



# 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

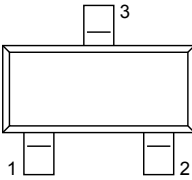
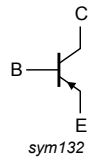
Table 1. Quick reference data

| Symbol    | Parameter                 | Conditions                                                         | Min | Typ | Max  | Unit |
|-----------|---------------------------|--------------------------------------------------------------------|-----|-----|------|------|
| $V_{CEO}$ | 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 <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  |                                          |         |
|-------------|----------|------------------------------------------|---------|
|             | Name     | Description                              | Version |
| 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

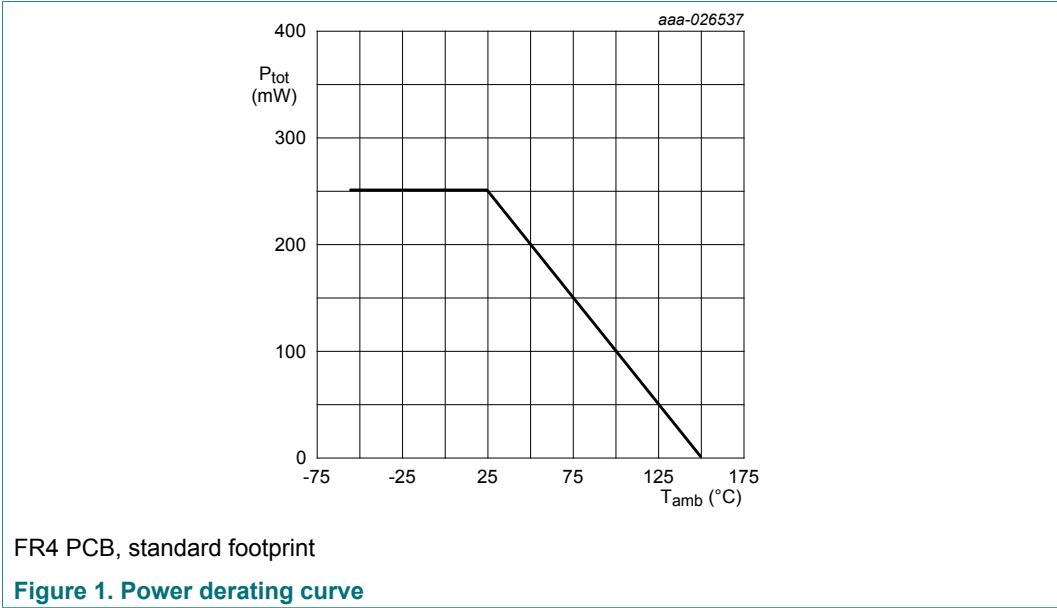
Table 5. Limiting values

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

| Symbol           | Parameter                 | Conditions                          | Min | Max  | Unit |
|------------------|---------------------------|-------------------------------------|-----|------|------|
| V <sub>CBO</sub> | collector-base voltage    | open emitter                        | -   | -50  | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                           | -   | -45  | V    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector                      | -   | -5   | V    |
| I <sub>C</sub>   | collector current         |                                     | -   | -800 | mA   |
| I <sub>CM</sub>  | peak collector current    | single pulse; t <sub>p</sub> ≤ 1 ms | -   | -1   | A    |
| I <sub>B</sub>   | base current              |                                     | -   | -100 | mA   |

| Symbol           | Parameter               | Conditions                          | Min | Max  | Unit |
|------------------|-------------------------|-------------------------------------|-----|------|------|
| I <sub>BM</sub>  | peak base current       | single pulse; t <sub>p</sub> ≤ 1 ms | -   | -200 | mA   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> ≤ 25 °C [1]        | -   | 250  | mW   |
| T <sub>j</sub>   | junction temperature    |                                     | -   | 150  | °C   |
| T <sub>amb</sub> | ambient temperature     |                                     | -55 | 150  | °C   |
| T <sub>stg</sub> | storage temperature     |                                     | -65 | 150  | °C   |

