



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

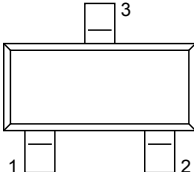
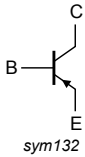
Table 1. Quick reference data

| 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: $t_p \leq 300$ μ 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

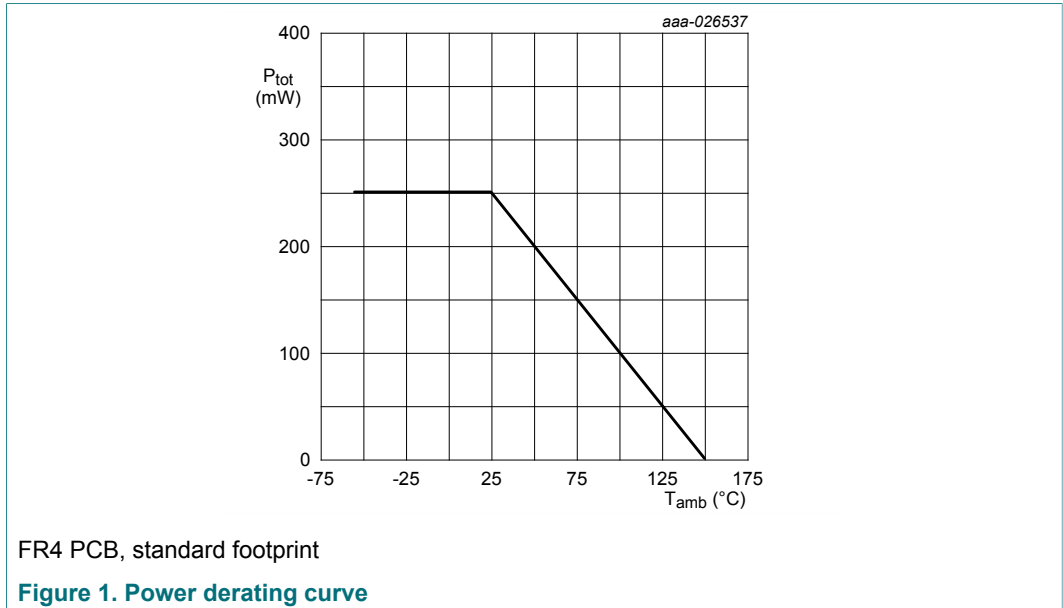
Table 5. Limiting values

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.

