



# BCW68 series

45 V, 800 mA PNP general-purpose transistor

Rev. 1 — 21 April 2017

Product data sheet

## 1 General description

PNP general-purpose transistors in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complements: BCW66F/G/H

## 2 Features and benefits

- High current
- AEC-Q101 qualified

## 3 Applications

- General-purpose switching and amplification

## 4 Quick reference data

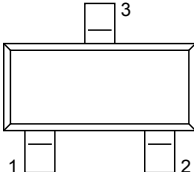
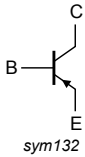
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CE0}$	collector-emitter voltage	open base	-	-	-45	V
$I_C$	collector current		-	-	-800	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	-1	A
$h_{FE}$	DC current gain	$V_{CE} = -1$ V; $I_C = -100$ mA; $T_{amb} = 25$ °C [1]				
	BCW68F		100	-	250	
	BCW68G		160	-	400	
	BCW68H		250	-	600	

[1] pulsed:  $t_p \leq 300$   $\mu$ s,  $\delta \leq 0.02$

## 5 Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		 sym132
2	E	emitter		
3	C	collector		

## 6 Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BCW68F	TO-236AB	plastic surface-mounted package; 3 leads	SOT23
BCW68G			
BCW68H			

## 7 Marking

Table 4. Marking

Type number	Marking code
BCW68F	[1] ET%
BCW68G	[1] EU%
BCW68H	[1] EV%

[1] % = placeholder for manufacturing site code

## 8 Limiting values

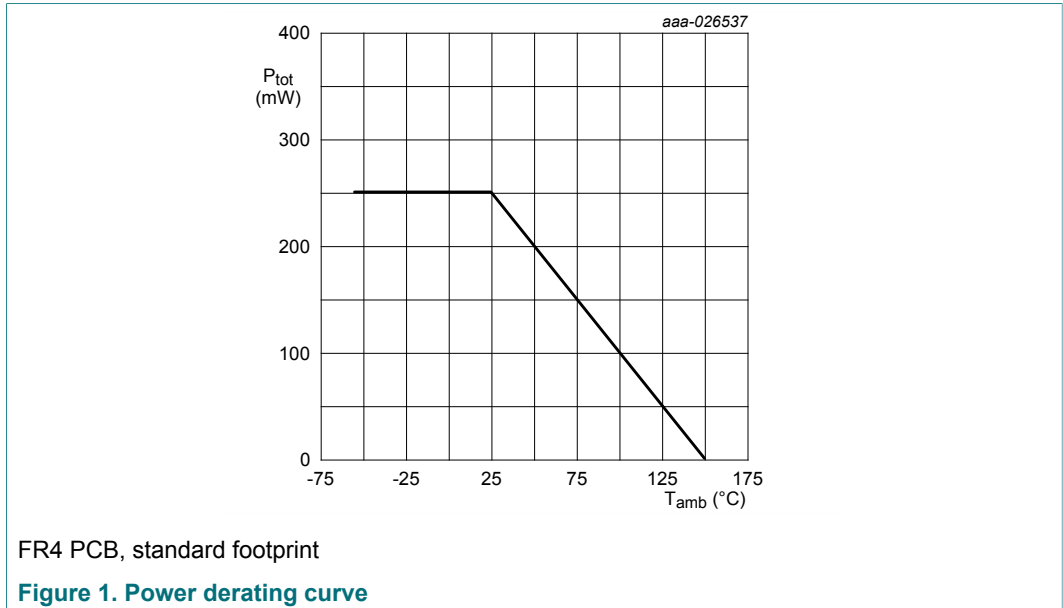
Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	-50	V
$V_{CEO}$	collector-emitter voltage	open base	-	-45	V
$V_{EBO}$	emitter-base voltage	open collector	-	-5	V
$I_C$	collector current		-	-800	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-1	A
$I_B$	base current		-	-100	mA

Symbol	Parameter	Conditions	Min	Max	Unit
$I_{BM}$	peak base current	single pulse; $t_p \leq 1$ ms	-	-200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C [1]	-	250	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-55	150	°C
$T_{stg}$	storage temperature		-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit-Board (PCB), single-sided chopper, tin-plated and standard footprint.

