



BC817W series

45 V, 500 mA NPN general-purpose transistors

Rev. 8 — 1 July 2022

Product data sheet

1. General description

NPN general-purpose transistor in a very small SOT323 (SC70) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

| Type number | Package | | | PNP complement |
|-------------|----------|-------|-------|----------------|
| | Nexperia | JEDEC | JEITA | |
| BC817W | SOT323 | - | SC-70 | BC807W |
| BC817-16W | | | | BC807-16W |
| BC817-25W | | | | BC807-25W |
| BC817-40W | | | | BC807-40W |

2. Features and benefits

- High current
- Three current gain selections

3. Applications

- General-purpose switching and amplification

4. Quick reference data

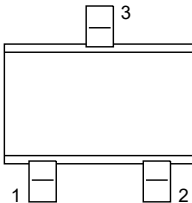
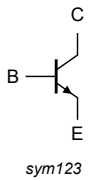
Table 2. Quick reference data

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-----------|---------------------------|--|-----|-----|-----|-----|------|
| V_{CE0} | collector-emitter voltage | open base; $T_{amb} = 25\text{ °C}$ | | - | - | 45 | V |
| I_C | collector current | $T_{amb} = 25\text{ °C}$ | | - | - | 500 | mA |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1\text{ ms}$; $T_{amb} = 25\text{ °C}$ | | - | - | 1 | A |
| h_{FE} | DC current gain | | | | | | |
| | BC817W | $V_{CE} = 1\text{ V}$; $I_C = 100\text{ mA}$ $T_{amb} = 25\text{ °C}$ | [1] | 100 | - | 600 | |
| | BC817-16W | | [1] | 100 | - | 250 | |
| | BC817-25W | | [1] | 160 | - | 400 | |
| | BC817-40W | | [1] | 250 | - | 600 | |

[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 |  |  |
| 2 | E | emitter | | |
| 3 | C | collector | | |

6. Ordering information

Table 4. Ordering information

| Type number | Package | | |
|---------------------------|---------|--|------------------------|
| | Name | Description | Version |
| BC817W | SC-70 | Plastic surface-mounted package; 3 leads | SOT323 |
| BC817-16W | | | |
| BC817-25W | | | |
| BC817-40W | | | |

7. Marking

Table 5. Marking

| Type number | Marking code[1] |
|-------------|-----------------|
| BC817W | 6D% |
| BC817-16W | 6A% |
| BC817-25W | 6B% |
| BC817-40W | 6C% |

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 6. 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; $T_{amb} = 25\text{ °C}$ | - | 50 | V | |
| V_{CEO} | collector-emitter voltage | open base; $T_{amb} = 25\text{ °C}$ | - | 45 | V | |
| V_{EBO} | emitter-base voltage | open collector; $T_{amb} = 25\text{ °C}$ | - | 5 | V | |
| I_C | collector current | $T_{amb} = 25\text{ °C}$ | - | 500 | mA | |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1\text{ ms}$; $T_{amb} = 25\text{ °C}$ | - | 1 | A | |
| I_{BM} | peak base current | single pulse; $t_p \leq 1\text{ ms}$; $T_{amb} = 25\text{ °C}$ | - | 200 | mA | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [1] | 200 | mW | |
| | | | [2] | - | 290 | mW |
| | | | [3] | - | 290 | 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 Printed-Circuit-Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Valid for all available selection groups.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 1 cm².

