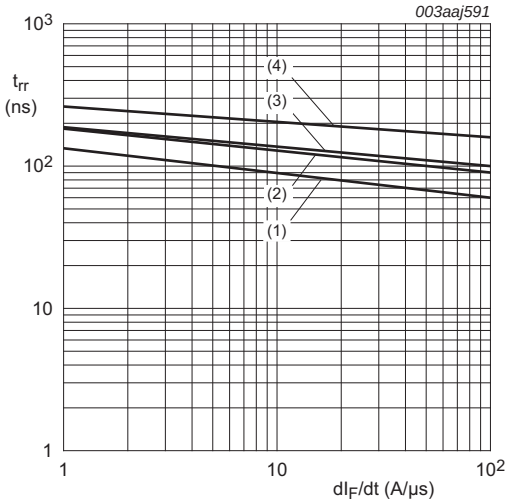


Fig 5. Reverse recovery definitions; ramp recovery



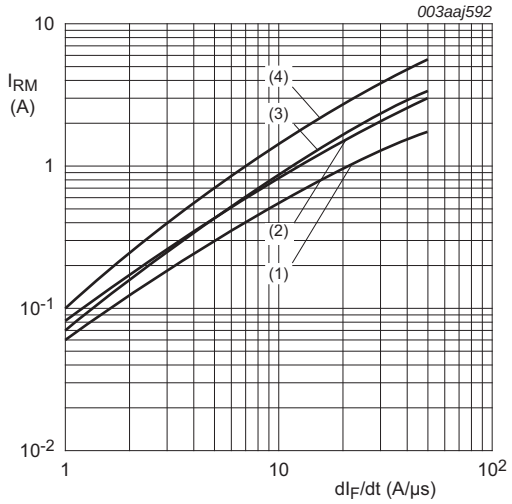
(1) $I_F = 2$ A; $T_j = 25$ °C;
(2) $I_F = 10$ A; $T_j = 25$ °C

Fig 6. Recovered charge as a function of rate of change of forward current; maximum values



(1) $I_F = 1$ A; $T_j = 25$ °C;
(2) $I_F = 1$ A; $T_j = 100$ °C;
(3) $I_F = 10$ A; $T_j = 25$ °C;
(4) $I_F = 10$ A; $T_j = 100$ °C

Fig 7. Reverse recovery time as a function of rate of change of forward current; maximum values



(1) $I_F = 1$ A; $T_j = 25$ °C;
(2) $I_F = 1$ A; $T_j = 100$ °C;
(3) $I_F = 10$ A; $T_j = 25$ °C;
(4) $I_F = 10$ A; $T_j = 100$ °C

Fig 8. Peak reverse recovery current as a function of rate of change of forward current; maximum values

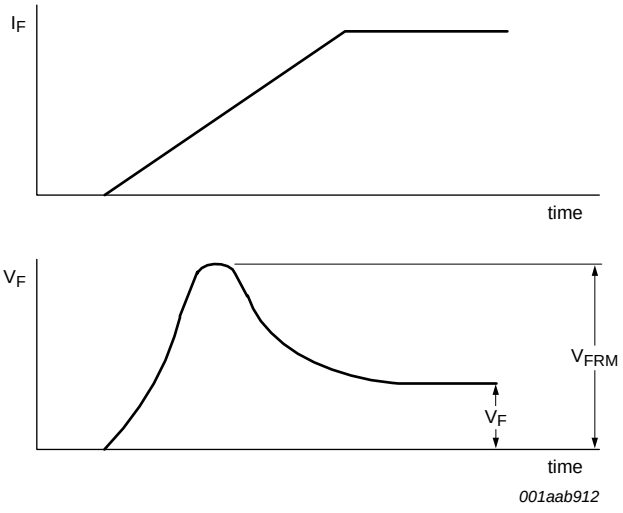
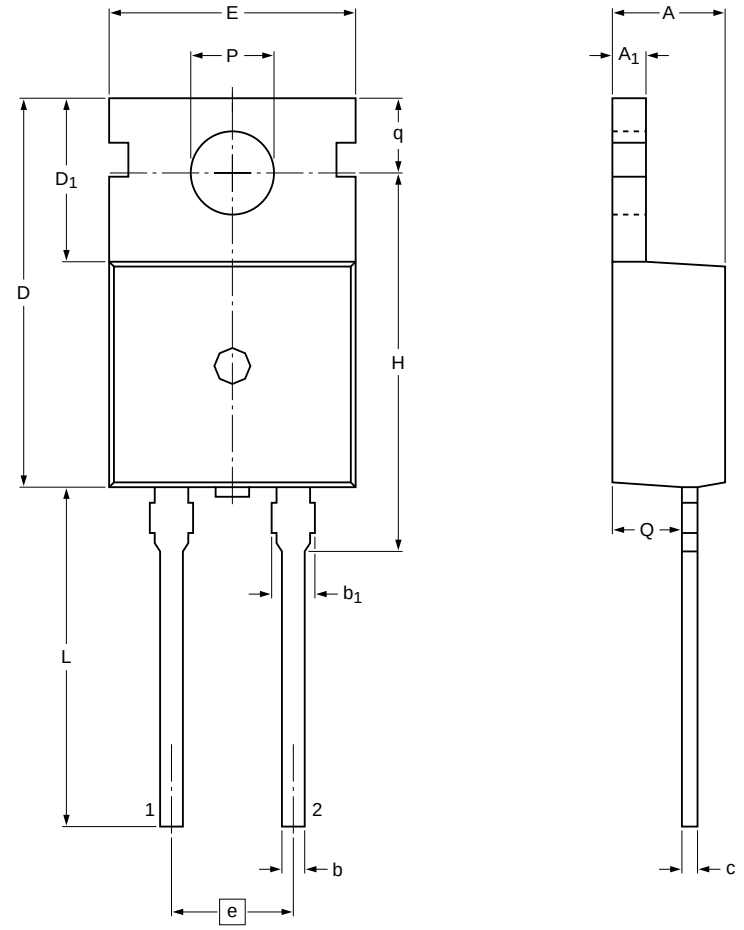


Fig 9. Forward recovery definitions

7. Package outline

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



0 5 10 mm

scale

Dimensions

Unit		A	A_1	b	b_1 (1)	c	D	D_1	E	e	H	L	P	Q	q
mm	max	4.7	1.40	0.95	1.7	0.65	15.8	6.8	10.30	5.08 (REF)	16.25	15.0	3.7	2.6	2.9
	nom														
	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 10. Package outline SOD59 (TO-220AC)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV29-400 v.3	20120529	Product data sheet	-	BYV29_SERIES v.2
Modifications:	• Type number BYV29-400 separated from data sheet BYV29_SERIES v.2. • Various changes to content.			
BYV29_SERIES v.2	19980901	Product specification	-	BYV29_SERIES v.1

9. Legal information

9.1 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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