



# BC806 series

80 V, 500 mA PNP general-purpose transistors

Rev. 2 — 5 November 2019

Product data sheet

## 1. General description

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

Table 1. Product overview

| Type number | Package  |          | NPN complement: |
|-------------|----------|----------|-----------------|
|             | Nexperia | JEDEC    |                 |
| BC806-16    | SOT23    | TO-236AB | BC816-16        |
| BC806-25    | SOT23    | TO-236AB | BC816-25        |

## 2. Features and benefits

- High current
- High voltage
- Two current gain selections
- AEC-Q101 qualified

## 3. Applications

- General-purpose switching and amplification
- 48 V automotive board net

## 4. Quick reference data

Table 2. Quick reference data

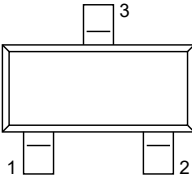
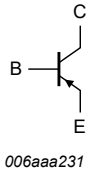
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

| Symbol    | Parameter                 | Conditions                                      | Min | Typ | Max  | Unit |
|-----------|---------------------------|-------------------------------------------------|-----|-----|------|------|
| $V_{CEO}$ | collector-emitter voltage | open base                                       | -   | -   | -80  | V    |
| $I_C$     | collector current         |                                                 | -   | -   | -500 | mA   |
| $I_{CM}$  | peak collector current    | single pulse; $t_p \leq 1\text{ ms}$            | -   | -   | -1   | A    |
| $h_{FE}$  | DC current gain           |                                                 |     |     |      |      |
|           | BC806-16                  | $V_{CE} = -1\text{ V}$ ; $I_C = -100\text{ mA}$ | [1] | 100 | -    | 250  |
|           | BC806-25                  |                                                 | [1] | 160 | -    | 400  |

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

## 5. Pinning information

Table 3. Pinning

| Pin | Symbol | Description | Simplified outline                                                                                     | Graphic symbol                                                                                   |
|-----|--------|-------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1   | B      | base        | <br>TO-236AB (SOT23) | <br>006aaa231 |
| 2   | E      | emitter     |                                                                                                        |                                                                                                  |
| 3   | C      | collector   |                                                                                                        |                                                                                                  |

## 6. Ordering information

Table 4. Ordering information

| Type number | Package  |                                           |         |
|-------------|----------|-------------------------------------------|---------|
|             | Name     | Description                               | Version |
| BC806-16    | TO-236AB | plastic, surface-mounted package; 3 leads | SOT23   |
| BC806-25    |          |                                           |         |

## 7. Marking

Table 5. Marking

| Type number | Marking code [1] |
|-------------|------------------|
| BC806-16    | %GR              |
| BC806-25    | %GS              |

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 6. Limiting values

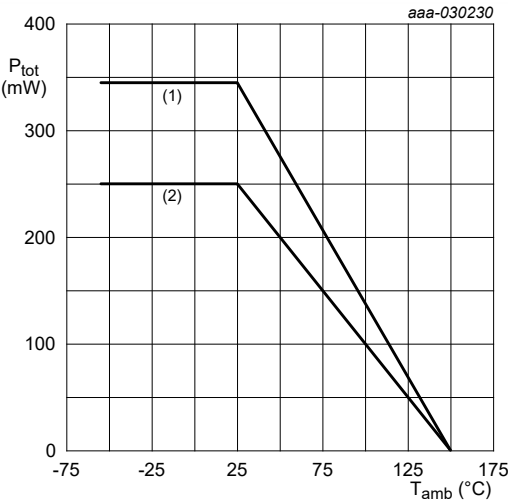
In accordance with the Absolute Maximum Rating System (IEC 60134).

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

| Symbol    | Parameter                 | Conditions                           | Min | Max  | Unit |
|-----------|---------------------------|--------------------------------------|-----|------|------|
| $V_{CBO}$ | collector-base voltage    | open emitter                         | -   | -80  | V    |
| $V_{CEO}$ | collector-emitter voltage | open base                            | -   | -80  | V    |
| $V_{EBO}$ | emitter-base voltage      | open collector                       | -   | -8   | V    |
| $I_C$     | collector current         |                                      | -   | -500 | mA   |
| $I_{CM}$  | peak collector current    | single pulse; $t_p \leq 1\text{ ms}$ | -   | -1   | A    |
| $I_{BM}$  | peak base current         | single pulse; $t_p \leq 1\text{ ms}$ | -   | -200 | mA   |
| $P_{tot}$ | total power dissipation   | $T_{amb} \leq 25\text{ °C}$          | [1] | 250  | mW   |
|           |                           |                                      | [2] | 345  | 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 copper; tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.



