



PBSS9110T

100 V, 1 A PNP low V_{CEsat} transistor

1 January 2023

Product data sheet

1. General description

PNP low V_{CEsat} transistor in a SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PBSS8110T

2. Features and benefits

- Low collector-emitter saturation voltage V_{CEsat} and corresponding low R_{CEsat}
- High collector current capability
- High collector current gain
- Improved efficiency due to reduced heat generation

3. Applications

- Major application segments
 - Automotive 42 V power
 - Telecom infrastructure
 - Industrial
- DC/DC converters
- Peripheral drivers
 - Driver in low supply voltage applications (e.g. lamps and LEDs)
 - Inductive load driver (e.g. relays, buzzers and motors)

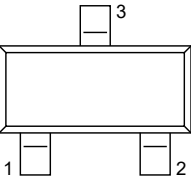
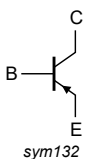
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------|---|--|-----|-----|------|------|
| V _{CEO} | collector-emitter voltage | open base | - | - | -100 | V |
| I _C | collector current | | - | - | -1 | A |
| I _{CM} | peak collector current | limited by T _{j(max)} | - | - | -3 | A |
| R _{CEsat} | collector-emitter saturation resistance | I _C = -1 A; I _B = -100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C | - | 170 | 320 | mΩ |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|---|
| 1 | B | base |  <p style="text-align: center;">SOT23</p> |  |
| 2 | E | emitter | | |
| 3 | C | collector | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------------------|---------|--|-----------------------|
| | Name | Description | Version |
| PBSS9110T | SOT23 | plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body | SOT23 |

7. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PBSS9110T | %U7 |

[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 | | - | -120 | V |
| V_{CEO} | collector-emitter voltage | open base | | - | -100 | V |
| V_{EBO} | emitter-base voltage | open collector | | - | -5 | V |
| I_C | collector current | | | - | -1 | A |
| I_{CM} | peak collector current | limited by $T_{j(max)}$ | | - | -3 | A |
| I_B | base current | | | - | -300 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [1] | - | 300 | mW |
| | | | [2] | - | 480 | mW |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -65 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |

[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 cm².

