

# ANTREX Electronics

## Electronic Components Sourcing Information

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### Product Reference Information

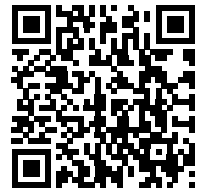
|                      |                           |
|----------------------|---------------------------|
| <b>Part Number:</b>  | BC817-QR                  |
| <b>Manufacturer:</b> | Nexperia USA Inc.         |
| <b>Package:</b>      | TO-236-3, SC-59, SOT-23-3 |
| <b>Availability:</b> | Please confirm with sales |

#### Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/bc817-qr.html>

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#### Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.



# BC817-Q series

45 V, 500 mA NPN general-purpose transistors

Rev. 1 — 8 June 2021

Product data sheet

## 1. General description

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

Table 1. Product overview

| Type number | Package  |          |       | PNP complement |
|-------------|----------|----------|-------|----------------|
|             | Nexperia | JEDEC    | JEITA |                |
| BC817-Q     | SOT23    | TO-236AB | -     | BC807-Q        |
| BC817-16-Q  |          |          |       | BC807-16-Q     |
| BC817-25-Q  |          |          |       | BC807-25-Q     |
| BC817-40-Q  |          |          |       | BC807-40-Q     |

## 2. Features and benefits

- High current
- Three current gain selections
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 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           |                                                                        |     |     |     |     |      |
|           | BC817-Q                   | $V_{CE} = 1\text{ V}$ ; $I_C = 100\text{ mA}$ $T_{amb} = 25\text{ °C}$ | [1] | 100 | -   | 600 |      |
|           | BC817-16-Q                |                                                                        | [1] | 100 | -   | 250 |      |
|           | BC817-25-Q                |                                                                        | [1] | 160 | -   | 400 |      |
|           | BC817-40-Q                |                                                                        | [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 |
| BC817-Q     | TO-236AB | Plastic surface-mounted package; 3 leads | SOT23   |
| BC817-16-Q  |          |                                          |         |
| BC817-25-Q  |          |                                          |         |
| BC817-40-Q  |          |                                          |         |

## 7. Marking

Table 5. Marking

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| BC817-Q     | 6D%                         |
| BC817-16-Q  | 6A%                         |
| BC817-25-Q  | 6B%                         |
| BC817-40-Q  | 6C%                         |

