BCW66 series

45 V, 800 mA NPN general-purpose transistor

Rev. 1 — 21 April 2017 Product data sheet

1 General description

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

PNP complements: BCW68F/G/H

2 Features and benefits

- High current
- AEC-Q101 qualified

3 Applications

- General-purpose switching and amplification

4 Quick reference data

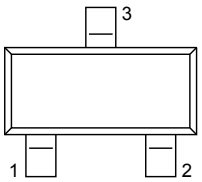
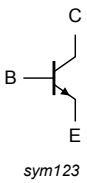
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	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]				
	BCW66F			100	-	250	
	BCW66G			160	-	400	
	BCW66H			250	-	600	

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

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		
	Name	Description	Version
BCW66F	TO-236AB	plastic surface-mounted package; 3 leads	SOT23
BCW66G			
BCW66H			

7 Marking

Table 4. Marking

Type number		Marking code
BCW66F	[1]	EQ%
BCW66G	[1]	ER%
BCW66H	[1]	ES%

[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

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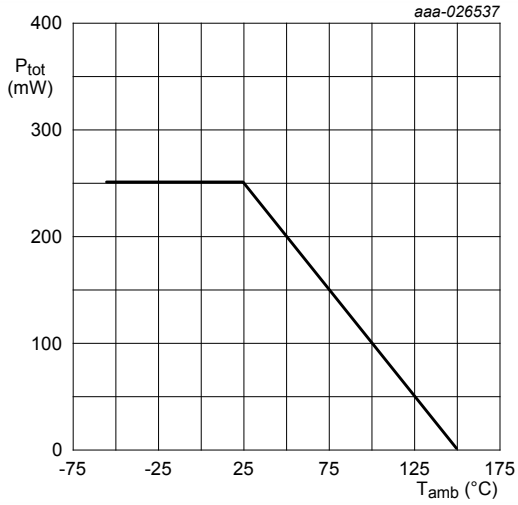
Symbol	Parameter	Conditions	Min	Max	Unit
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms	-	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C [1]	-	250	mW
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	150	°C
T_{stg}	storage temperature		-65	150	°C

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



FR4 PCB, standard footprint

Figure 1. Power derating curve

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.

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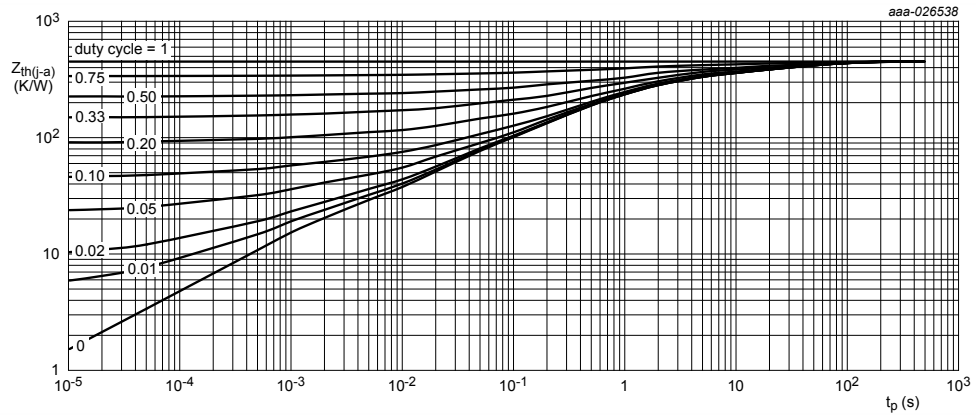

FR4 PCB, standard footprint

Figure 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10 Electrical characteristics