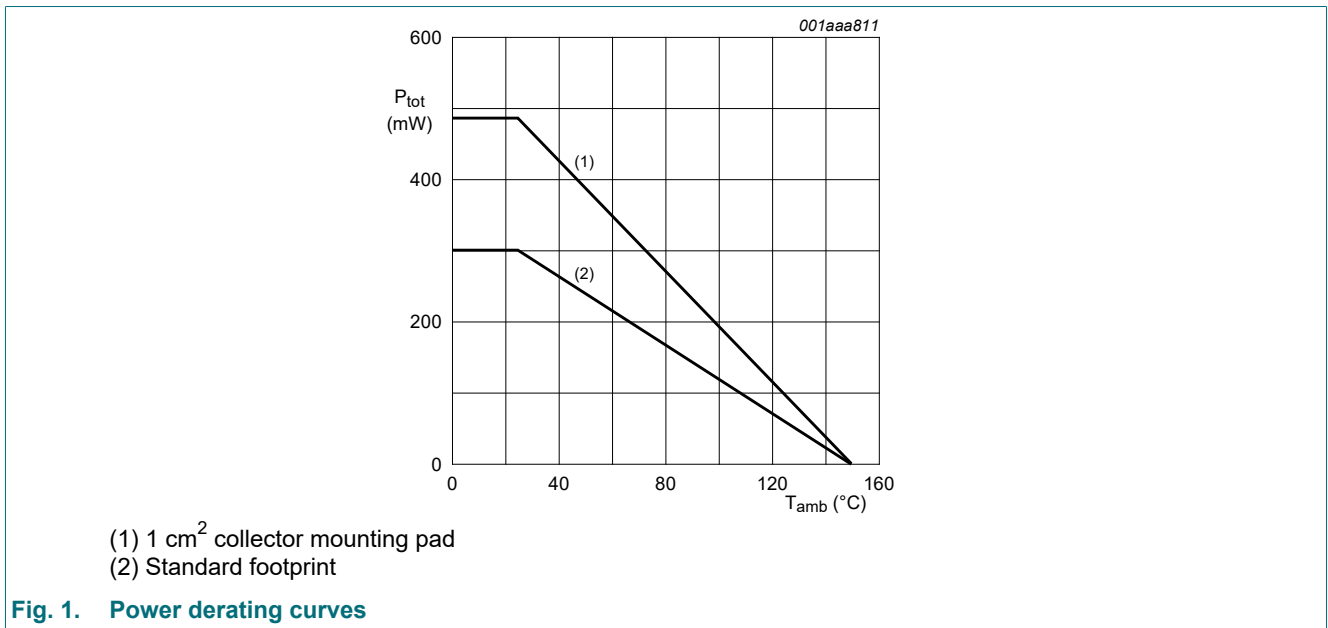


Fig. 1. Power derating curves

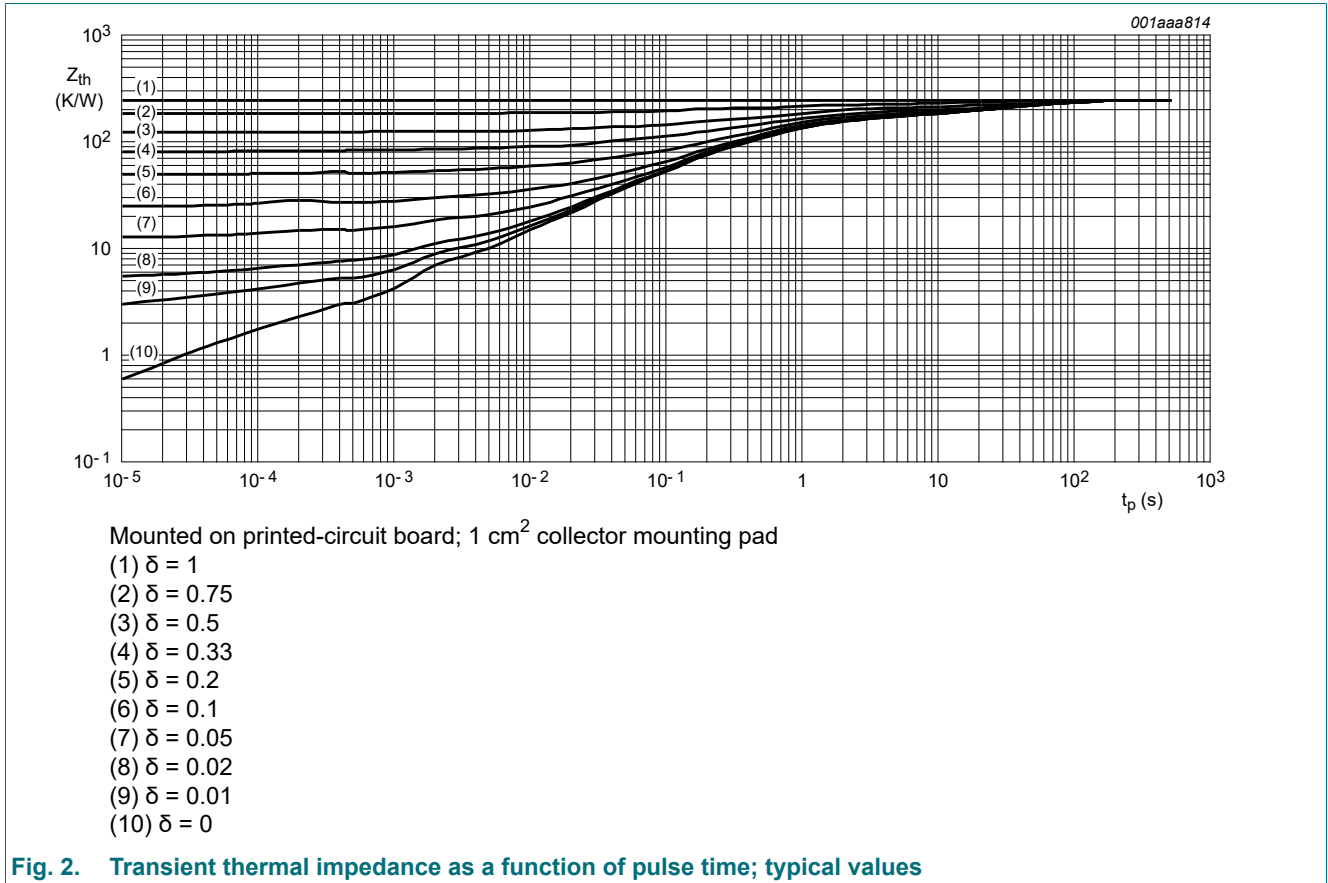
9. Thermal characteristics

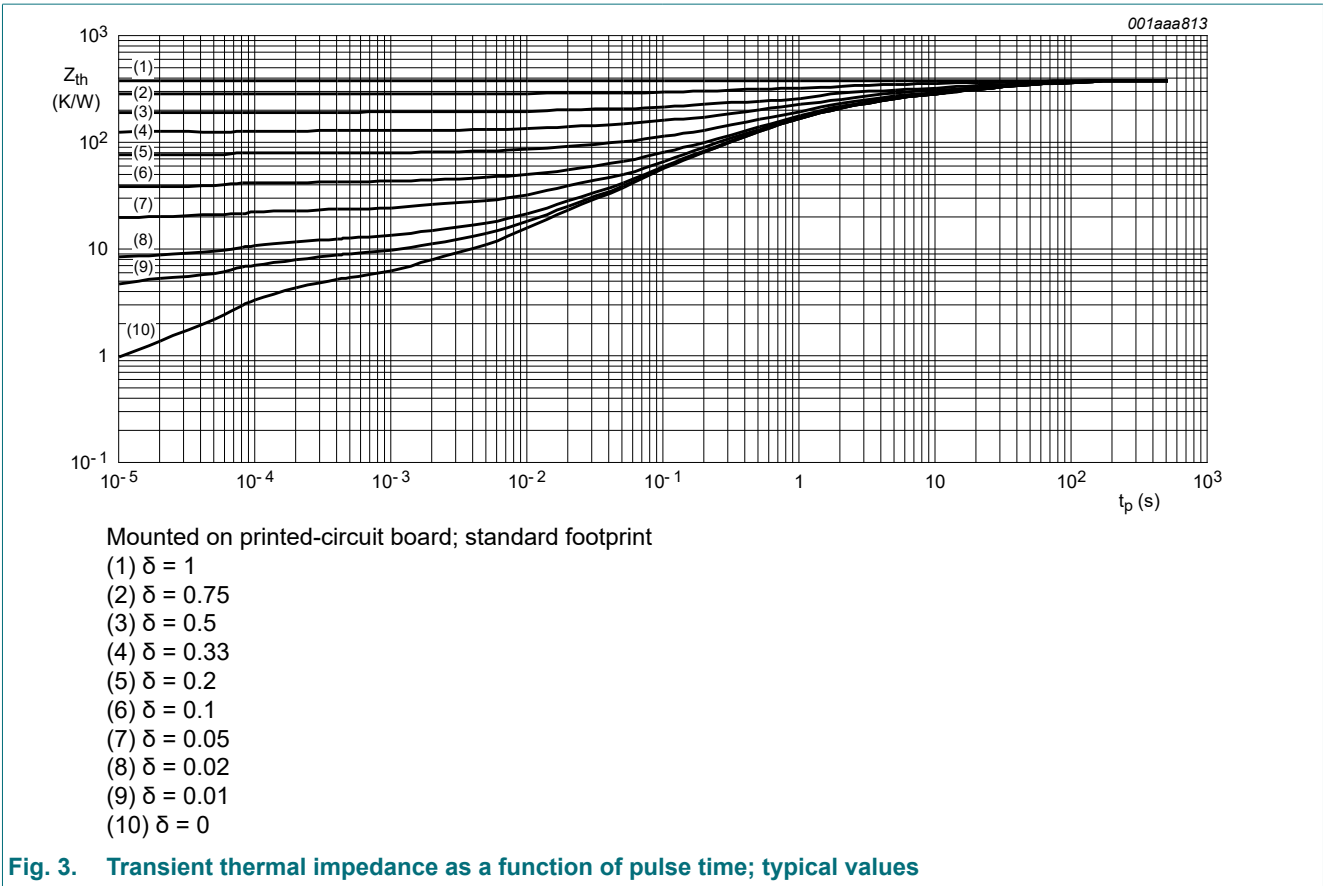
Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---------------|---|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | - | 417 | K/W |
| | | | [2] | - | - | 260 | 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 cm².