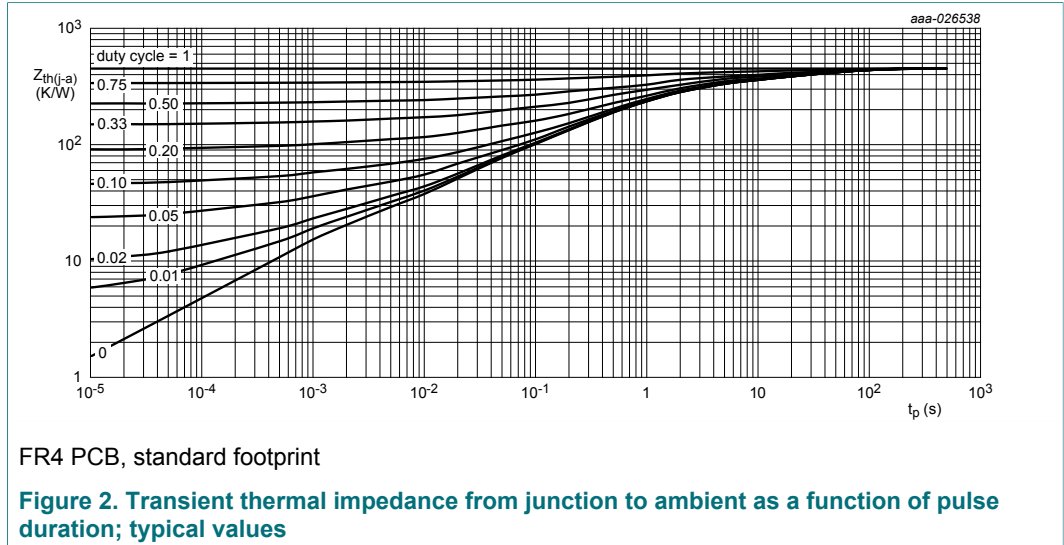


9 Thermal characteristics

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

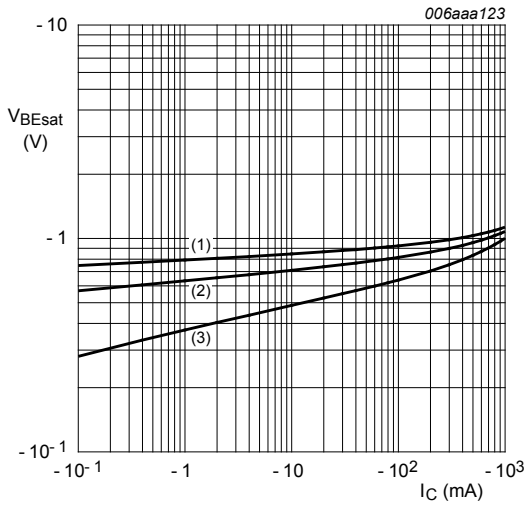
$T_{amb} = 25\text{ °C}$ unless otherwise specified.

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

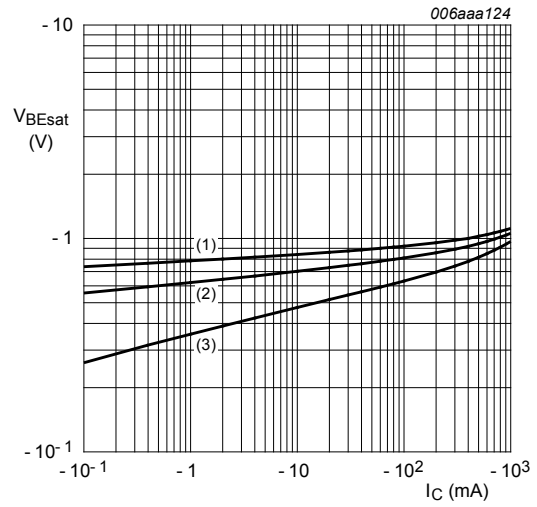
Table 8.

| | |
|---|---|
| <p>006aaa119</p> <p>$V_{CE} = -1\text{ V}$ (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$ (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$ (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$</p> <p>Figure 3. BCW68F: DC current gain as a function of collector current; typical values</p> | <p>006aaa120</p> <p>$V_{CE} = -1\text{ V}$ (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$ (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$ (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$</p> <p>Figure 4. BCW68G: DC current gain as a function of collector current; typical values</p> |
| <p>006aaa121</p> <p>$V_{CE} = -1\text{ V}$ (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$ (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$ (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$</p> <p>Figure 5. BCW68H: DC current gain as a function of collector current; typical values</p> | <p>006aaa122</p> <p>$I_C/I_B = 10$ (1) $T_{amb} = -55\text{ }^{\circ}\text{C}$ (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$ (3) $T_{amb} = 150\text{ }^{\circ}\text{C}$</p> <p>Figure 6. BCW68F: Base-emitter saturation voltage as a function of collector current; typical values</p> |



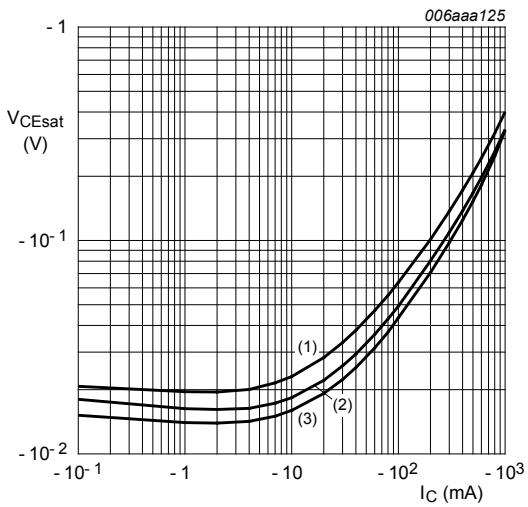
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



