

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



BYW29E-150

Ultrafast power diode

17 September 2013

Product data sheet

1. General description

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

2. Features and benefits

- Fast switching
- Guaranteed ESD capability
- High thermal cycling performance
- Low on-state loss
- Low thermal resistance
- Rugged: reverse voltage surge capability
- Soft recovery minimizes power-consuming oscillations

3. Applications

- Output rectifiers in high-frequency switched-mode power supplies

4. Quick reference data

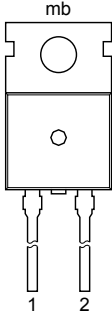
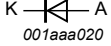
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	150	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 128\text{ }^{\circ}\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2	-	-	8	A
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}$; $T_J = 25\text{ }^{\circ}\text{C}$; Fig. 4	-	0.92	1.05	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $T_J = 25\text{ }^{\circ}\text{C}$; ramp recovery; Fig. 5 ; Fig. 7	-	20	25	ns
Electrostatic discharge						
V_{ESD}	electrostatic discharge voltage	HBM; $C = 250\text{ pF}$; $R = 1.5\text{ k}\Omega$	-	-	8	kV



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO-220AC (SOD59)	
2	A	anode		
mb	mb	mounting base; cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYW29E-150	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		-	150	V
V_{RWM}	crest working reverse voltage		-	150	V
V_R	reverse voltage		-	150	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 128\text{ }^{\circ}\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2	-	8	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 128\text{ }^{\circ}\text{C}$; square-wave pulse	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse	-	88	A
		$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse	-	80	A
I_{RRM}	repetitive peak reverse current	$\delta = 0.001$; $t_p = 2\text{ }\mu\text{s}$	-	0.2	A

Symbol	Parameter	Conditions		Min	Max	Unit
I_{RSM}	non-repetitive peak reverse current	$t_p = 100 \mu s$		-	0.2	A
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	150	°C
Electrostatic discharge						
V_{ESD}	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 kΩ		-	8	kV

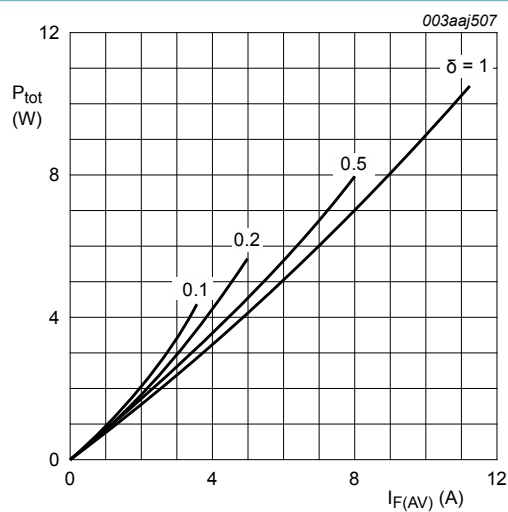


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

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

$$V_O = 0.791 \text{ V}; R_S = 0.013 \Omega$$

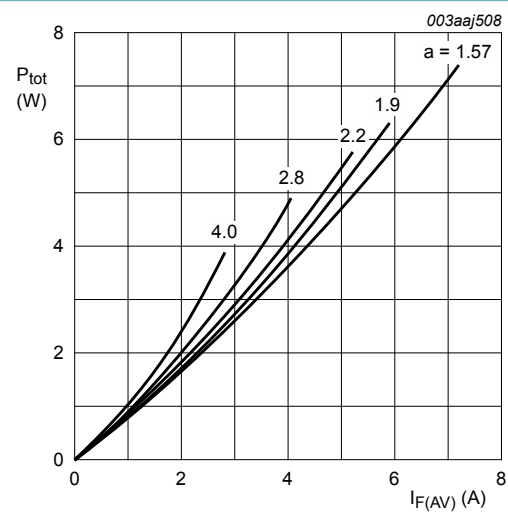


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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

$$V_O = 0.791 \text{ V}; R_S = 0.013 \Omega$$

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		-	-	2.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W

