



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.

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Thank you for your cooperation and understanding,

WeEn Semiconductors





BYV34-500

Dual ultrafast power diodes

4 June 2014

Product data sheet

1. General description

Dual ultrafast power diodes in a SOT78 (TO-220AB) plastic package.

2. Features and benefits

- Fast switching
- High thermal cycling performance
- Low forward voltage drop
- Low switching loss
- Low thermal resistance
- Soft recovery characteristic

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	500	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$; $T_{mb} \leq 115$ °C; both diodes conducting; Fig. 1 ; Fig. 2	-	-	20	A
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 150$ °C; Fig. 4	-	0.87	1.05	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/ μ s; $T_j = 25$ °C; Fig. 7 ; Fig. 5	-	50	60	ns

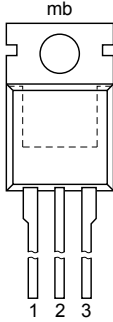
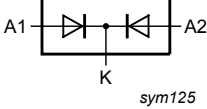


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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 <p>TO-220AB (SOT78)</p>	 <p><i>sym125</i></p>
2	K	cathode		
3	A2	anode 2		

6. Ordering information

Table 3. Ordering information

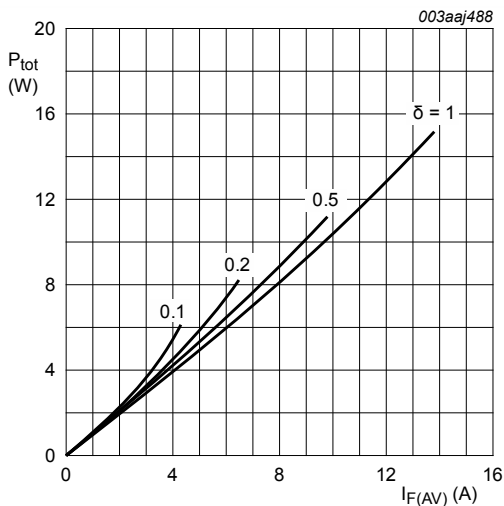
Type number	Package		
	Name	Description	Version
BYV34-500	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Limiting values

Table 4. Limiting values

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

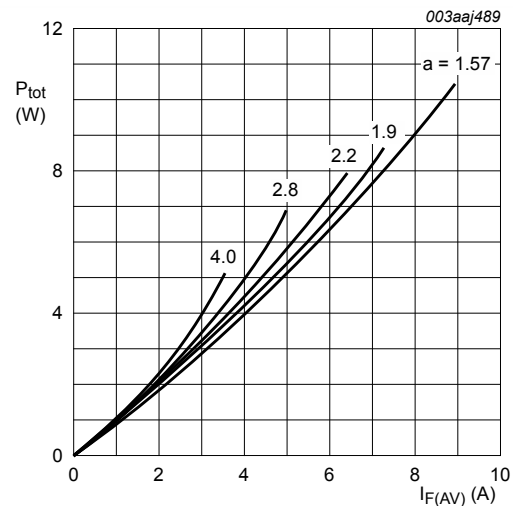
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	500	V
V_{RWM}	crest working reverse voltage		-	500	V
V_R	reverse voltage	$T_{mb} \leq 138\text{ °C}$; DC	-	500	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$; $T_{mb} \leq 115\text{ °C}$; both diodes conducting; Fig. 1 ; Fig. 2	-	20	A
I_{FRM}	repetitive peak forward current	SQW; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 115\text{ °C}$; per diode	-	20	A
I_{FSM}	non-repetitive peak forward current	SIN; $t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; per diode	-	120	A
		SIN; $t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; per diode	-	132	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



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

$$V_o = 0.94\text{ V}; R_s = 0.01\text{ }\Omega$$

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



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

$$V_o = 0.94\text{ V}; R_s = 0.01\text{ }\Omega$$

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

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	with heatsink compound; per diode; Fig. 3	-	-	2.4	K/W
		with heatsink compound; both diodes conducting	-	-	1.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