[1] % = placeholder for manufacturing site code

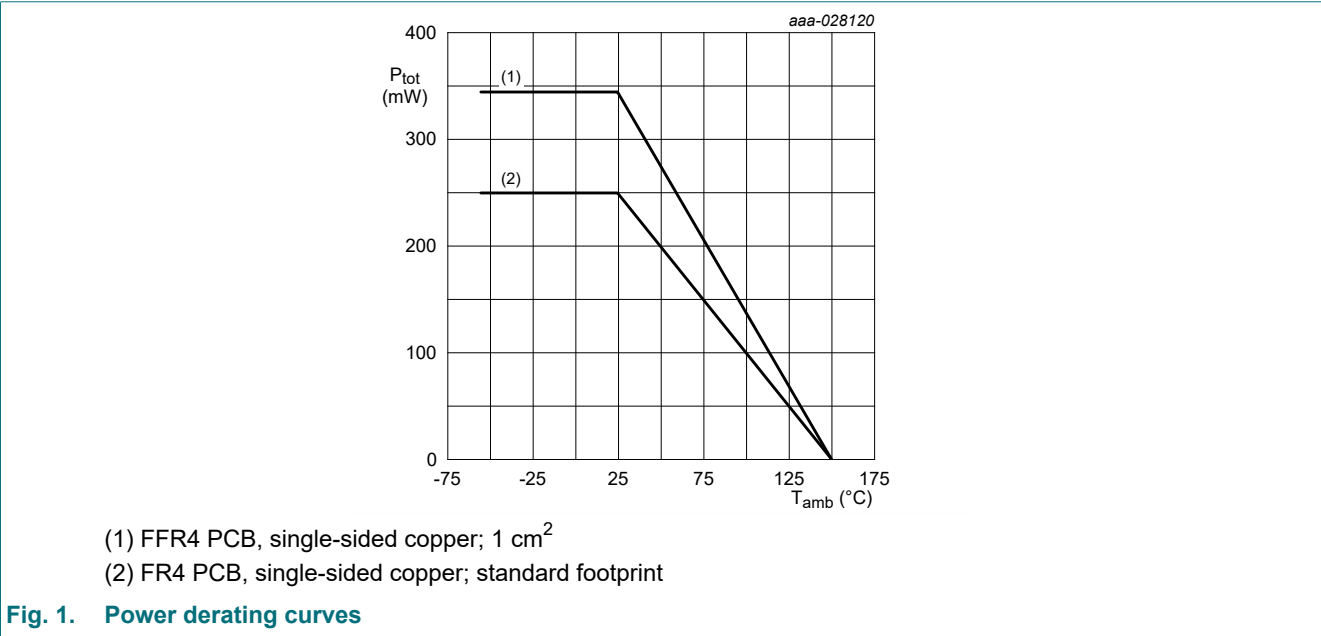
8. Limiting values

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; $T_{amb} = 25\text{ }^{\circ}\text{C}$                          | -   | 50  | V                  |
| $V_{CEO}$ | collector-emitter voltage | open base; $T_{amb} = 25\text{ }^{\circ}\text{C}$                             | -   | 45  | V                  |
| $V_{EBO}$ | emitter-base voltage      | open collector; $T_{amb} = 25\text{ }^{\circ}\text{C}$                        | -   | 5   | V                  |
| $I_C$     | collector current         | $T_{amb} = 25\text{ }^{\circ}\text{C}$                                        | -   | 500 | mA                 |
| $I_{CM}$  | peak collector current    | single pulse; $t_p \leq 1\text{ ms}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$ | -   | 1   | A                  |
| $I_{BM}$  | peak base current         | single pulse; $t_p \leq 1\text{ ms}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$ | -   | 200 | mA                 |
| $P_{tot}$ | total power dissipation   | $T_{amb} \leq 25\text{ }^{\circ}\text{C}$ [1]                                 | -   | 250 | mW                 |
|           |                           | [2]                                                                           | -   |     |                    |
|           |                           | [3] [2]                                                                       | -   | 345 | mW                 |
| $T_j$     | junction temperature      |                                                                               | -   | 150 | $^{\circ}\text{C}$ |
| $T_{amb}$ | ambient temperature       |                                                                               | -65 | 150 | $^{\circ}\text{C}$ |
| $T_{stg}$ | storage temperature       |                                                                               | -65 | 150 | $^{\circ}\text{C}$ |

- [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 cm<sup>2</sup>.



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] | -   | -   | 500 | K/W  |
|               |                                             |             | [2] | -   | -   | 362 | K/W  |
|               |                                             |             | [3] | -   | -   | 362 | K/W  |

- [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 cm<sup>2</sup>.

