



# THE DATASHEET OF BC857C,235



# BC856; BC857; BC858

65 V, 100 mA PNP general-purpose transistors

Rev. 9 — 1 July 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       | SOT23    | TO-236AB | BC846          |
| BC856A      |          |          | BC846A         |
| BC856B      |          |          | BC846B         |
| BC857       |          |          | BC847          |
| BC857A      |          |          | BC847A         |
| BC857B      |          |          | BC847B         |
| BC857C      |          |          | BC847C         |
| BC858B      |          |          | BC848B         |

## 2. Features and benefits

- Low current (max. 100 mA)
- Low voltage (max. 65 V)

## 3. Applications

- General-purpose switching and amplification

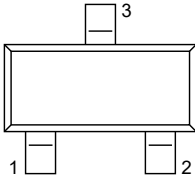
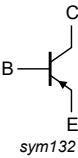
4. Quick reference data

Table 2. Quick reference data  
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

| Symbol           | Parameter                        | Conditions                                   | Min | Typ | Max  | Unit |
|------------------|----------------------------------|----------------------------------------------|-----|-----|------|------|
| V <sub>CEO</sub> | collector-emitter voltage        | open base                                    |     |     |      |      |
|                  | BC856; BC856A; BC856B            |                                              | -   | -   | -65  | V    |
|                  | BC857; BC857A; BC857B;<br>BC857C |                                              | -   | -   | -45  | V    |
|                  | BC858B                           |                                              | -   | -   | -30  | V    |
| I <sub>C</sub>   | collector current                |                                              | -   | -   | -100 | mA   |
| I <sub>CM</sub>  | peak collector current           |                                              | -   | -   | -200 | mA   |
| h <sub>FE</sub>  | DC current gain                  |                                              |     |     |      |      |
|                  | BC856                            | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 2 mA | 125 | -   | 475  |      |
|                  | BC857                            |                                              | 125 | -   | 800  |      |
|                  | BC856A; BC857A                   |                                              | 125 | -   | 250  |      |
|                  | BC856B; BC857B; BC858B           |                                              | 220 | -   | 475  |      |
|                  | BC857C                           |                                              | 420 | -   | 800  |      |

5. Pinning information

Table 3. Pinning information

| 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               |
| <a href="#">BC856</a>  | TO-236AB | plastic surface-mounted package; 3 leads | <a href="#">SOT23</a> |
| <a href="#">BC856A</a> |          |                                          |                       |
| <a href="#">BC856B</a> |          |                                          |                       |
| <a href="#">BC857</a>  |          |                                          |                       |
| <a href="#">BC857A</a> |          |                                          |                       |
| <a href="#">BC857B</a> |          |                                          |                       |
| <a href="#">BC857C</a> |          |                                          |                       |
| <a href="#">BC858B</a> |          |                                          |                       |

## 7. Marking

Table 5. Marking codes

| Type number |     | Marking code |
|-------------|-----|--------------|
| BC856       | [1] | 3D%          |
| BC856A      | [1] | 3A%          |
| BC856B      | [1] | 3B%          |
| BC857       | [1] | 3H%          |
| BC857A      | [1] | 3E%          |
| BC857B      | [1] | 3F%          |
| BC857C      | [1] | 3G%          |
| BC858B      | [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; BC856A; BC856B            |                             | -     | -80  | V    |
|           | BC857; BC857A; BC857B;<br>BC857C |                             | -     | -50  | V    |
|           | BC858B                           |                             | -     | -30  | V    |
| $V_{CEO}$ | collector-emitter voltage        | open base                   |       |      |      |
|           | BC856; BC856A; BC856B            |                             | -     | -65  | V    |
|           | BC857; BC857A; BC857B;<br>BC857C |                             | -     | -45  | V    |
|           | BC858B                           |                             | -     | -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   |