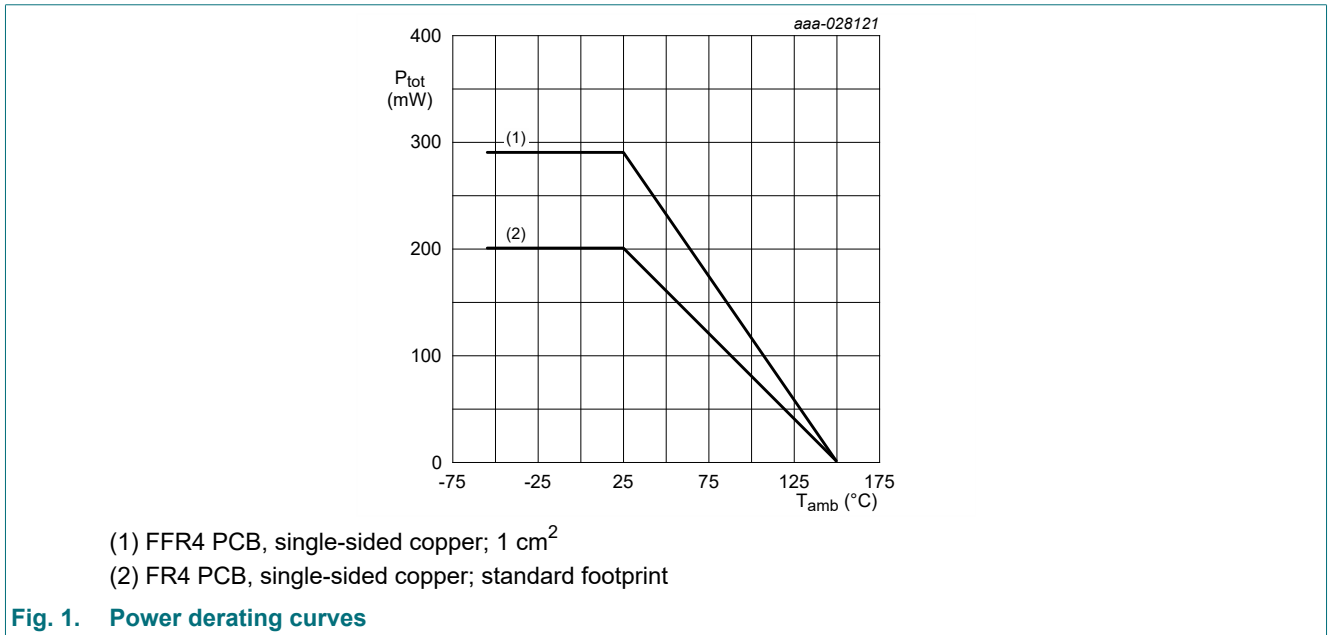


Fig. 1. Power derating curves

9. Thermal characteristics

Table 7. Thermal characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---------------|---|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | - | 625 | K/W |
| | | | [2] | - | - | 431 | K/W |
| | | | [3] | - | - | 431 | K/W |

- [1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.
- [2] Valid for all available selection groups.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 1 cm².