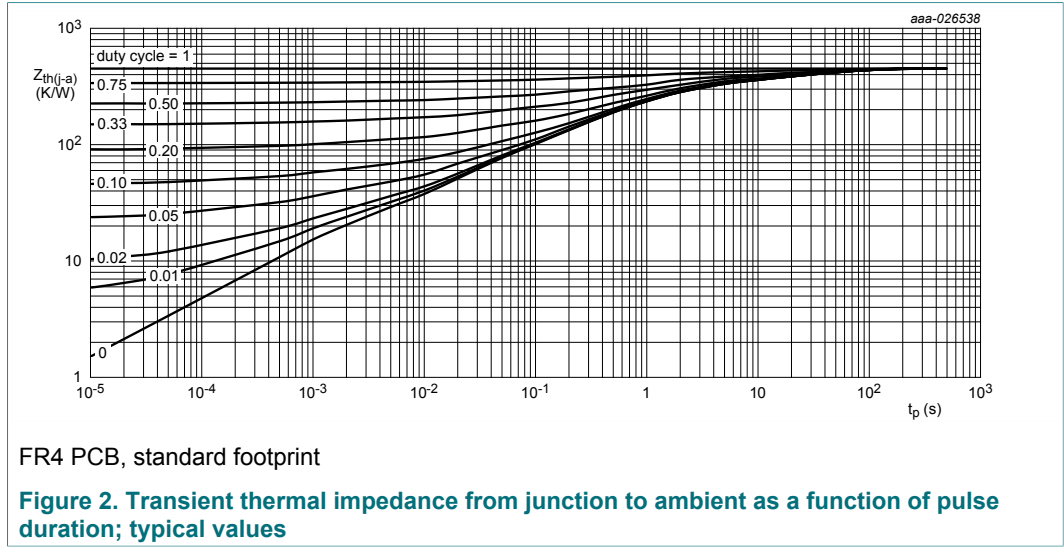


## 9 Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air [1]	-	-	500	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