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

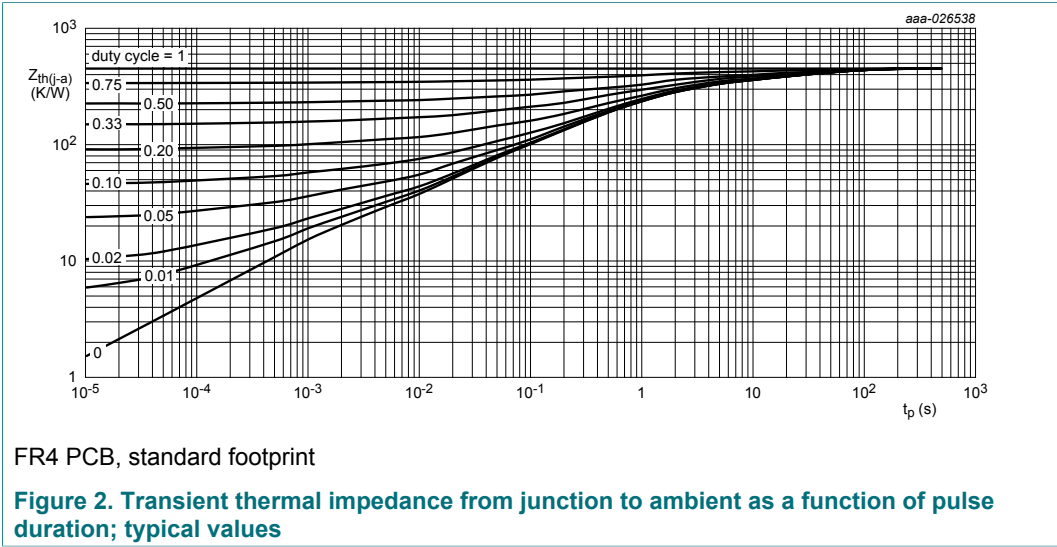


9 Thermal characteristics

Table 6. Thermal characteristics

| Symbol               | Parameter                                   | Conditions      | Min | Typ | Max | Unit |
|----------------------|---------------------------------------------|-----------------|-----|-----|-----|------|
| R <sub>th(j-a)</sub> | 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

