IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

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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

BYC60W-600P

Hyperfast power diode

5 November 2015 **Product data sheet**

1. General description

Hyperfast power diode in a SOD142 (2-lead TO247) plastic package.

2. Features and benefits

- Fast switching and soft reverse recovery characteristics
- Low forward voltage drop
- Low leakage current
- Low reverse recovery current
- Reduces switching losses in associated MOSFET or IGBT

3. Applications

- UPS
- EV Charger
- Welding Machine
- Air Conditioner

4. Quick reference data

Table 1. Quick reference data

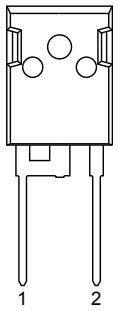
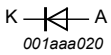
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 41$ °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3		-	-	60	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 41$ °C; square-wave pulse		-	-	120	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4		-	-	600	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4		-	-	660	A
Static characteristics							
V_F	forward voltage	$I_F = 60$ A; $T_j = 25$ °C; Fig. 6		-	2	2.6	V
		$I_F = 60$ A; $T_j = 150$ °C; Fig. 6		-	1.55	2	V

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 7		-	-	50	ns
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	40	-	ns
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	101	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 **TO-247 (SOD142)**	
2	A	anode		
mb	mb	mounting base; connected to cathode		

6. Ordering information

Table 3. Ordering information

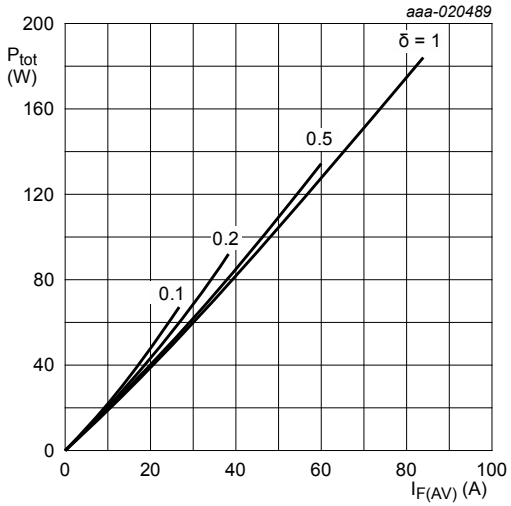
Type number	Package		
	Name	Description	Version
BYC60W-600P	TO-247	Plastic Single-ended through-hole package; Heatsink mounted; 1 mounting hole; 2-lead TO-247	SOD142

7. Limiting values

Table 4. Limiting values

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

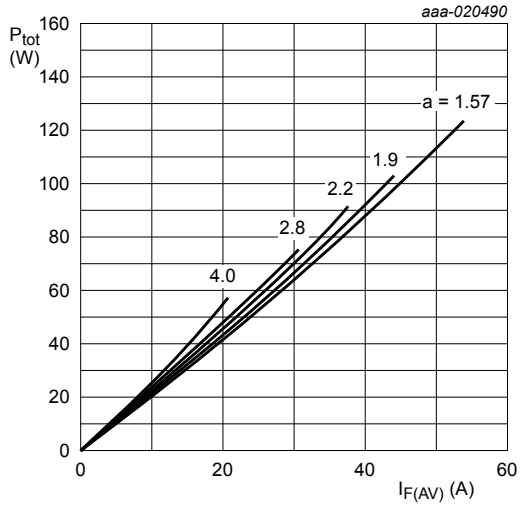
Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	600	V
V_{RWM}	crest working reverse voltage			-	600	V
V_R	reverse voltage	DC		-	600	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; T_{mb} ≤ 41 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3		-	60	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; T_{mb} ≤ 41 °C; square-wave pulse		-	120	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4		-	600	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4		-	660	A
T_{stg}	storage temperature			-55	175	°C
T_j	junction temperature			-	175	°C



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

V_o = 1.994 V; R_s = 0.002 Ω

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



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

V_o = 1.994 V; R_s = 0.002 Ω

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

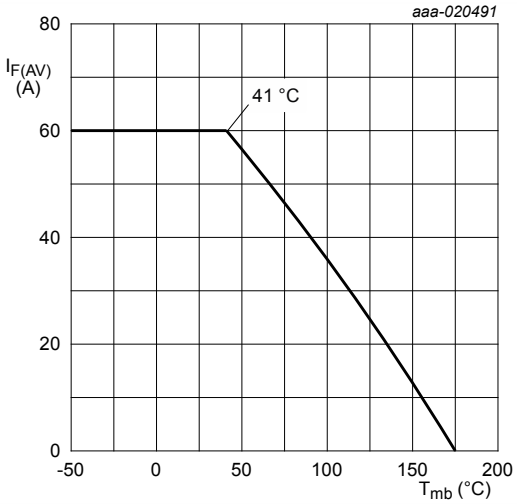


Fig. 3. Forward current as a function of mounting base temperature; maximum values