- (1) FR4 PCB; 1 cm<sup>2</sup> mounting pad for collector  
(2) FR4 PCB; standard footprint

Fig. 1. Power derating curves for SOT23

9. Thermal characteristics

Table 7. Thermal characteristics

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

| Symbol        | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|---------------|---------------------------------------------|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 500 | K/W  |
|               |                                             |             | [2] | -   | -   | 363 | K/W  |

- [1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.  
[2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.

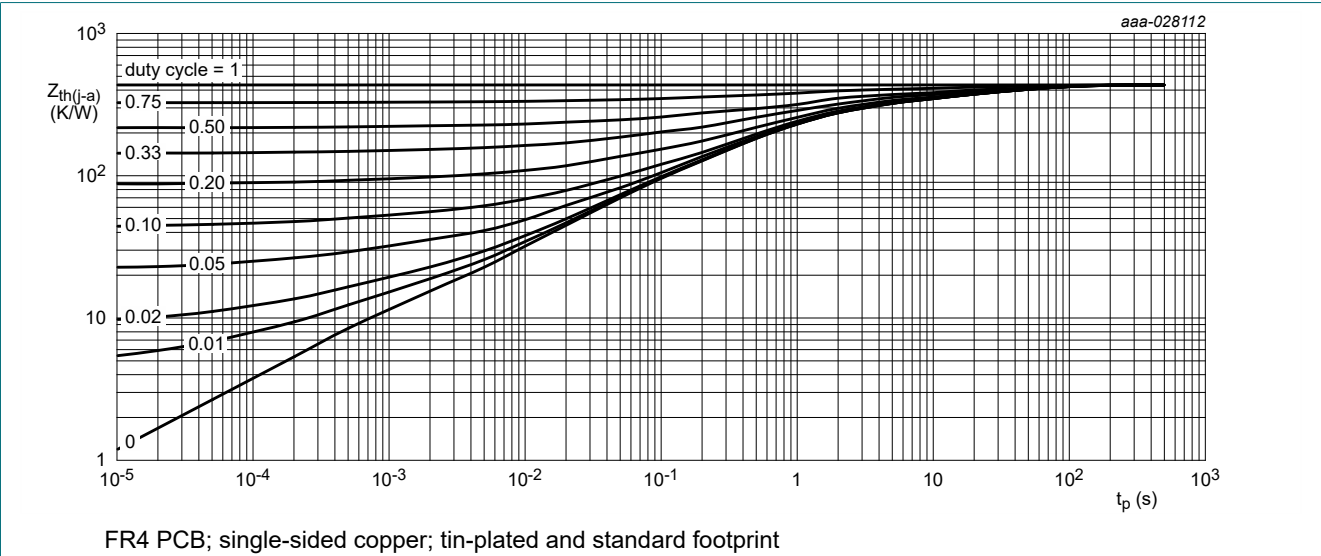


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

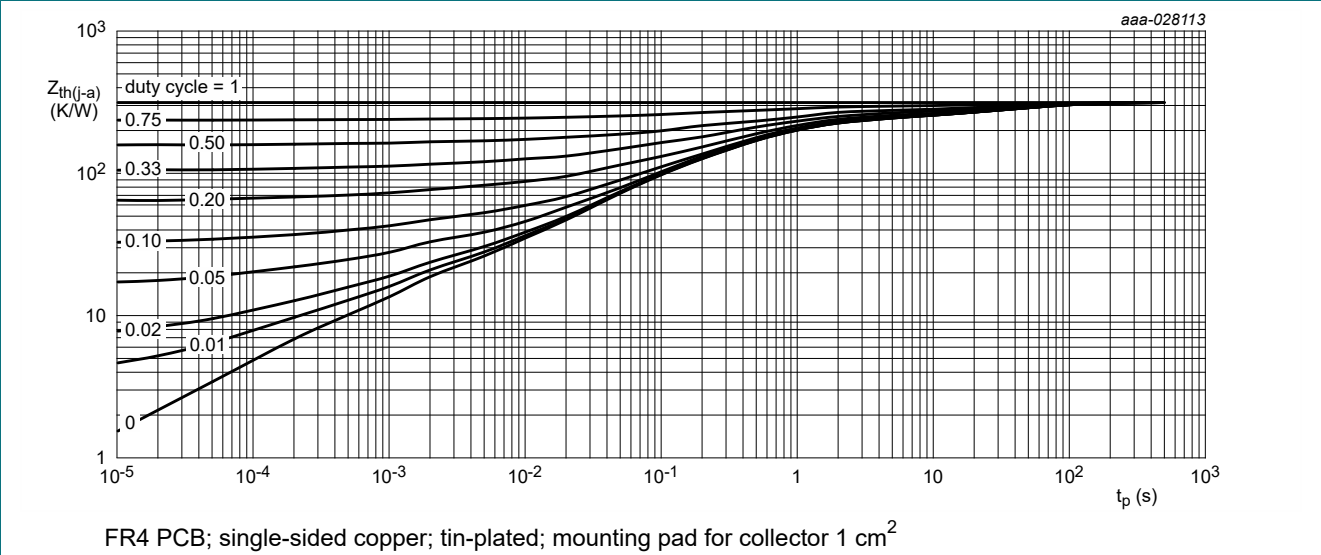


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

**Table 8. Characteristics**

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

| Symbol        | Parameter                            | Conditions                                                              |     | Min | Typ | Max  | Unit          |
|---------------|--------------------------------------|-------------------------------------------------------------------------|-----|-----|-----|------|---------------|
| $V_{(BR)CBO}$ | collector-base breakdown voltage     | $I_C = -100\text{ }\mu\text{A}$ ; $I_E = 0\text{ A}$                    |     | -80 | -   |      | V             |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage  | $I_C = -2\text{ mA}$ ; $I_E = 0\text{ A}$                               |     | -80 | -   |      | V             |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage       | $I_E = -100\text{ }\mu\text{A}$ ; $I_C = 0\text{ A}$                    |     | -8  | -   |      | V             |
| $I_{CBO}$     | collector-base cut-off current       | $V_{CB} = -64\text{ V}$ ; $I_E = 0\text{ A}$                            |     | -   | -   | -100 | nA            |