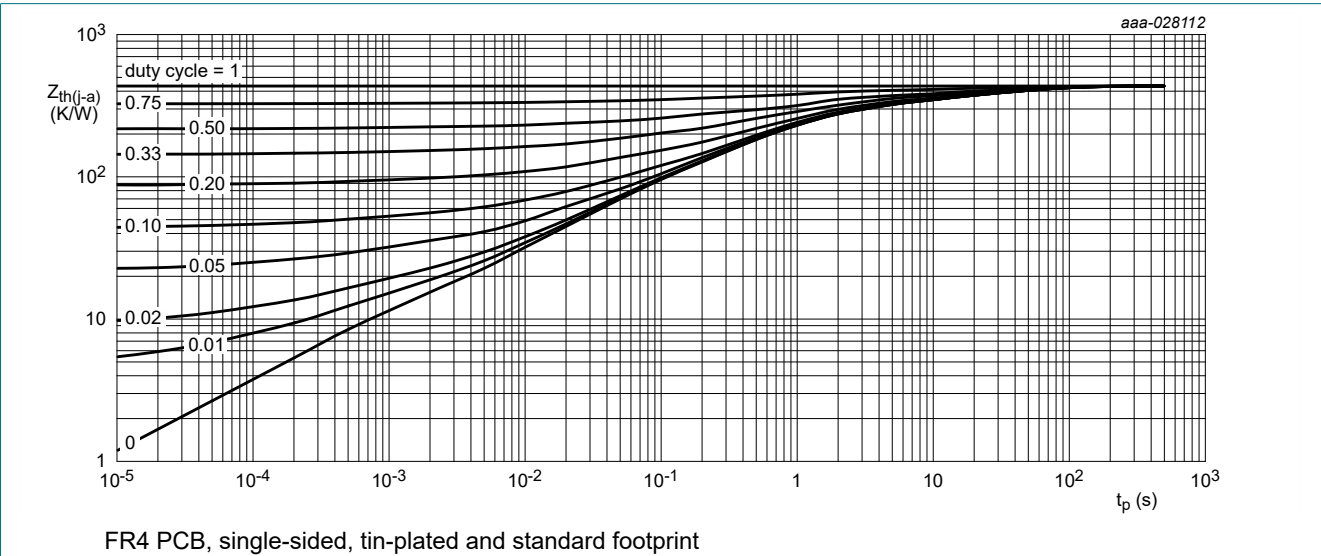


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

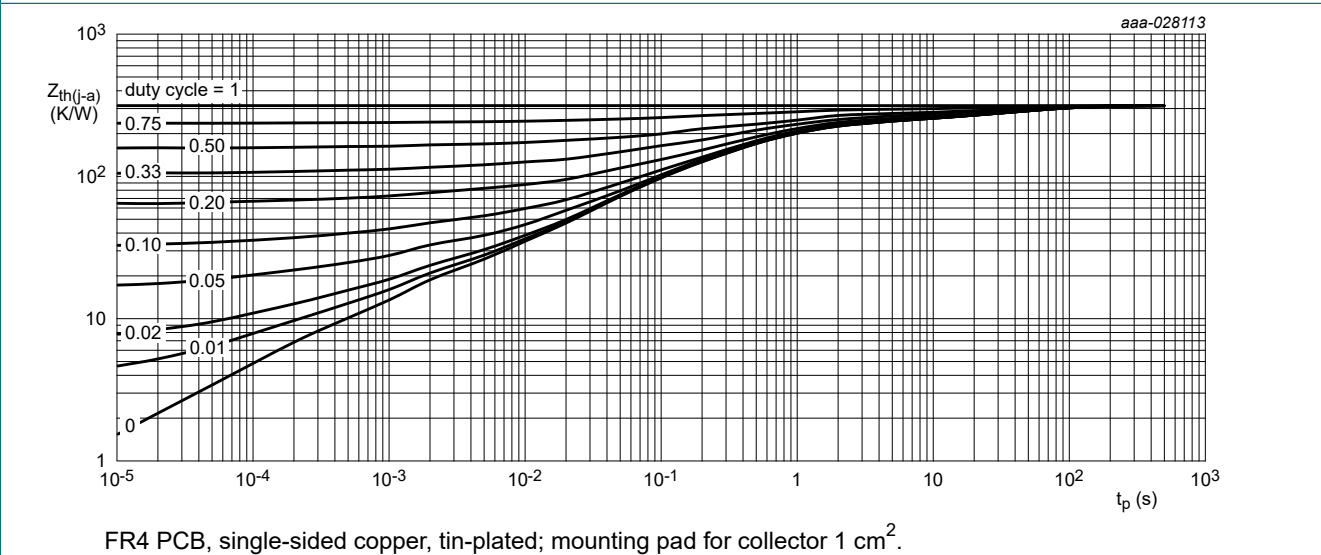


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 8. Characteristics

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

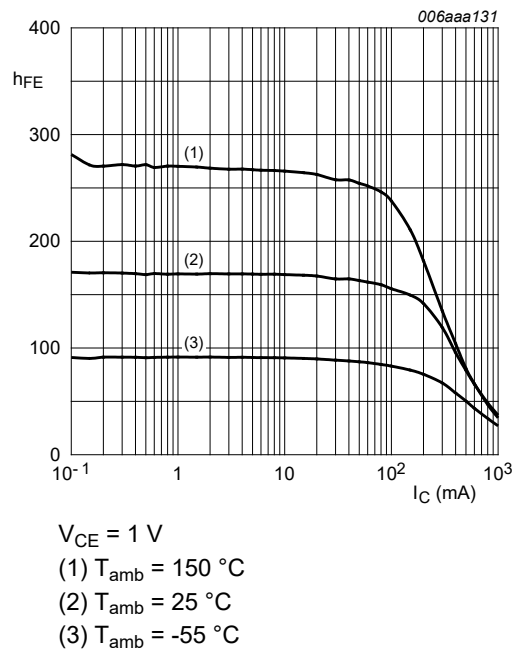


Fig. 4. BC817-16-Q: DC current gain as a function of collector current; typical values