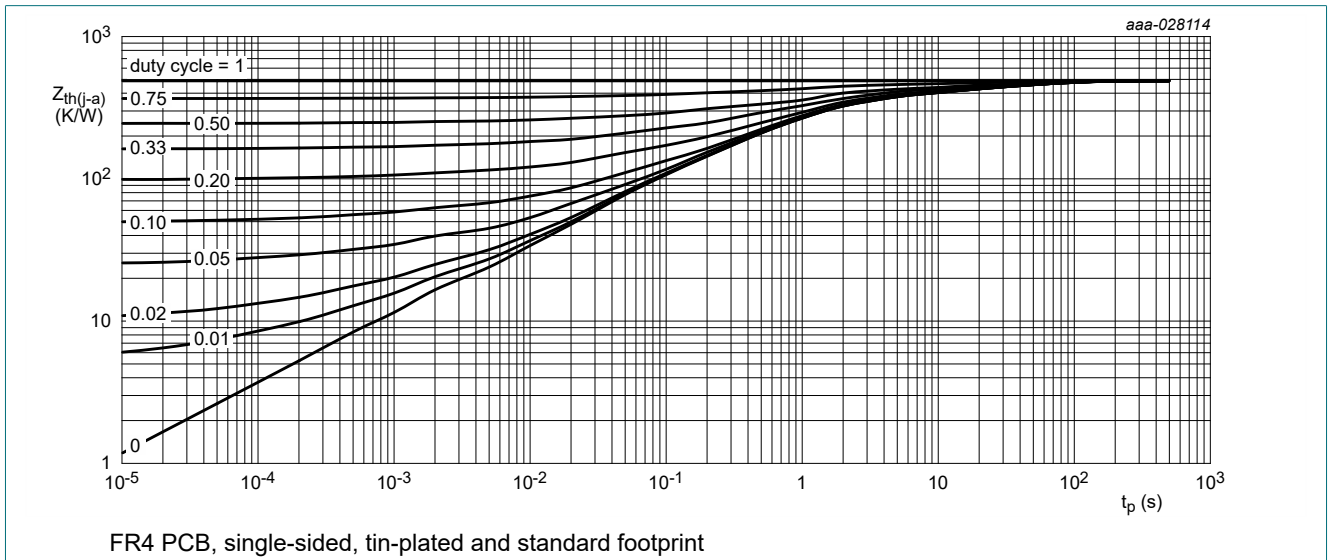


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

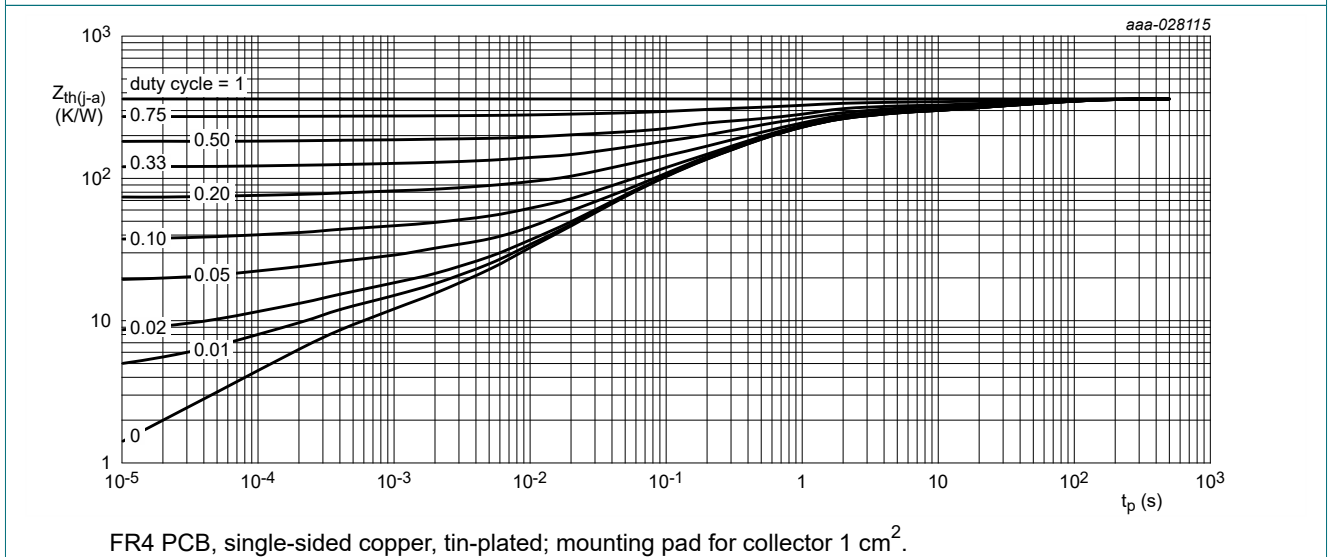


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

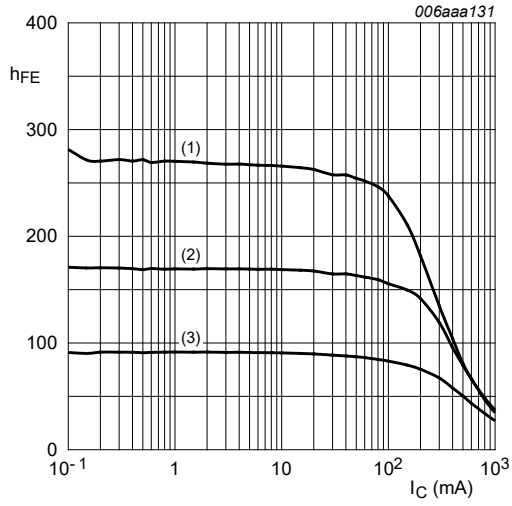
10. Characteristics

Table 8. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|--------------------------------------|---|------------|-----|-----|---------------|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | $I_C = 100 \mu\text{A}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 50 | - | - | V |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage | $I_C = 10 \text{ mA}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 45 | - | - | V |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage | $I_E = 100 \mu\text{A}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 5 | - | - | V |
| I_{CBO} | collector-base cut-off current | $V_{CB} = 20 \text{ V}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 100 | nA |
| | | $V_{CB} = 20 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$ | - | - | 5 | μA |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = 5 \text{ V}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 100 | nA |
| h_{FE} | DC current gain | | | | | |
| | BC817W | $V_{CE} = 1 \text{ V}; I_C = 100 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [1] | 100 | - | 600 |
| | BC817-16W | | [1] | 100 | - | 250 |
| | BC817-25W | | [1] | 160 | - | 400 |
| BC817-40W | [1] | | 250 | - | 600 | |
| h_{FE} | DC current gain | $V_{CE} = 1 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [1] | 40 | - | - |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [1] | - | - | 700 mV |
| V_{BE} | base-emitter voltage | $V_{CE} = 1 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [1] [2] | - | - | 1.2 V |
| f_T | transition frequency | $V_{CE} = 5 \text{ V}; I_C = 10 \text{ mA}; f = 100 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | | 100 | - | - MHz |
| C_c | collector capacitance | $V_{CB} = 10 \text{ V}; I_E = I_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | | - | 3 | - pF |