|               |                                      | $V_{CB} = -64\text{ V}$ ; $I_E = 0\text{ A}$ ; $T_j = 150\text{ °C}$    |     | -   | -   | -5   | $\mu\text{A}$ |
| $I_{EBO}$     | emitter-base cut-off current         | $V_{EB} = -6.4\text{ V}$ ; $I_C = 0\text{ A}$                           |     | -   | -   | -100 | nA            |
| $h_{FE}$      | DC current gain                      |                                                                         |     |     |     |      |               |
|               | BC806-16                             | $V_{CE} = -1\text{ V}$ ; $I_C = -100\text{ mA}$                         | [1] | 100 | -   | 250  |               |
|               | BC806-25                             | $V_{CE} = -1\text{ V}$ ; $I_C = -100\text{ mA}$                         | [1] | 160 | -   | 400  |               |
|               |                                      | $V_{CE} = -2\text{ V}$ ; $I_C = -500\text{ mA}$                         | [1] | 30  | -   | -    |               |
| $V_{CEsat}$   | collector-emitter saturation voltage | $I_C = -100\text{ mA}$ ; $I_B = -10\text{ mA}$                          | [1] | -   | -   | -150 | mV            |
|               |                                      | $I_C = -500\text{ mA}$ ; $I_B = -50\text{ mA}$                          | [1] | -   | -   | -400 | mV            |
| $V_{BE}$      | base-emitter voltage                 | $V_{CE} = -1\text{ V}$ ; $I_C = -500\text{ mA}$                         | [1] | -   | -   | -1.2 | V             |
| $f_T$         | transition frequency                 | $V_{CE} = -5\text{ V}$ ; $I_C = -50\text{ mA}$ ; $f = 100\text{ MHz}$   |     | 80  | -   | -    | MHz           |
| $C_c$         | collector capacitance                | $V_{CB} = -10\text{ V}$ ; $I_E = I_C = 0\text{ A}$ ; $f = 1\text{ MHz}$ |     | -   | 5   | -    | pF            |