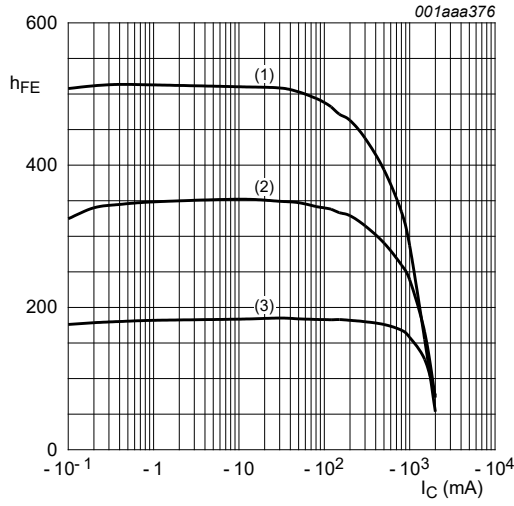




10. Characteristics

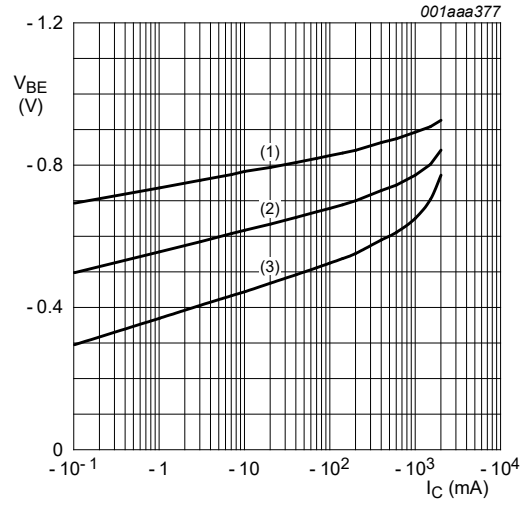
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|---|--|------|-----|------|---------------|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | $I_C = -100 \mu\text{A}$; $I_E = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | -120 | - | - | V |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage | $I_C = -10 \text{ mA}$; $I_B = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | -100 | - | - | V |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage (collector open) | $I_C = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | -5 | - | - | V |
| I_{CBO} | collector-base cut-off current | $V_{CB} = -80 \text{ V}$; $I_E = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -100 | nA |
| | | $V_{CB} = -80 \text{ V}$; $I_E = 0 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$ | - | - | -50 | μA |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = -4 \text{ V}$; $I_C = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -100 | nA |
| I_{CES} | collector-emitter cut-off current | $V_{CE} = -80 \text{ V}$; $V_{BE} = 0 \text{ V}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -100 | nA |
| h_{FE} | DC current gain | $V_{CE} = -5 \text{ V}$; $I_C = -1 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 150 | - | - | |
| | | $V_{CE} = -5 \text{ V}$; $I_C = -250 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 150 | - | - | |
| | | $V_{CE} = -5 \text{ V}$; $I_C = -500 \text{ mA}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 150 | - | 450 | |
| | | $V_{CE} = -5 \text{ V}$; $I_C = -1 \text{ A}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 125 | - | - | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = -250 \text{ mA}$; $I_B = -25 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -120 | mV |
| | | $I_C = -500 \text{ mA}$; $I_B = -50 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -180 | mV |
| | | $I_C = -1 \text{ A}$; $I_B = -100 \text{ mA}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -320 | mV |
| R_{CEsat} | collector-emitter saturation resistance | $I_C = -1 \text{ A}$; $I_B = -100 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | 170 | 320 | m Ω |
| V_{BEsat} | base-emitter saturation voltage | $I_C = -1 \text{ A}$; $I_B = -100 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -1.1 | V |
| V_{BEon} | base-emitter turn-on voltage | $V_{CE} = -5 \text{ V}$; $I_C = -1 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | -1 | V |
| f_T | transition frequency | $V_{CE} = -10 \text{ V}$; $I_C = -50 \text{ mA}$; $f = 100 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 100 | - | - | MHz |
| C_c | collector capacitance | $V_{CB} = -10 \text{ V}$; $I_E = 0 \text{ A}$; $i_e = 0 \text{ A}$; $f = 1 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 17 | pF |