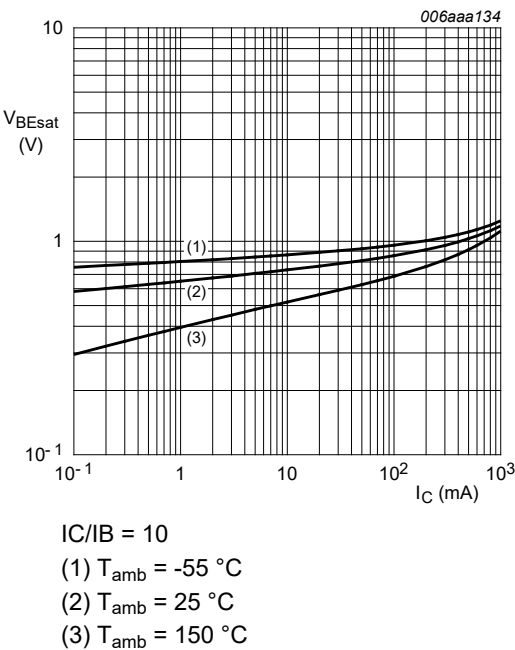


Fig. 5. BC817-16-Q: Base-emitter saturation voltage as a function of collector current; typical values

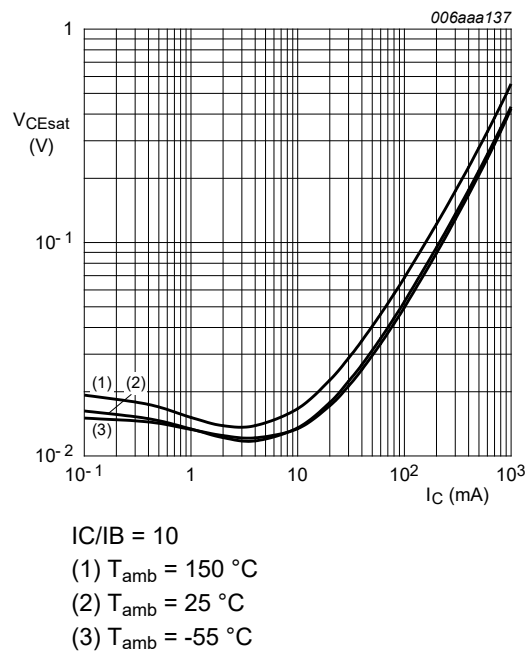


Fig. 6. BC817-16-Q: Collector-emitter saturation voltage as a function of collector current; typical values

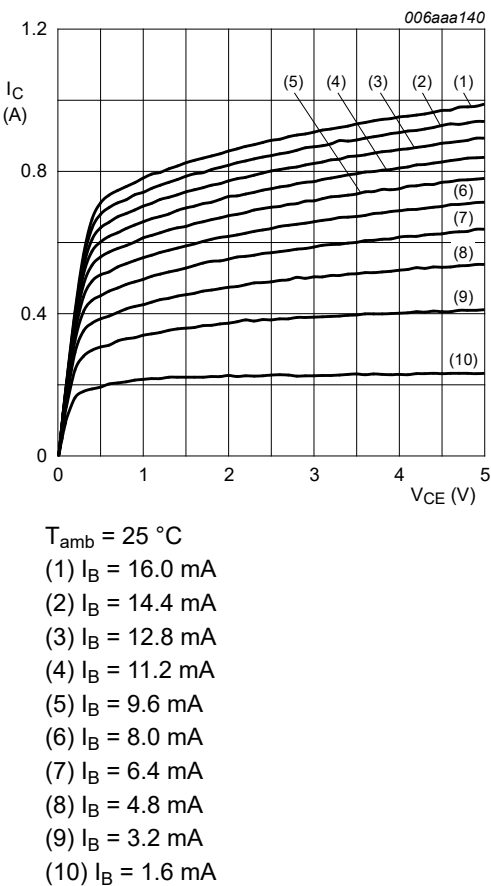
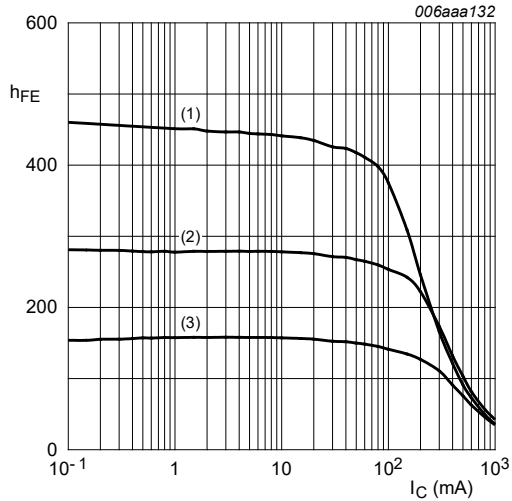


