



# THE DATASHEET OF BCW68FVL





# 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

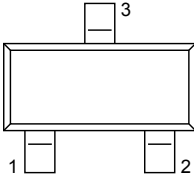
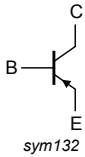
Table 1. Quick reference data

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 <sup>[1]</sup>				
	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		
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

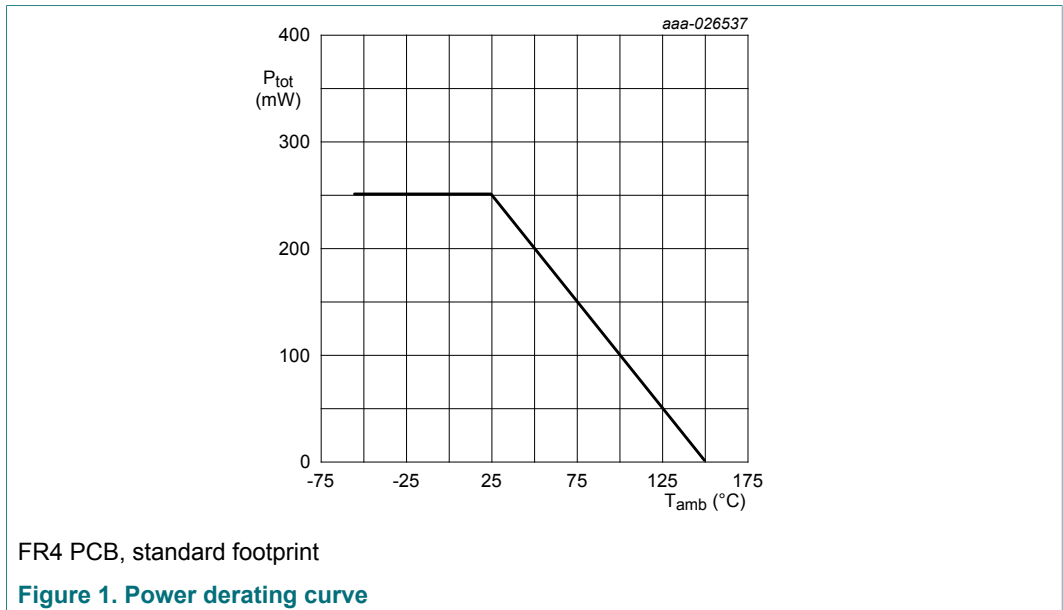
Table 5. Limiting values

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.