Table 7. Electrical characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 40 V; I_E = 0 A		-	-	20	nA
		V_{CB} = 40 V; I_E = 0 A; T_j = 150 °C		-	-	5	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A		-	-	20	nA
h_{FE}	DC current gain						
	BCW66F/G/H	V_{CE} = 1 V; I_C = 100 µA		75	-	-	
	BCW66F/G/H	V_{CE} = 1 V; I_C = 1 mA		75	-	-	
	BCW66F/G/H	V_{CE} = 1 V; I_C = 10 mA		75	-	-	
	BCW66F	V_{CE} = 1 V; I_C = 100 mA	[1]	100	-	250	
	BCW66G		[1]	160	-	400	
	BCW66H		[1]	250	-	630	
	BCW66F/G/H	V_{CE} = 1 V; I_C = 500 mA	[1]	40	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 100 mA; I_B = 10 mA	[1]	-	-	350	mV
		I_C = 500 mA; I_B = 50 mA	[1]	-	-	450	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 100 mA; I_B = 10 mA	[1]	-	-	1.25	V
		I_C = 500 mA; I_B = 50 mA	[1]	-	-	1.25	V
f_T	transition frequency	V_{CE} = 5 V; I_C = 10 mA; f = 100 MHz		100	-	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz		-	3	-	pF

[1] pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02

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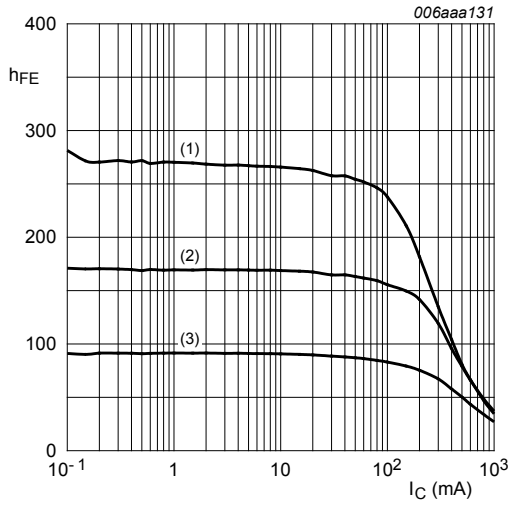
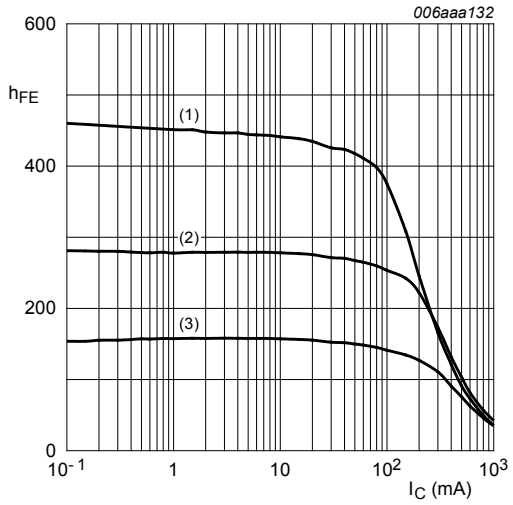
Table 8.



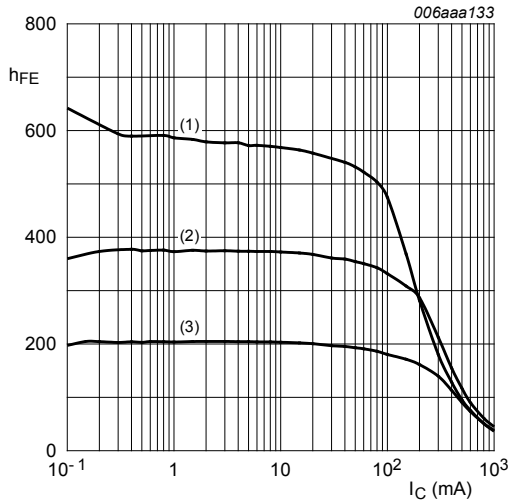
V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Figure 3. BCW66F: DC current gain as a function of collector current; typical values