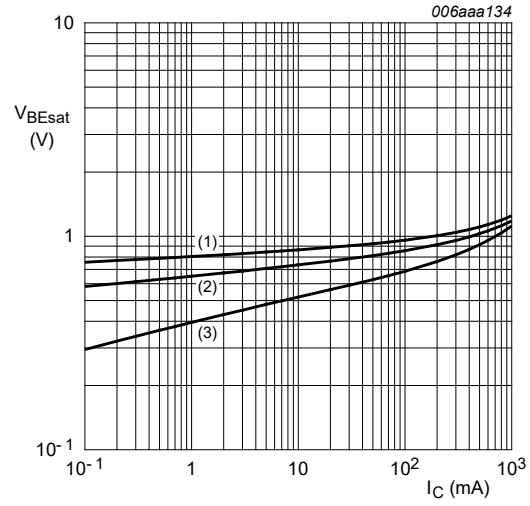
[1] pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$

[2] V_{BE} decreases by about 2 mV/K with increasing temperature.



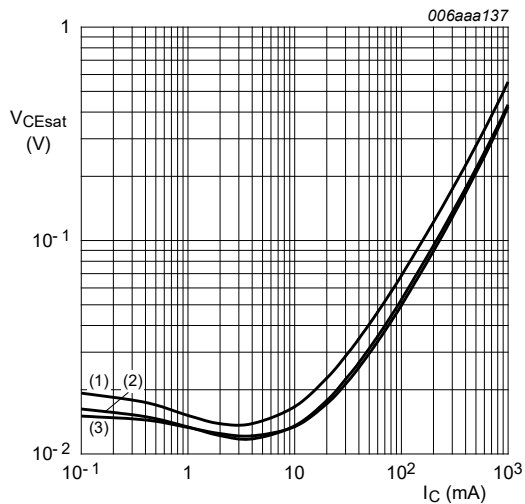
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 4. BC817-16W: DC current gain as a function of collector current; typical values



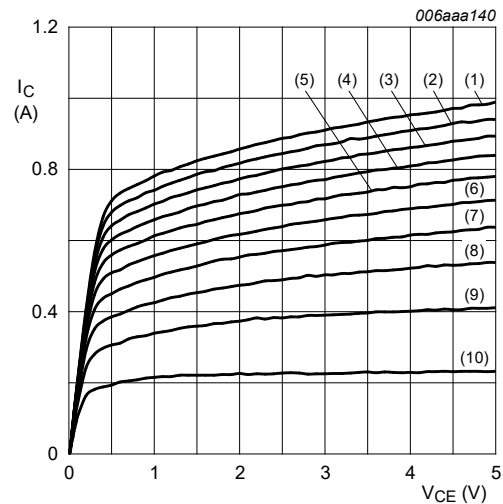
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 5. BC817-16W: Base-emitter saturation voltage as a function of collector current; typical values



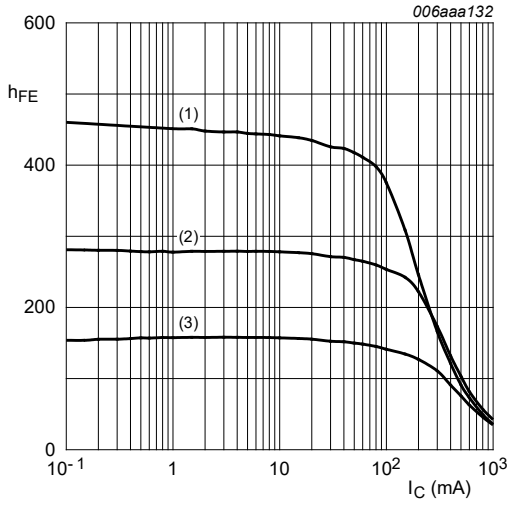
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 6. BC817-16W: Collector-emitter saturation voltage as a function of collector current; typical values



