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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If you have any questions related to this document, please contact our nearest sales office via e-mail or phone (details via salesaddresses@ween-semi.com).

Thank you for your cooperation and understanding,

WeEn Semiconductors

BYV410X-600

Enhanced ultrafast dual rectifier diode

Rev. 01 — 29 June 2009 Product data sheet

1. Product profile

1.1 General description

Enhanced ultrafast dual rectifier diode in a SOT186A (TO-220AB) plastic package.

1.2 Features and benefits

- High thermal cycling performance
- Isolated package
- Low thermal resistance
- Soft recovery characteristic minimizes power consuming oscillations
- Very low on-state losses

1.3 Applications

- Dual mode (DCM and CCM) PFC
- Power Factor Correction (PFC) for Interleaved Topology

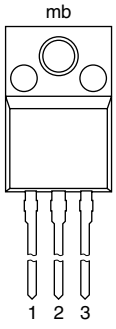
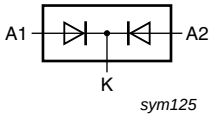
1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{O(AV)}$	average output current	square-wave pulse; δ = 0.5; $T_h \leq 42$ °C; both diodes conducting; see Figure 1; see Figure 2	-	-	20	A
Dynamic characteristics						
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; see Figure 5	-	20	35	ns
Q_r	recovered charge	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs	-	15	28	nC
Static characteristics						
V_F	forward voltage	I_F = 10 A; T_j = 25 °C; see Figure 4	-	1.4	2.1	V
		I_F = 10 A; T_j = 150 °C	-	1.3	1.9	V

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
2	K	cathode		
3	A2	anode 2		
mb	n.c.	mounting base; isolated		

SOT186A (TO-220F)

3. Ordering information

Table 3. Ordering information

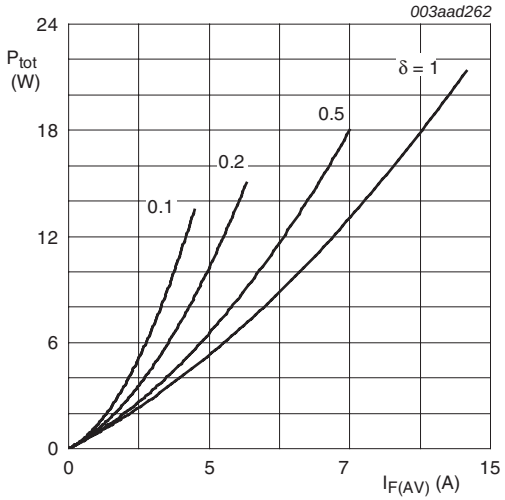
Type number	Package		
	Name	Description	Version
BYV410X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

4. Limiting values

Table 4. Limiting values

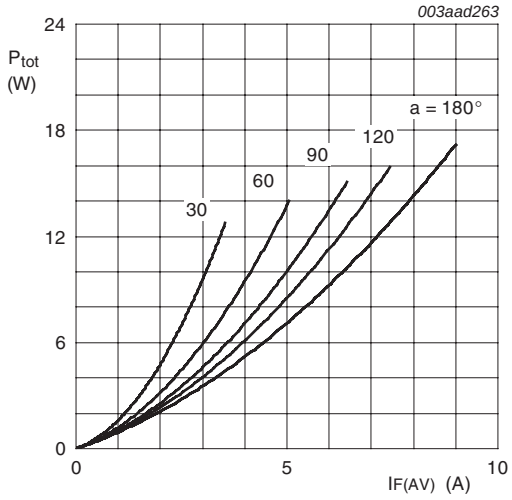
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	-	600	V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$; $T_h \leq 42$ °C; both diodes conducting; see Figure 1; see Figure 2	-	20	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25$ µs; $T_h \leq 60$ °C; per diode	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3$ ms; sine-wave pulse; $T_{j(init)} = 25$ °C; per diode	-	132	A
		$t_p = 10$ ms; sine-wave pulse; $T_{j(init)}$ 25 °C; per diode	-	120	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



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

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



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

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
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; per diode; see Figure 3	-	-	5	K/W
		with heatsink compound; both diodes conducting	-	-	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	55	-	K/W