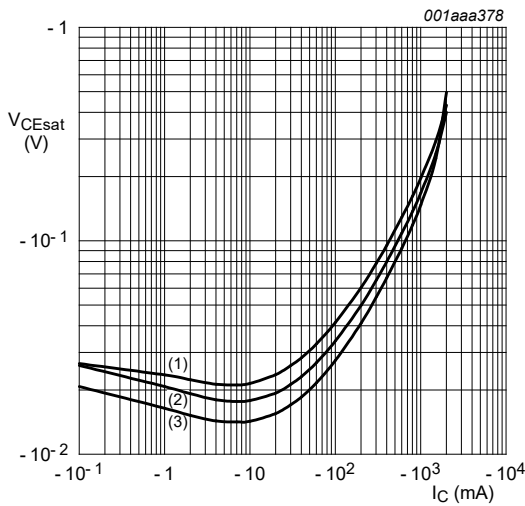
$V_{CE} = -10\text{ V}$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 4. DC current gain as a function of collector current; typical values



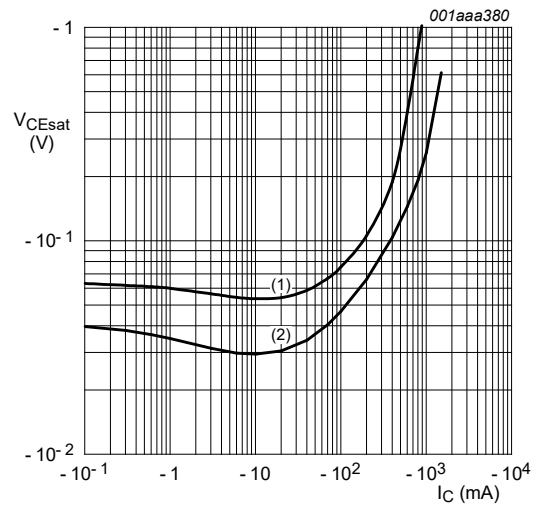
$V_{CE} = -10\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$

Fig. 5. Base-emitter voltage as a function of collector current; typical values



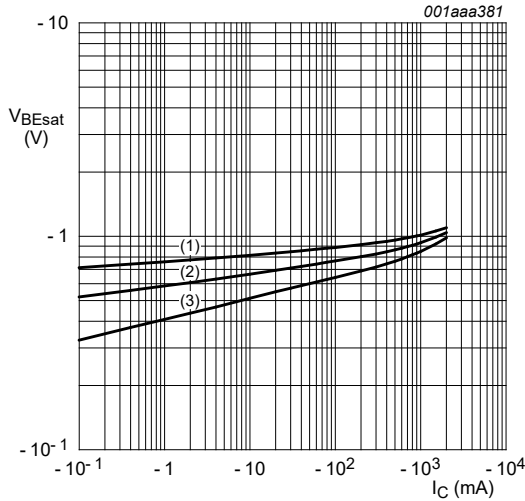
$I_C/I_B = 10$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