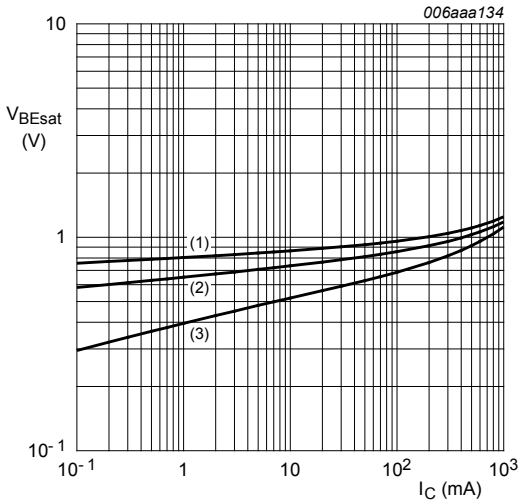
V_{CE} = 1 V
(1) $_{amb}$ = 150 °C
(2) $_{amb}$ = 25 °C
(3) $_{amb}$ = -55 °C

Figure 4. BCW66G: DC current gain as a function of collector current; typical values



V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Figure 5. BCW66H: DC current gain as a function of collector current; typical values



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

Figure 6. BCW66F: Base-emitter saturation voltage as a function of collector current; typical values

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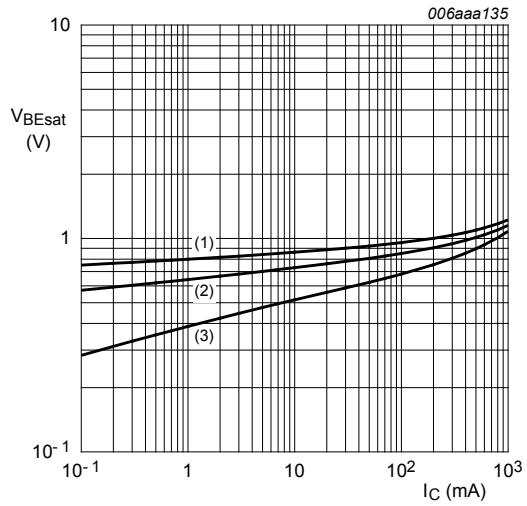
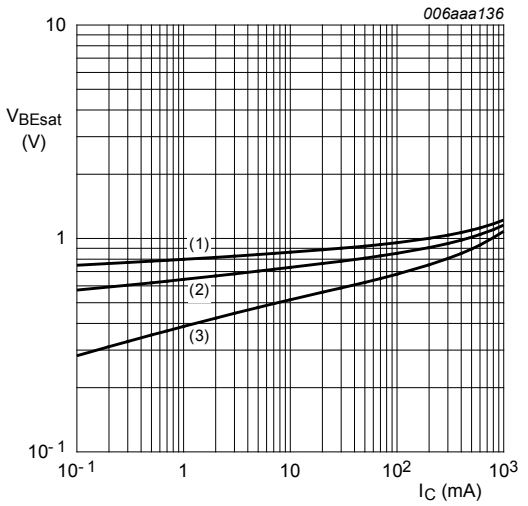


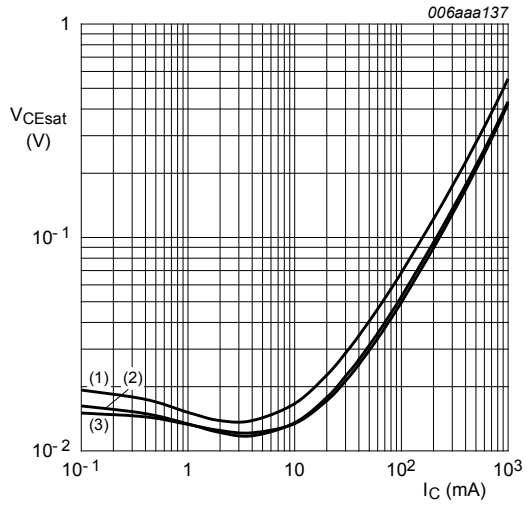
I_C/I_B = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Figure 7. BCW66G: Base-emitter saturation voltage as a function of collector current; typical values