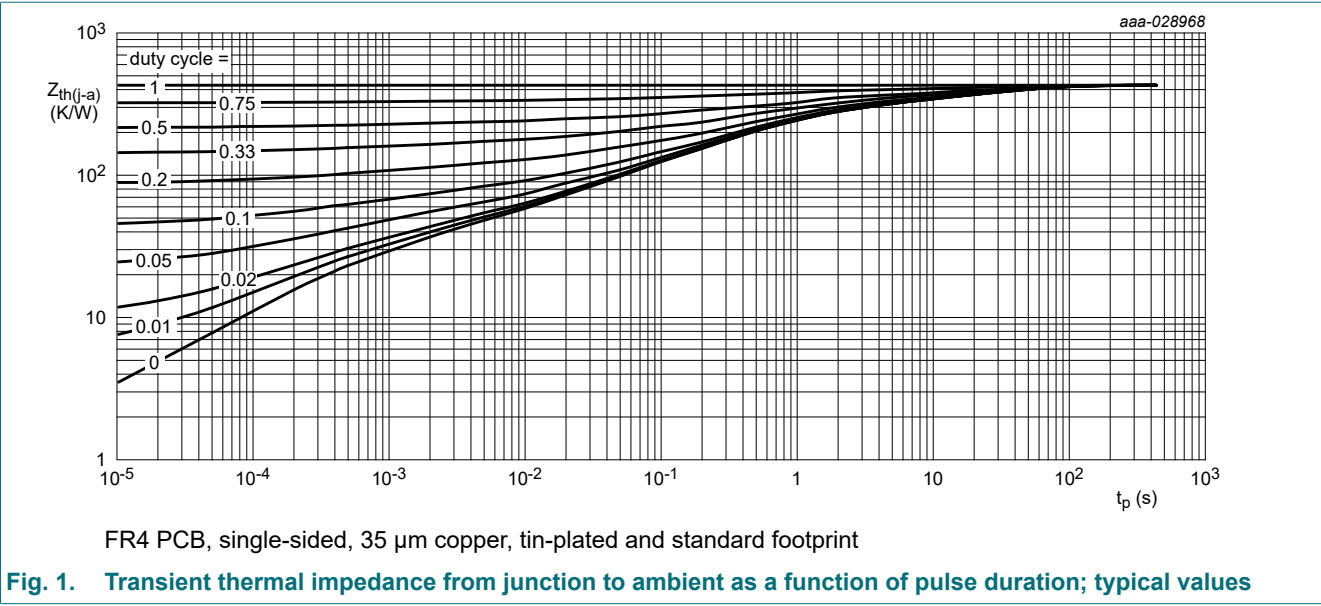
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 µm copper, tin-plated and standard footprint.

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  $\mu$ m 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; BC856A;<br>BC856B             | $I_C = -100\text{ }\mu\text{A}; I_E = 0\text{ A}$                                                                       | -80  | -    | -    | V             |
|               | BC857; BC857A;<br>BC857B; BC857C     |                                                                                                                         | -50  | -    | -    | V             |
|               | BC858B                               |                                                                                                                         | -30  | -    | -    | V             |
| $V_{(BR)CEO}$ | collector-emitter breakdown voltage  |                                                                                                                         |      |      |      |               |
|               | BC856; BC856A;<br>BC856B             | $I_C = -2\text{ mA}; I_B = 0\text{ A}$                                                                                  | -65  | -    | -    | V             |
|               | BC857; BC857A;<br>BC857B; BC857C     |                                                                                                                         | -45  | -    | -    | V             |
|               | BC858B                               |                                                                                                                         | -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                                | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}$                                                                              | 125  | -    | 475  |               |
|               | BC857                                |                                                                                                                         | 125  | -    | 800  |               |
|               | BC856A; BC857A                       |                                                                                                                         | 125  | -    | 250  |               |
|               | BC856B; BC857B;<br>BC858B            |                                                                                                                         | 220  | -    | 475  |               |
|               | BC857C                               |                                                                                                                         | 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                         | $I_C = -200\text{ }\mu\text{A}; V_{CE} = -5\text{ V}; R_S = 2\text{ k}\Omega;$<br>$f = 1\text{ kHz}; B = 200\text{ Hz}$ | -    | 2    | 10   | dB            |

