

# ANTREX Electronics

Electronic Components Sourcing Information

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## Product Reference Information

**Part Number:** BC857-QVL  
**Manufacturer:** Nexperia USA Inc.  
**Package:** TO-236-3, SC-59, SOT-23-3  
**Availability:** Please confirm with sales

**Product Page:**

<https://antrexco.com/product/details/nexperia-usa-inc/bc857-qvl.html>

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**Note:**

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.



# BC856-Q; BC857-Q; BC858-Q

65 V, 100 mA PNP general-purpose transistors

Rev. 2 — 21 February 2022

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    |                |
| BC856-Q     | SOT23    | TO-236AB | BC846-Q        |
| BC856A-Q    |          |          | BC846A-Q       |
| BC856B-Q    |          |          | BC846B-Q       |
| BC857-Q     |          |          | BC847-Q        |
| BC857A-Q    |          |          | BC847A-Q       |
| BC857B-Q    |          |          | BC847B-Q       |
| BC857C-Q    |          |          | BC847C-Q       |
| BC858B-Q    |          |          | BC848B-Q       |

## 2. Features and benefits

- Low current (max. 100 mA)
- Low voltage (max. 65 V)
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- General-purpose switching and amplification

## 4. Quick reference data

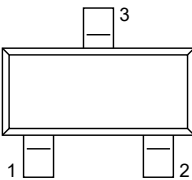
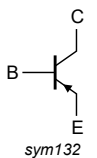
**Table 2. Quick reference data**

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

| Symbol    | Parameter                                | Conditions                               | Min | Typ | Max  | Unit |
|-----------|------------------------------------------|------------------------------------------|-----|-----|------|------|
| $V_{CEO}$ | collector-emitter voltage                | open base                                |     |     |      |      |
|           | BC856-Q; BC856A-Q;<br>BC856B-Q           |                                          | -   | -   | -65  | V    |
|           | BC857-Q; BC857A-Q;<br>BC857B-Q; BC857C-Q |                                          | -   | -   | -45  | V    |
|           | BC858B-Q                                 |                                          | -   | -   | -30  | V    |
| $I_C$     | collector current                        |                                          | -   | -   | -100 | mA   |
| $I_{CM}$  | peak collector current                   |                                          | -   | -   | -200 | mA   |
| $h_{FE}$  | DC current gain                          |                                          |     |     |      |      |
|           | BC856-Q                                  | $V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$ | 125 | -   | 475  |      |
|           | BC857-Q                                  |                                          | 125 | -   | 800  |      |
|           | BC856A-Q; BC857A-Q                       |                                          | 125 | -   | 250  |      |
|           | BC856B-Q; BC857B-Q;<br>BC858B-Q          |                                          | 220 | -   | 475  |      |
|           | BC857C-Q                                 |                                          | 420 | -   | 800  |      |

## 5. Pinning information

**Table 3. Pinning information**

| Pin | Symbol | Description | Simplified outline                                                                   | Graphic symbol                                                                                  |
|-----|--------|-------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1   | B      | base        |  | <br>sym132 |
| 2   | E      | emitter     |                                                                                      |                                                                                                 |
| 3   | C      | collector   |                                                                                      |                                                                                                 |

## 6. Ordering information

**Table 4. Ordering information**

| Type number | Package  |                                          |         |
|-------------|----------|------------------------------------------|---------|
|             | Name     | Description                              | Version |
| BC856-Q     | TO-236AB | plastic surface-mounted package; 3 leads | SOT23   |
| BC856A-Q    |          |                                          |         |
| BC856B-Q    |          |                                          |         |
| BC857-Q     |          |                                          |         |
| BC857A-Q    |          |                                          |         |
| BC857B-Q    |          |                                          |         |
| BC857C-Q    |          |                                          |         |
| BC858B-Q    |          |                                          |         |

## 7. Marking

Table 5. Marking codes

| Type number |     | Marking code |
|-------------|-----|--------------|
| BC856-Q     | [1] | 3D%          |
| BC856A-Q    | [1] | 3A%          |
| BC856B-Q    | [1] | 3B%          |
| BC857-Q     | [1] | 3H%          |
| BC857A-Q    | [1] | 3E%          |
| BC857B-Q    | [1] | 3F%          |
| BC857C-Q    | [1] | 3G%          |
| BC858B-Q    | [1] | 3K%          |