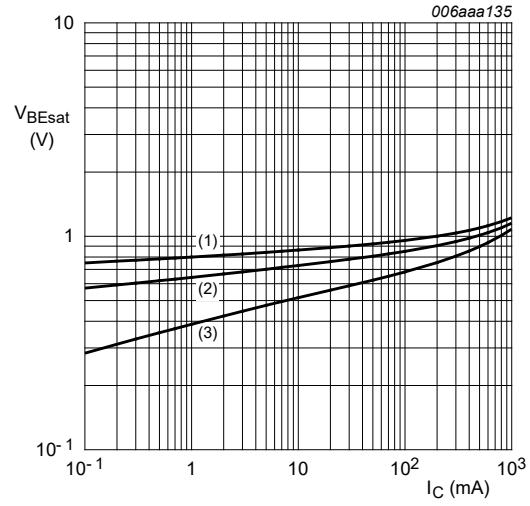
$T_{amb} = 25\text{ °C}$
 (1) $I_B = 16.0\text{ mA}$
 (2) $I_B = 14.4\text{ mA}$
 (3) $I_B = 12.8\text{ mA}$
 (4) $I_B = 11.2\text{ mA}$
 (5) $I_B = 9.6\text{ mA}$
 (6) $I_B = 8.0\text{ mA}$
 (7) $I_B = 6.4\text{ mA}$
 (8) $I_B = 4.8\text{ mA}$
 (9) $I_B = 3.2\text{ mA}$
 (10) $I_B = 1.6\text{ mA}$

Fig. 7. BC817-16W: Collector current as a function of collector-emitter voltage; typical values



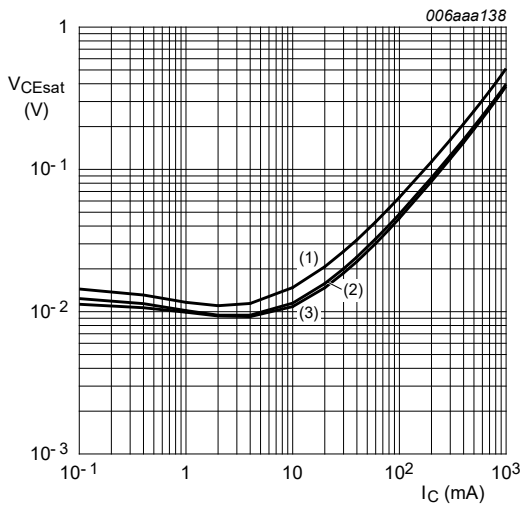
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 8. BC817-25W: DC current gain as a function of collector current; typical values



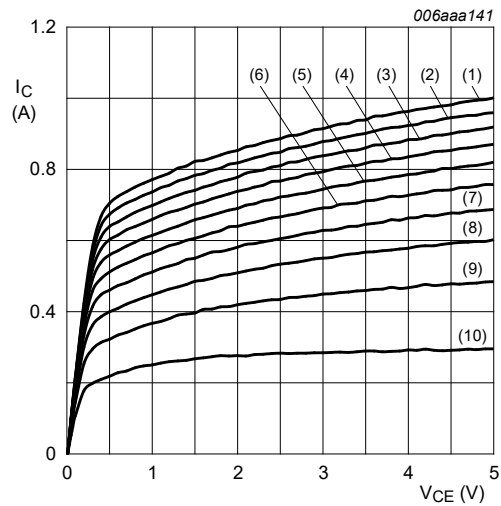
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 9. BC817-25W: Base-emitter saturation voltage as a function of collector current; typical values



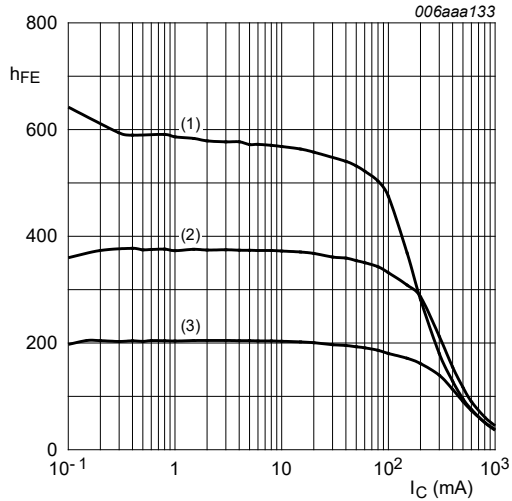
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 10. BC817-25W: Collector-emitter saturation voltage as a function of collector current; typical values