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

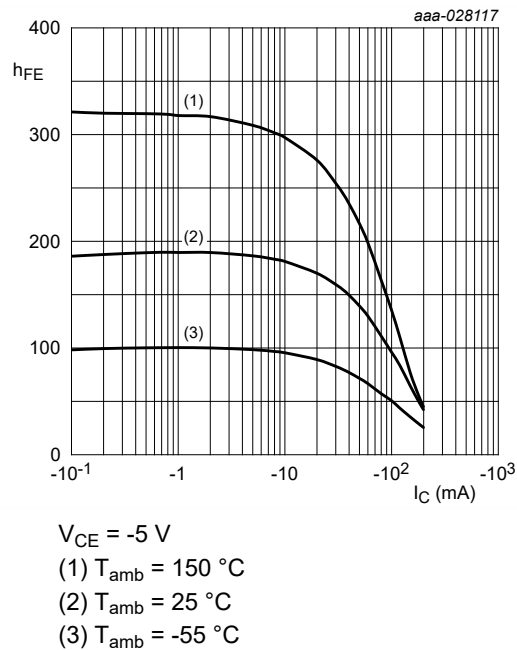


Fig. 2. BC856A; BC857A: DC current gain as a function of collector current; typical values

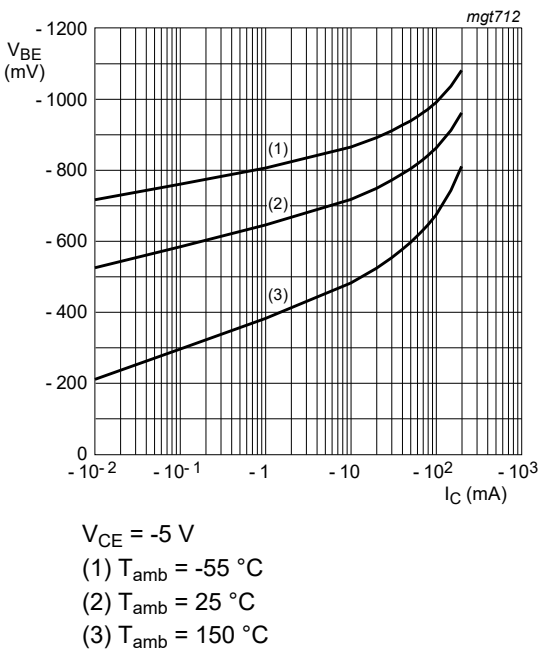


Fig. 3. BC856A; BC857A: Base-emitter voltage as a function of collector current; typical values

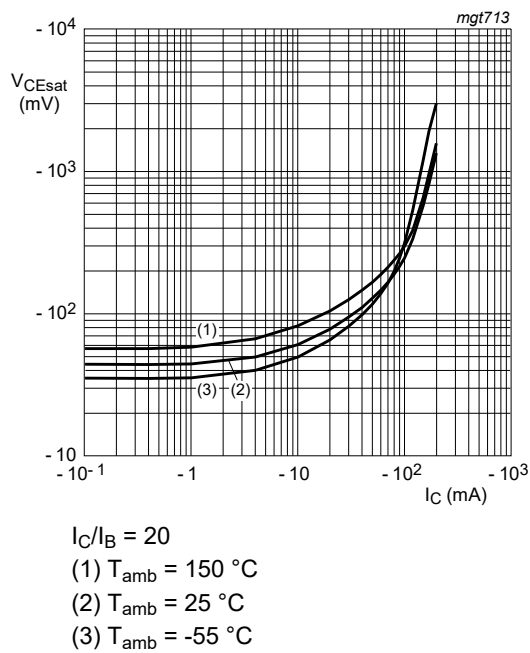


Fig. 4. BC856A; BC857A: Collector-emitter saturation voltage as a function of collector current; typical values