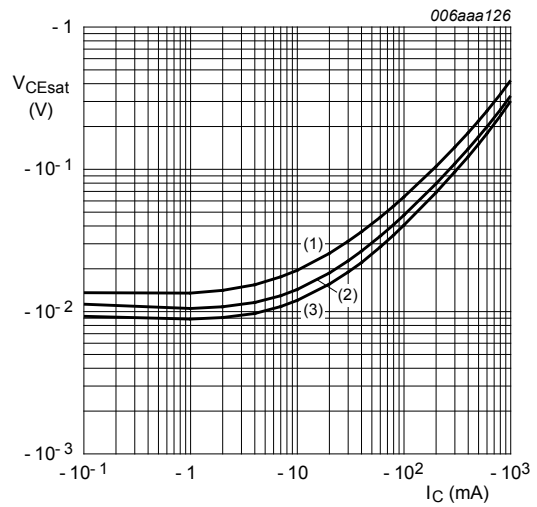
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



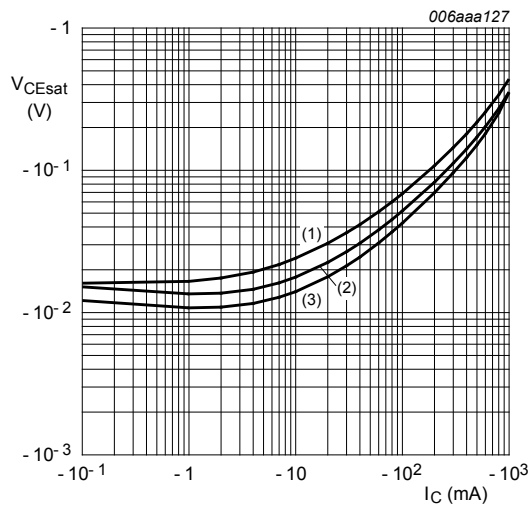
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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) $T_{amb} = -55\text{ °C}$

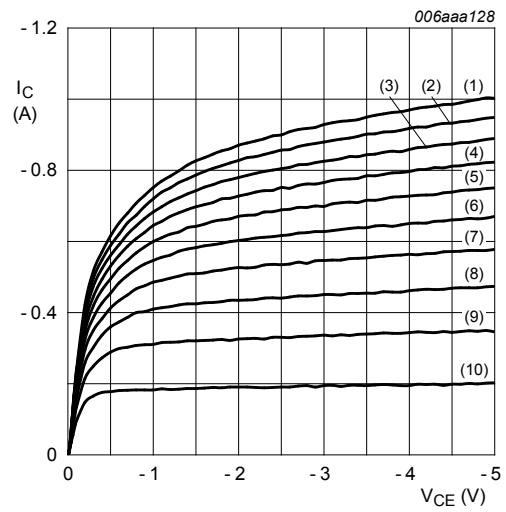
Figure 10. BCW68G: Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 10$