## 10 Electrical characteristics

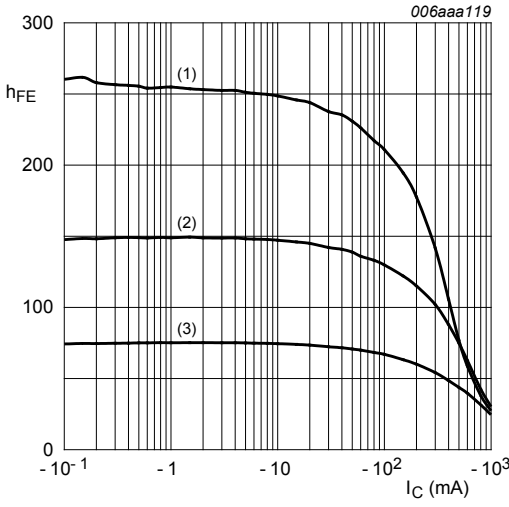
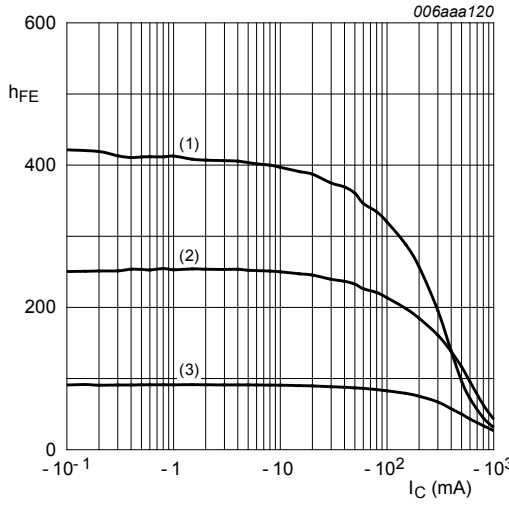
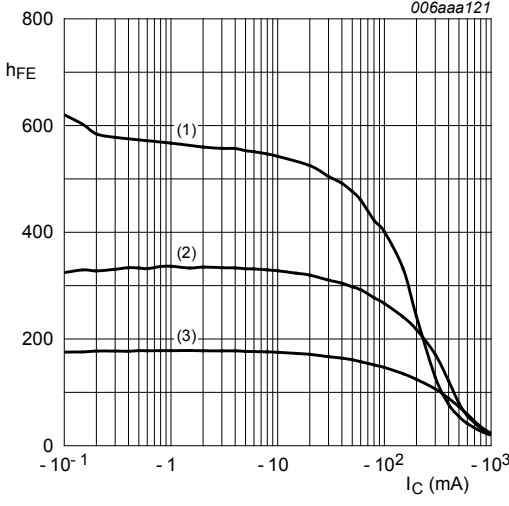
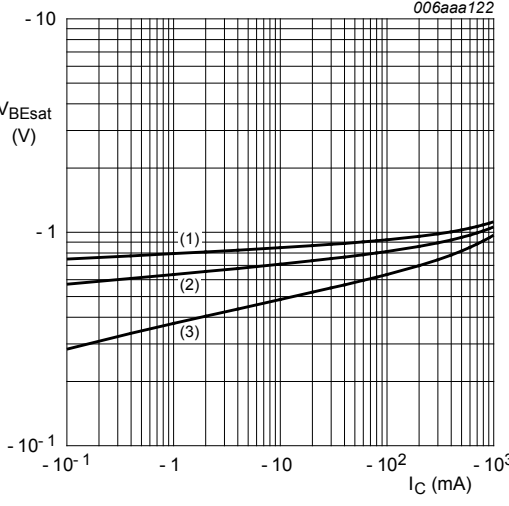
**Table 7. Electrical characteristics**

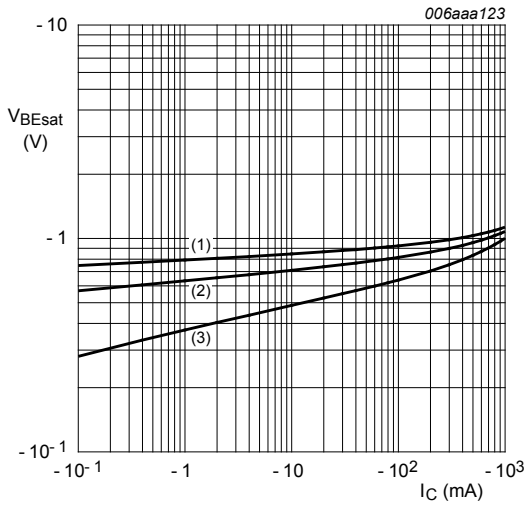
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -40\text{ V}; I_E = 0\text{ A}$	-	-	-20	nA
		$V_{CB} = -40\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ °C}$	-	-	-5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-20	nA
$h_{FE}$	DC current gain					
	BCW68F/G/H	$V_{CE} = -1\text{ V}; I_C = -100\text{ }\mu\text{A}$	100	-	-	
	BCW68F/G/H	$V_{CE} = -1\text{ V}; I_C = -1\text{ mA}$	100	-	-	
	BCW68F/G/H	$V_{CE} = -1\text{ V}; I_C = -10\text{ mA}$	100	-	-	
	BCW68F	$V_{CE} = -1\text{ V}; I_C = -100\text{ mA}$	[1] 100	-	250	
	BCW68G		160	-	400	
	BCW68H		250	-	600	
	BCW68F	$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$	[1] 35	-	-	
	BCW68G		60	-	-	
BCW68H	100		-	-		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -100\text{ mA}; I_B = -10\text{ mA}$	[1] -	-	-350	mV
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	[1] -	-	-450	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -100\text{ mA}; I_B = -10\text{ mA}$	[1] -	-	-1.25	V
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	[1] -	-	-1.25	V
$f_T$	transition frequency	$V_{CE} = -5\text{ V}; I_C = -10\text{ mA}; f = 100\text{ MHz}$	80	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$	-	5	-	pF