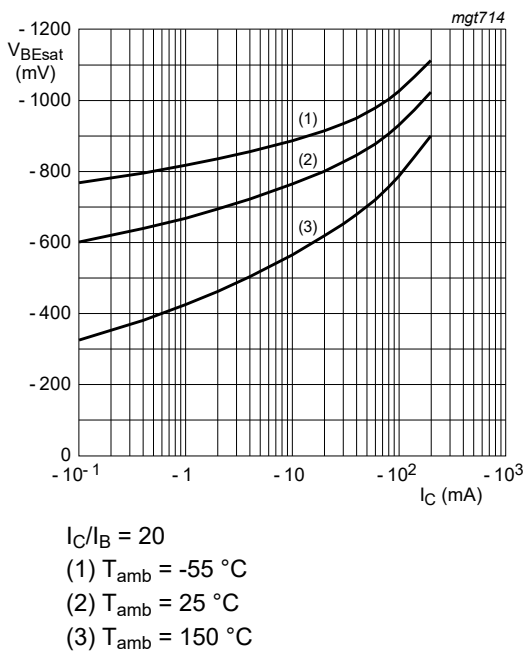


Fig. 5. BC856A; BC857A: Base-emitter saturation voltage as a function of collector current; typical values

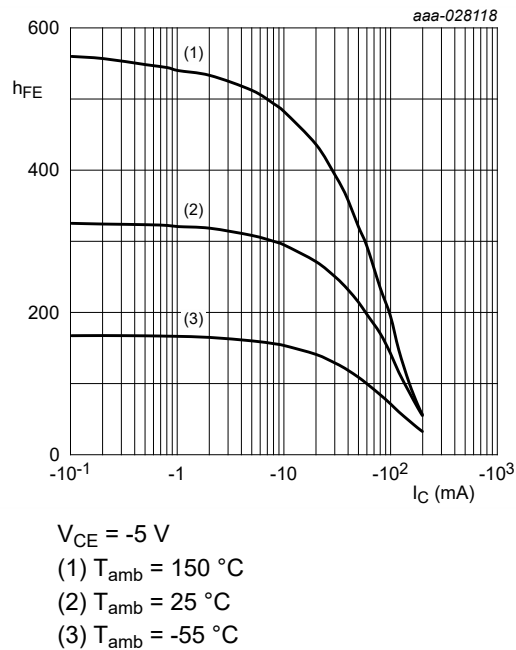


Fig. 6. BC856B; BC857B; BC858B: DC current gain as a function of collector current; typical values

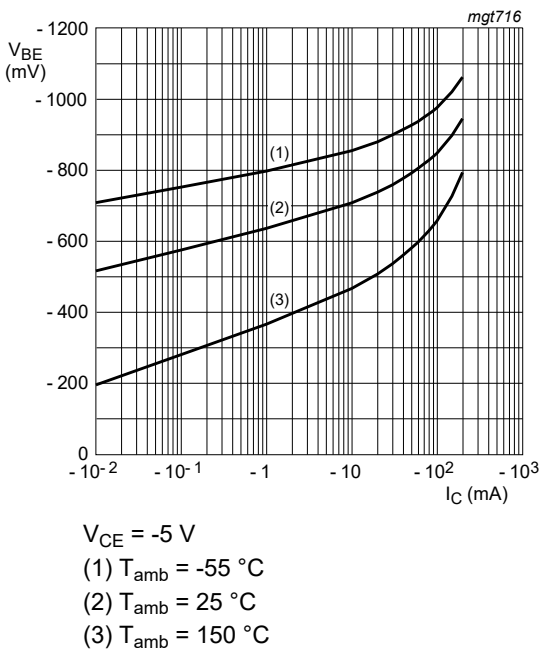


Fig. 7. BC856B; BC857B; BC858B: Base-emitter voltage as a function of collector current; typical values