[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                |       |      |      |
|           | BC856-Q; BC856A-Q;<br>BC856B-Q           |                             | -     | -80  | V    |
|           | BC857-Q; BC857A-Q;<br>BC857B-Q; BC857C-Q |                             | -     | -50  | V    |
|           | BC858B-Q                                 |                             | -     | -30  | V    |
| $V_{CEO}$ | collector-emitter voltage                | open base                   |       |      |      |
|           | BC856-Q; BC856A-Q;<br>BC856B-Q           |                             | -     | -65  | V    |
|           | BC857-Q; BC857A-Q;<br>BC857B-Q; BC857C-Q |                             | -     | -45  | V    |
|           | BC858B-Q                                 |                             | -     | -30  | V    |
| $V_{EBO}$ | emitter-base voltage                     | open collector              | -     | -5   | V    |
| $I_C$     | collector current                        |                             | -     | -100 | mA   |
| $I_{CM}$  | peak collector current                   |                             | -     | -200 | mA   |
| $I_{BM}$  | peak base current                        |                             | -     | -200 | mA   |
| $P_{tot}$ | total power dissipation                  | $T_{amb} \leq 25\text{ °C}$ | [1] - | 250  | mW   |
| $T_j$     | junction temperature                     |                             | -     | 150  | °C   |
| $T_{amb}$ | ambient temperature                      |                             | -65   | 150  | °C   |
| $T_{stg}$ | storage temperature                      |                             | -65   | 150  | °C   |

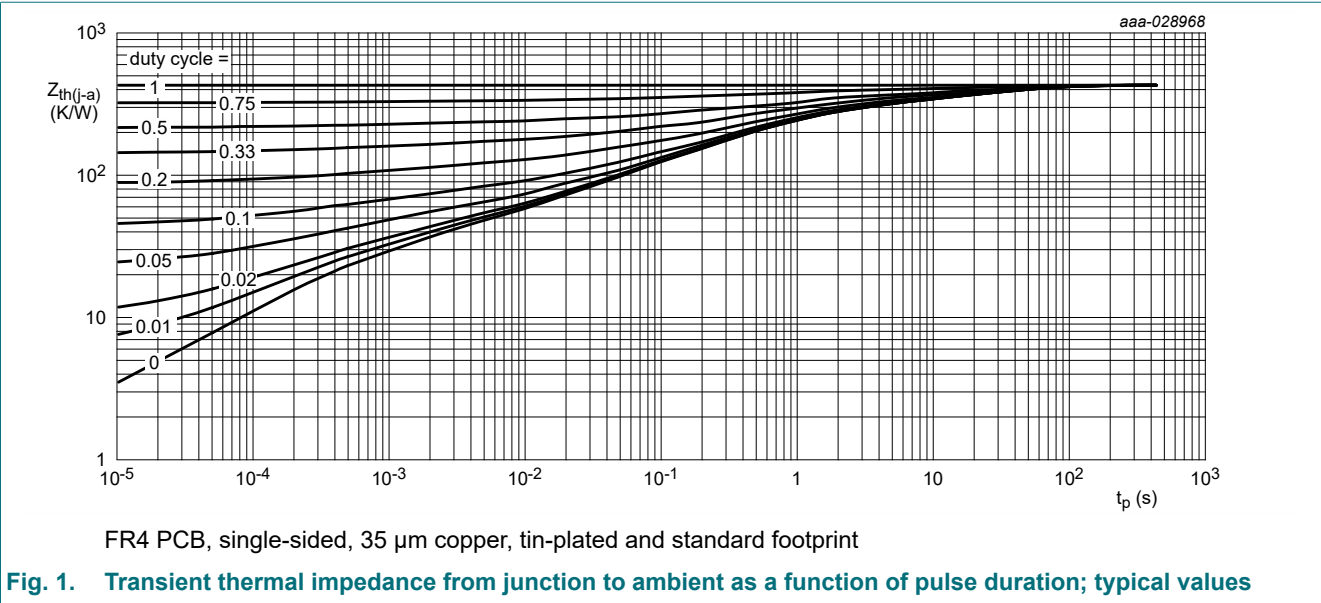
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 µm copper, tin-plated and standard footprint.