[1] pulsed;  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$

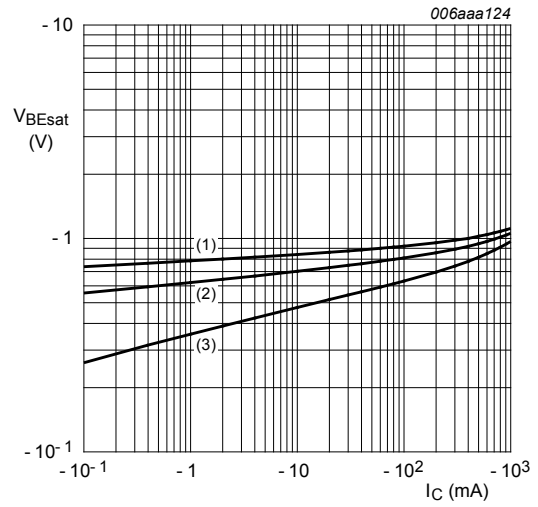
Table 8.

 <p><math>V_{CE} = -1 \text{ V}</math>            (1) <math>T_{amb} = 150 \text{ }^\circ\text{C}</math>            (2) <math>T_{amb} = 25 \text{ }^\circ\text{C}</math>            (3) <math>T_{amb} = -55 \text{ }^\circ\text{C}</math></p> <p><b>Figure 3. BCW68F: DC current gain as a function of collector current; typical values</b></p>	 <p><math>V_{CE} = -1 \text{ V}</math>            (1) <math>T_{amb} = 150 \text{ }^\circ\text{C}</math>            (2) <math>T_{amb} = 25 \text{ }^\circ\text{C}</math>            (3) <math>T_{amb} = -55 \text{ }^\circ\text{C}</math></p> <p><b>Figure 4. BCW68G: DC current gain as a function of collector current; typical values</b></p>
 <p><math>V_{CE} = -1 \text{ V}</math>            (1) <math>T_{amb} = 150 \text{ }^\circ\text{C}</math>            (2) <math>T_{amb} = 25 \text{ }^\circ\text{C}</math>            (3) <math>T_{amb} = -55 \text{ }^\circ\text{C}</math></p> <p><b>Figure 5. BCW68H: DC current gain as a function of collector current; typical values</b></p>	 <p><math>I_C/I_B = 10</math>            (1) <math>T_{amb} = -55 \text{ }^\circ\text{C}</math>            (2) <math>T_{amb} = 25 \text{ }^\circ\text{C}</math>            (3) <math>T_{amb} = 150 \text{ }^\circ\text{C}</math></p> <p><b>Figure 6. BCW68F: Base-emitter saturation voltage as a function of collector current; typical values</b></p>



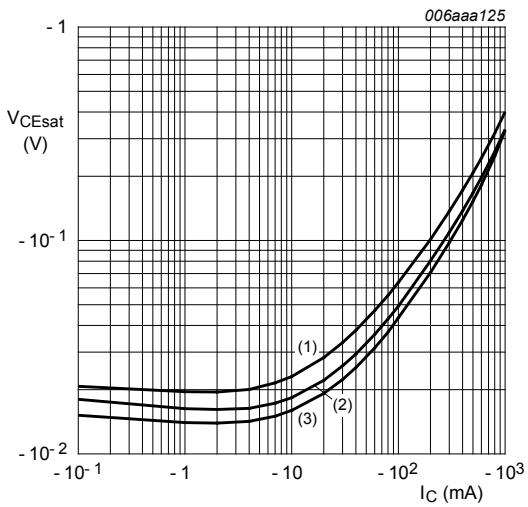
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

Figure 7. BCW68G: Base-emitter saturation voltage as a function of collector current; typical values