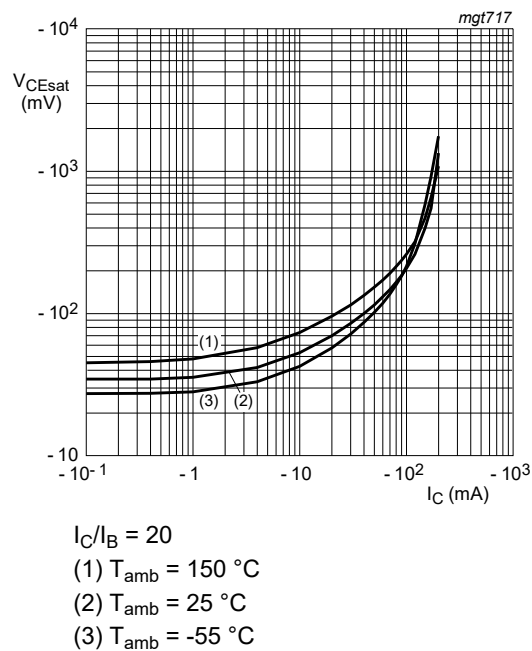


Fig. 8. BC856B; BC857B; BC858B: Collector-emitter saturation voltage as a function of collector current; typical values

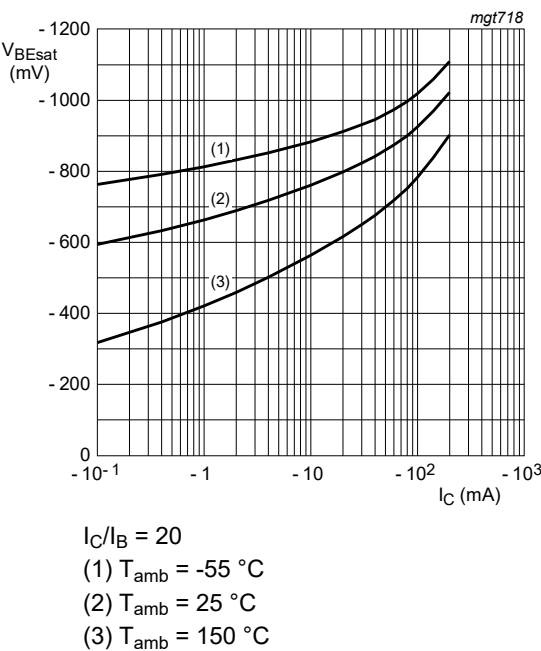


Fig. 9. BC856B; BC857B; BC858B: Base-emitter saturation voltage as a function of collector current; typical values

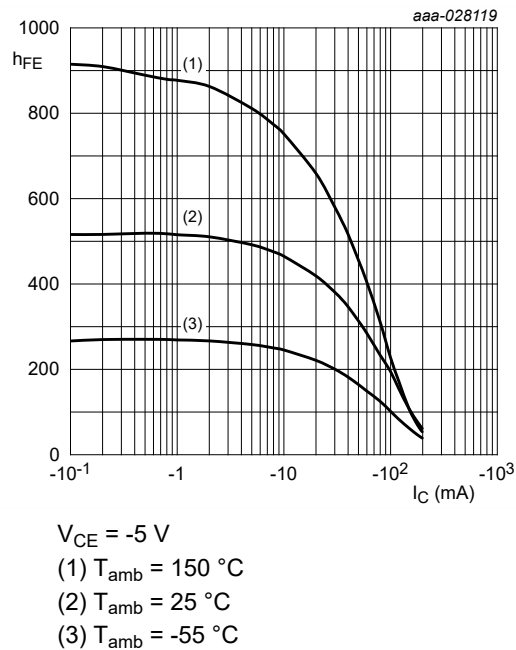


Fig. 10. BC857C: DC current gain as a function of collector current; typical values

