# 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

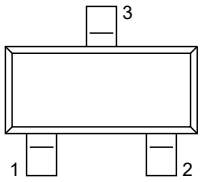
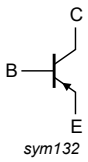
**Table 2. Quick reference data**

*$T_{amb}$ = 25 °C unless otherwise specified.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | open base | | | | |
| | BC856; BC856A; BC856B | | - | - | -65 | V |
| | BC857; BC857A; BC857B; BC857C | | - | - | -45 | V |
| | BC858B | | - | - | -30 | V |
| $I_C$ | collector current | | - | - | -100 | mA |
| $I_{CM}$ | peak collector current | | - | - | -200 | mA |
| $h_{FE}$ | DC current gain | | | | | |
| | BC856 | $V_{CE}$ = 5 V; $I_C$ = 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 | Descrition | Simlified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | B | base |   |   sym132 |
| 2 | E | emitter | | |
| 3 | C | collector | | |

## 6. Ordering information

**Table 4. Ordering information**

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

# 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; BC857C | | | - | -50 | V |
| | BC858B | | | - | -30 | V |
| $V_{CEO}$ | collector-emitter voltage | open base | | | | |
| | BC856; BC856A; BC856B | | | - | -65 | V |
| | BC857; BC857A; BC857B; 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 | $T_{amb} \leq 25$ °C | [1] | - | 250 | mW |
| $T_j$ | junction temperature | | | - | 150 | °C |
| $T_{amb}$ | ambient temperature | | | -65 | 150 | °C |
| $T_{stg}$ | storage temperature | | | -65 | 150 | °C |

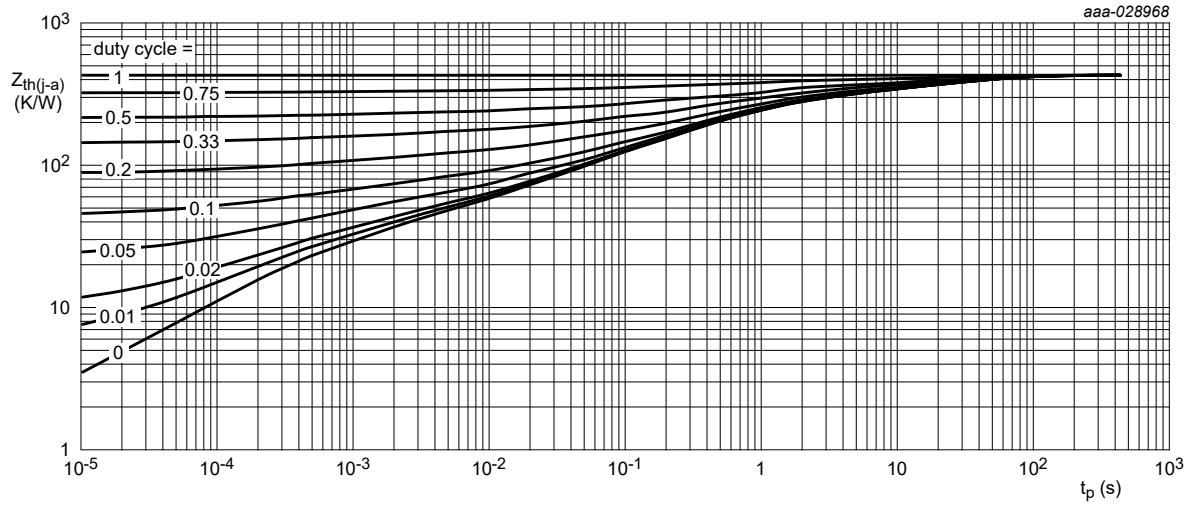
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 µm copper, tin-plated and standard footprint.