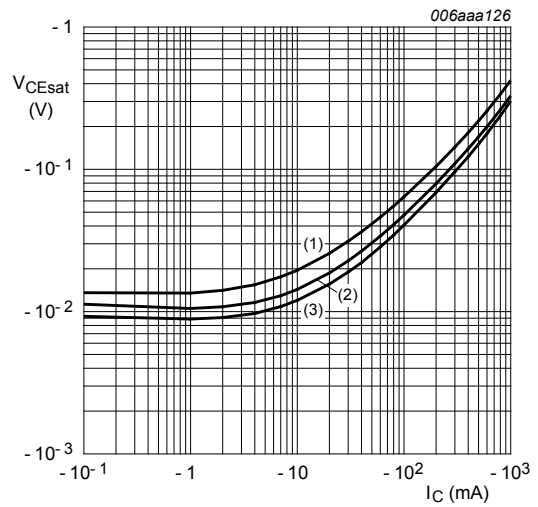
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

Figure 8. BCW68H: Base-emitter saturation voltage as a function of collector current; typical values



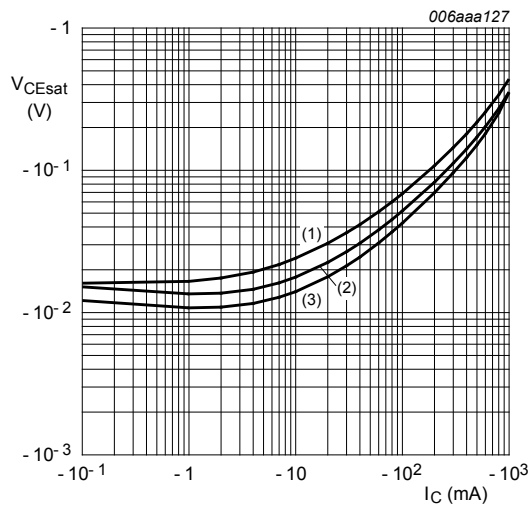
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Figure 9. BCW68F: Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

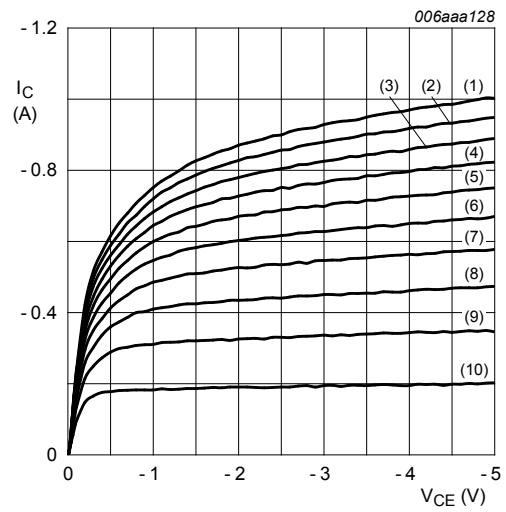
Figure 10. BCW68G: Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 10$

- (1)  $T_{amb} = 150\text{ °C}$
- (2)  $T_{amb} = 25\text{ °C}$
- (3)  $T_{amb} = -55\text{ °C}$

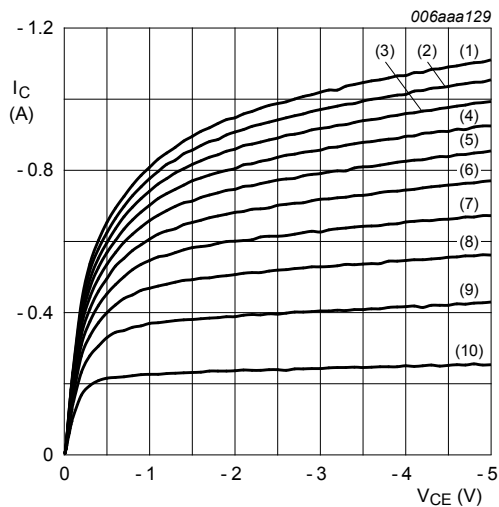
**Figure 11. BCW68H: Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25\text{ °C}$