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  |

[1] Device mounted on an FR4 PCB; single-sided, 35 µm copper; tin-plated and standard footprint.



## 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         |                                                                                                                                |      |      |      |               |
|               | BC856-Q; BC856A-Q;<br>BC856B-Q           | $I_C = -100\text{ }\mu\text{A}$ ; $I_E = 0\text{ A}$                                                                           | -80  | -    | -    | V             |
|               | BC857-Q; BC857A-Q;<br>BC857B-Q; BC857C-Q |                                                                                                                                | -50  | -    | -    | V             |
|               | BC858B-Q                                 |                                                                                                                                | -30  | -    | -    | V             |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage      |                                                                                                                                |      |      |      |               |
|               | BC856-Q; BC856A-Q;<br>BC856B-Q           | $I_C = -2\text{ mA}$ ; $I_B = 0\text{ A}$                                                                                      | -65  | -    | -    | V             |
|               | BC857-Q; BC857A-Q;<br>BC857B-Q; BC857C-Q |                                                                                                                                | -45  | -    | -    | V             |
|               | BC858B-Q                                 |                                                                                                                                | -30  | -    | -    | V             |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage           | $I_C = 0\text{ A}$ ; $I_E = -100\text{ }\mu\text{A}$                                                                           | -5   | -    | -    | V             |
| $I_{CBO}$     | collector-base cut-off current           | $V_{CB} = -30\text{ V}$ ; $I_E = 0\text{ A}$                                                                                   | -    | -1   | -15  | nA            |
|               |                                          | $V_{CB} = -30\text{ V}$ ; $I_E = 0\text{ A}$ ; $T_j = 150\text{ °C}$                                                           | -    | -    | -4   | $\mu\text{A}$ |
| $I_{EBO}$     | emitter-base cut-off current             | $V_{EB} = -5\text{ V}$ ; $I_C = 0\text{ A}$                                                                                    | -    | -    | -100 | nA            |
| $h_{FE}$      | DC current gain                          |                                                                                                                                |      |      |      |               |
|               | BC856-Q                                  | $V_{CE} = -5\text{ V}$ ; $I_C = -2\text{ mA}$                                                                                  | 125  | -    | 475  |               |
|               | BC857-Q                                  |                                                                                                                                | 125  | -    | 800  |               |
|               | BC856A-Q; BC857A-Q                       |                                                                                                                                | 125  | -    | 250  |               |
|               | BC856B-Q; BC857B-Q;<br>BC858B-Q          |                                                                                                                                | 220  | -    | 475  |               |
|               | BC857C-Q                                 |                                                                                                                                | 420  | -    | 800  |               |
| $V_{CEsat}$   | collector-emitter saturation voltage     | $I_C = -10\text{ mA}$ ; $I_B = -0.5\text{ mA}$                                                                                 | -    | -75  | -300 | mV            |
|               |                                          | $I_C = -100\text{ mA}$ ; $I_B = -5\text{ mA}$                                                                                  | [1]  | -250 | -650 | mV            |
| $V_{BEsat}$   | base-emitter saturation voltage          | $I_C = -10\text{ mA}$ ; $I_B = -0.5\text{ mA}$                                                                                 | [1]  | -700 | -    | mV            |
|               |                                          | $I_C = -100\text{ mA}$ ; $I_B = -5\text{ mA}$                                                                                  | [1]  | -850 | -    | mV            |
| $V_{BE}$      | base-emitter voltage                     | $V_{CE} = -5\text{ V}$ ; $I_C = -2\text{ mA}$                                                                                  | -600 | -650 | -750 | mV            |
|               |                                          | $V_{CE} = -5\text{ V}$ ; $I_C = -10\text{ mA}$                                                                                 | -    | -    | -820 | mV            |
| $C_c$         | collector capacitance                    | $V_{CB} = -10\text{ V}$ ; $I_E = I_B = 0\text{ A}$ ; $f = 1\text{ MHz}$                                                        | -    | 4.5  | -    | pF            |
| $f_T$         | transition frequency                     | $V_{CE} = -5\text{ V}$ ; $I_C = -10\text{ mA}$ ; $f = 100\text{ MHz}$                                                          | 100  | -    | -    | MHz           |
| NF            | noise figure                             | $I_C = -200\text{ }\mu\text{A}$ ; $V_{CE} = -5\text{ V}$ ; $R_S = 2\text{ k}\Omega$ ; $f = 1\text{ kHz}$ ; $B = 200\text{ Hz}$ | -    | 2    | 10   | dB            |