# 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.




FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint

**Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

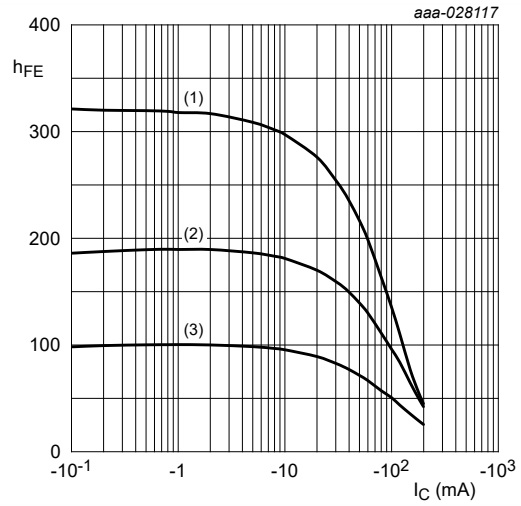
# 10. Characteristics

**Table 8. Characteristics**

*$T_{amb}$ = 25 °C unless otherwise specified.*

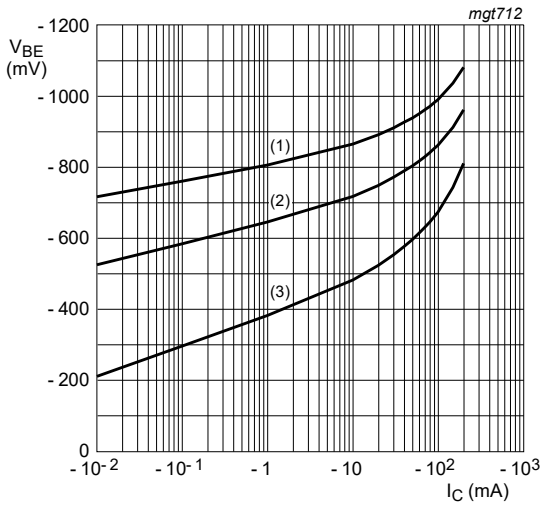
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | | | | | | |
| | BC856; BC856A; BC856B | $I_C$ = -100 µA; $I_E$ = 0 A | | -80 | - | - | V |
| | BC857; BC857A; BC857B; BC857C | | | -50 | - | - | V |
|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

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$



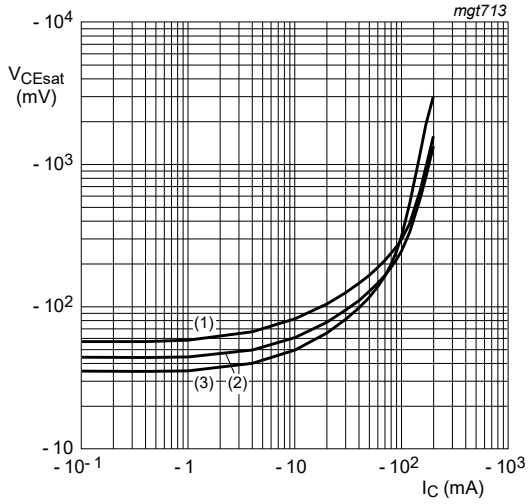

$V_{CE}$ = -5 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



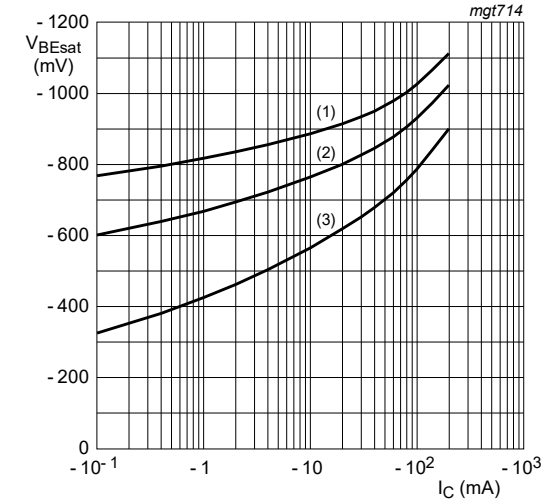

$V_{CE}$ = -5 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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