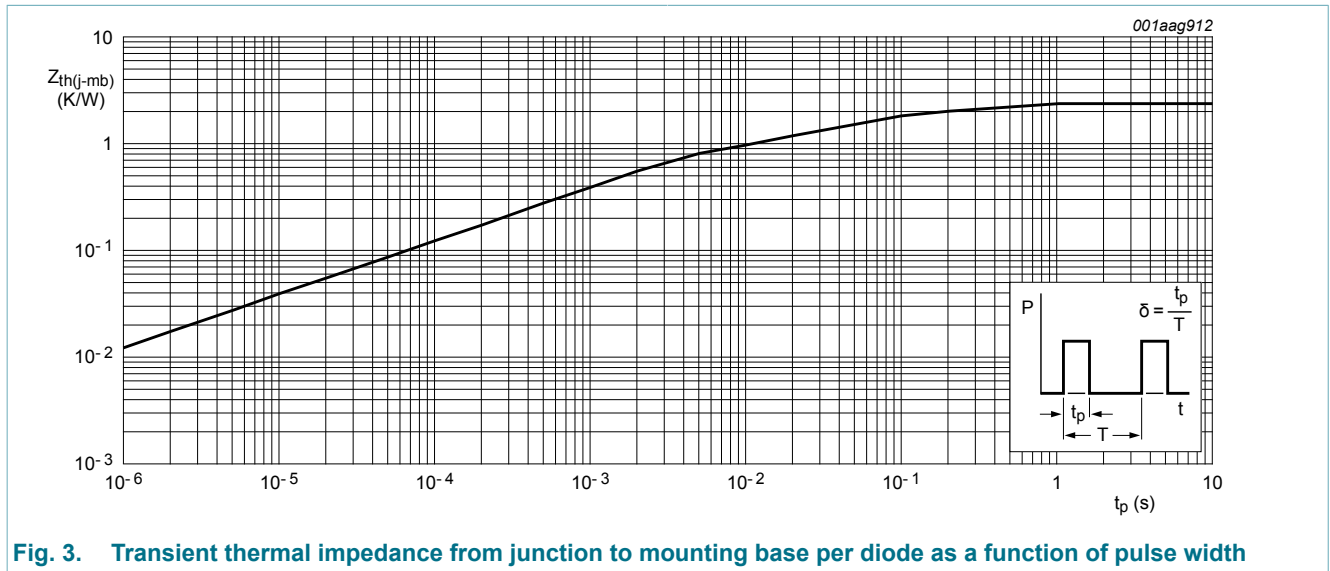
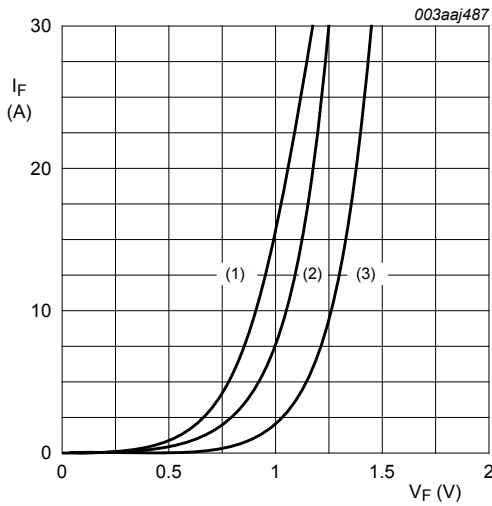