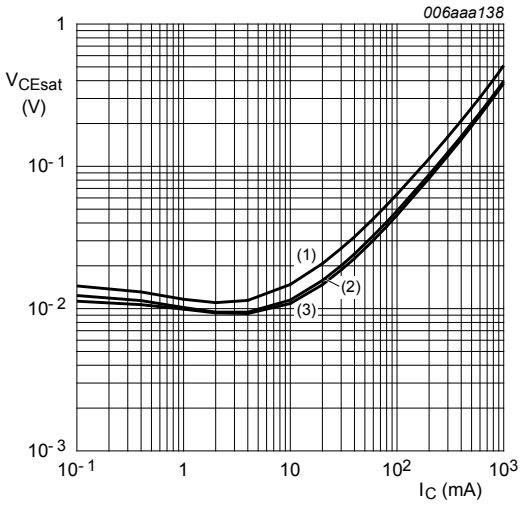
I_C/I_B = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Figure 8. BCW66H: Base-emitter saturation voltage as a function of collector current; typical values



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

Figure 9. BCW66F: Collector-emitter saturation voltage as a function of collector current; typical values



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

Figure 10. BCW66G: Collector-emitter saturation voltage as a function of collector current; typical values

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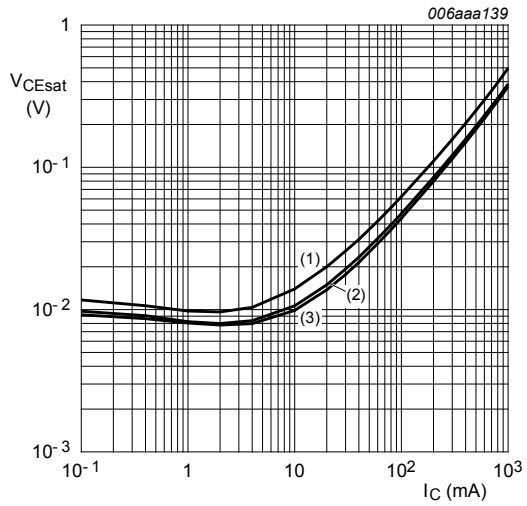
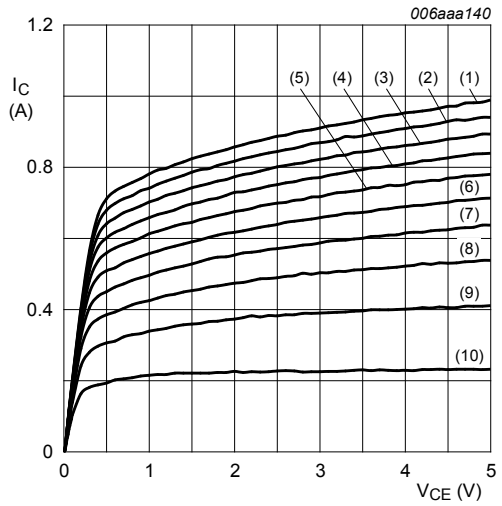


I_C/I_B = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Figure 11. BCW66H: Collector-emitter saturation voltage as a function of collector current; typical values



T_{amb} = 25 °C
(1) I_B = 16.0 mA
(2) I_B = 14.4 mA
(3) I_B = 12.8 mA
(4) I_B = 11.2 mA
(5) I_B = 9.6 mA
(6) I_B = 8.0 mA
(7) I_B = 6.4 mA
(8) I_B = 4.8 mA
(9) I_B = 3.2 mA
(10) I_B = 1.6 mA

Figure 12. BCW66F: Collector current as a function of collector-emitter voltage; typical values