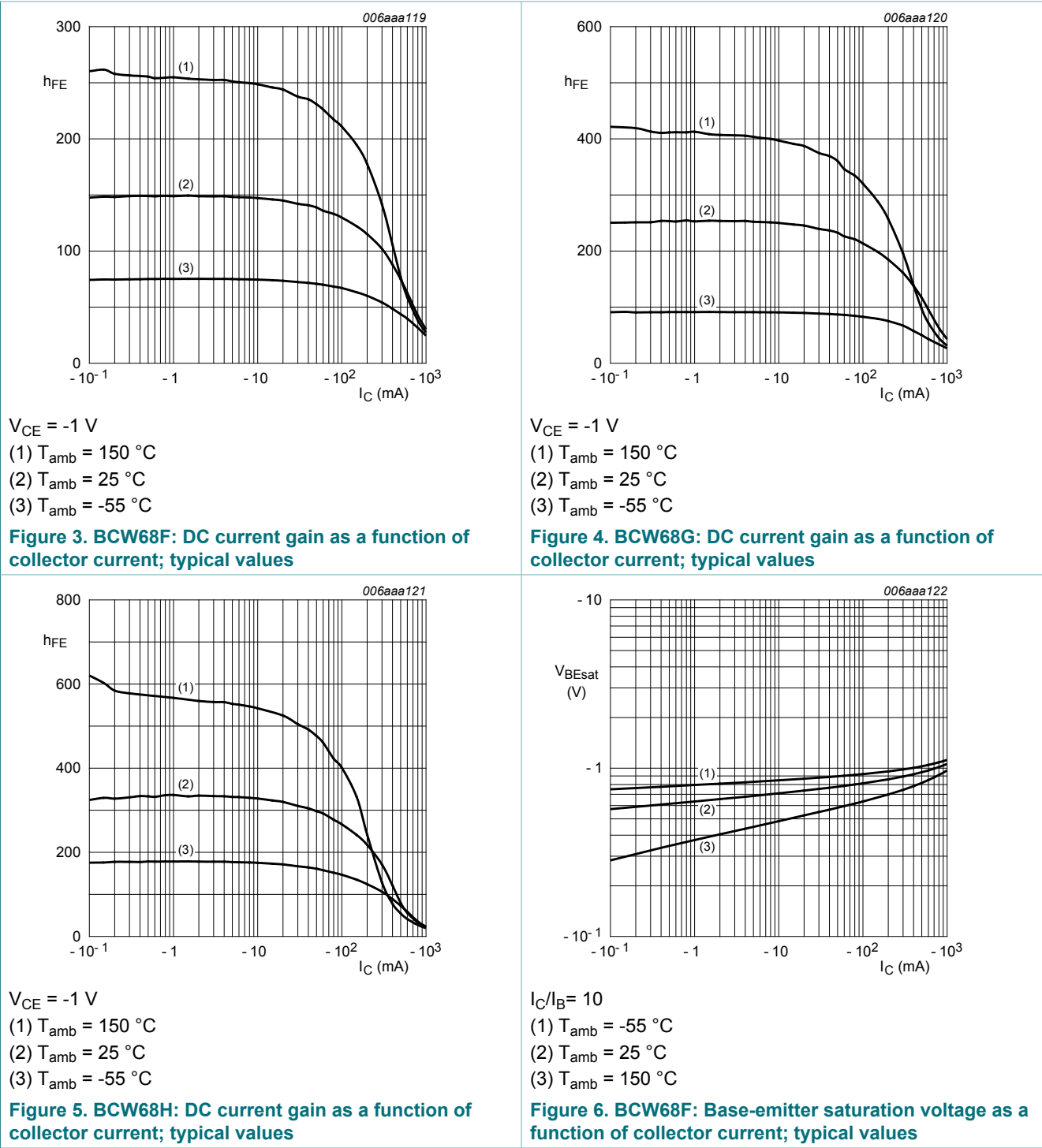
Table 7. Electrical characteristics

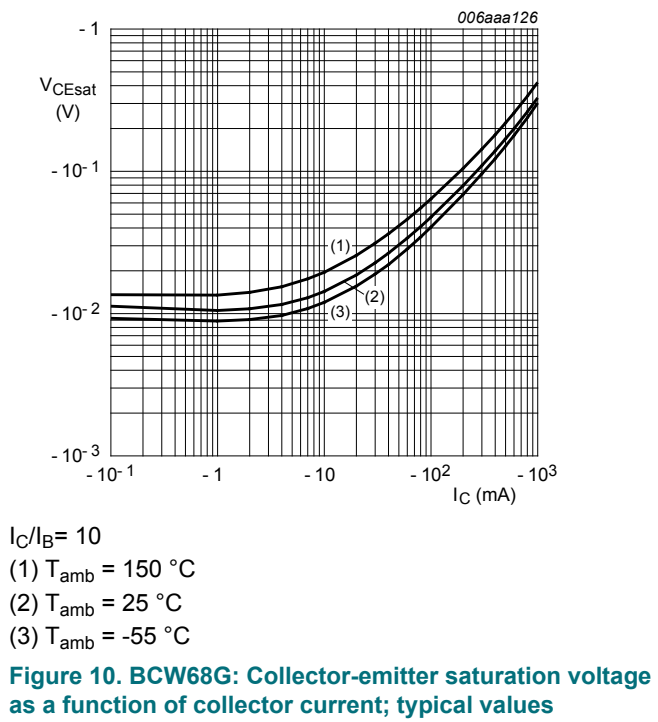
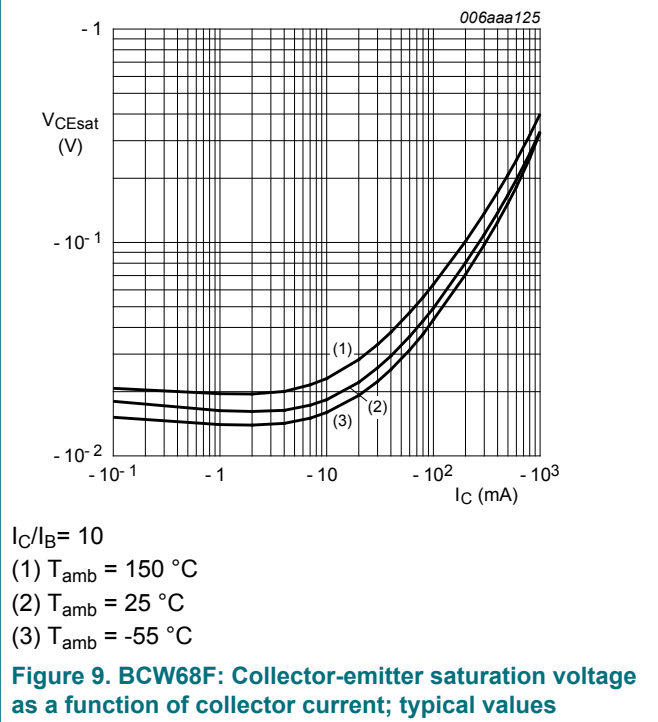