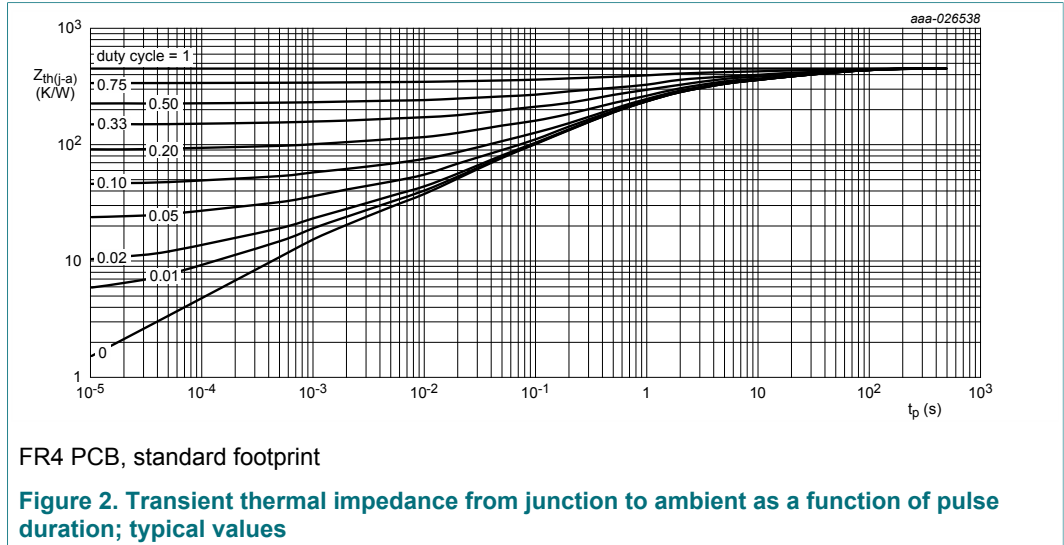


## 9 Thermal characteristics

**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**

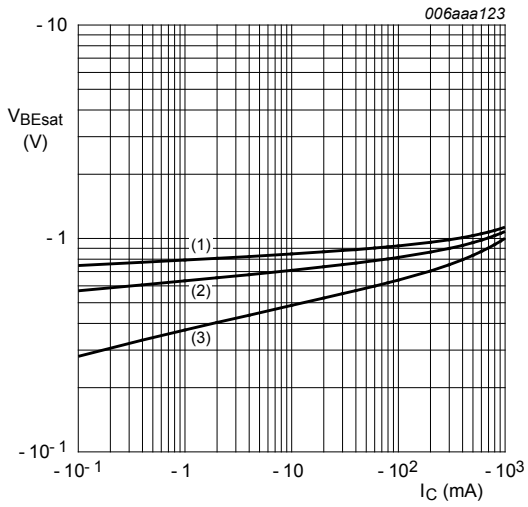
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

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;  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$

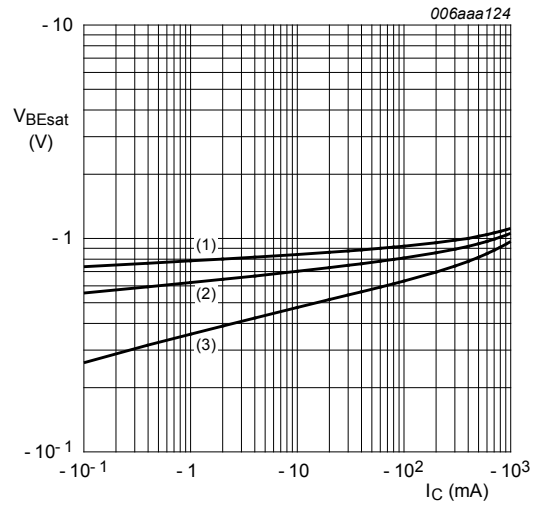
Table 8.

<p>006aaa119</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 3. BCW68F: DC current gain as a function of collector current; typical values</b></p>	<p>006aaa120</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>006aaa121</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>006aaa122</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>



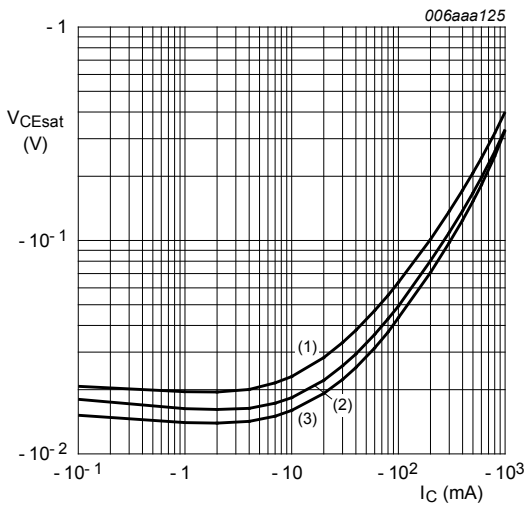
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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



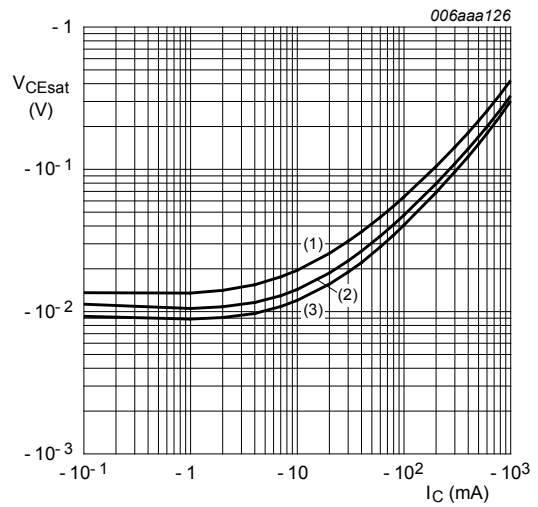
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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