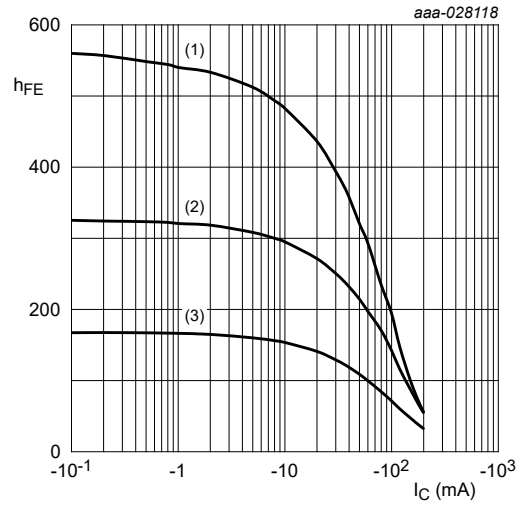

$I_C/I_B$ = 20
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



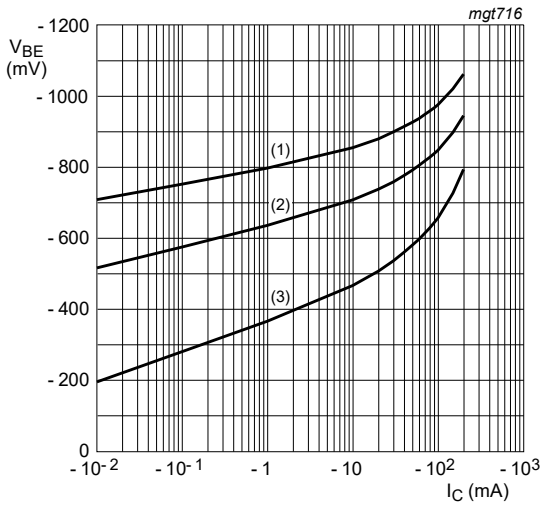

$I_C/I_B$ = 20
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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



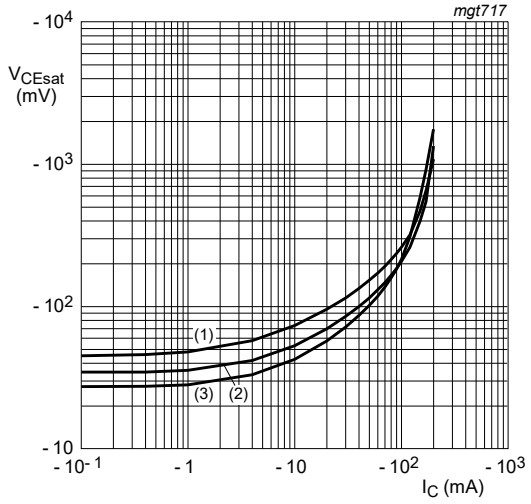

$V_{CE}$ = -5 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



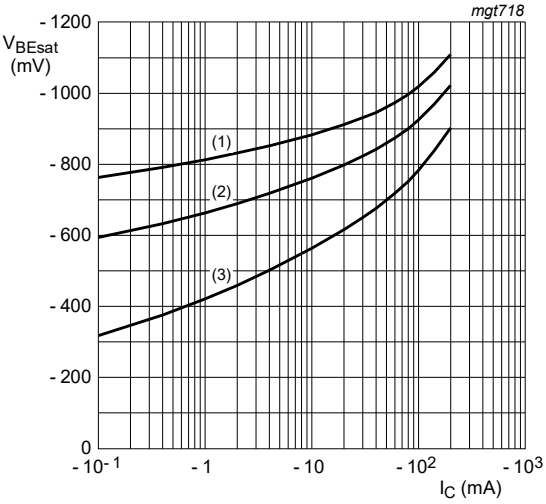

$V_{CE}$ = -5 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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