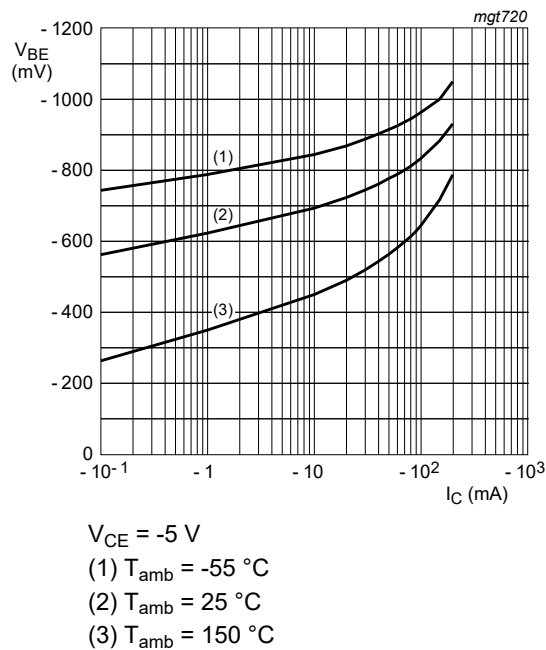


Fig. 11. BC857C: Base-emitter voltage as a function of collector current; typical values

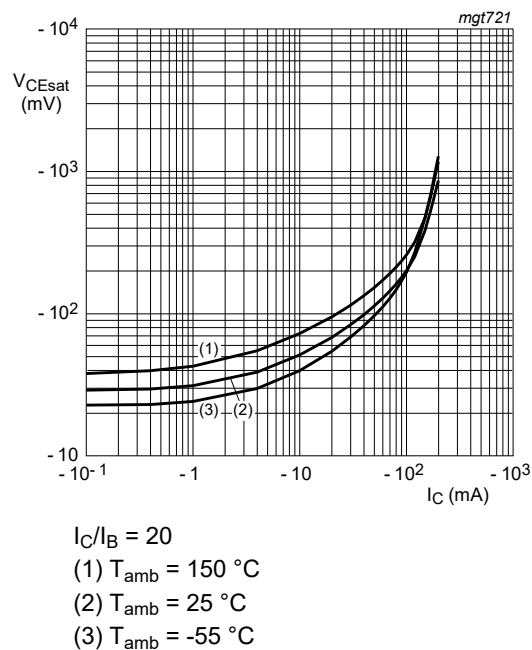


Fig. 12. BC857C: Collector-emitter saturation voltage as a function of collector current; typical values

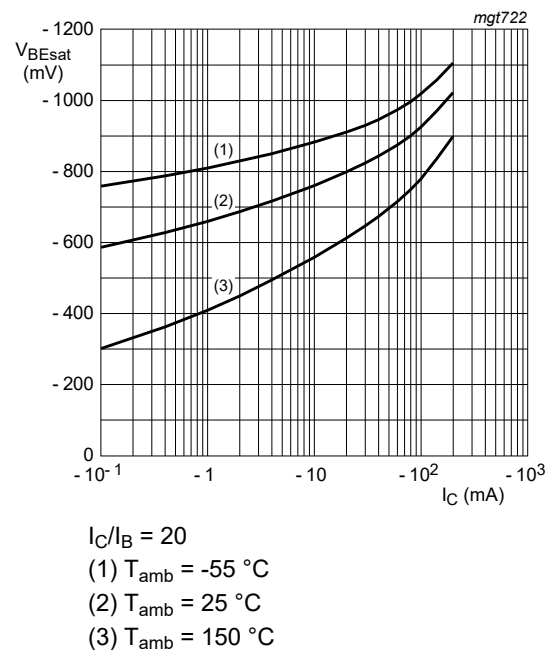


Fig. 13. BC857C: Base-emitter saturation voltage as a function of collector current; typical values