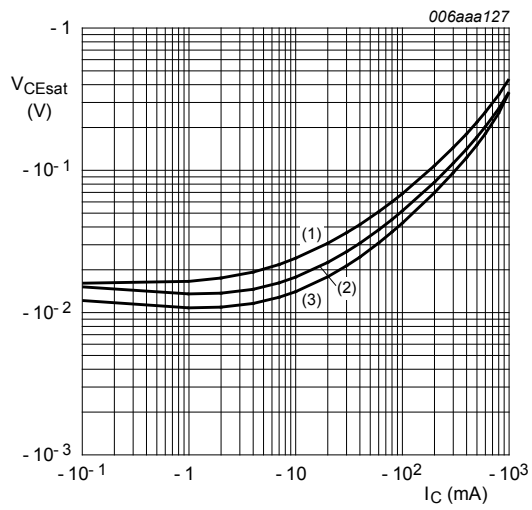
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**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)  $T_{amb} = -55\text{ °C}$

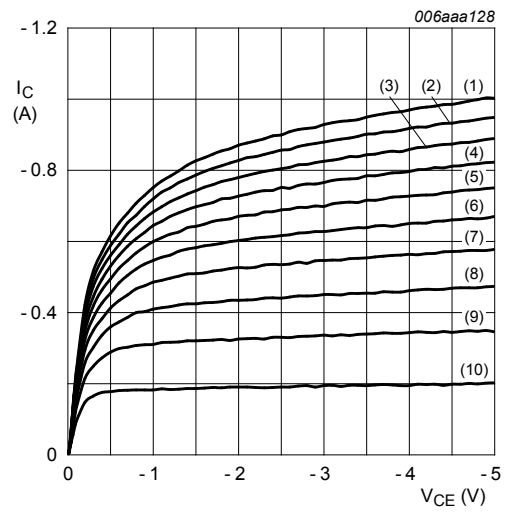
**Figure 10. BCW68G: Collector-emitter saturation voltage as a function of collector current; typical values**



$I_C/I_B = 10$

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

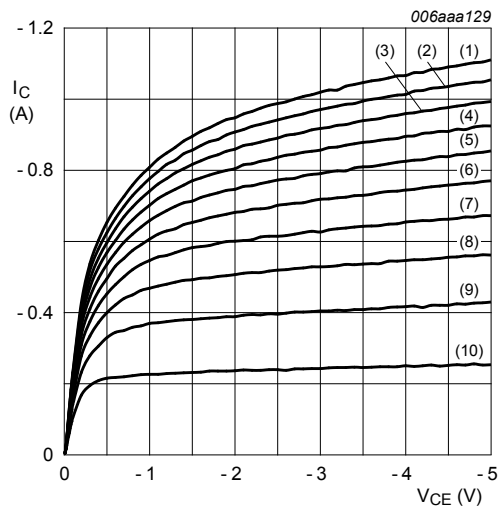
**Figure 11. BCW68H: Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25\text{ °C}$

- (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)  $I_B = -1.6\text{ mA}$

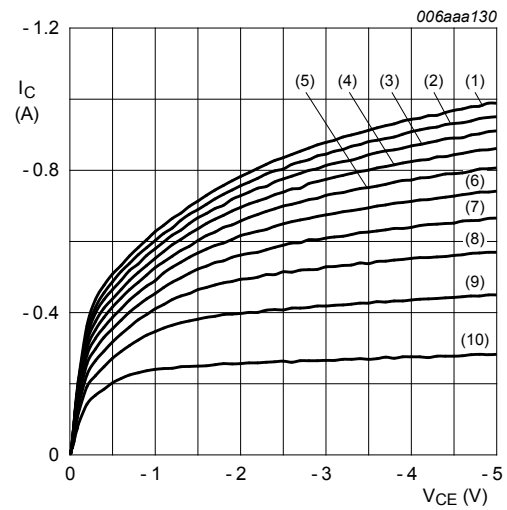
**Figure 12. BCW68F: Collector current as a function of collector-emitter voltage; typical values**