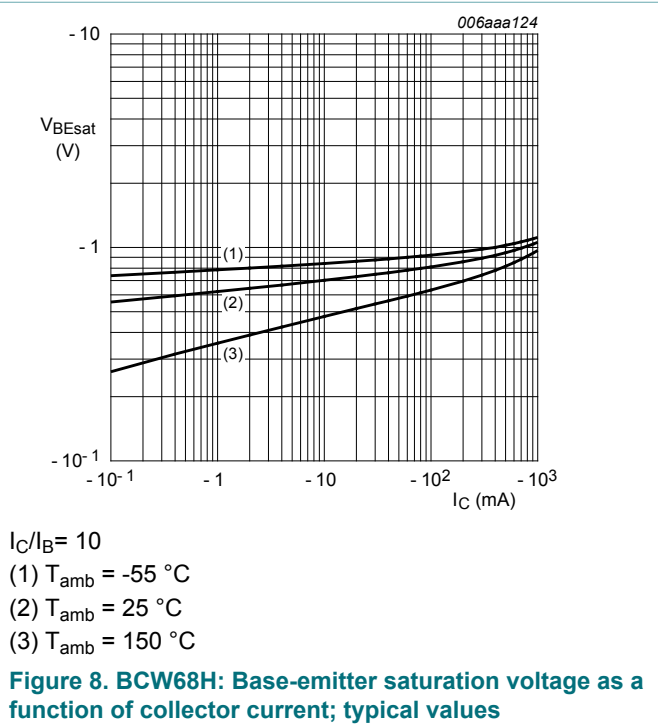
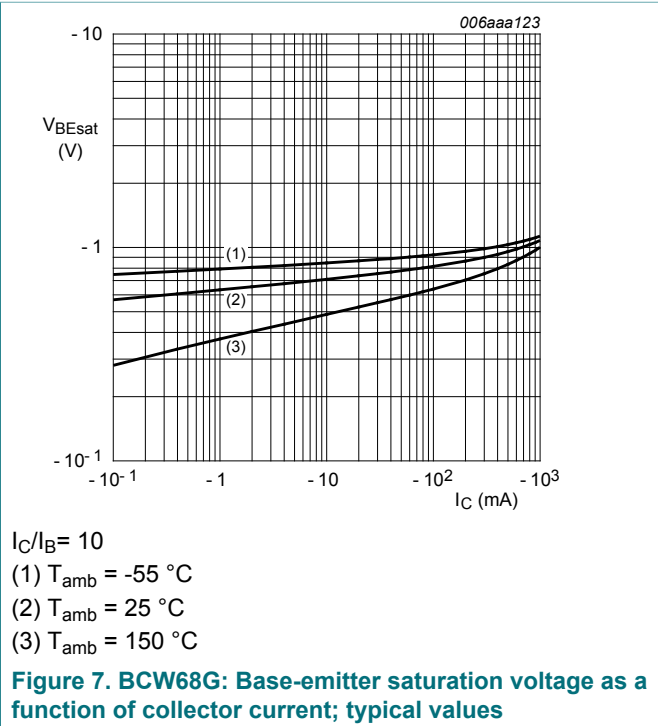
T<sub>amb</sub> = 25 °C unless otherwise specified.