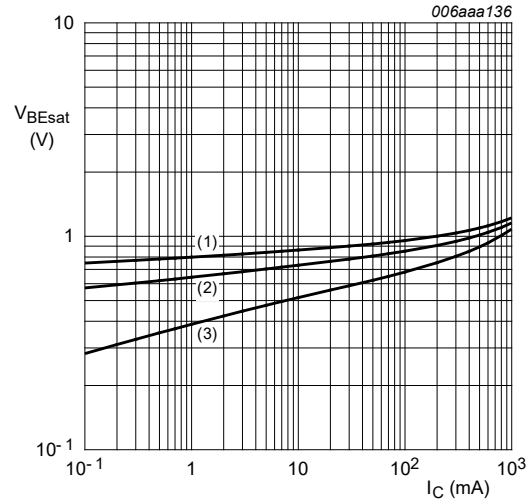
$T_{amb} = 25\text{ °C}$
 (1) $I_B = 13.0\text{ mA}$
 (2) $I_B = 11.7\text{ mA}$
 (3) $I_B = 10.4\text{ mA}$
 (4) $I_B = 9.1\text{ mA}$
 (5) $I_B = 7.8\text{ mA}$
 (6) $I_B = 6.5\text{ mA}$
 (7) $I_B = 5.2\text{ mA}$
 (8) $I_B = 3.9\text{ mA}$
 (9) $I_B = 2.6\text{ mA}$
 (10) $I_B = 1.3\text{ mA}$

Fig. 11. BC817-25W: Collector current as a function of collector-emitter voltage; typical values



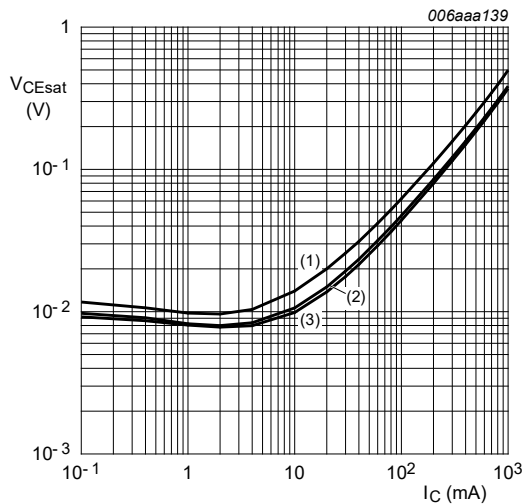
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 12. BC817-40W: DC current gain as a function of collector current; typical values



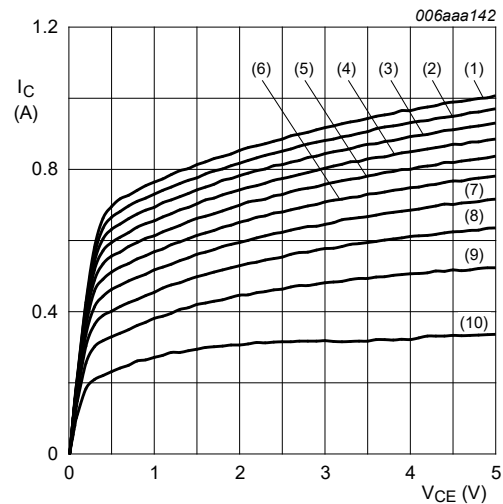
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 13. BC817-40W: 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) $T_{amb} = -55\text{ °C}$

Fig. 14. BC817-40W: Collector-emitter saturation voltage as a function of collector current; typical values



$T_{amb} = 25\text{ °C}$
 (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) $I_B = 1.2\text{ mA}$

Fig. 15. BC817-40W: Collector current as a function of collector-emitter voltage; typical values