$T_{amb} = 25\text{ °C}$

- (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**



$T_{amb} = 25\text{ °C}$

- (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

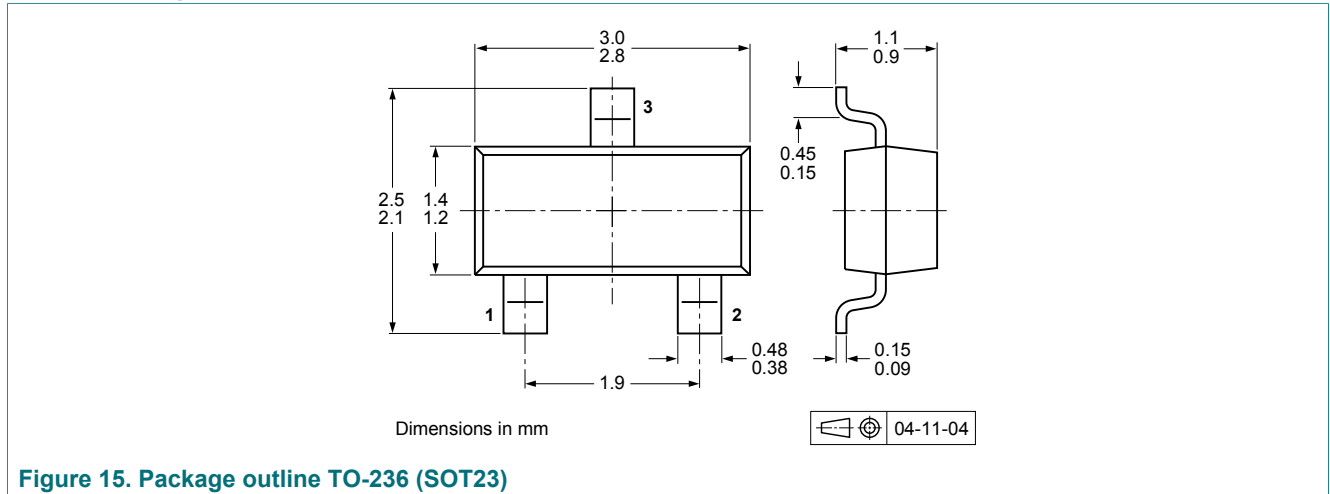


Figure 15. Package outline TO-236 (SOT23)