11. Package outline

Table 9. Package outline

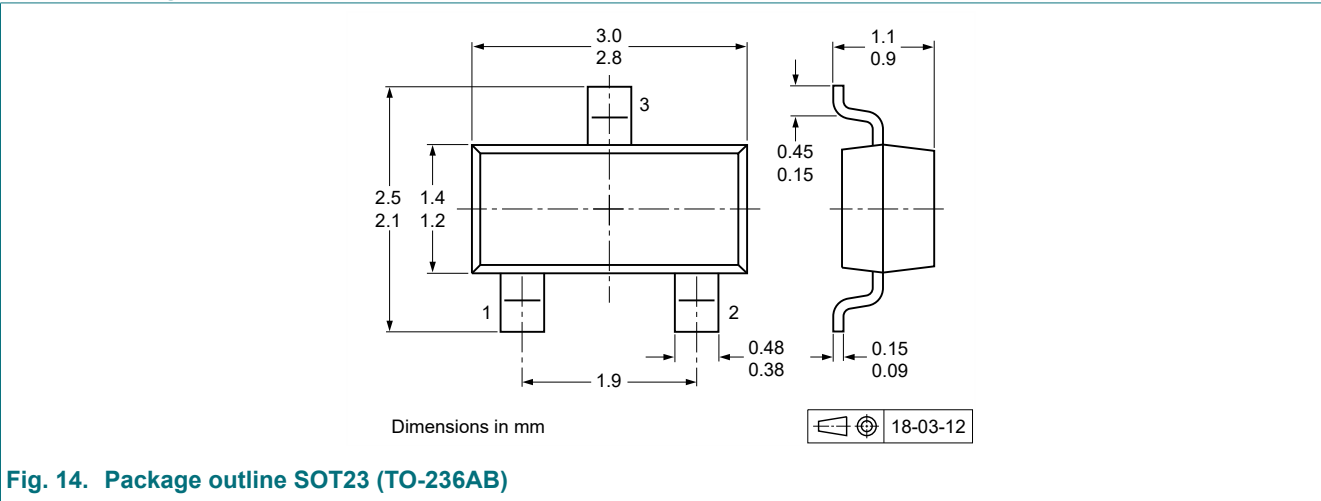
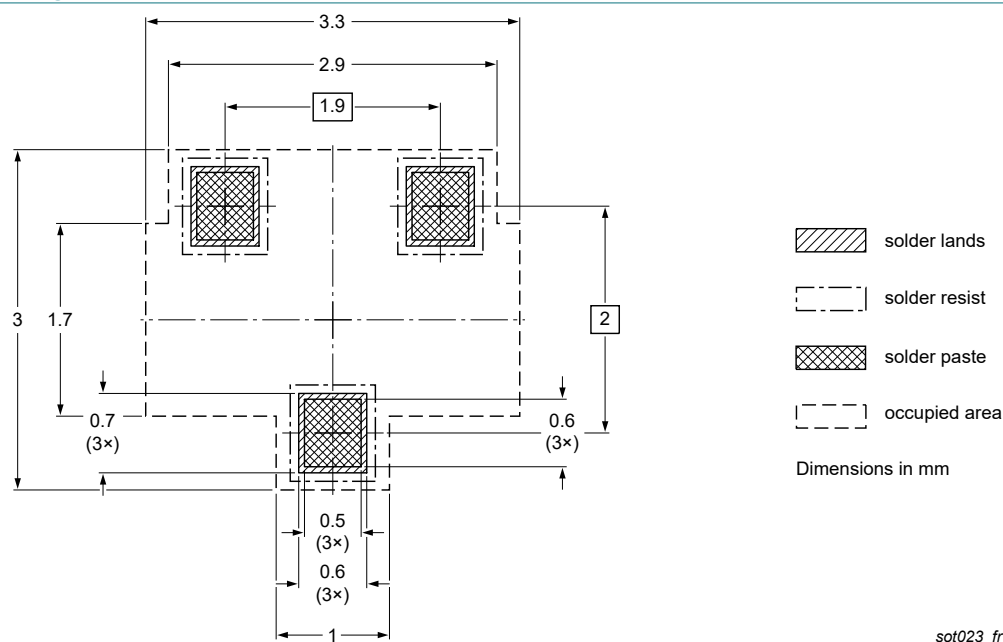