- (1)  $I_B = -16.0\text{ mA}$
- (2)  $I_B = -14.4\text{ mA}$
- (3)  $I_B = -12.8\text{ mA}$
- (4)  $I_B = -11.2\text{ mA}$
- (5)  $I_B = -9.6\text{ mA}$
- (6)  $I_B = -8.0\text{ mA}$
- (7)  $I_B = -6.4\text{ mA}$
- (8)  $I_B = -4.8\text{ mA}$
- (9)  $I_B = -3.2\text{ mA}$
- (10)  $I_B = -1.6\text{ mA}$

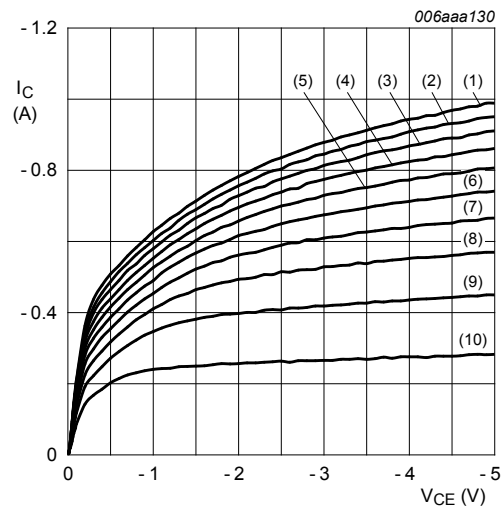
**Figure 12. BCW68F: Collector current as a function of collector-emitter voltage; typical values**



$T_{amb} = 25\text{ }^{\circ}\text{C}$

- (1)  $I_B = -13.0\text{ mA}$
- (2)  $I_B = -11.7\text{ mA}$
- (3)  $I_B = -10.4\text{ mA}$
- (4)  $I_B = -9.1\text{ mA}$
- (5)  $I_B = -7.8\text{ mA}$
- (6)  $I_B = -6.5\text{ mA}$
- (7)  $I_B = -5.2\text{ mA}$
- (8)  $I_B = -3.9\text{ mA}$
- (9)  $I_B = -2.6\text{ mA}$
- (10)  $I_B = -1.3\text{ mA}$

**Figure 13. BCW68G: Collector current as a function of collector-emitter voltage; typical values**



$T_{amb} = 25\text{ }^{\circ}\text{C}$

- (1)  $I_B = -12.0\text{ mA}$
- (2)  $I_B = -10.8\text{ mA}$
- (3)  $I_B = -9.6\text{ mA}$
- (4)  $I_B = -8.4\text{ mA}$
- (5)  $I_B = -7.2\text{ mA}$
- (6)  $I_B = -6.0\text{ mA}$
- (7)  $I_B = -4.8\text{ mA}$
- (8)  $I_B = -3.6\text{ mA}$
- (9)  $I_B = -2.4\text{ mA}$
- (10)  $I_B = -1.2\text{ mA}$