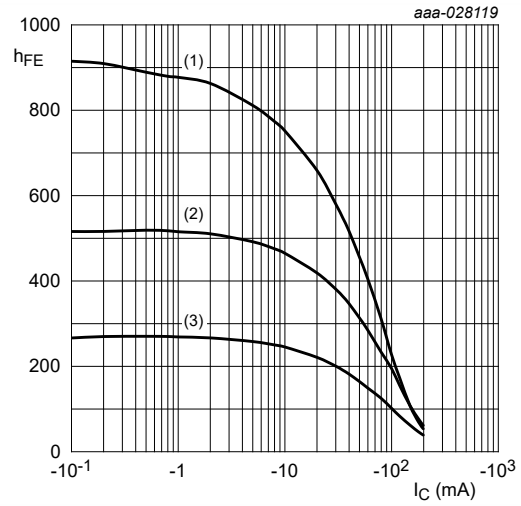

$I_C/I_B$ = 20
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



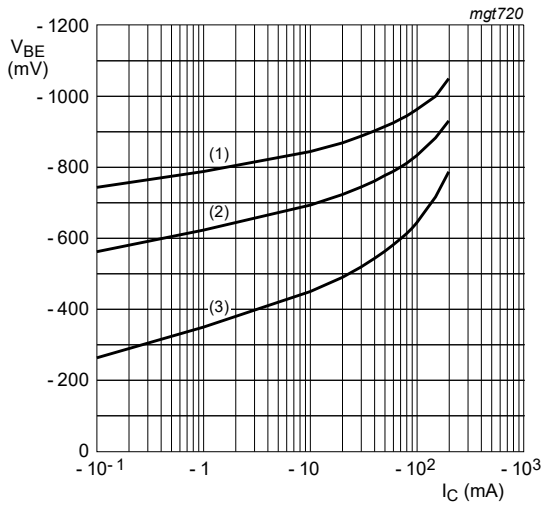

$I_C/I_B$ = 20
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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



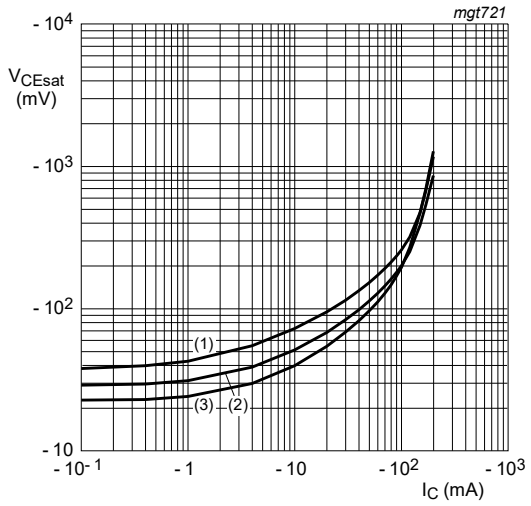

$V_{CE}$ = -5 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



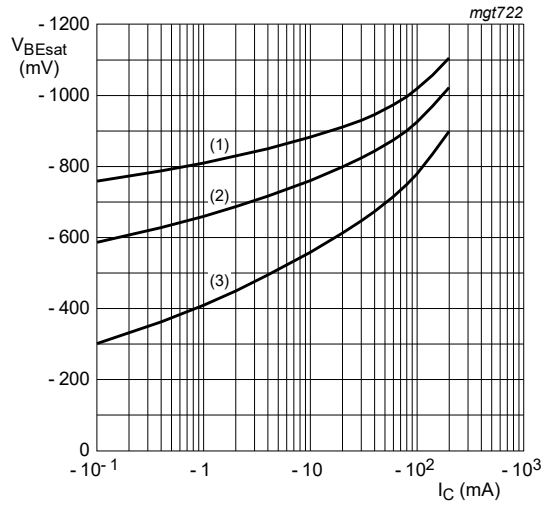

$V_{CE}$ = -5 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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




$I_C/I_B$ = 20
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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




$I_C/I_B$ = 20
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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