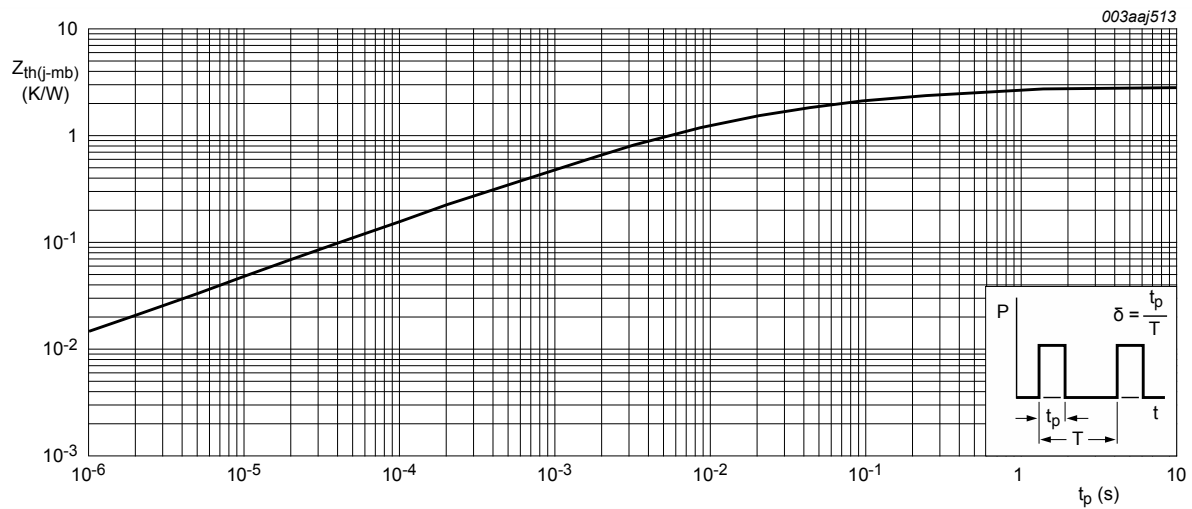


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 8 A; T _j = 25 °C; Fig. 4		-	0.92	1.05	V
		I _F = 20 A; T _j = 25 °C; Fig. 4		-	1.1	1.3	V
		I _F = 8 A; T _j = 150 °C; Fig. 4		-	0.8	0.895	V
I _R	reverse current	V _R = 150 V; T _j = 25 °C		-	2	10	μA
		V _R = 150 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/μs; T _j = 25 °C; Fig. 5 ; Fig. 6		-	4	11	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; T _j = 25 °C; ramp recovery; Fig. 5 ; Fig. 7		-	20	25	ns
		I _F = 0.5 A; I _R = 1 A; I _{R(meas)} = 0.25 A; T _j = 25 °C; step recovery; Fig. 8		-	15	20	ns
V _{FRM}	forward recovery voltage	I _F = 1 A; dI _F /dt = 10 A/μs; T _j = 25 °C; Fig. 9		-	1	-	V

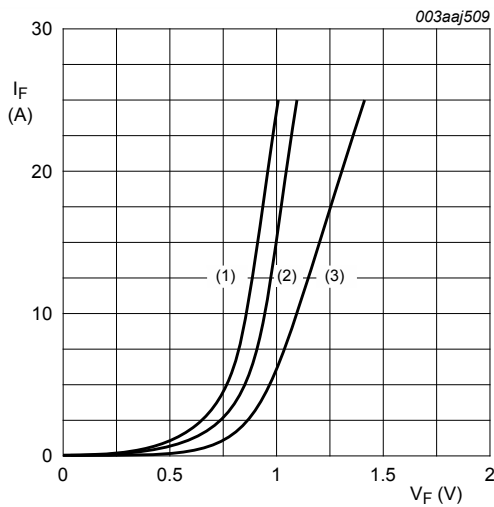


Fig. 4. Forward current as a function of forward voltage

- (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;
- $V_O = 0.791\text{ V}$; $R_S = 0.013\text{ }\Omega$