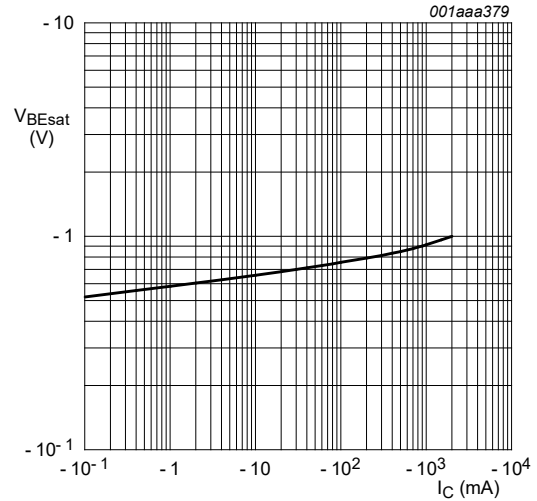
$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 50$
 (2) $I_C/I_B = 20$

Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values



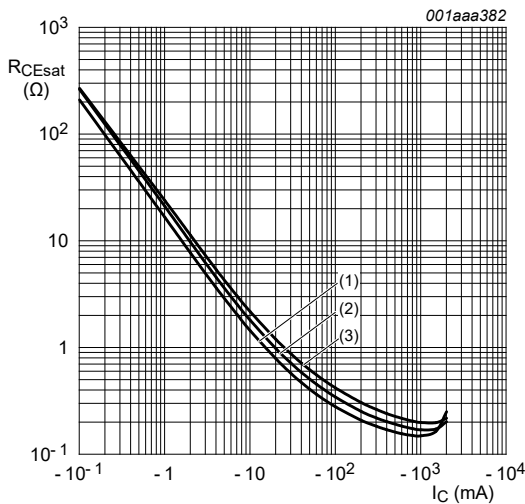
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$

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



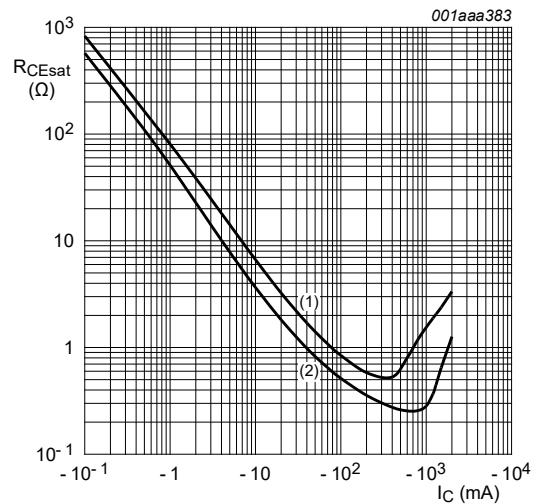
$I_C/I_B = 20$
 $T_{amb} = 25\text{ °C}$

Fig. 9. 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) $T_{amb} = 100\text{ °C}$

Fig. 10. Collector-emitter saturation resistance as a function of collector current; typical values



$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 50$
 (2) $I_C/I_B = 20$

Fig. 11. Collector-emitter saturation resistance as a function of collector current; typical values