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

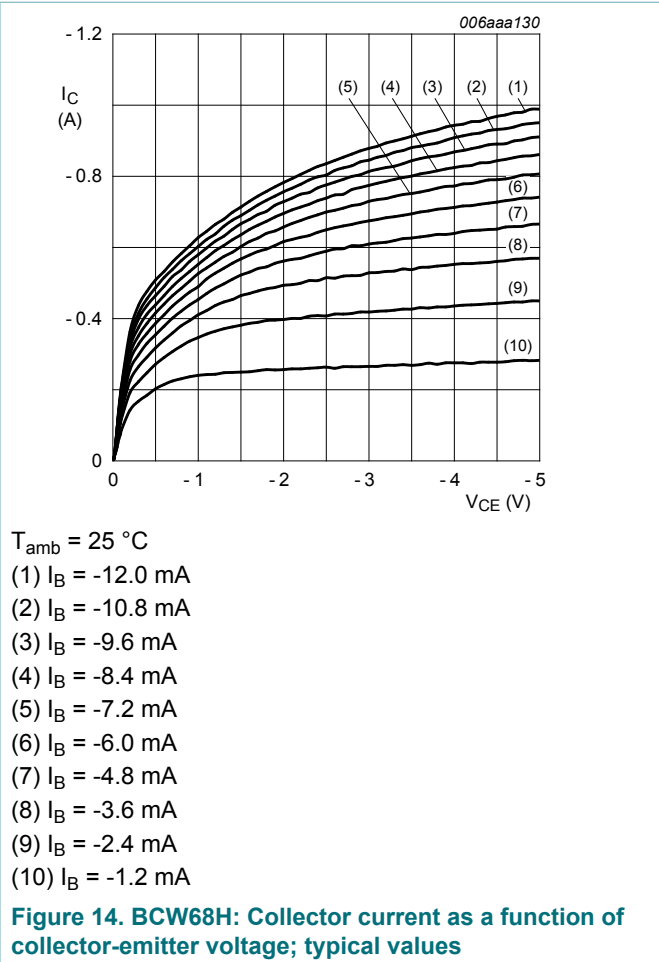
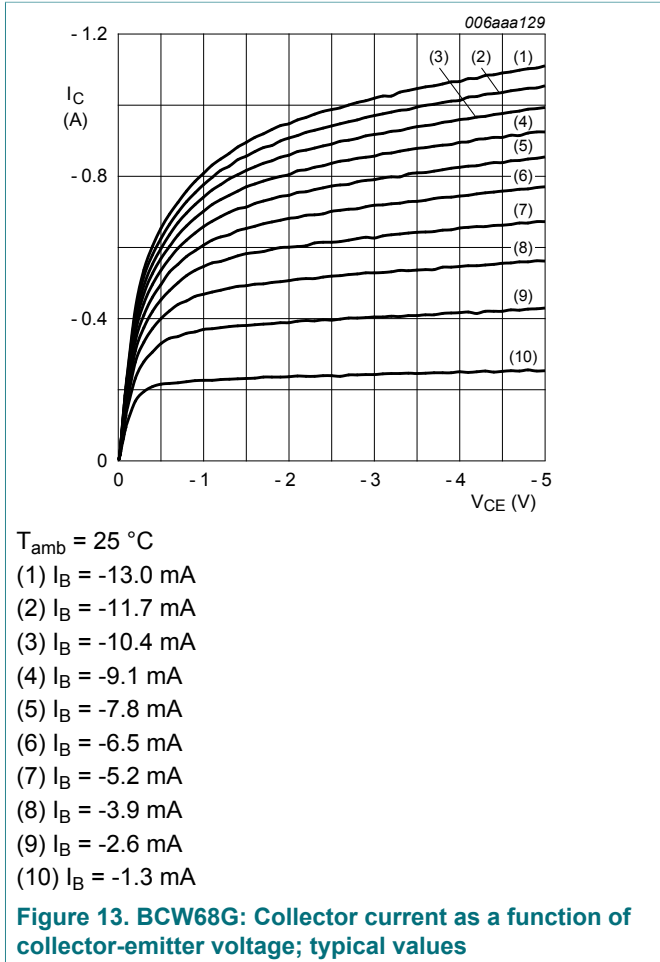
Figure 11. BCW68H: Collector-emitter saturation voltage as a function of collector current; typical values