## 13 Soldering

Table 10. Soldering

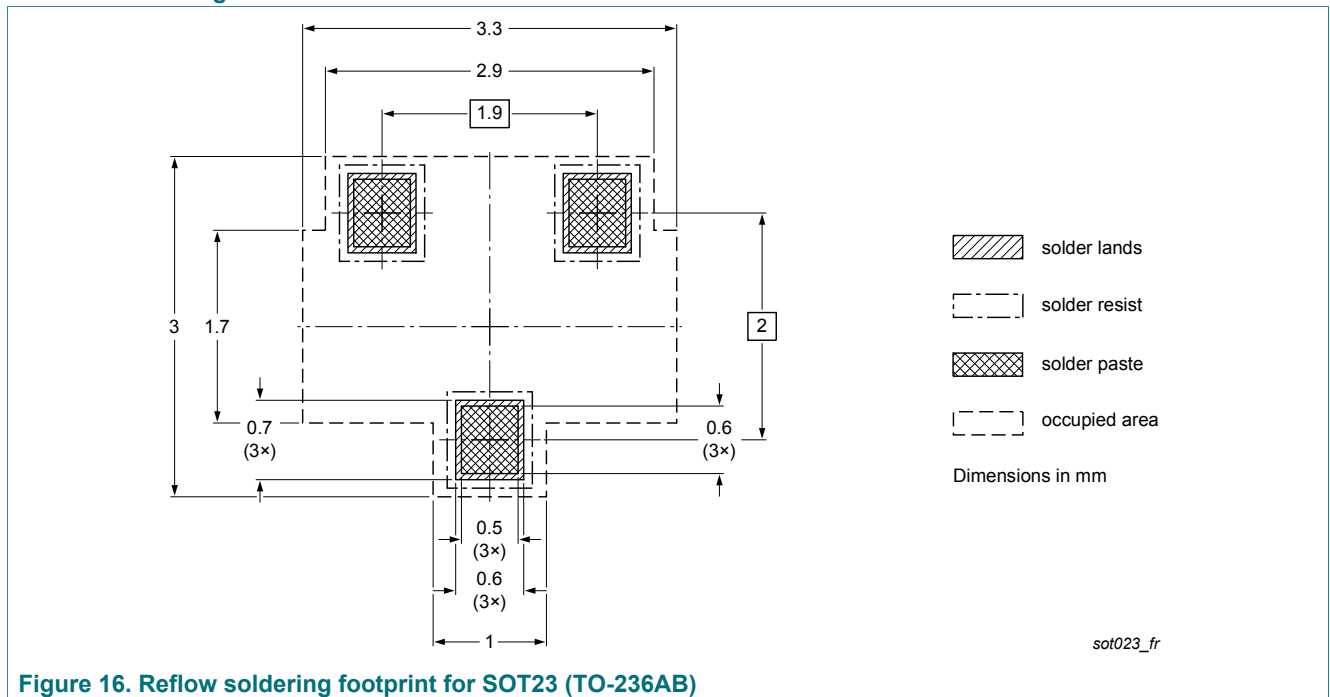
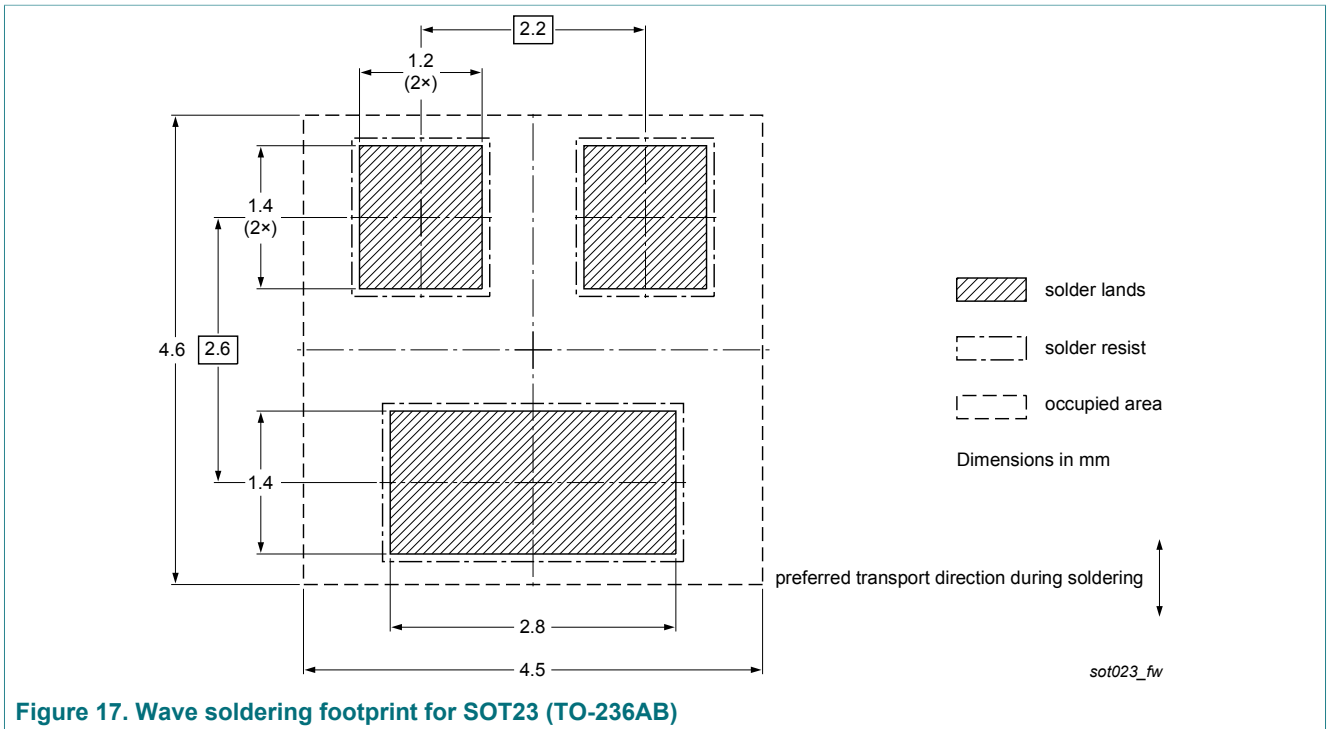


Figure 16. Reflow soldering footprint for SOT23 (TO-236AB)



## 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".

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## Contents

1	General description .....	1
2	Features and benefits .....	1
3	Applications .....	1
4	Quick reference data .....	1
5	Pinning information .....	2
6	Ordering information .....	2
7	Marking .....	2
8	Limiting values .....	2
9	Thermal characteristics .....	3
10	Electrical characteristics .....	4
11	Test information .....	8
11.1	Quality information .....	8
12	Package outline .....	9
13	Soldering .....	9
14	Revision history .....	10
15	Legal information .....	11

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

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