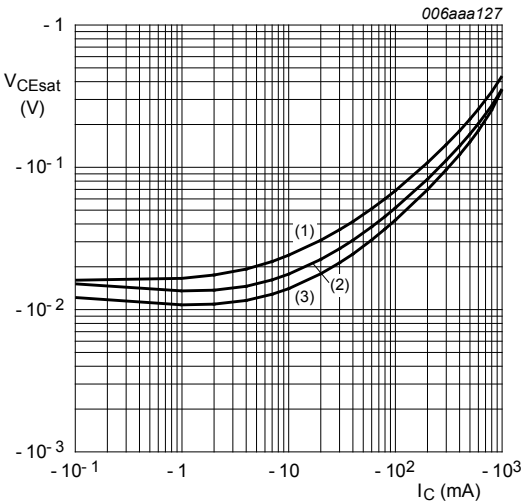
| Symbol             | Parameter                            | Conditions                                                                | Min     | Typ | Max   | Unit |
|--------------------|--------------------------------------|---------------------------------------------------------------------------|---------|-----|-------|------|
| I <sub>CBO</sub>   | collector-base cut-off current       | V <sub>CB</sub> = -40 V; I <sub>E</sub> = 0 A                             | -       | -   | -20   | nA   |
|                    |                                      | V <sub>CB</sub> = -40 V; I <sub>E</sub> = 0 A; T <sub>J</sub> = 150 °C    | -       | -   | -5    | μA   |
| I <sub>EBO</sub>   | emitter-base cut-off current         | V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A                              | -       | -   | -20   | nA   |
| h <sub>FE</sub>    | DC current gain                      |                                                                           |         |     |       |      |
|                    | BCW68F/G/H                           | V <sub>CE</sub> = -1 V; I <sub>C</sub> = -100 μA                          | 100     | -   | -     |      |
|                    | BCW68F/G/H                           | V <sub>CE</sub> = -1 V; I <sub>C</sub> = -1 mA                            | 100     | -   | -     |      |
|                    | BCW68F/G/H                           | V <sub>CE</sub> = -1 V; I <sub>C</sub> = -10 mA                           | 100     | -   | -     |      |
|                    | BCW68F                               | V <sub>CE</sub> = -1 V; I <sub>C</sub> = -100 mA                          | [1] 100 | -   | 250   |      |
|                    | BCW68G                               |                                                                           | 160     | -   | 400   |      |
|                    | BCW68H                               |                                                                           | 250     | -   | 600   |      |
|                    | BCW68F                               | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA                          | [1] 35  | -   | -     |      |
|                    | BCW68G                               |                                                                           | 60      | -   | -     |      |
|                    | BCW68H                               |                                                                           | 100     | -   | -     |      |
| V <sub>CEsat</sub> | collector-emitter saturation voltage | I <sub>C</sub> = -100 mA; I <sub>B</sub> = -10 mA                         | [1] -   | -   | -350  | mV   |
|                    |                                      | I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA                         | [1] -   | -   | -450  | mV   |
| V <sub>BEsat</sub> | base-emitter saturation voltage      | I <sub>C</sub> = -100 mA; I <sub>B</sub> = -10 mA                         | [1] -   | -   | -1.25 | V    |
|                    |                                      | I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA                         | [1] -   | -   | -1.25 | V    |
| f <sub>T</sub>     | transition frequency                 | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -10 mA; f = 100 MHz              | 80      | -   | -     | MHz  |
| C <sub>c</sub>     | collector capacitance                | V <sub>CB</sub> = -10 V; I <sub>E</sub> = i <sub>e</sub> = 0 A; f = 1 MHz | -       | 5   | -     | pF   |

[1] pulsed; t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02

Table 8.