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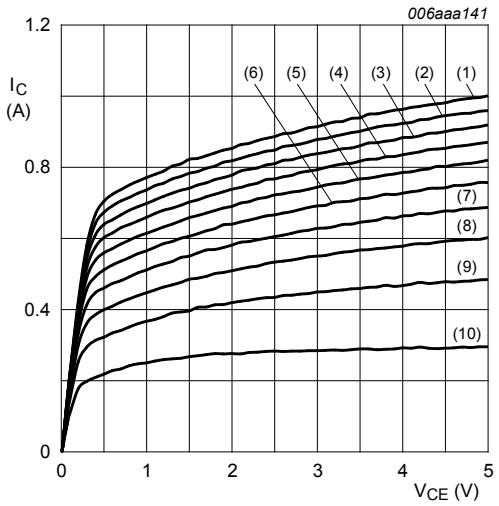
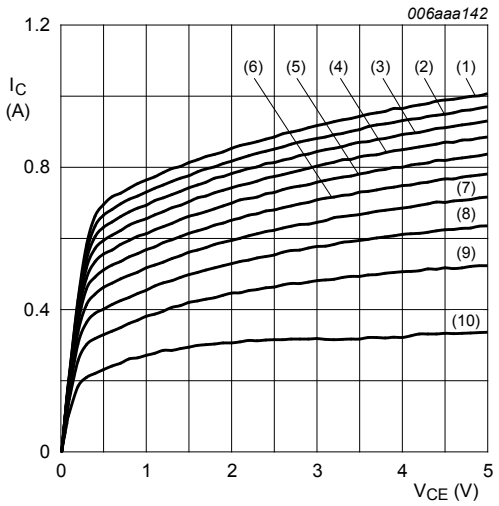


T_{amb} = 25 °C
(1) I_B = 13.0 mA
(2) I_B = 11.7 mA
(3) I_B = 10.4 mA
(4) I_B = 9.1 mA
(5) I_B = 7.8 mA
(6) I_B = 6.5 mA
(7) I_B = 5.2 mA
(8) I_B = 3.9 mA
(9) I_B = 2.6 mA
(10) I_B = 1.3 mA

Figure 13. BCW66G: Collector current as a function of collector-emitter voltage; typical values



T_{amb} = 25 °C
(1) I_B = 12.0 mA
(2) I_B = 10.8 mA
(3) I_B = 9.6 mA
(4) I_B = 8.4 mA
(5) I_B = 7.2 mA
(6) I_B = 6.0 mA
(7) I_B = 4.8 mA
(8) I_B = 3.6 mA
(9) I_B = 2.4 mA
(10) I_B = 1.2 mA

Figure 14. BCW66H: 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.

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12 Package outline

Table 9. Package outline

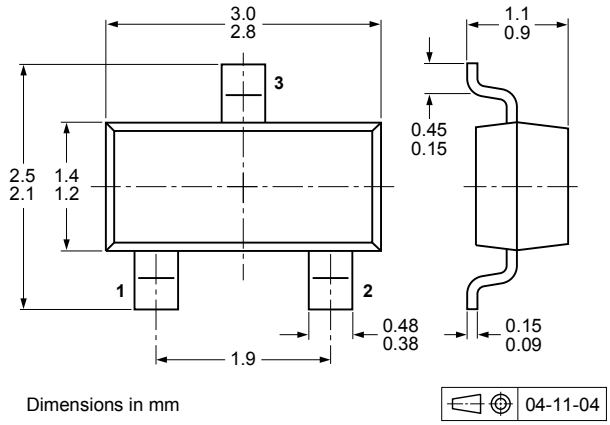

Figure 15. Package outline TO-236 (SOT23)