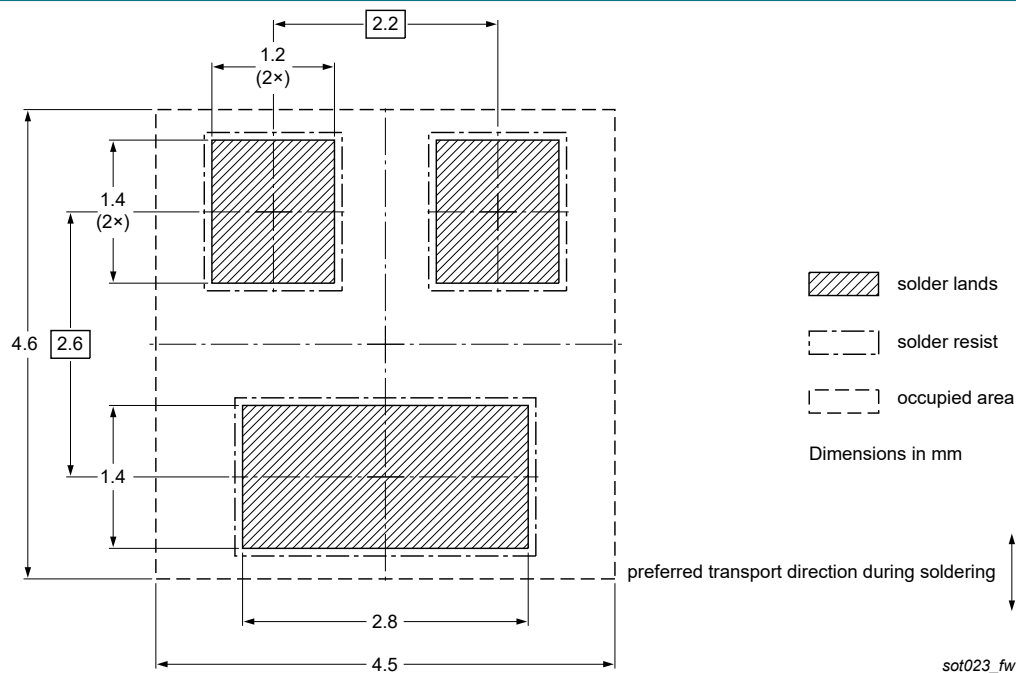
Fig. 14. Package outline SOT23 (TO-236AB)

## 12. Soldering

### Table 10. Soldering



**Fig. 15. Reflow soldering footprint SOT23 (TO-236AB)**



**Fig. 16. Wave soldering footprint SOT23 (TO-236AB)**

## 13. Revision history

Table 11. Revision history

| Document ID           | Release date                                                                                                                                                                                                        | Data sheet status  | Change notice | Supersedes            |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|-----------------------|
| BC856_BC857_BC858 v.9 | 20220701                                                                                                                                                                                                            | Product data sheet | -             | BC856_BC857_BC858 v.8 |
| Modifications:        | <ul style="list-style-type: none"><li>Product(s) changed to non-automotive qualification. Please refer to <a href="https://www.nexperia.com">nexperia.com</a> for automotive (-Q) product alternative(s).</li></ul> |                    |               |                       |
| BC856_BC857_BC858 v.8 | 20210221                                                                                                                                                                                                            | Product data sheet | -             | BC856_BC857_BC858 v.7 |
| BC856_BC857_BC858 v.7 | 20180416                                                                                                                                                                                                            | Product data sheet | -             | BC856_BC857_BC858 v.6 |
| BC856_BC857_BC858 v.6 | 20040106                                                                                                                                                                                                            | Product data sheet | -             | BC856_BC857_BC858 v.5 |

## 14. 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. |
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Date of release: 1 July 2022

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