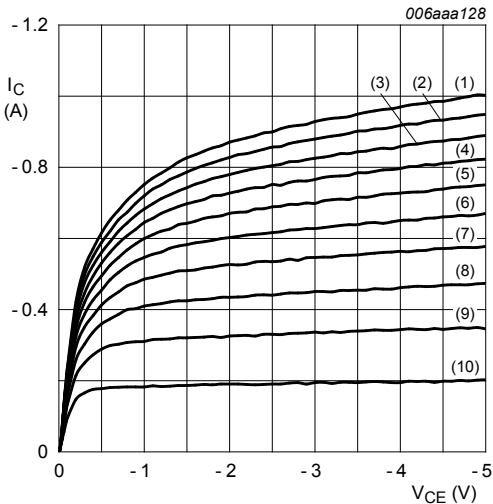






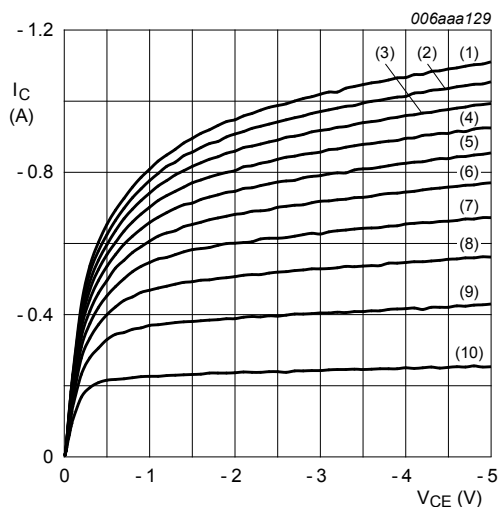
$I_C/I_B = 10$   
(1)  $T_{amb} = 150\text{ °C}$   
(2)  $T_{amb} = 25\text{ °C}$   
(3)  $T_{amb} = -55\text{ °C}$

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

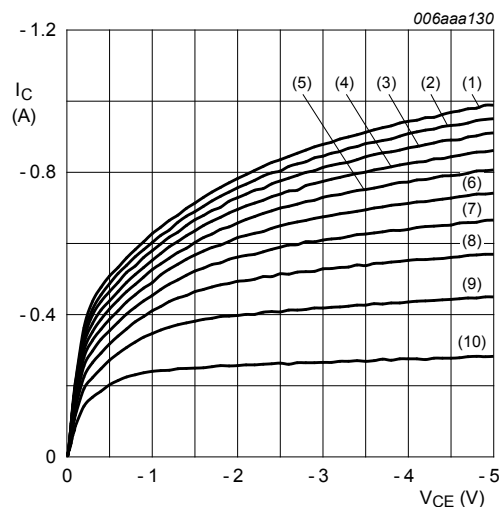
Figure 12. BCW68F: Collector current as a function of collector-emitter voltage; typical values