$T_{amb} = 25\text{ °C}$

- (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



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

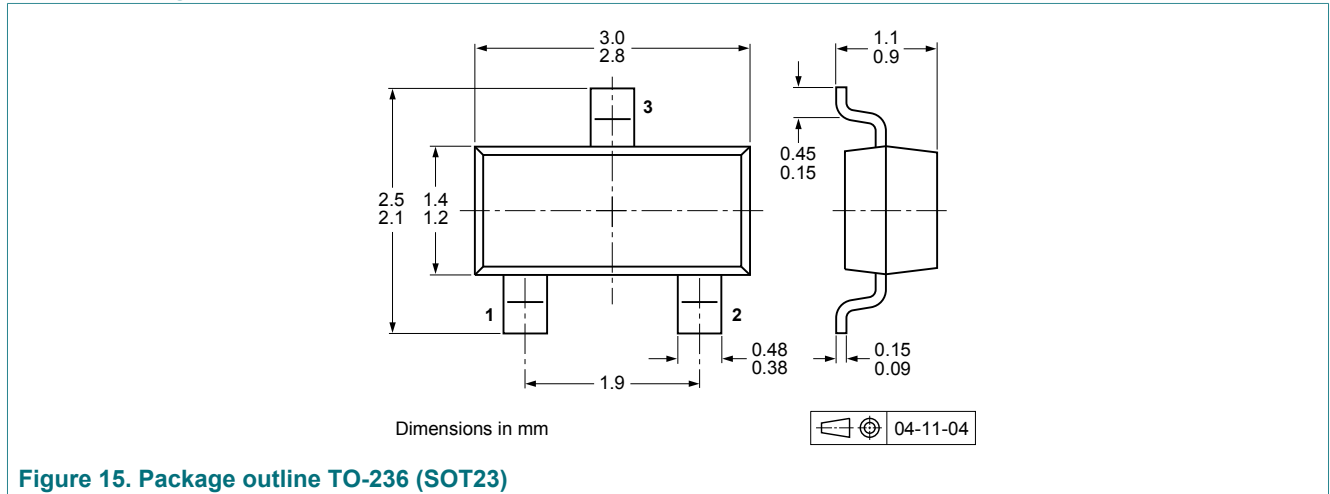


Figure 15. Package outline TO-236 (SOT23)