# 11. Package outline

**Table 9. Package outline**

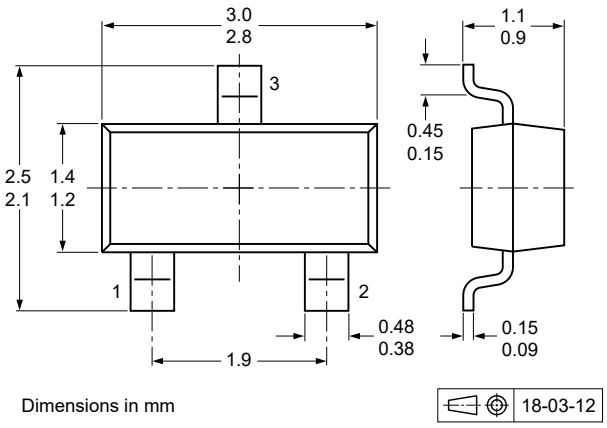



**Fig. 14. Package outline SOT23 (TO-236AB)**

## 12. Soldering

**Table 10. Soldering**

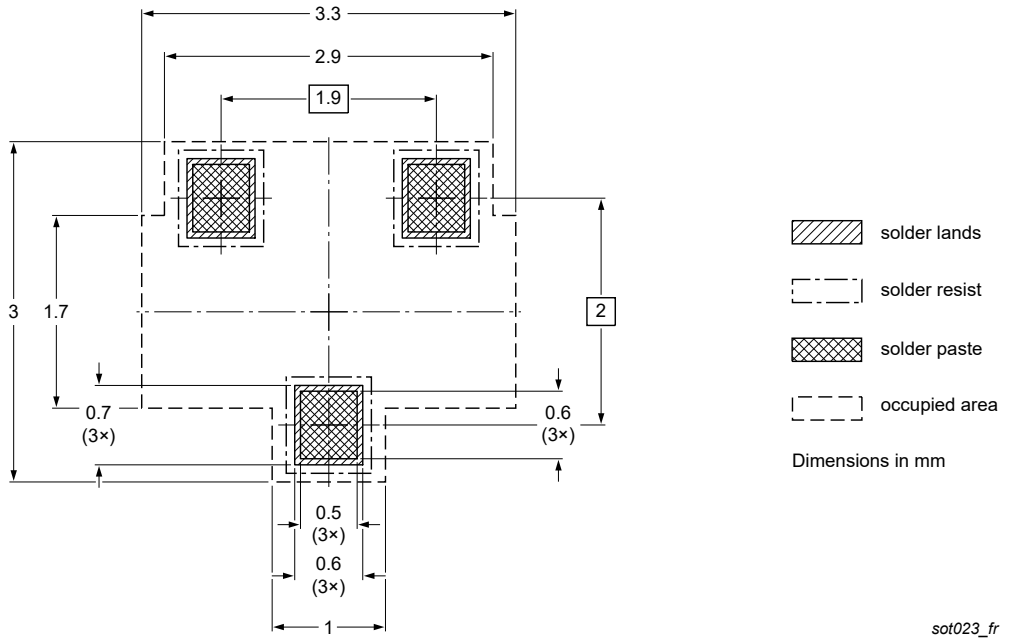



**Fig. 15. Reflow soldering footprint SOT23 (TO-236AB)**

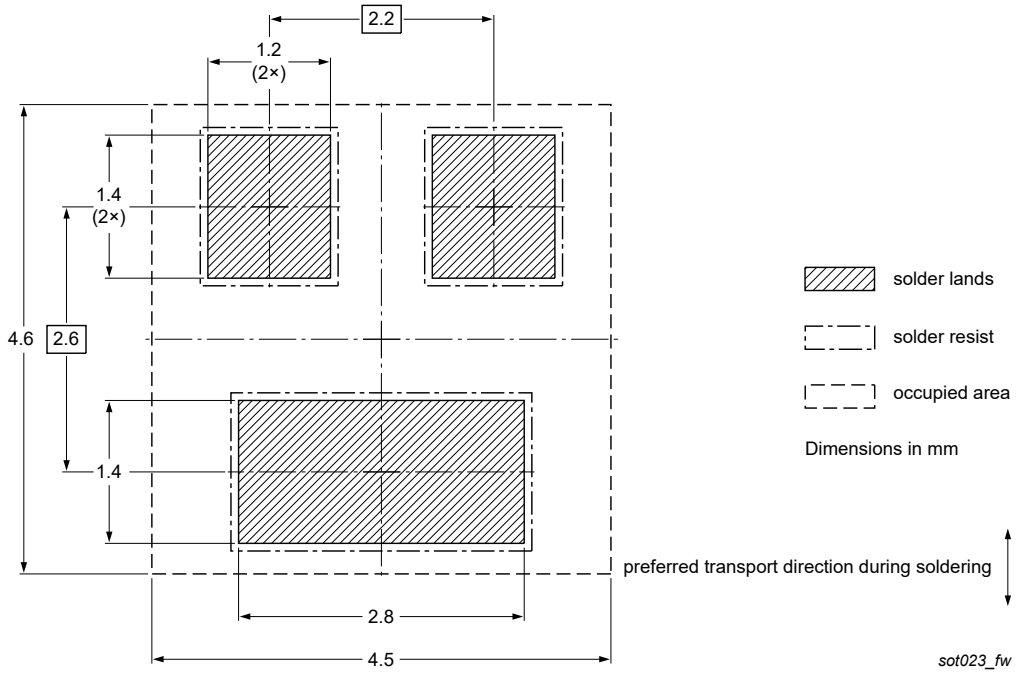



**Fig. 16. Wave soldering footprint SOT23 (TO-236AB)**

## 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: | • Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). | | | |
| 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 [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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**Date of release: 1 July 2022**

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