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

- (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**

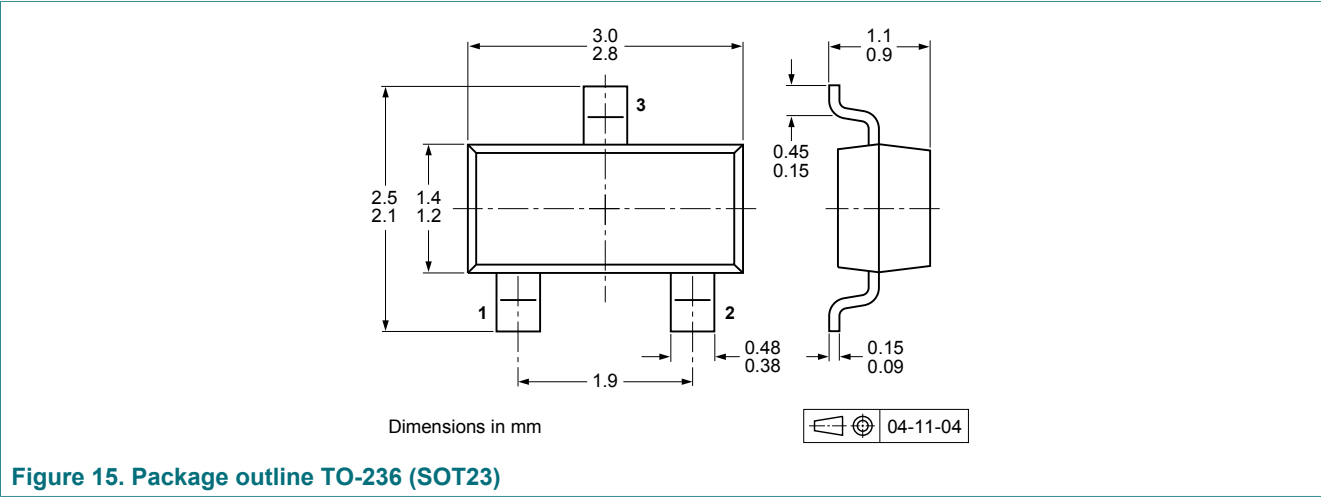
## 11 Test information

### 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.

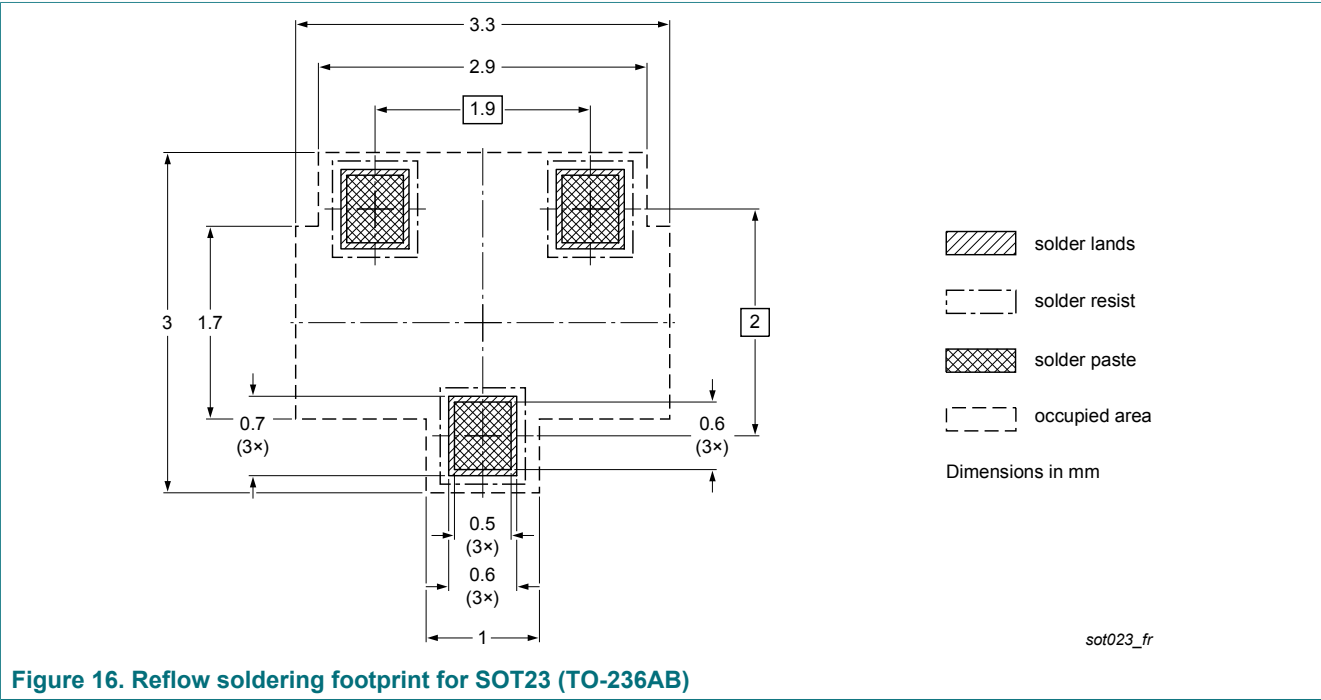
12 Package outline