11. Package outline

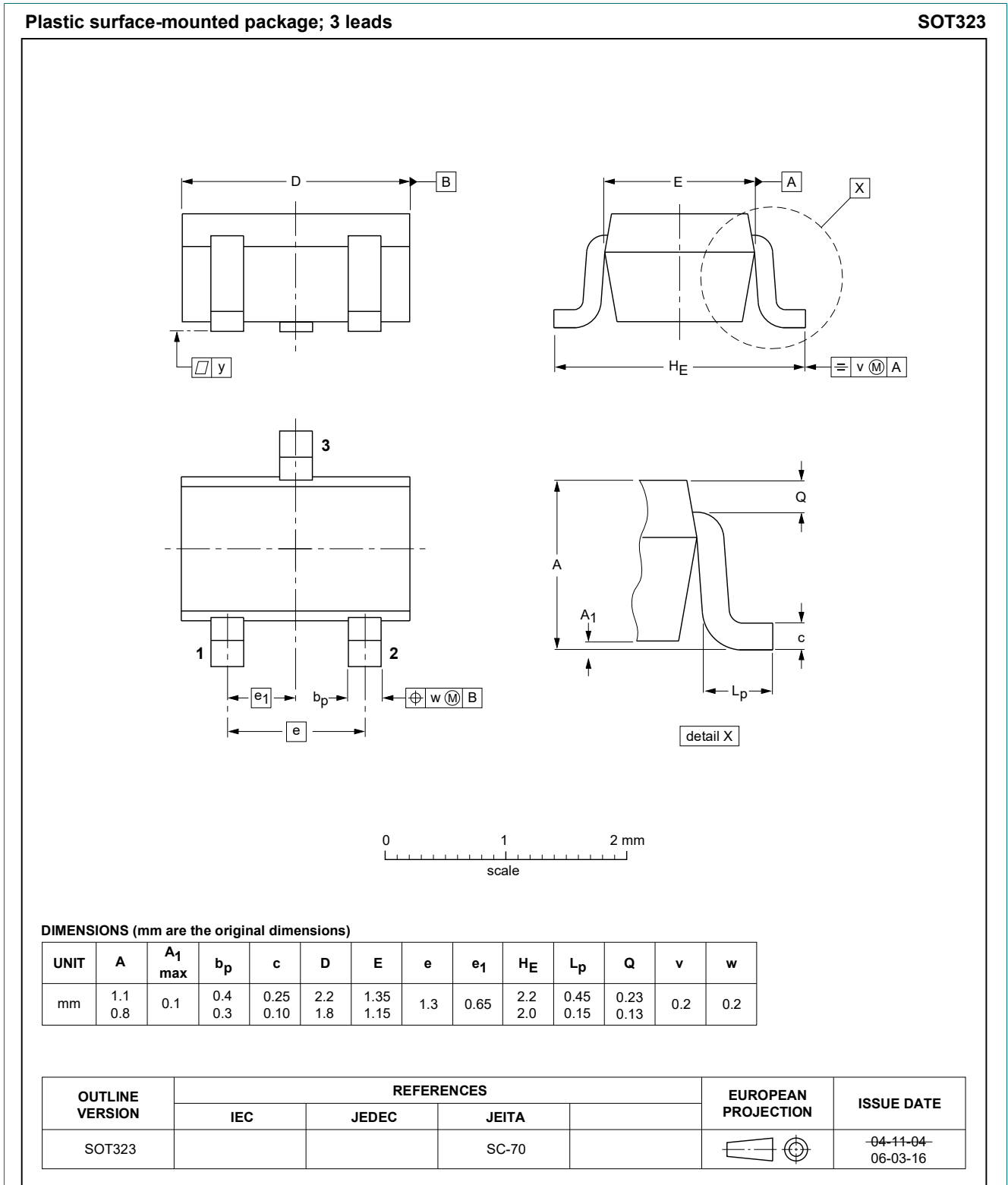


Fig. 16. Package outline SOT323 (SC70)