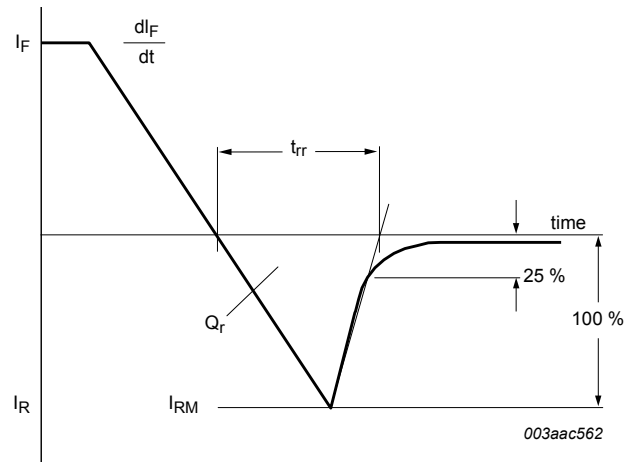


Fig. 5. Reverse recovery definitions; ramp recovery

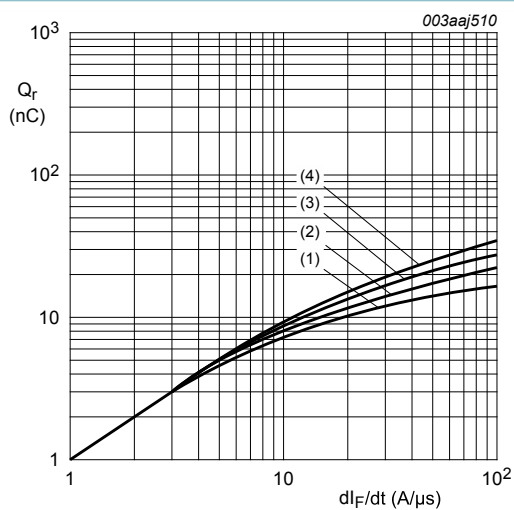


Fig. 6. Recovered charge as a function of rate of change of forward current; maximum values

- (1) $I_F = 1\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$
- (2) $I_F = 2\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$
- (3) $I_F = 5\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$
- (4) $I_F = 10\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$

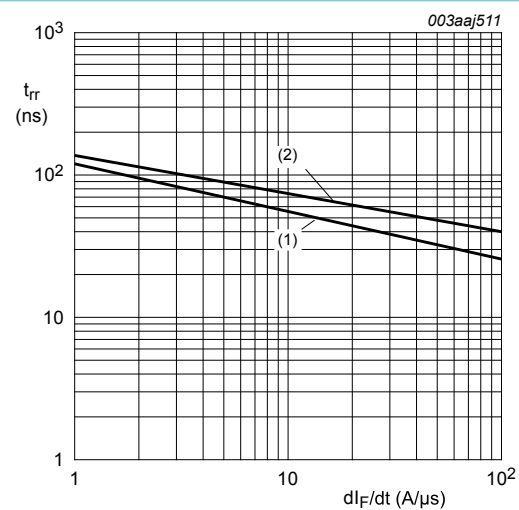


Fig. 7. Reverse recovery time as a function of rate of change of forward current; maximum values

- (1) $I_F = 1\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$
- (2) $I_F = 10\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$