13 Soldering

Table 10. Soldering

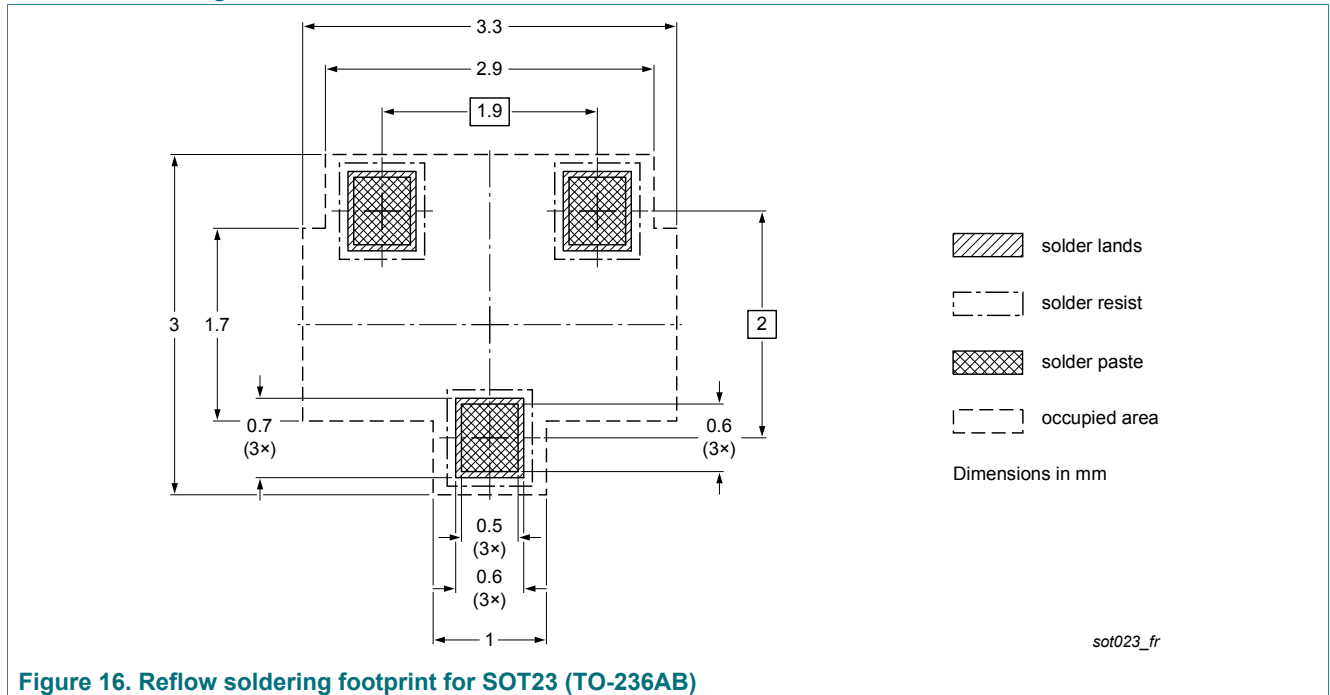
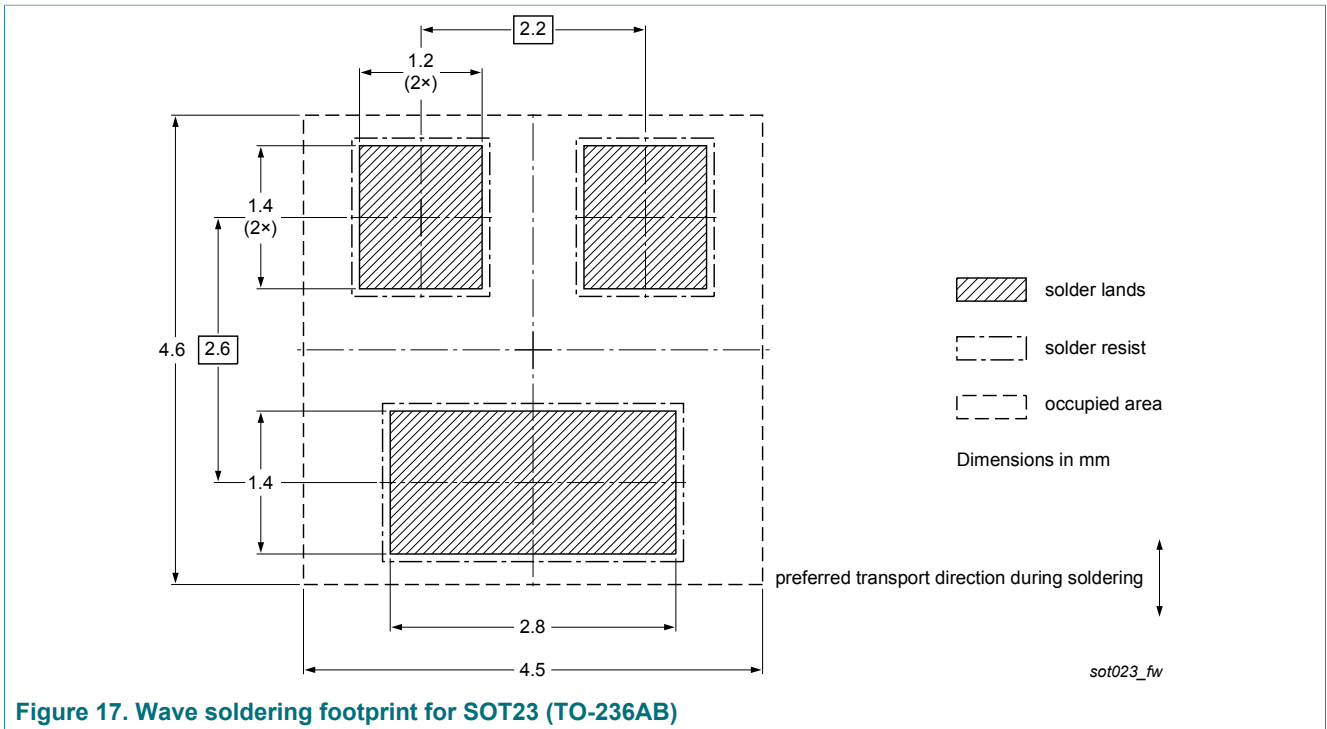


Figure 16. Reflow soldering footprint for SOT23 (TO-236AB)



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 ^{[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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