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



Fig. 2. BC856A-Q; BC857A-Q: DC current gain as a function of collector current; typical values



Fig. 3. BC856A-Q; BC857A-Q: Base-emitter voltage as a function of collector current; typical values

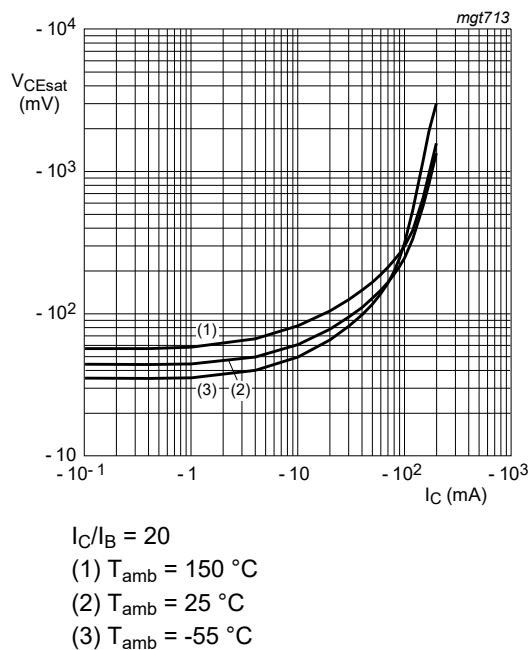


Fig. 4. BC856A-Q; BC857A-Q: Collector-emitter saturation voltage as a function of collector current; typical values

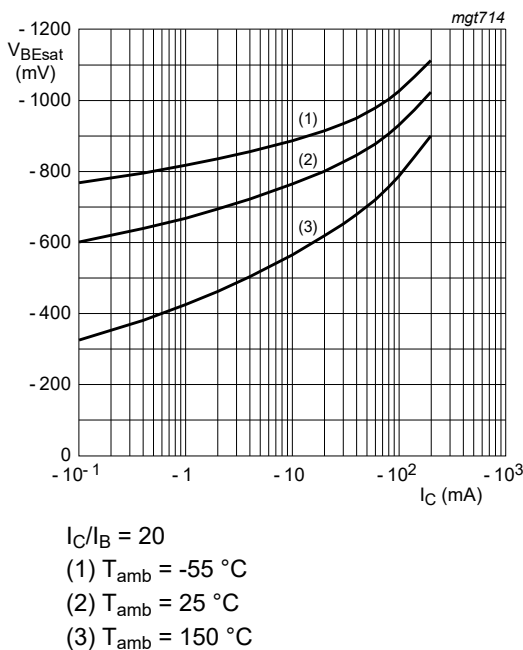


Fig. 5. BC856A-Q; BC857A-Q: Base-emitter saturation voltage as a function of collector current; typical values



Fig. 6. BC856B-Q; BC857B-Q; BC858B-Q: DC current gain as a function of collector current; typical values

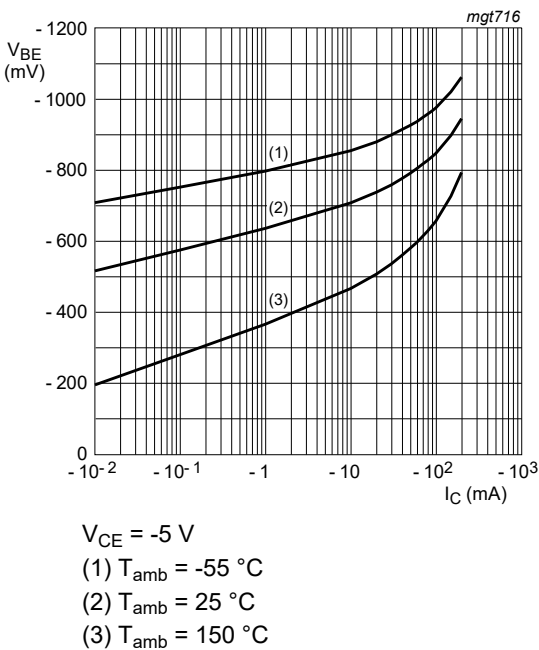


Fig. 7. BC856B-Q; BC857B-Q; BC858B-Q: Base-emitter voltage as a function of collector current; typical values