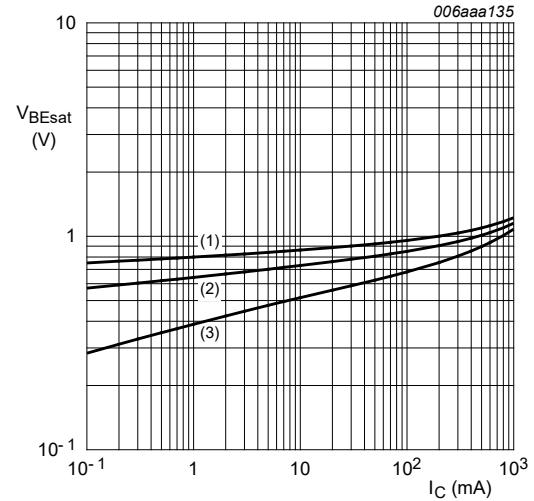
Fig. 7. BC817-16-Q: Collector current as a function of collector-emitter voltage; typical values



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

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

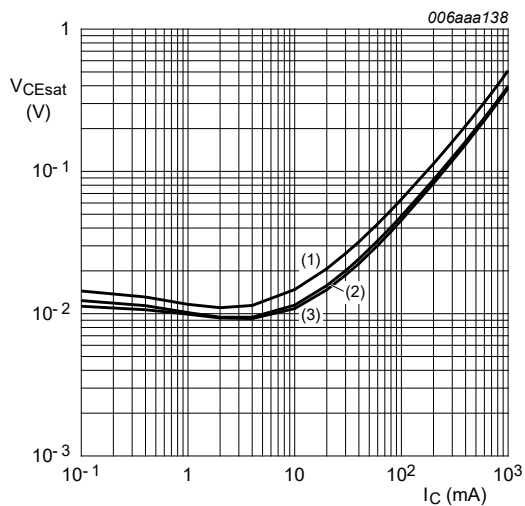
**Fig. 8. BC817-25-Q: DC current gain as a function of collector current; typical values**



$I_C/I_B = 10$

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

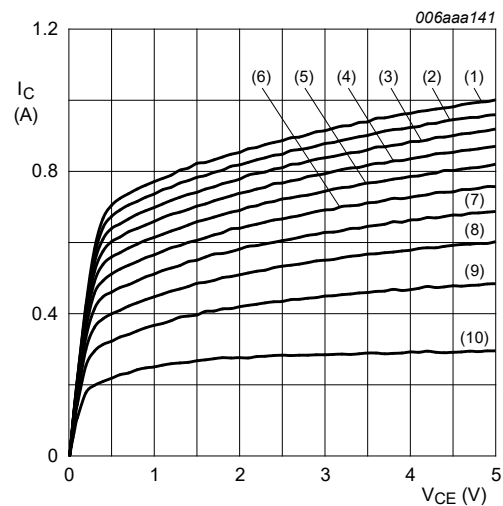
**Fig. 9. BC817-25-Q: Base-emitter saturation voltage as a function of collector current; typical values**



$I_C/I_B = 10$

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

**Fig. 10. BC817-25-Q: Collector-emitter saturation voltage as a function of collector current; 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)  $I_B = 1.3 \text{ mA}$