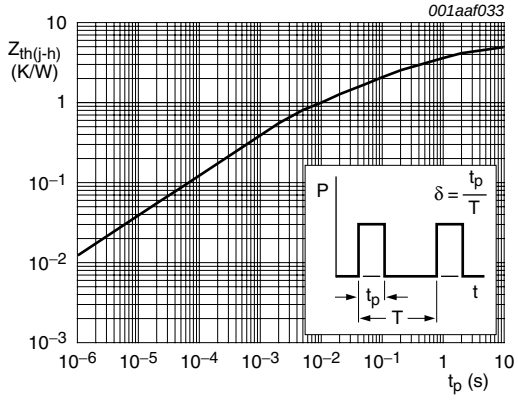


Fig 3. Transient thermal impedance from junction to heatsink per diode as a function of pulse width

6. Isolation characteristics

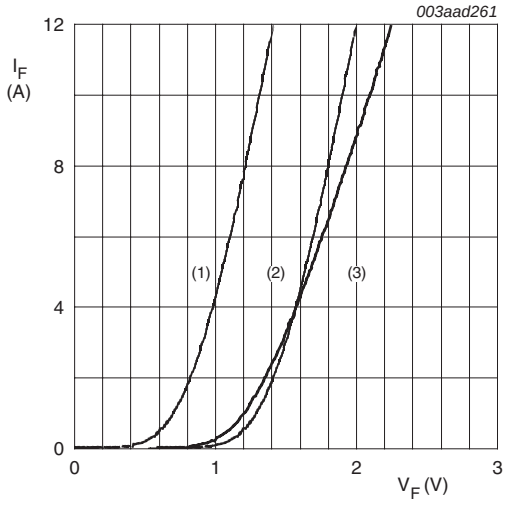
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz < f < 60 Hz; sinusoidal waveform; relative humidity < 65 %; clean and dust free; from all terminals to external heatsink	-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external heatsink; f = 1 MHz	-	10	-	pF

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 10 A; T_j = 25 °C; see Figure 4	-	1.4	2.1	V
		I_F = 10 A; T_j = 150 °C	-	1.3	1.9	V
I_R	reverse current	V_R = 600 V; T_j = 100 °C	-	0.7	1.5	mA
		V_R = 600 V; T_j = 25 °C	-	10	50	µA
Dynamic characteristics						
Q_r	recovered charge	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs	-	15	28	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; see Figure 5	-	20	35	ns
I_{RM}	peak reverse recovery current	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; see Figure 5	-	1.4	1.9	A
V_{FR}	forward recovery voltage	I_F = 1 A; dI_F/dt = 100 A/µs; see Figure 6	-	3.2	-	V



(1) $T_j = 150\ °C$; typical values
(2) $T_j = 150\ °C$; maximum values
(3) $T_j = 25\ °C$; maximum values