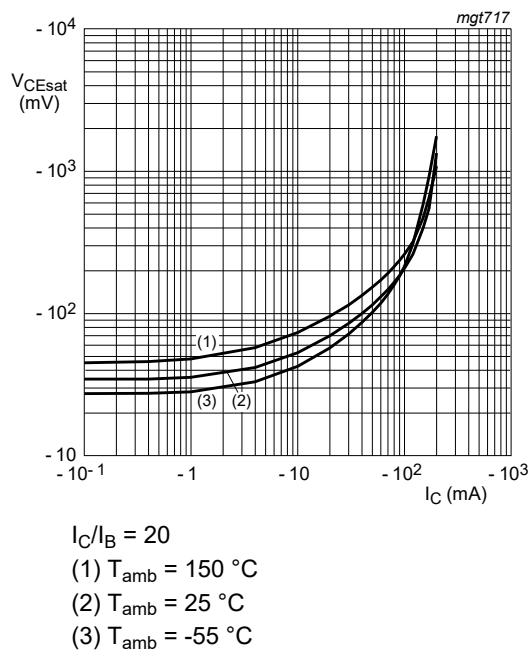


Fig. 8. BC856B-Q; BC857B-Q; BC858B-Q: Collector-emitter saturation voltage as a function of collector current; typical values

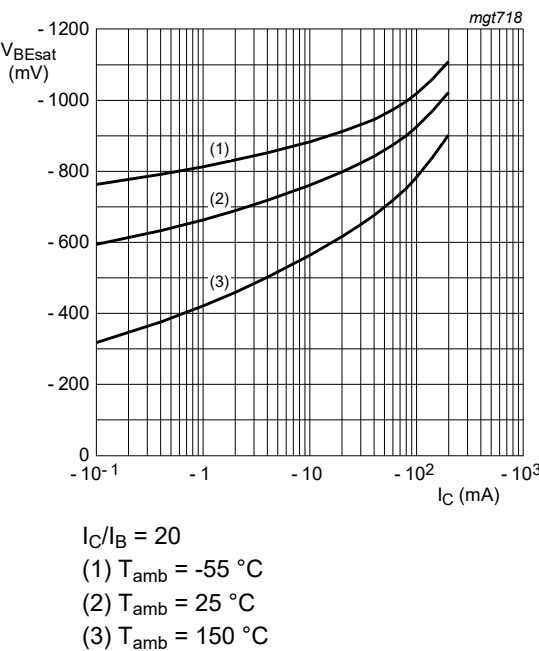


Fig. 9. BC856B-Q; BC857B-Q; BC858B-Q: Base-emitter saturation voltage as a function of collector current; typical values

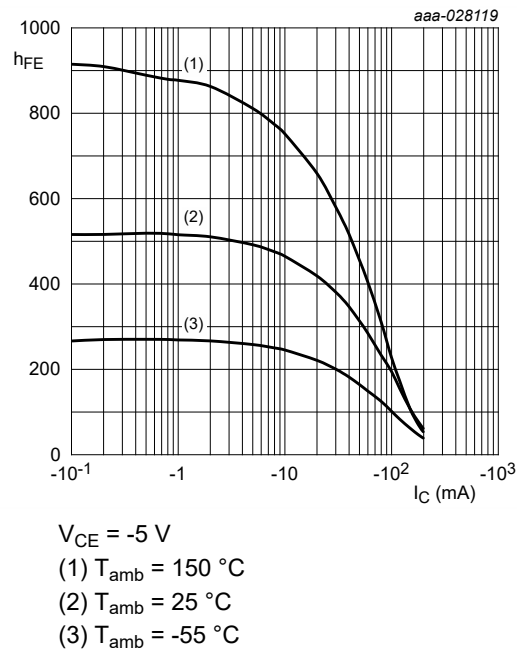


Fig. 10. BC857C-Q: DC current gain as a function of collector current; typical values