**Figure 14. BCW68H: Collector current as a function of collector-emitter voltage; typical values**

## 11 Test information

### 11.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.



## 12 Package outline

Table 9. Package outline

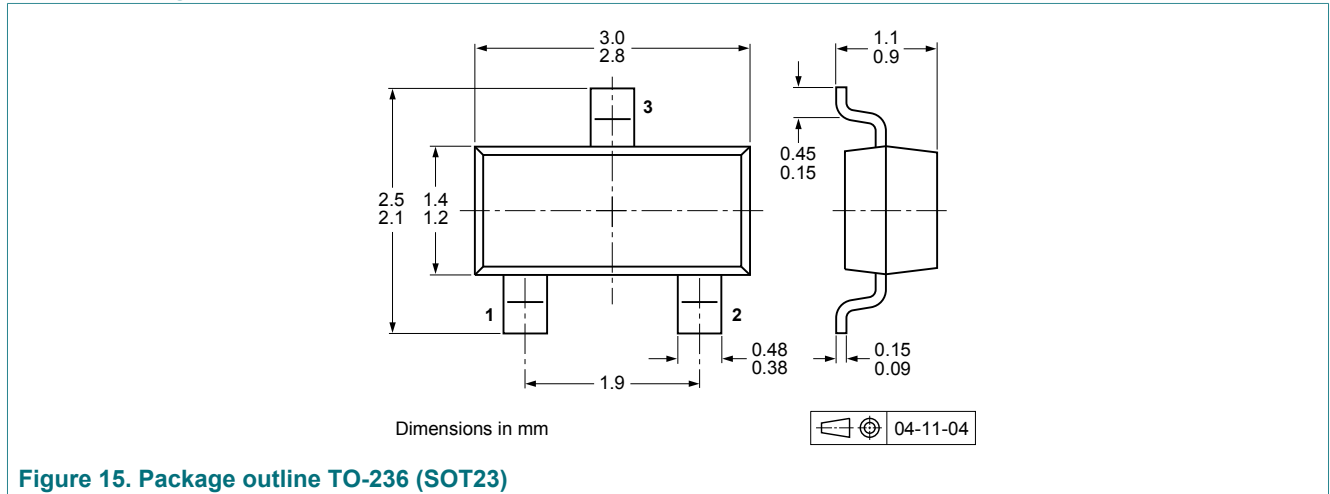


Figure 15. Package outline TO-236 (SOT23)