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

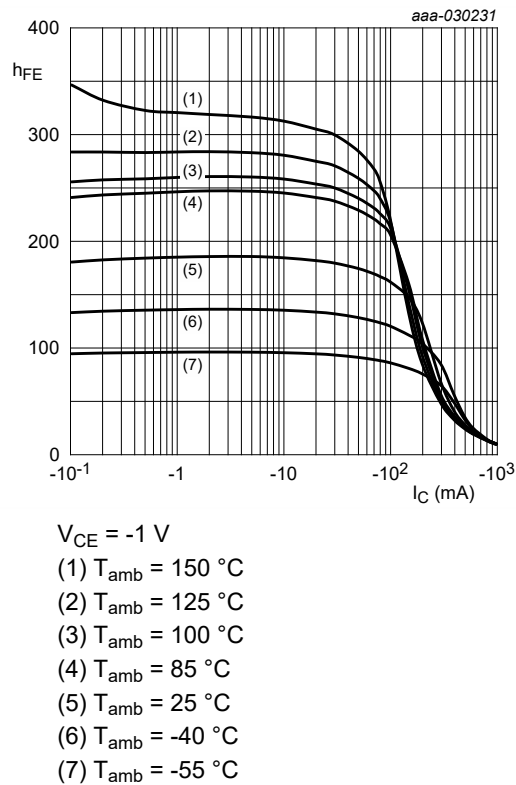


Fig. 4. BC806-16: DC current gain as a function of collector current; typical values

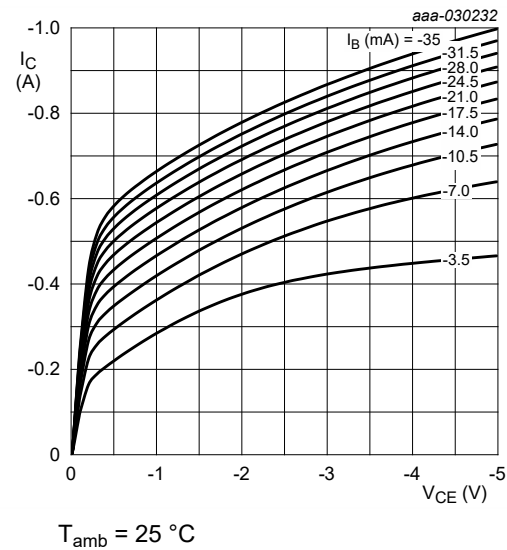


Fig. 5. BC806-16: Collector current as a function of collector-emitter voltage; typical values

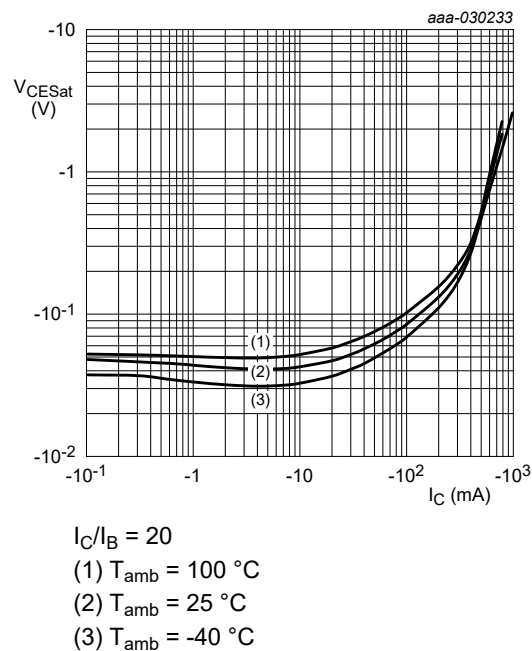


Fig. 6. BC806-16: Collector-emitter saturation voltage as a function of collector current; typical values