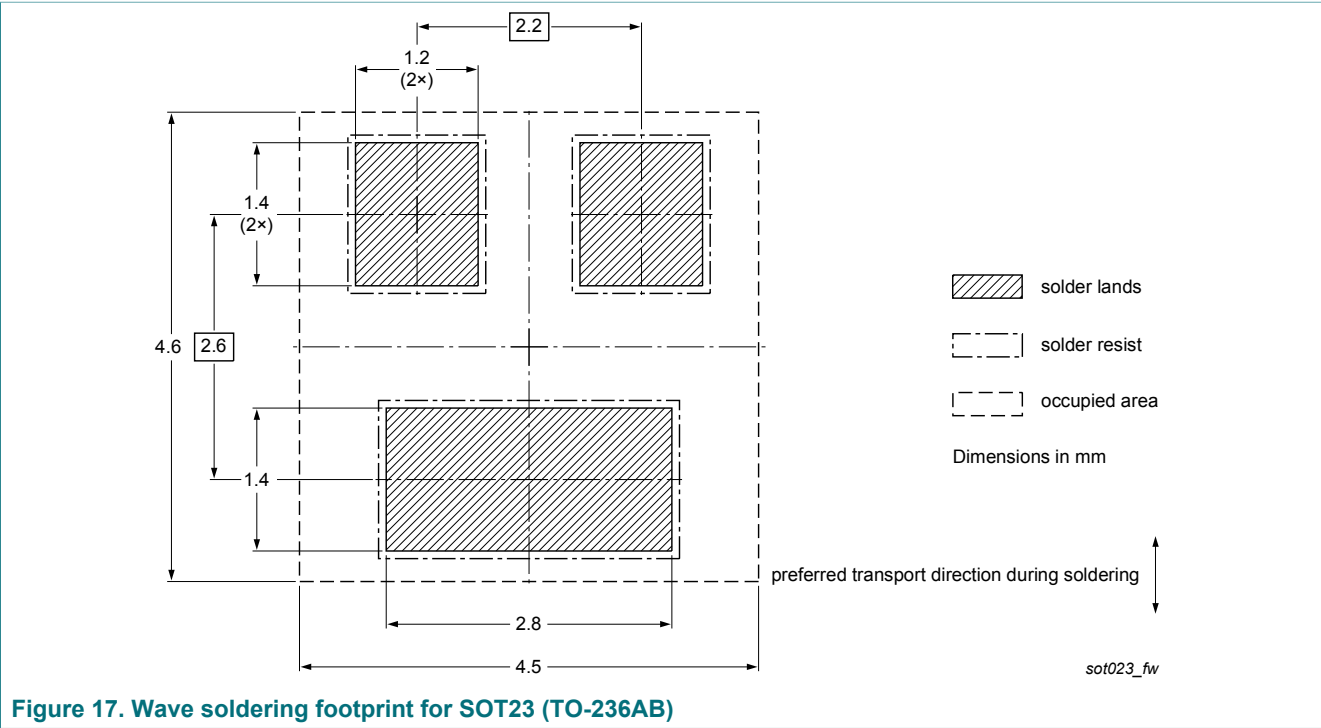
Table 9. Package outline



13 Soldering

Table 10. Soldering





## 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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Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

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