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

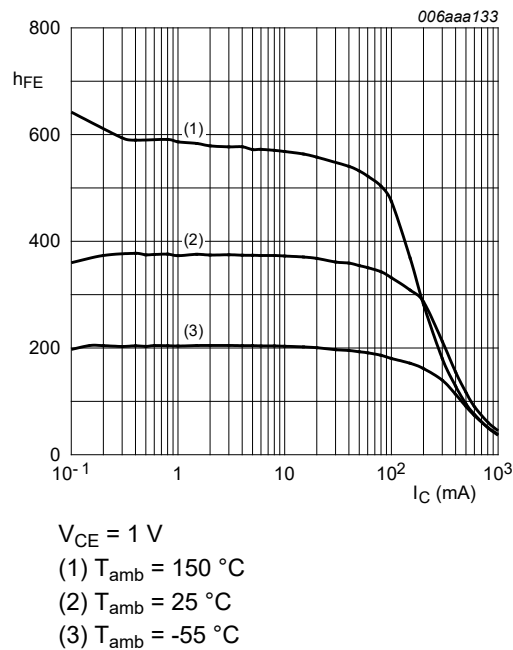


Fig. 12. BC817-40-Q: DC current gain as a function of collector current; typical values

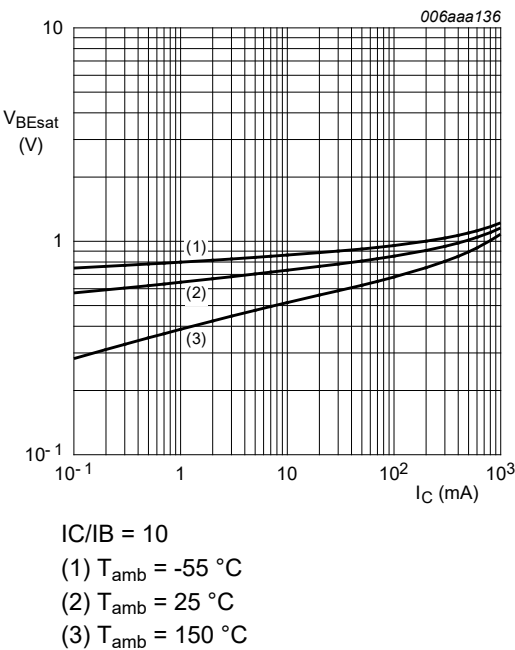


Fig. 13. BC817-40-Q: Base-emitter saturation voltage as a function of collector current; typical values

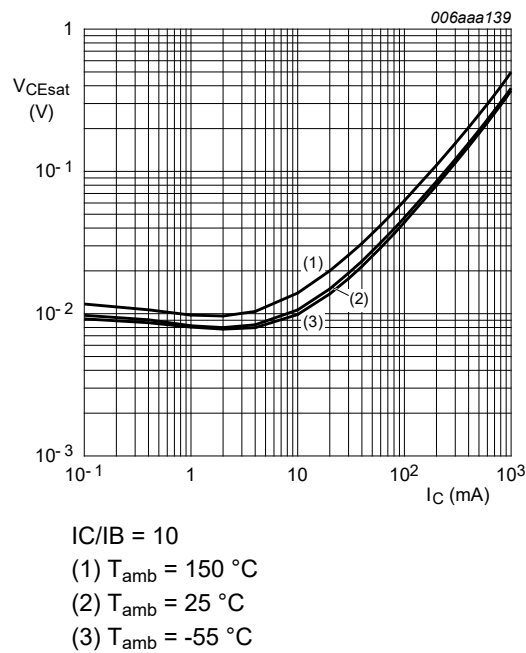


Fig. 14. BC817-40-Q: Collector-emitter saturation voltage as a function of collector current; typical values