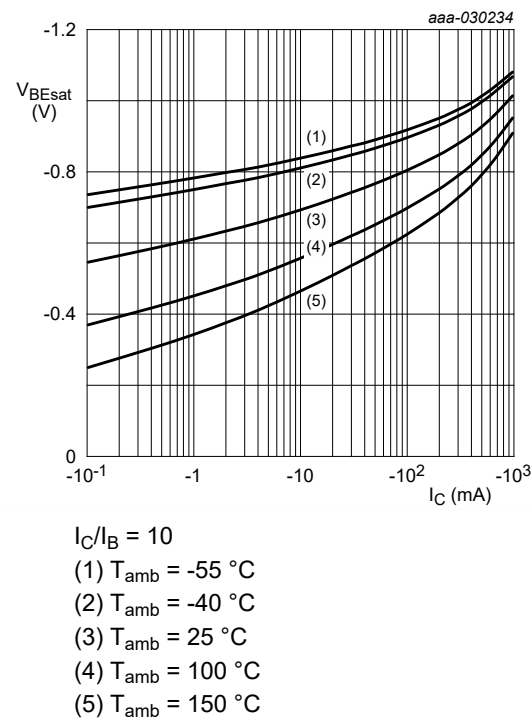
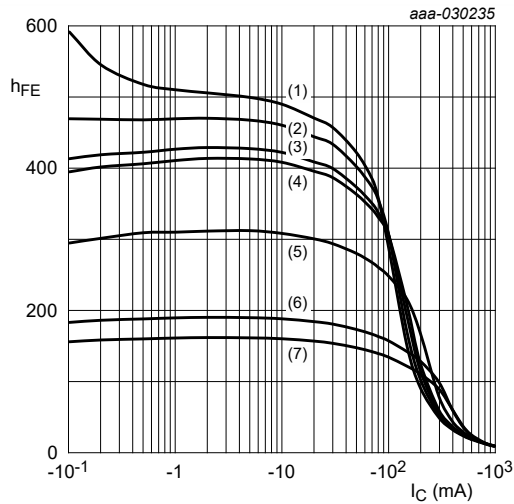


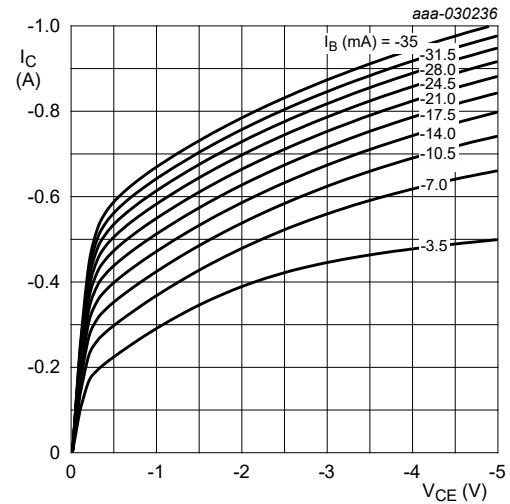
Fig. 7. BC806-16: Base-emitter saturation voltage as a function of collector current; typical values



$V_{CE} = -1 \text{ V}$

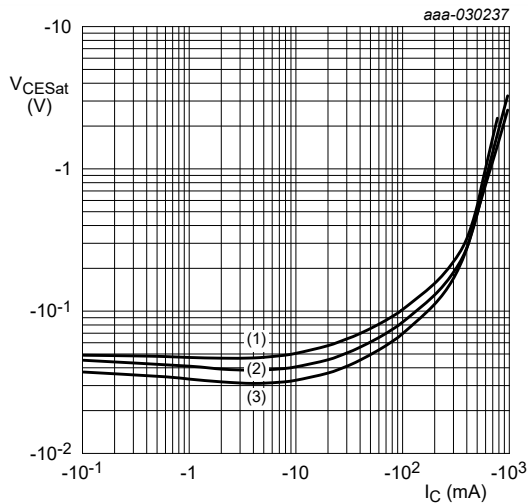
- (1)  $T_{amb} = 150 \text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125 \text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 85 \text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$
- (6)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$
- (7)  $T_{amb} = -55 \text{ }^{\circ}\text{C}$

**Fig. 8. BC806-25: DC current gain as a function of collector current; typical values**



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

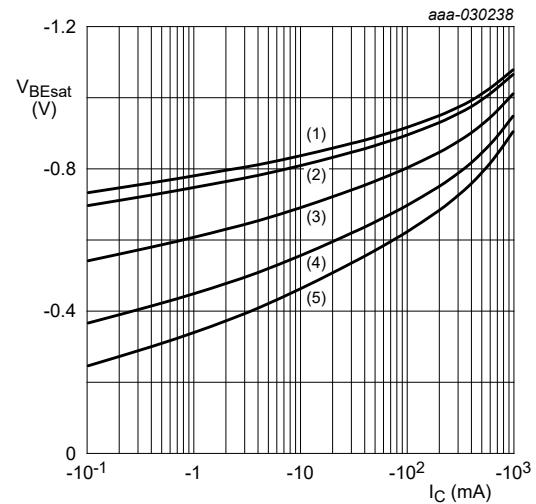
**Fig. 9. BC806-25: Collector current as a function of collector-emitter voltage; typical values**