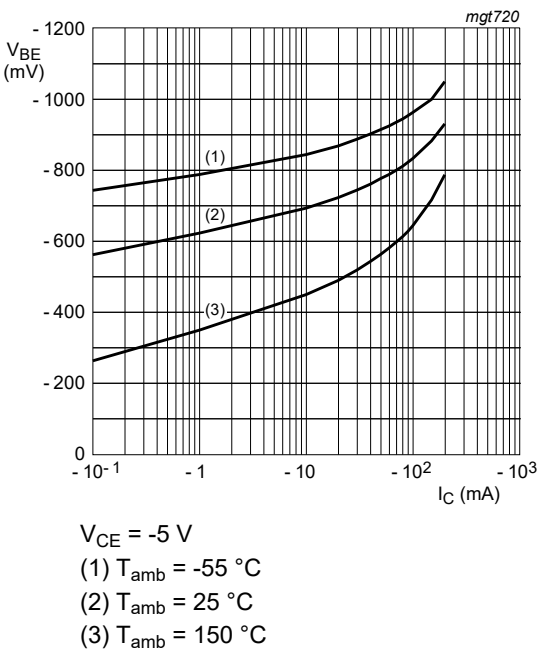


Fig. 11. BC857C-Q: Base-emitter voltage as a function of collector current; typical values

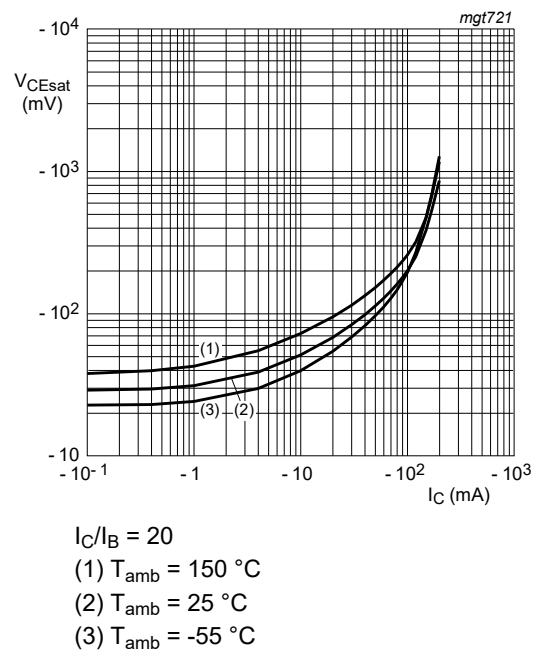


Fig. 12. BC857C-Q: Collector-emitter saturation voltage as a function of collector current; typical values

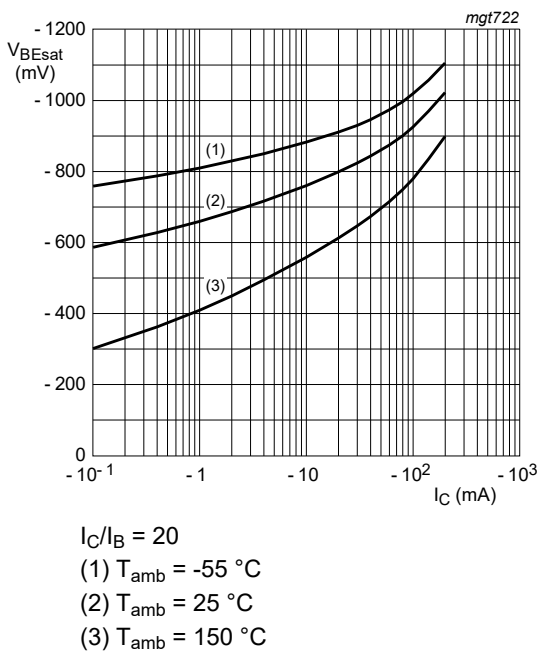


Fig. 13. BC857C-Q: Base-emitter saturation voltage as a function of collector current; typical values