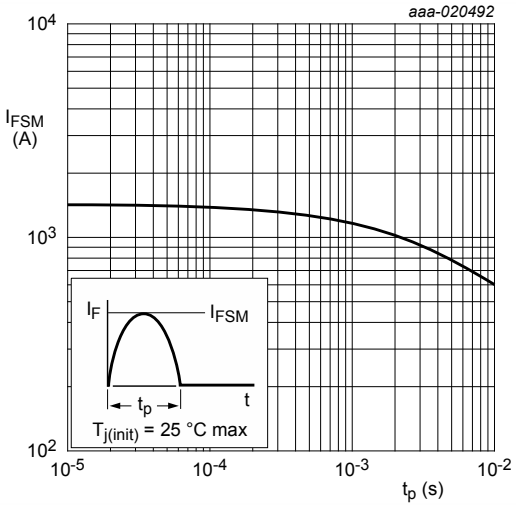


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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; Fig. 5		-	-	1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	45	-	K/W

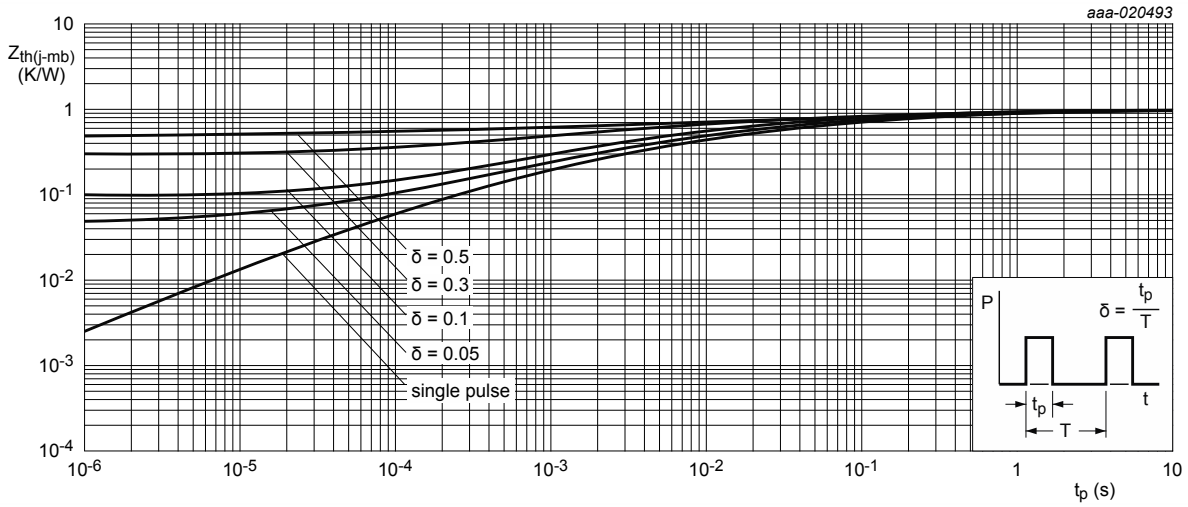
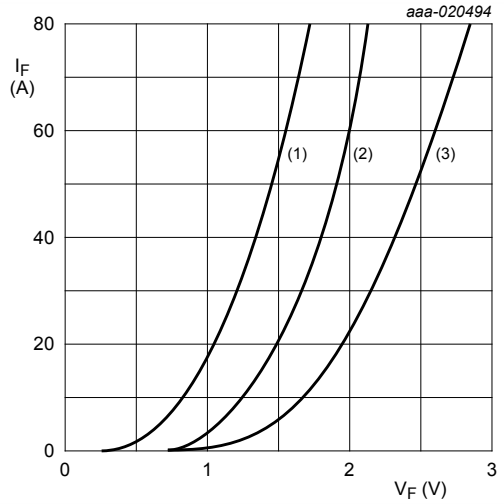


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 60 A; T_j = 25 °C; Fig. 6		-	2	2.6	V
		I_F = 60 A; T_j = 150 °C; Fig. 6		-	1.55	2	V
I_R	reverse current	V_R = 600 V; T_j = 25 °C		-	2	10	µA
		V_R = 600 V; T_j = 125 °C		-	-	500	µA
Dynamic characteristics							
Q_r	recovered charge	I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	74	-	nC
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	559	-	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 7		-	-	50	ns
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	40	-	ns
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	101	-	ns
I_{RM}	peak reverse recovery current	I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	3.7	-	A
		I_F = 60 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	11	-	A