$I_C/I_B = 20$

- (1)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$

**Fig. 10. BC806-25: Collector-emitter saturation voltage as a function of collector current; typical values**



$I_C/I_B = 10$

- (1)  $T_{amb} = -55 \text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = 150 \text{ }^{\circ}\text{C}$

**Fig. 11. BC806-25: Base-emitter saturation voltage as a function of collector current; typical values**

## 11. 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

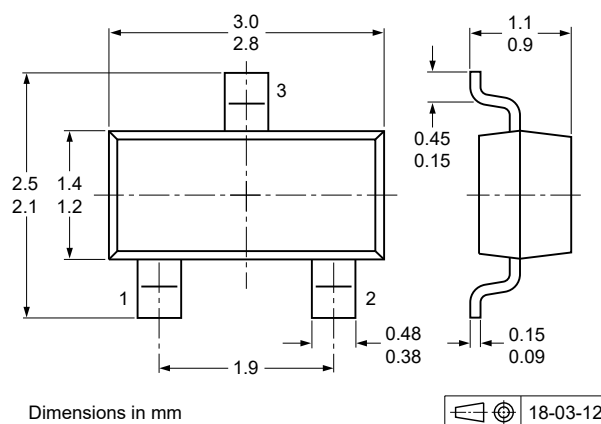
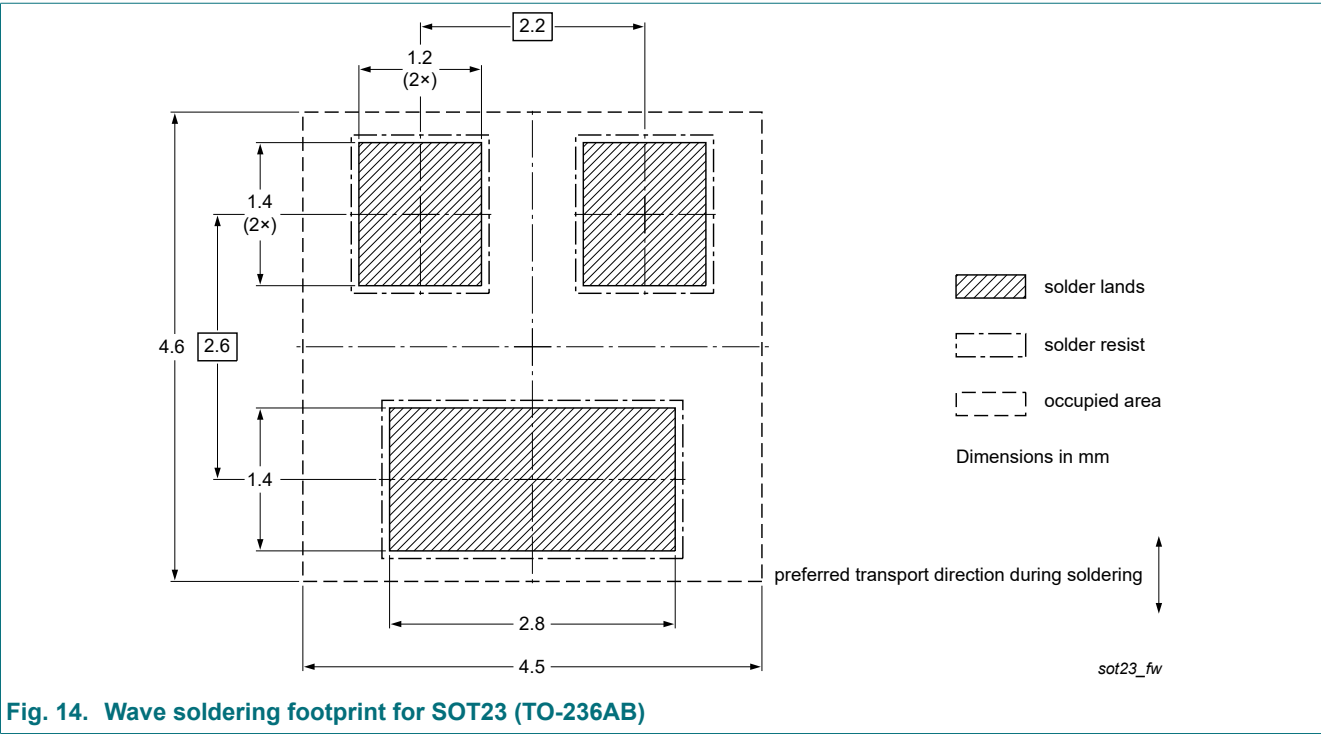
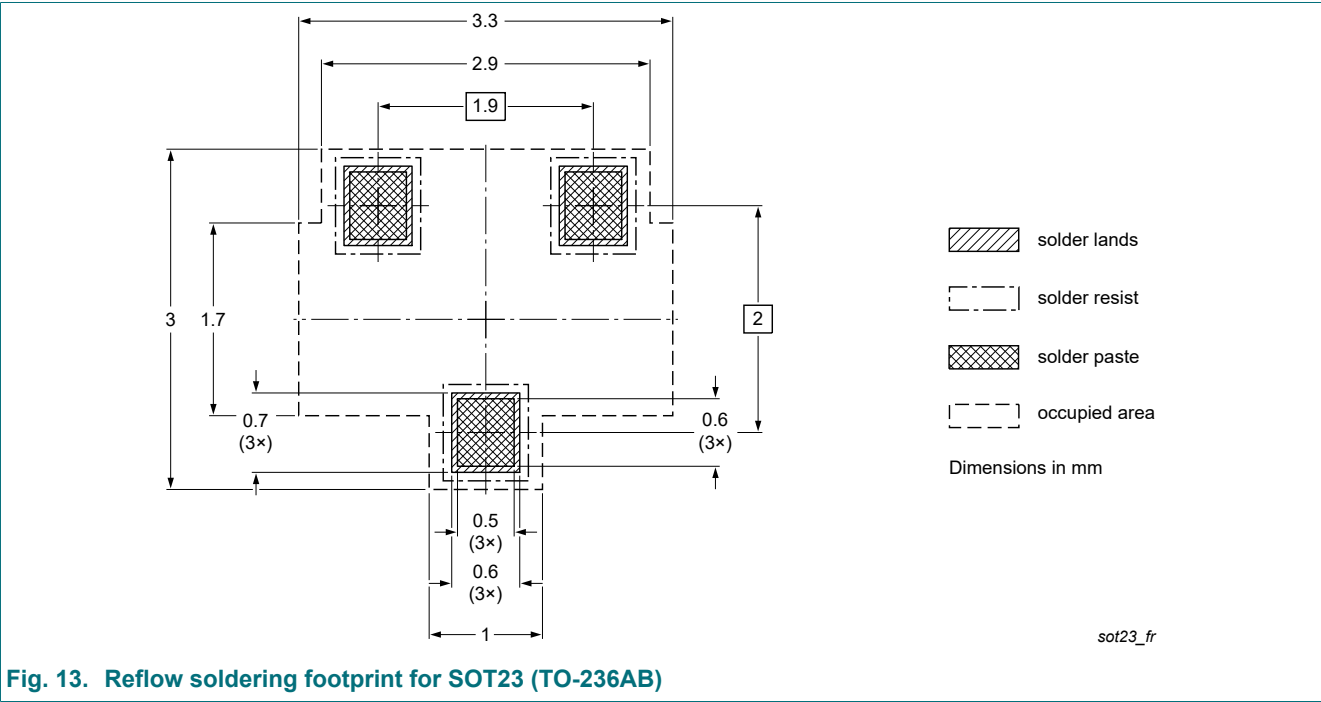


Fig. 12. Package outline SOT23 (TO-236AB)



13. Soldering



## 14. Revision history

**Table 9. Revision history**

| Data sheet ID  | Release date                                                           | Data sheet status      | Change notice | Supersedes    |
|----------------|------------------------------------------------------------------------|------------------------|---------------|---------------|
| BC806_SER v.2  | 20191105                                                               | Product data sheet     | -             | BC806_SER v.1 |
| Modifications: | <ul style="list-style-type: none"><li>Product status changed</li></ul> |                        |               |               |
| BC806_SER v.1  | 20190909                                                               | Preliminary data sheet | -             | -             |

## 15. Legal information

### Data sheet status

| Document status<br>[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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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..... 3

9. Thermal characteristics..... 4

10. Characteristics..... 5

11. Quality information..... 8

12. Package outline..... 8

13. Soldering..... 9

14. Revision history..... 10

15. Legal information..... 11

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