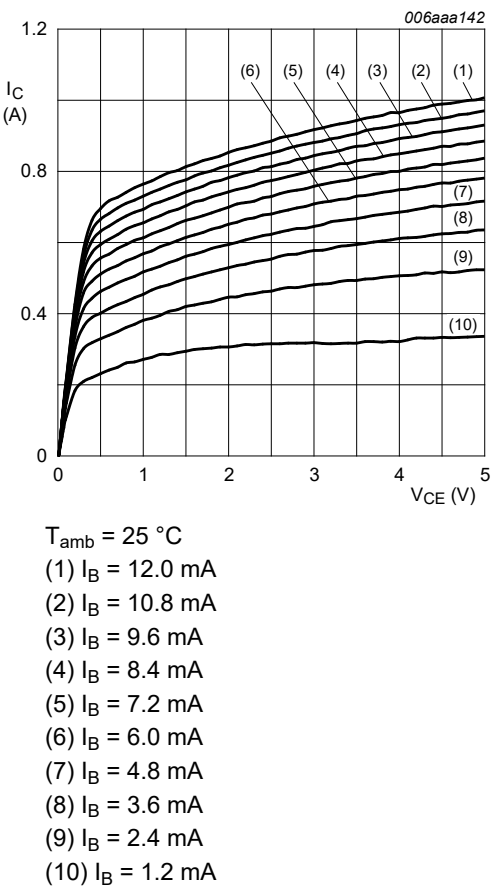


Fig. 15. BC817-40-Q: Collector current as a function of collector-emitter voltage; typical values