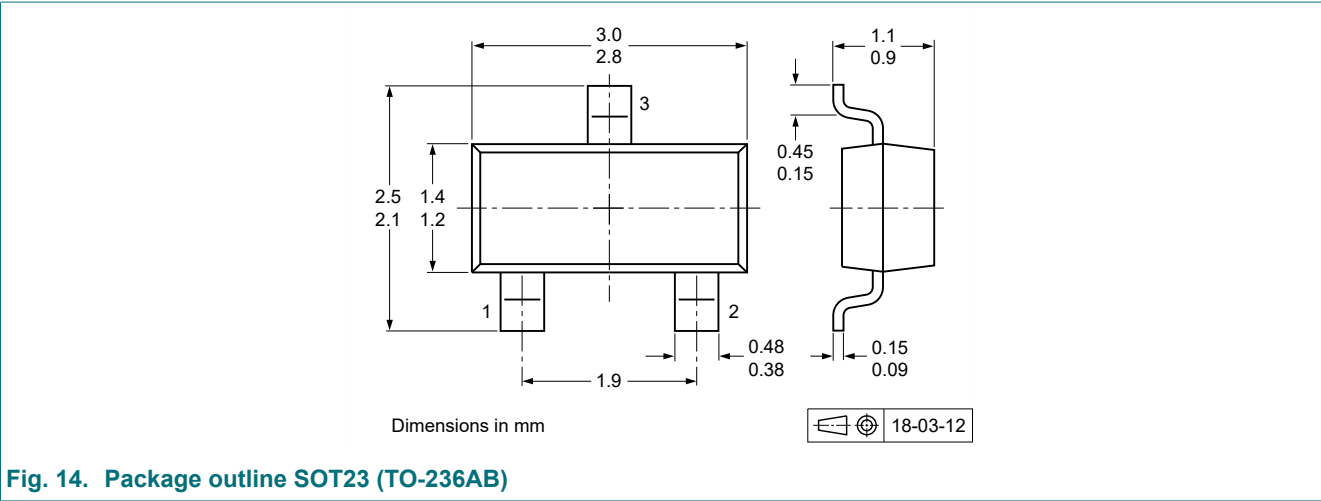
11. Test information

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.