Fig 4. Forward current as a function of forward voltage

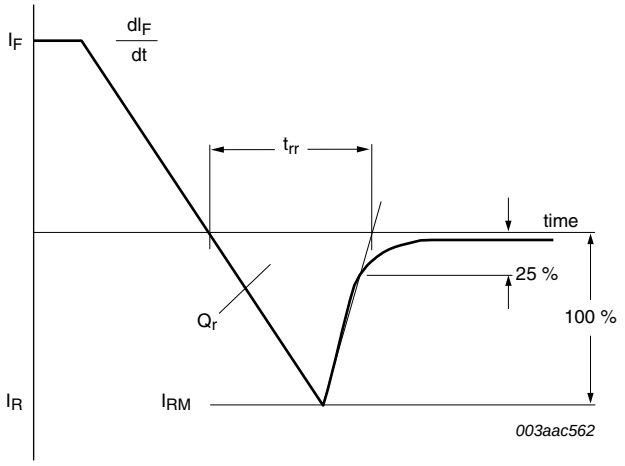


Fig 5. Reverse recovery definitions; ramp recovery

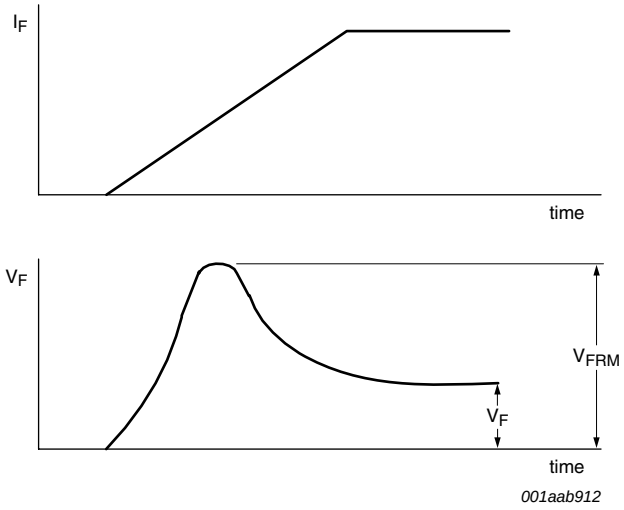
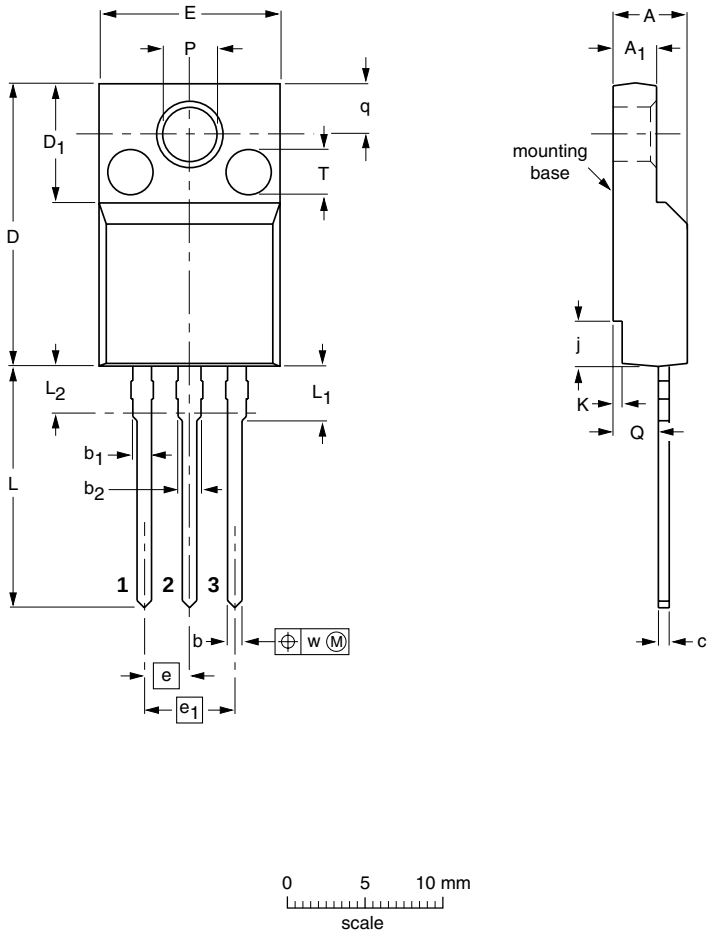


Fig 6. Forward recovery definitions

8. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 3-lead TO-220 'full pack'

SOT186A



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	b_2	c	D	D_1	E	e	e_1	j	K	L	L_1	L_2 (1) max.	P	Q	q	T (2)	w
mm	4.6 4.0	2.9 2.5	0.9 0.7	1.1 0.9	1.4 1.0	0.7 0.4	15.8 15.2	6.5 6.3	10.3 9.7	2.54	5.08	2.7 1.7	0.6 0.4	14.4 13.5	3.30 2.79	3	3.2 3.0	2.6 2.3	3.0 2.6	2.5	0.4

Notes

1. Terminal dimensions within this zone are uncontrolled.
2. Both recesses are ∅ 2.5 × 0.8 max. depth

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT186A		3-lead TO-220F				~~02-04-09~~ 06-02-14

Fig 7. Package outline SOT186A (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV410X-600_1	20090629	Product data sheet	-	-

10. Legal information

10.1 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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12. Contents

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