Fig. 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _F	forward voltage	I _F = 20 A; T _j = 25 °C; Fig. 4	-	1.1	1.35	V
		I _F = 10 A; T _j = 150 °C; Fig. 4	-	0.87	1.05	V
I _R	reverse current	V _R = 500 V; T _j = 25 °C	-	10	50	μA
		V _R = 500 V; T _j = 100 °C	-	0.2	0.6	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; Fig. 5; Fig. 6	-	50	60	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; T _j = 25 °C; Fig. 7; Fig. 5	-	50	60	ns
I _{RM}	peak reverse recovery current	I _F = 10 A; V _R = 30 V; dI _F /dt = 50 A/μs; T _j = 100 °C; Fig. 8; Fig. 5	-	4	5	A
V _{FRM}	forward recovery voltage	I _F = 10 A; dI _F /dt = 10 A/μs; T _j = 25 °C; Fig. 9	-	2.5	-	V



V₀ = 0.94 V; R_s = 0.01 Ω
 (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; per diode

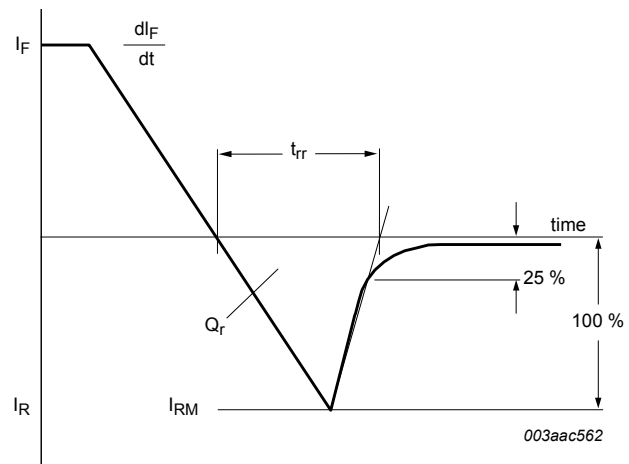
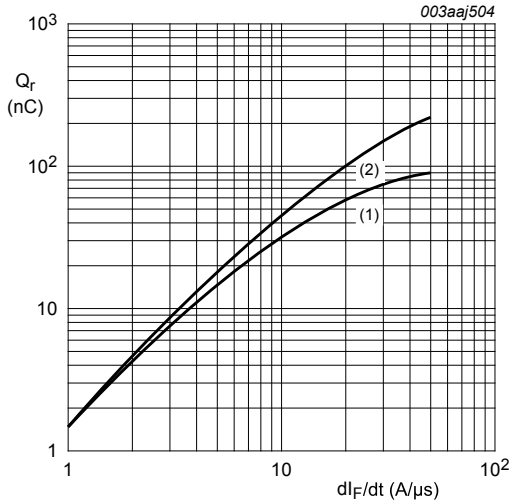
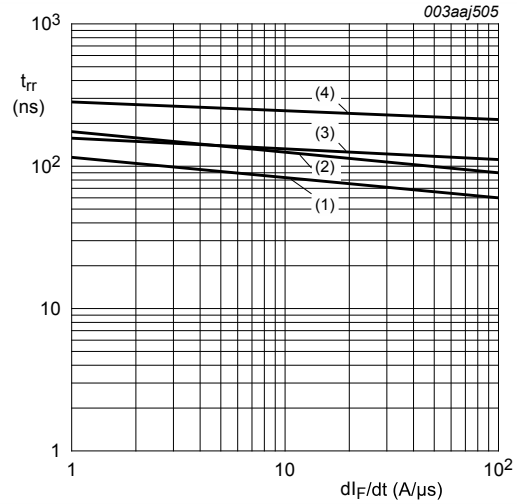