V_o = 1.994 V; R_s = 0.002 Ω

(1) T_j = 150 °C; typical values

(2) T_j = 150 °C; maximum values

(3) T_j = 25 °C; maximum values

Fig. 6. Forward current as a function of forward voltage

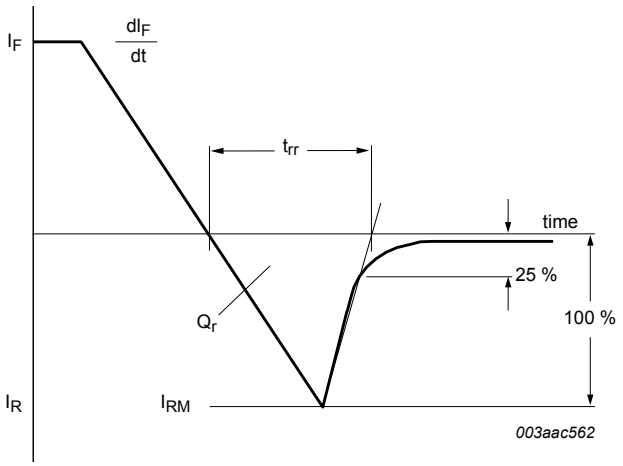
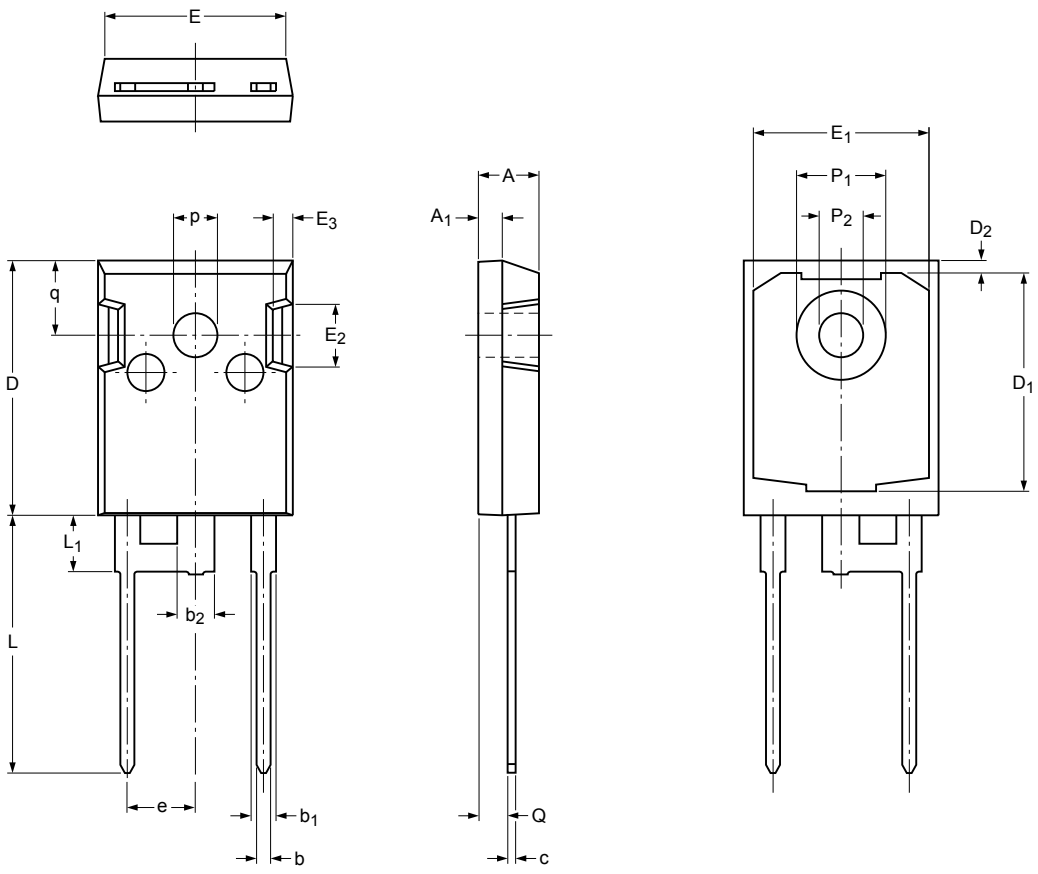


Fig. 7. Reverse recovery definitions; ramp recovery

10. Package outline

Plastic Single-ended through-hole package; Heatsink mounted; 1 mounting hole; 2-lead TO-247 **SOD142**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b	b_1	b_2	c	D	D_1	D_2	e	E	E_1	E_2	E_3	L	L_1	p	p_1	p_2	q	Q
mm	max	5.2	2.1	1.4	2.2	3.2	0.7	20.6	17.68	1.2		15.75	14.22	5.2	1.8	20.9	4.75	3.7	7.3	3.6	6.18	2.6
	nom										5.45											
	min	4.7	1.9	1.0	1.8	2.8	0.5	20.3	17.28	0.8		15.45	13.82	4.8	1.4	20.4	4.25	3.5	7.1	3.4	5.78	2.2

sod142_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD142		TO247				~~12-11-13~~ 12-11-27

Fig. 8. Package outline TO-247 (SOD142)

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: 5 November 2015