## 13 Soldering

Table 10. Soldering

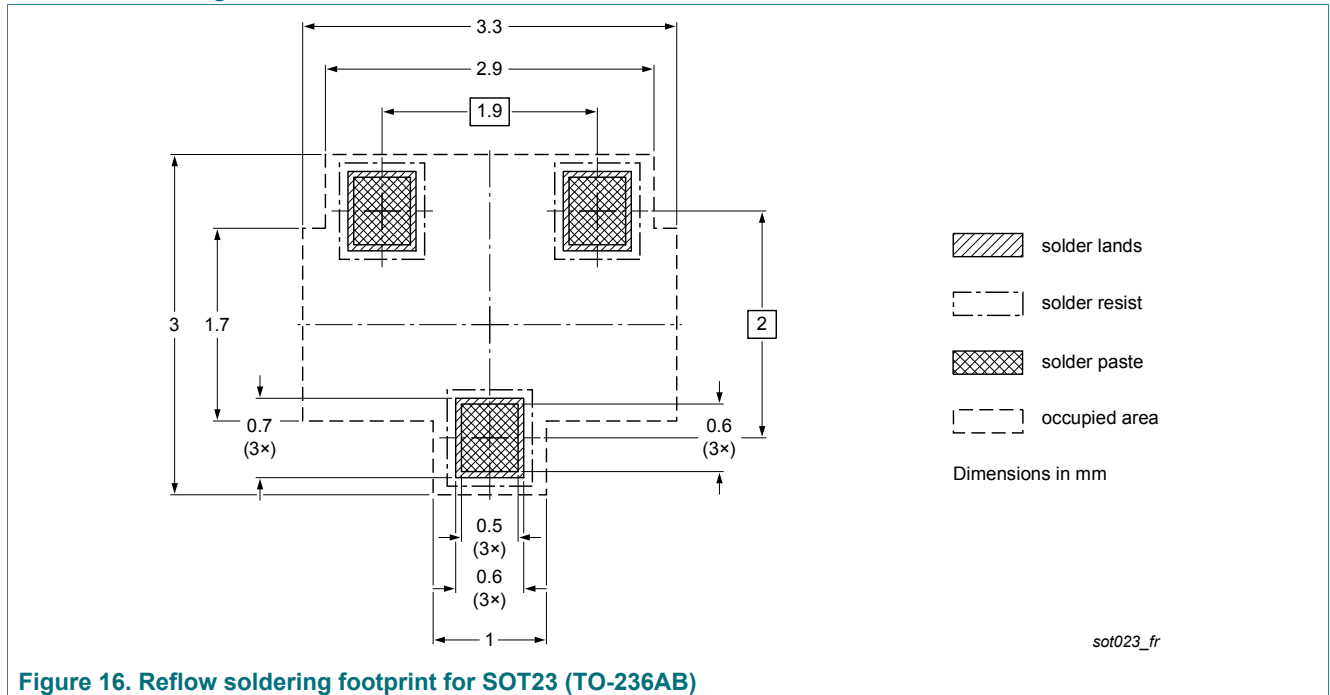
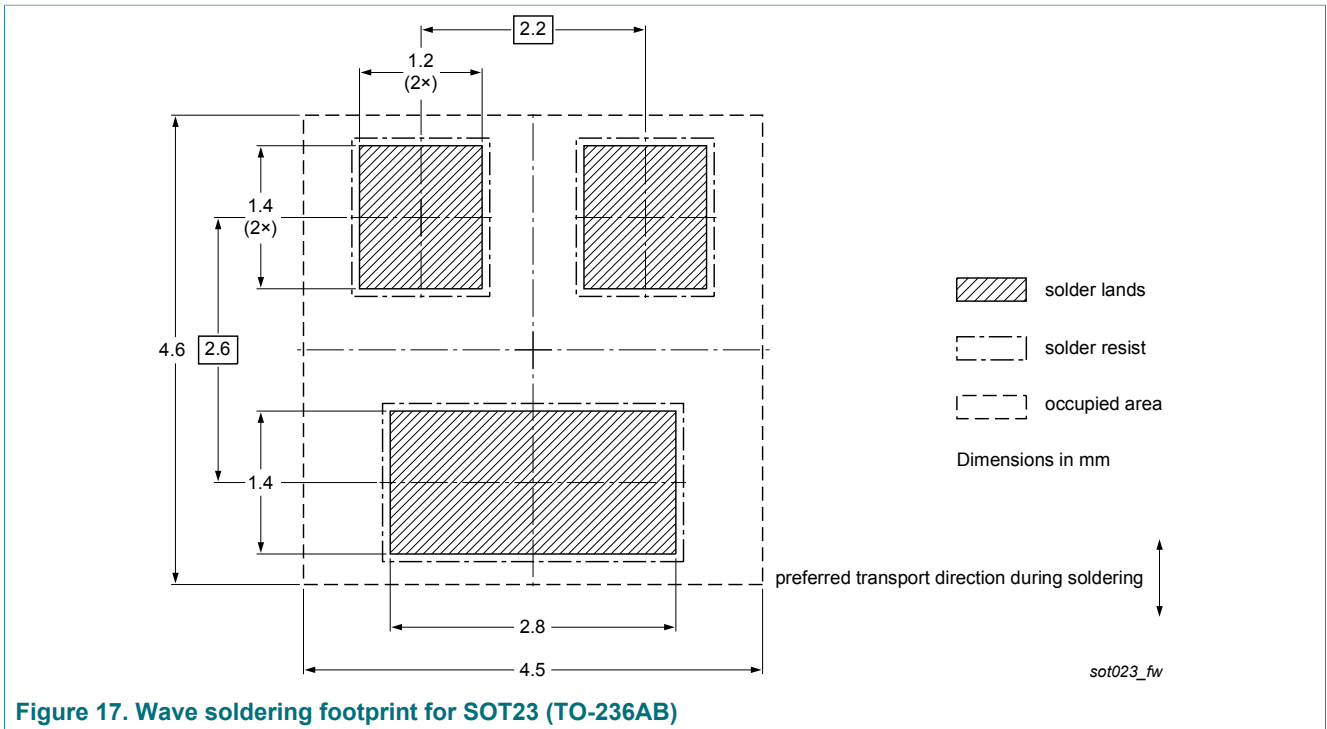


Figure 16. Reflow soldering footprint for SOT23 (TO-236AB)



## 14 Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCW68X_SER v.1	20170421	Product data sheet	-	-

## 15 Legal information

### 15.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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Date of release: 21 April 2017  
Document identifier: BCW68X\_SER



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**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.