Fig. 5. Reverse recovery definitions; ramp recovery



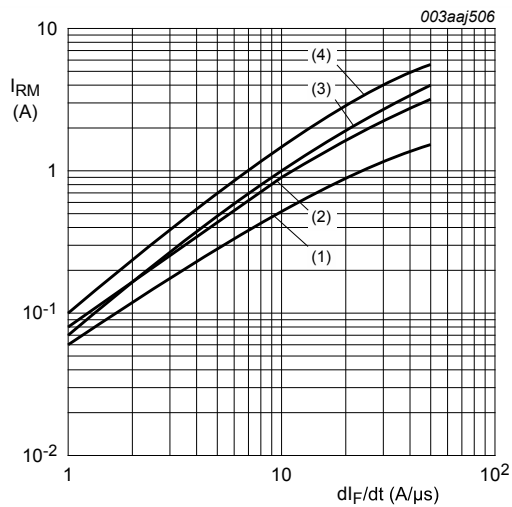
- (1) $I_F = 2 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (2) $I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$

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



- (1) $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (2) $I_F = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$
- (3) $I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (4) $I_F = 20 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

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



- (1) $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (2) $I_F = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$
- (3) $I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$
- (4) $I_F = 20 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

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

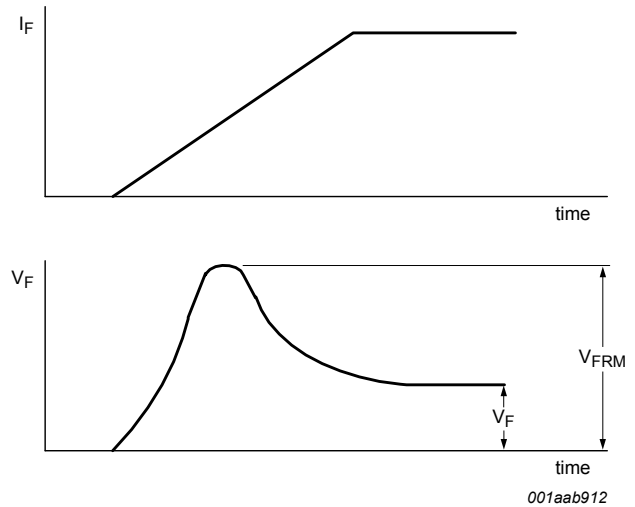
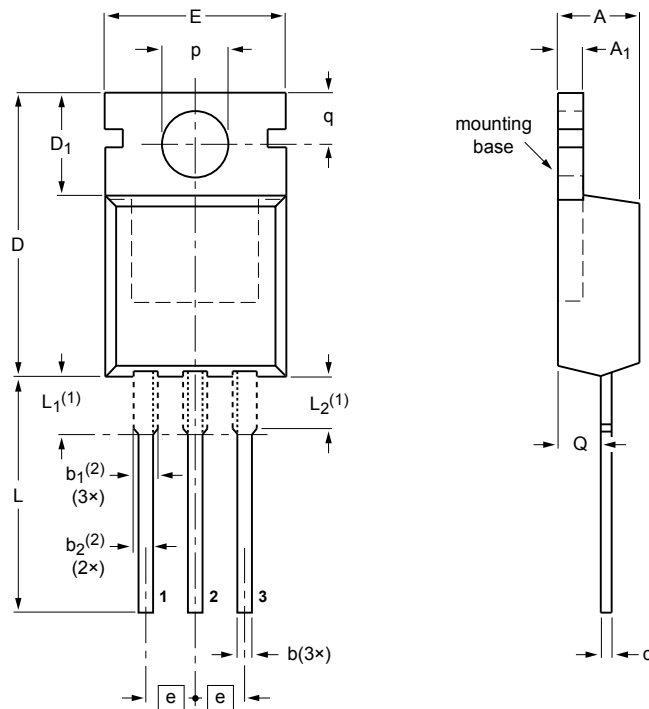


Fig. 9. Forward recovery definitions

10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁	b	b ₁ (2)	b ₂ (2)	c	D	D ₁	E	e	L	L ₁ (1)	L ₂ (1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes

- Lead shoulder designs may vary.
- Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT78		3-lead TO-220AB	SC-46		08-04-23 08-06-13

Fig. 10. Package outline TO-220AB (SOT78)

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.

- [1] Please consult the most recently issued document before initiating or completing a design.
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