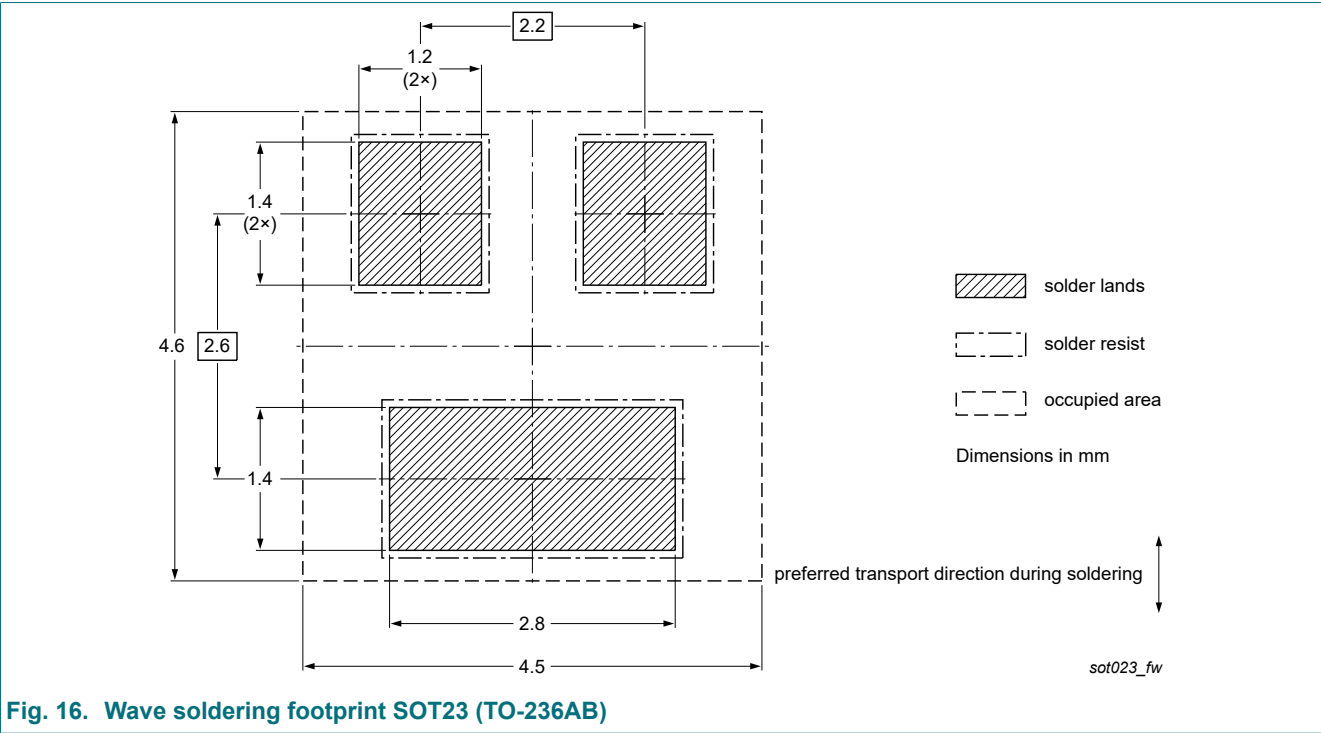
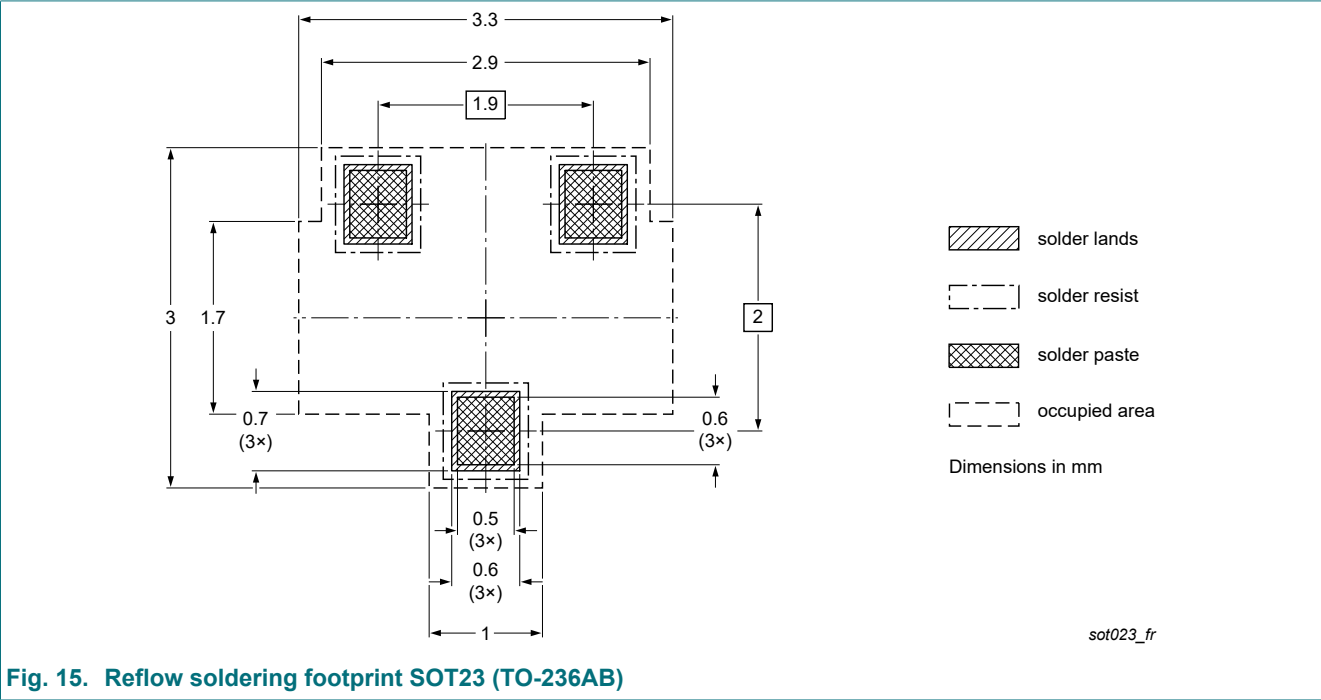
12. Package outline

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                  |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|-----------------------------|
| BC856-Q_BC857-Q_BC858-Q v.2 | 20220221                                                                                                                                                                                                               | Product data sheet | -             | BC856-Q_BC857-Q_BC858-Q v.1 |
| Modifications:              | <ul style="list-style-type: none"><li>Quick reference data: BC856-Q corrected to BC856B-Q at <math>h_{FE}</math></li><li>Limiting values and Characteristics: Product names changed to detailed descriptions</li></ul> |                    |               |                             |
| BC856-Q_BC857-Q_BC858-Q v.1 | 20210624                                                                                                                                                                                                               | Product data sheet | -             | -                           |

15. 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".
- [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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