11. Package outline

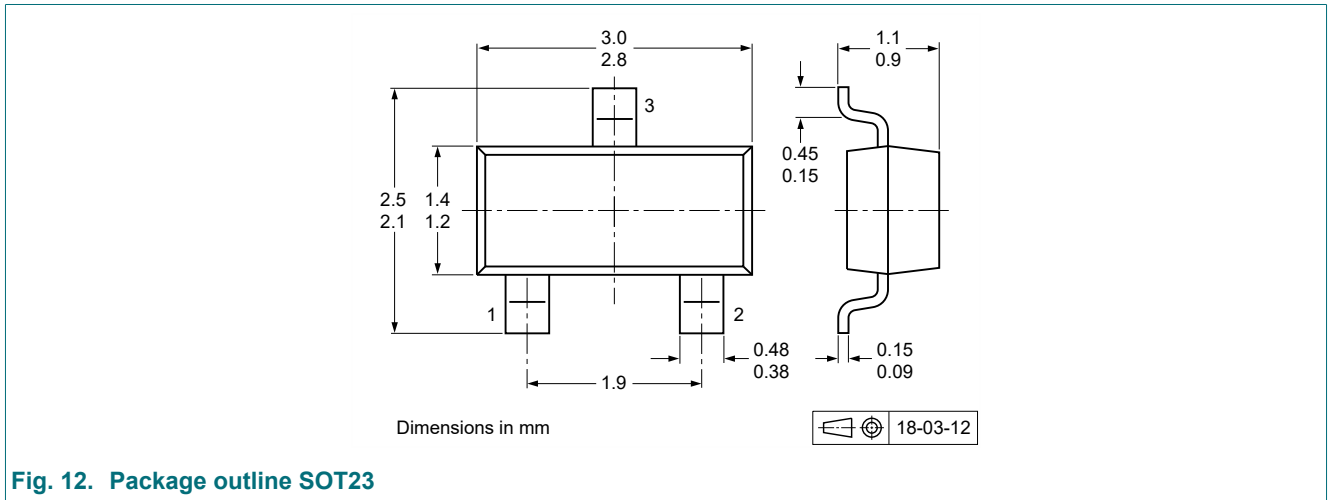


Fig. 12. Package outline SOT23

12. Soldering

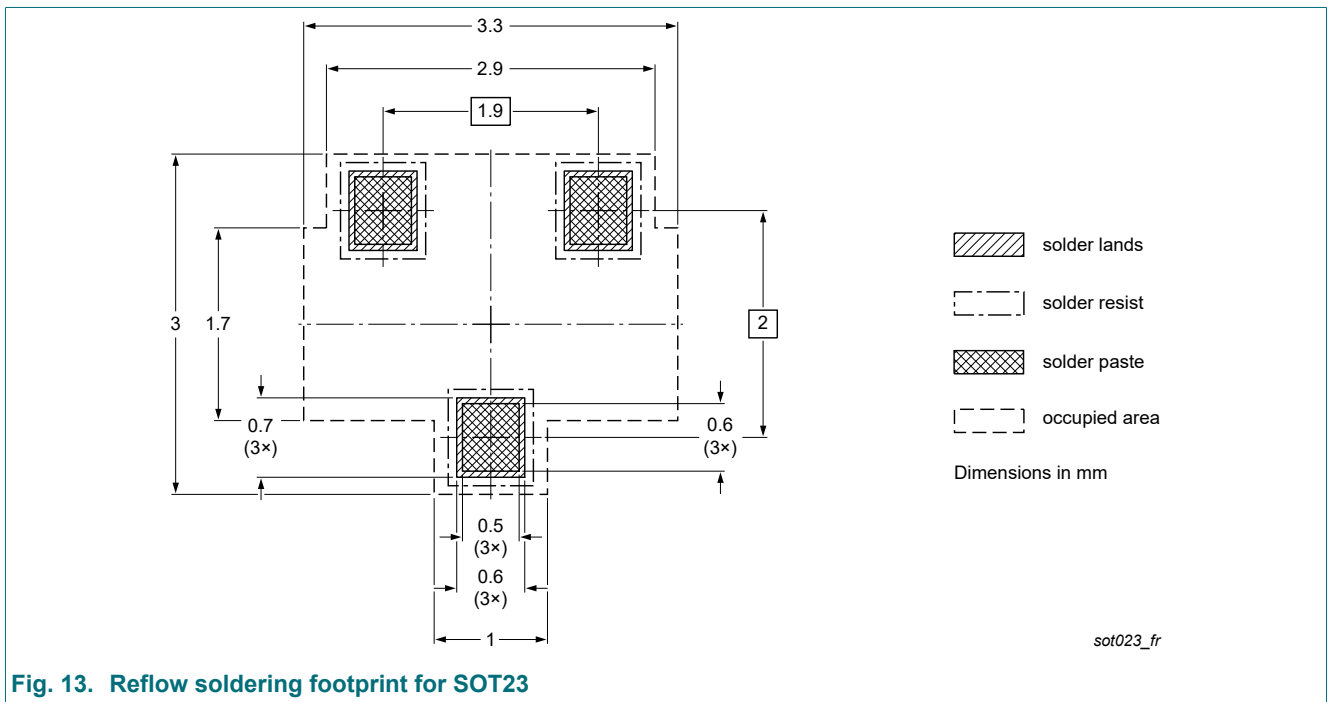


Fig. 13. Reflow soldering footprint for SOT23

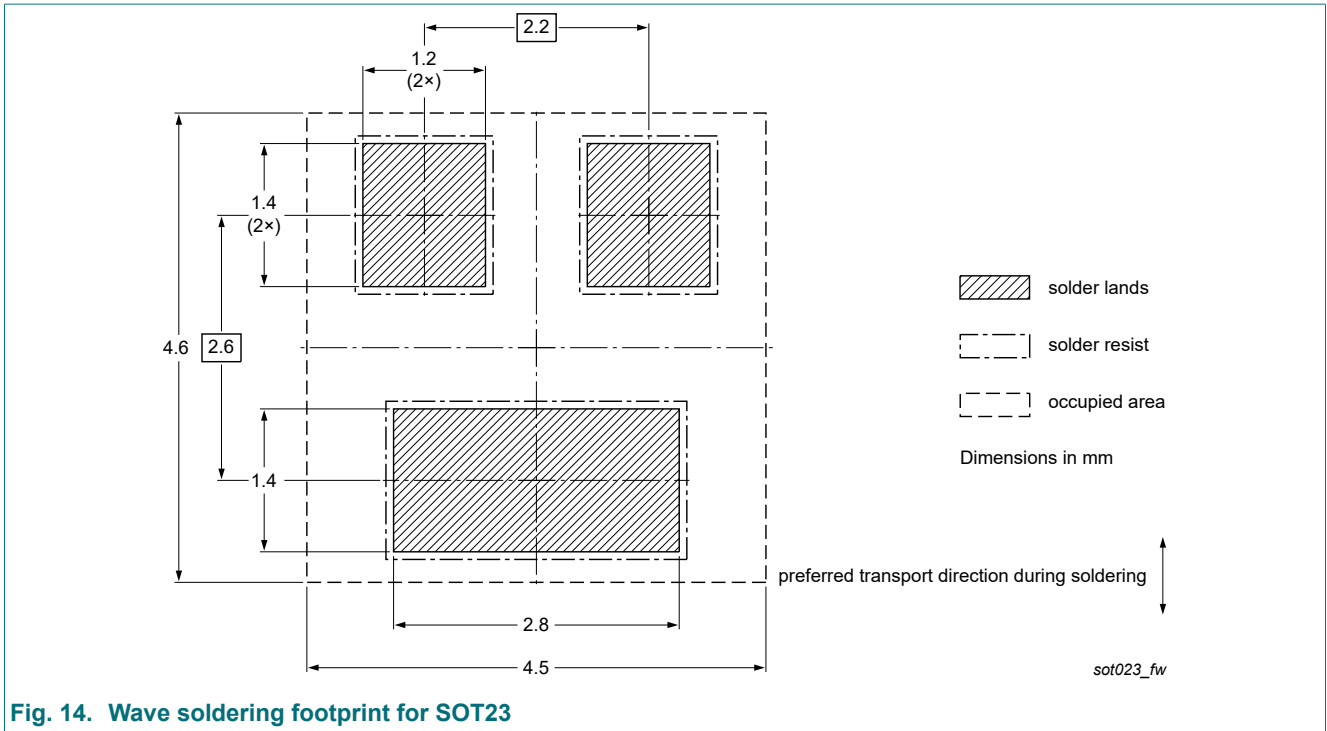


Fig. 14. Wave soldering footprint for SOT23

13. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|--------------------|---------------|---------------|
| PBSS9110T v.4 | 20230101 | Product data sheet | - | PBSS9110T v.3 |
| Modifications: | <ul style="list-style-type: none">Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). | | | |
| PBSS9110T v.3 | 20220523 | Product data sheet | - | PBSS9110T v.2 |
| PBSS9110T v.2 | 20040513 | Product data sheet | - | PBSS9110T v.1 |
| PBSS9110T v.1 | 20040506 | Product data sheet | - | - |

14. Legal information

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. |

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- [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..... | 6 |
| 11. Package outline..... | 9 |
| 12. Soldering..... | 9 |
| 13. Revision history..... | 11 |
| 14. Legal information..... | 12 |

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Date of release: 1 January 2023