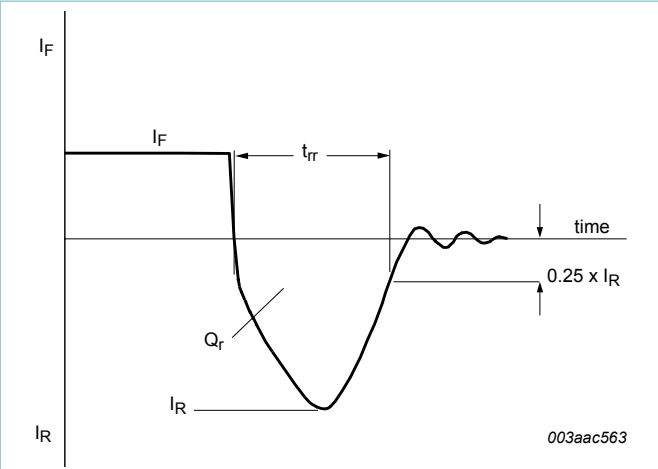


Fig. 8. Reverse recovery definitions; step recovery

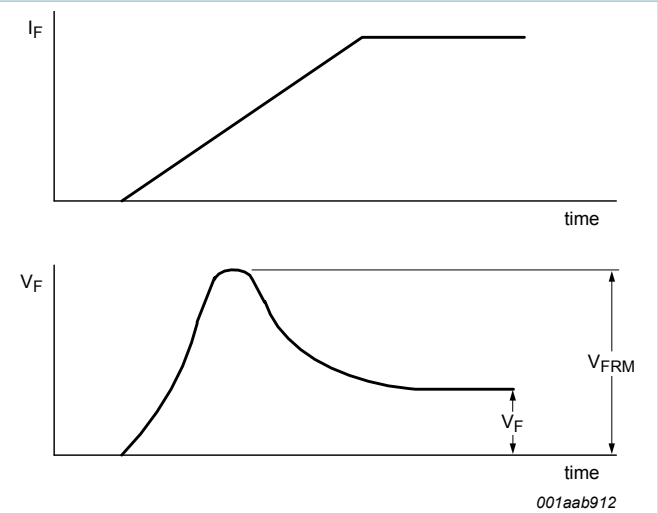


Fig. 9. Forward recovery definitions

10. Package outline

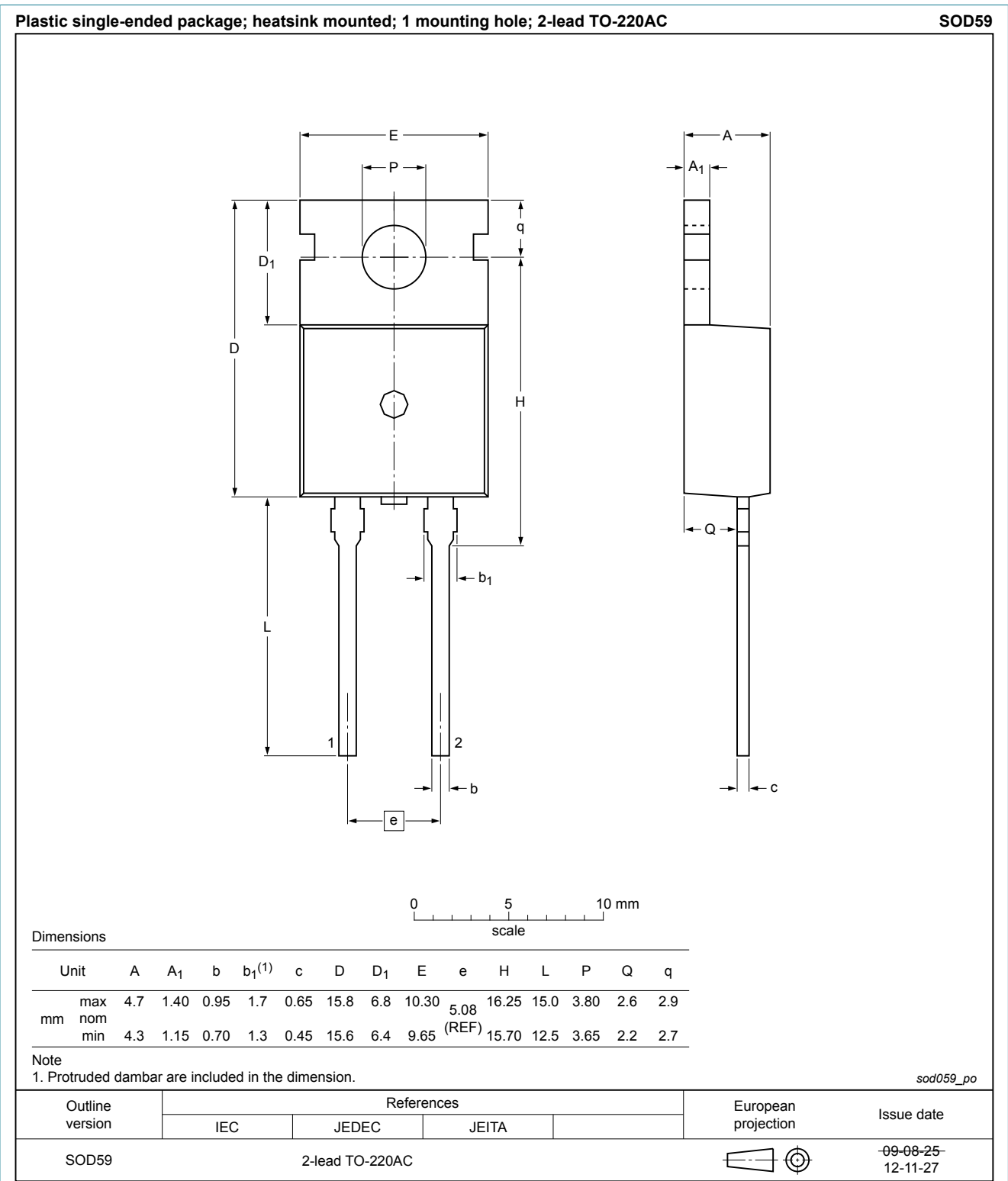


Fig. 10. Package outline TO-220AC (SOD59)

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.

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