13 Soldering

Table 10. Soldering

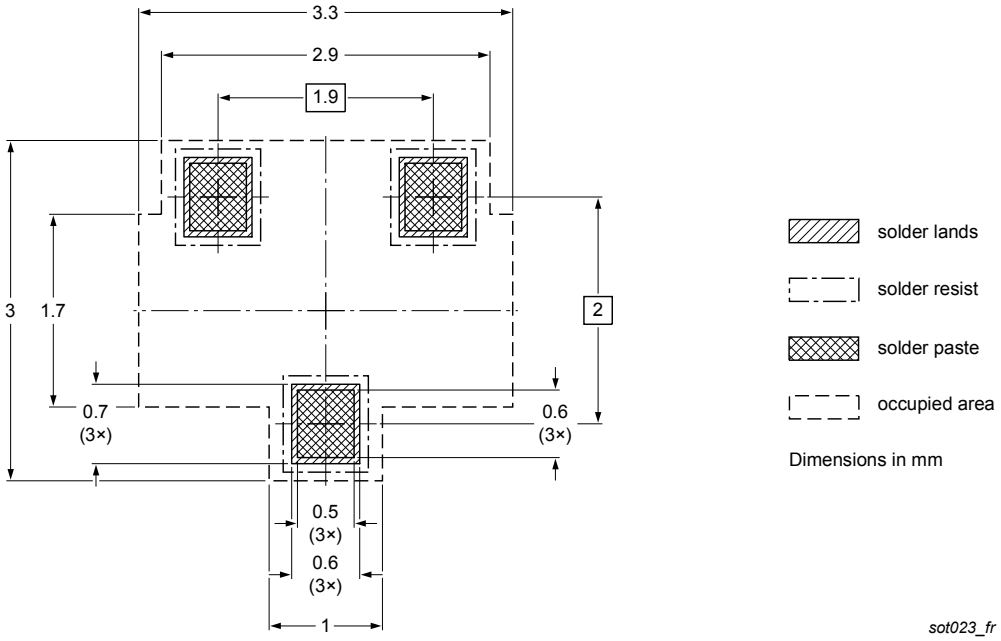

Figure 16. Reflow soldering footprint for SOT23 (TO-236AB)

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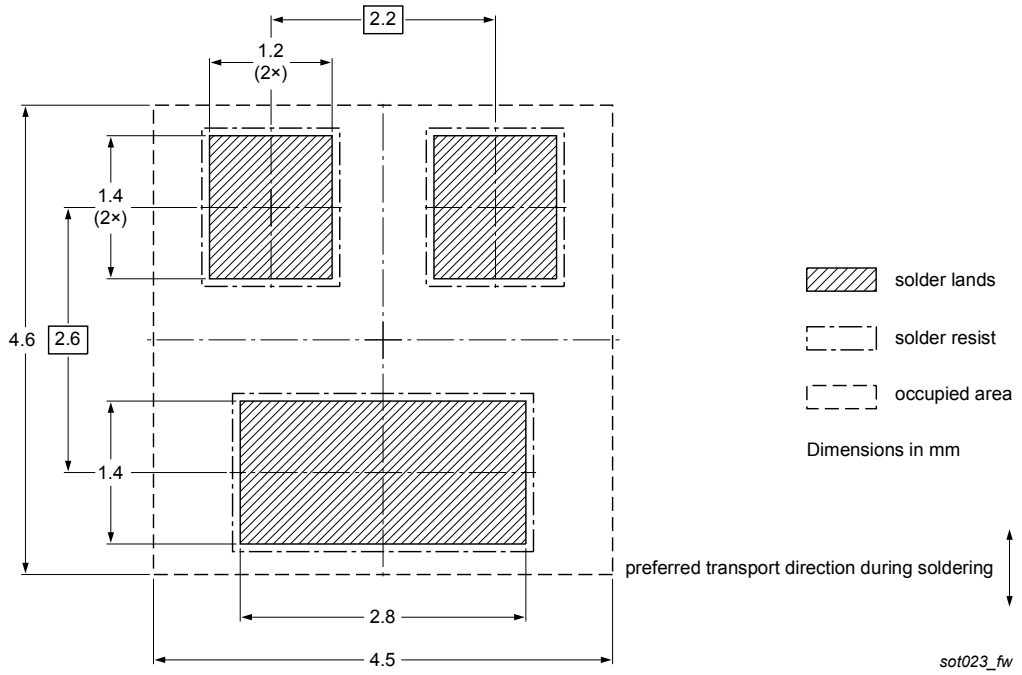

Figure 17. Wave soldering footprint for SOT23 (TO-236AB)

14 Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCW66x_SER v.1	21 April 2017	Product data sheet	-	-

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15 Legal information

15.1 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.
[2] The term 'short data sheet' is explained in section "Definitions".
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