12. Soldering

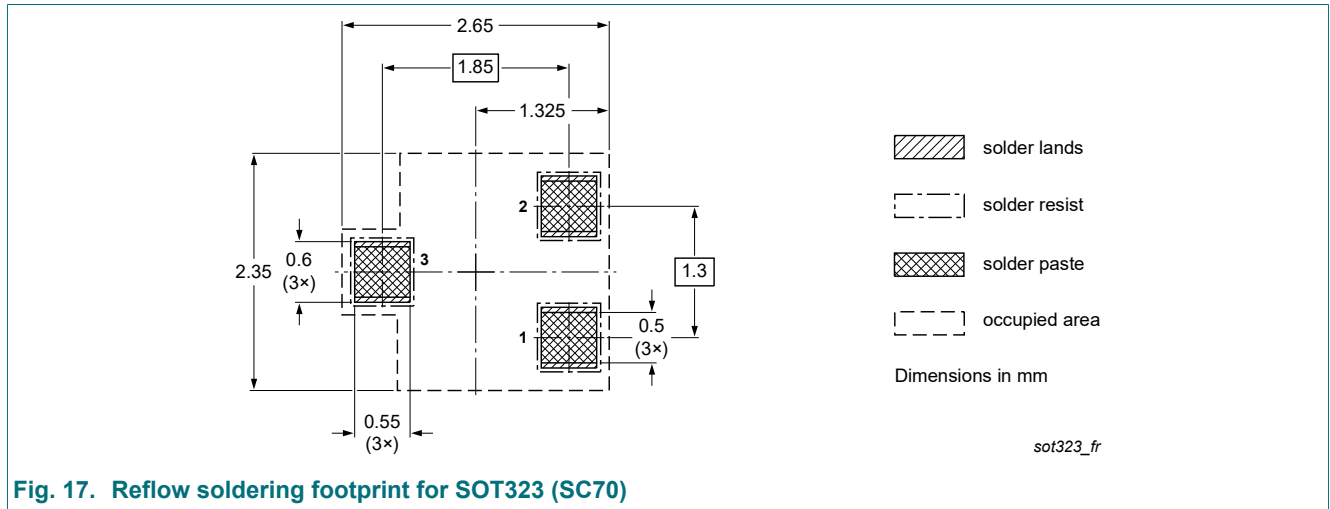


Fig. 17. Reflow soldering footprint for SOT323 (SC70)

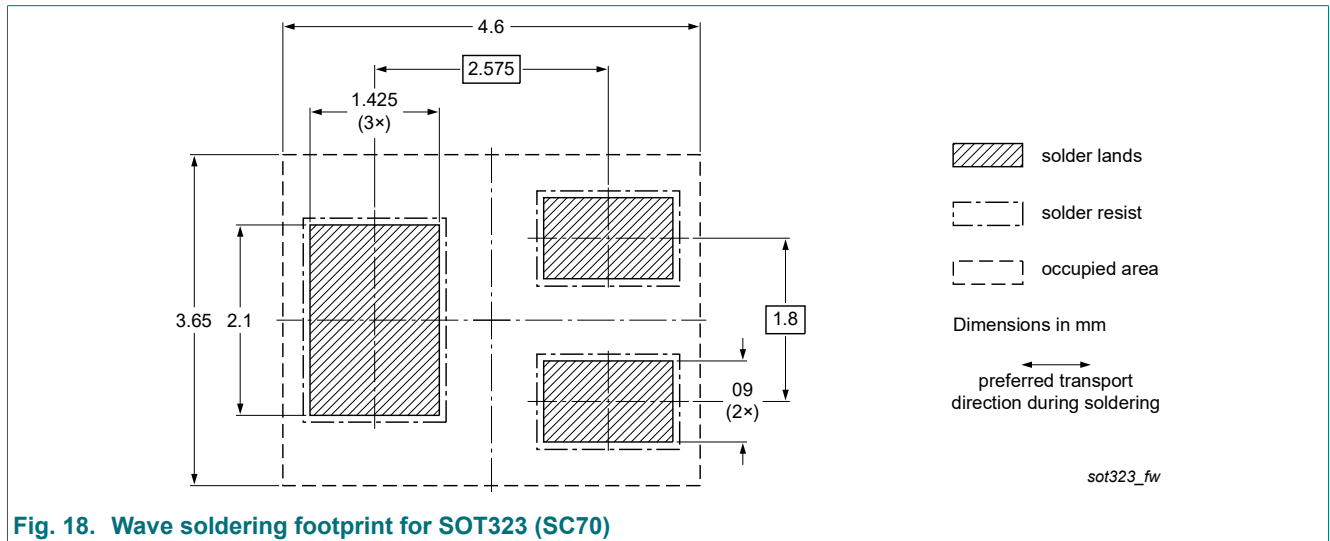


Fig. 18. Wave soldering footprint for SOT323 (SC70)

13. Revision history

Table 9. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------------|---|-----------------------|---------------|--------------------------------------|
| BC817W_SER v.8 | 20220701 | Product data sheet | - | BC817W_SER v.7 |
| Modifications: | <ul style="list-style-type: none"> Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). | | | |
| BC817W_SER v.7 | 20180615 | Product data sheet | - | BC817_BC817W_BC327 v.6 |
| BC817_BC817W_BC337 v.6 | 20091117 | Product data sheet | - | BC817_BC817W_BC337 v.5 |
| BC817_BC817W_BC337 v.5 | 20050221 | Product data sheet | - | BC817 v.4 BC817W v.4 BC337 v.3 |
| BC817 v.4 | 20040116 | Product Specification | - | BC817 v.3 |
| BC817W_SER v.4 | 19990518 | Product Specification | - | BC817W_SER v.3 |
| BC337 v.3 | 19990415 | Product Specification | - | BC337_338_CNV v.2 |

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. |

- [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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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