## 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

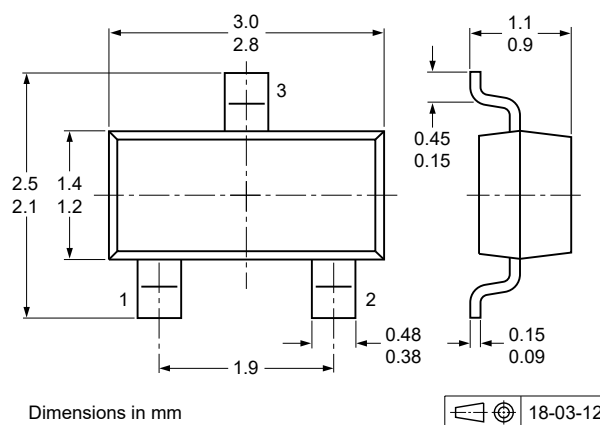
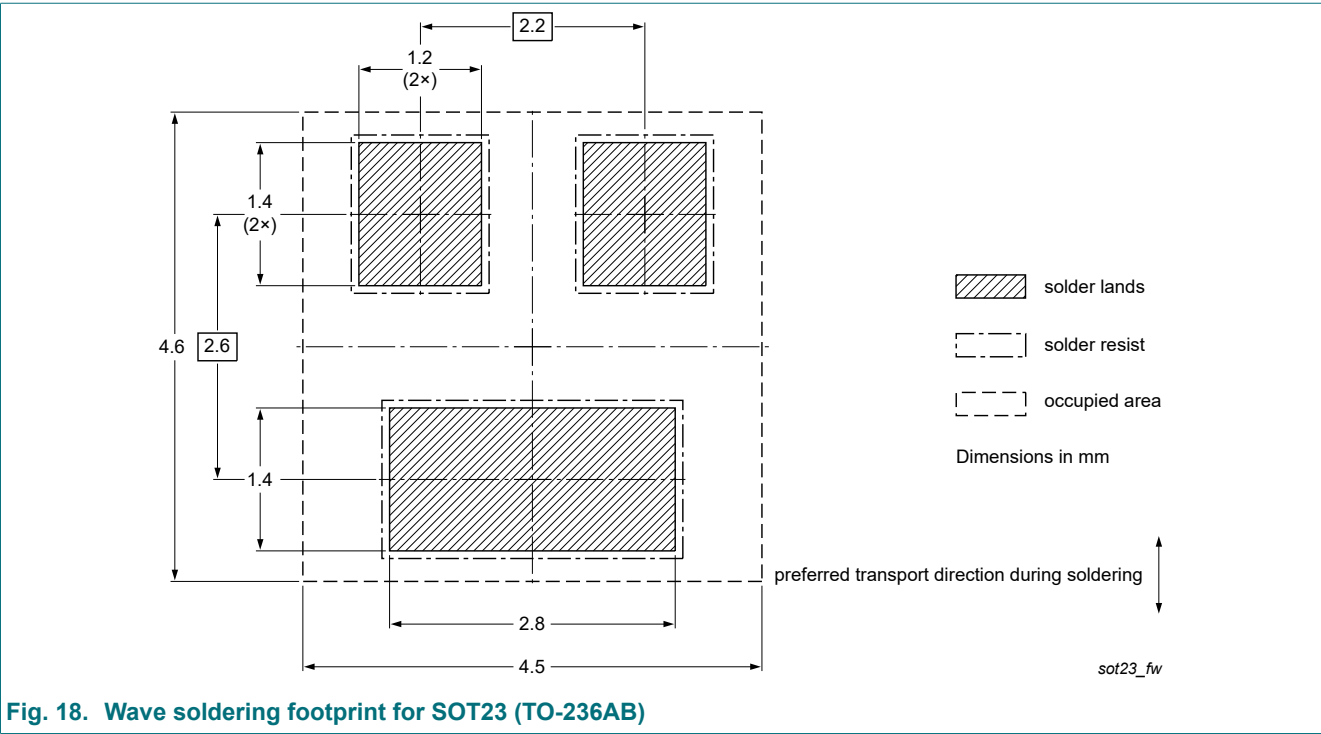
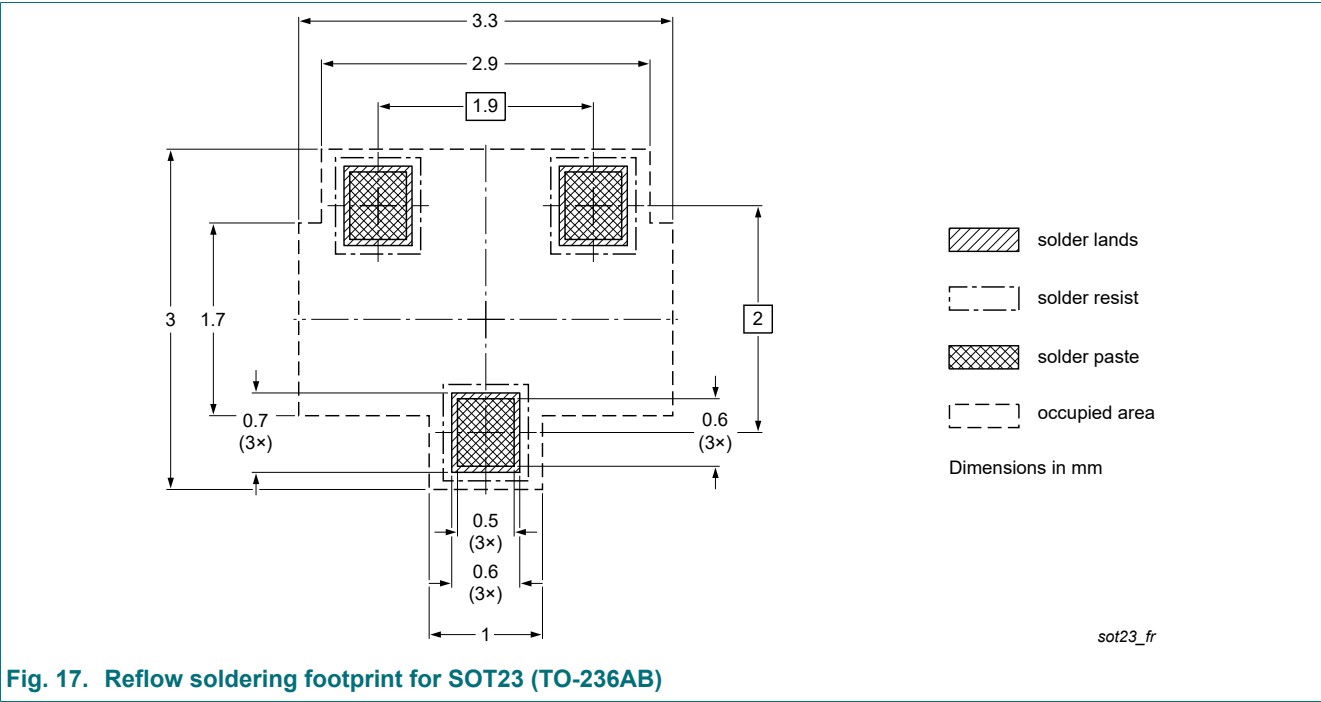


Fig. 16. Package outline SOT23 (TO-236AB)

13. Soldering



14. Revision history

Table 9. Revision history

| Data sheet ID   | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| BC817-Q_SER v.1 | 20210608     | Product 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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For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

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