# 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

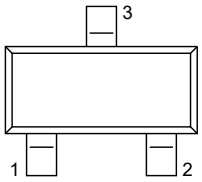
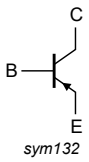
**Table 2. Quick reference data**

*$T_{amb}$ = 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 |

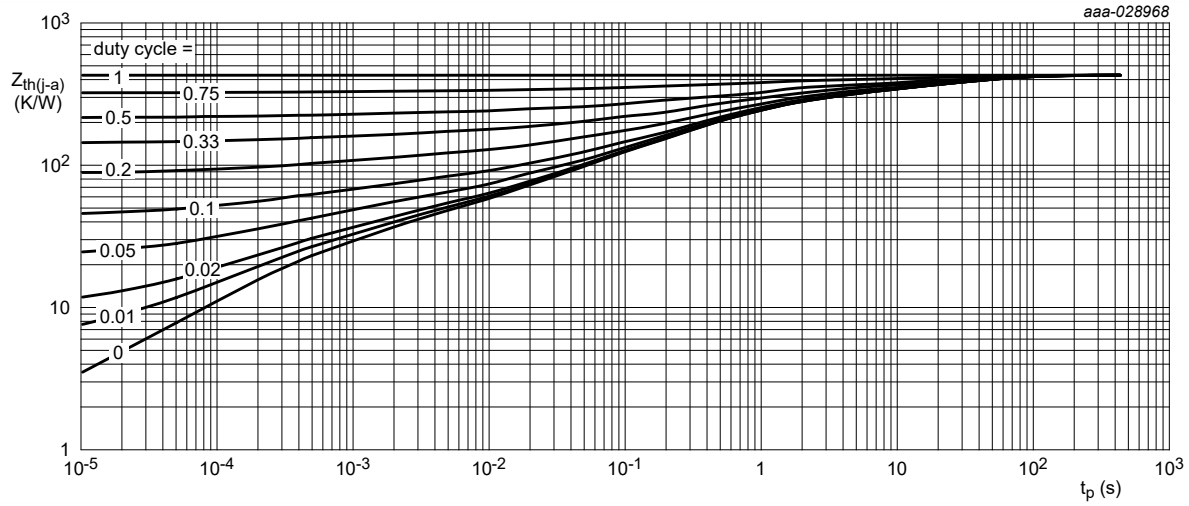
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 µm copper, tin-plated and standard footprint.

# 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**

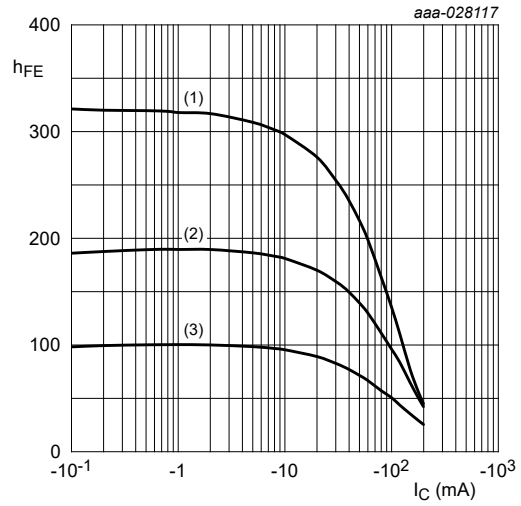
# 10. Characteristics

**Table 8. Characteristics**

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

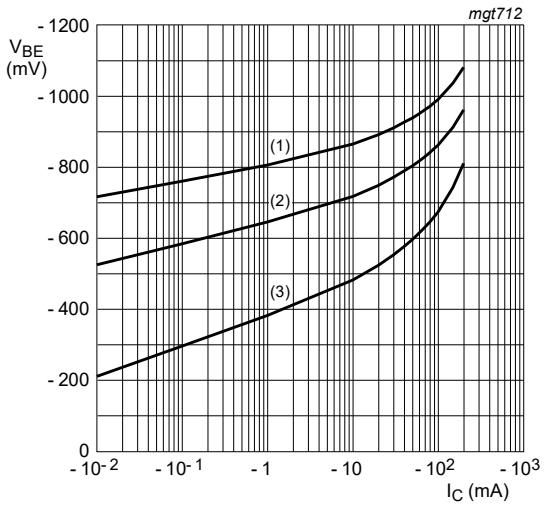
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{(BR)CBO}$ | collector-base breakdown voltage | | | | | | |
| | BC856; BC856A; BC856B | $I_C$ = -100 µA; $I_E$ = 0 A | | -80 | - | - | V |
| | BC857; BC857A; BC857B; BC857C | | | -50 | - | - | V |
| | 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; $\delta \leq 0.02$



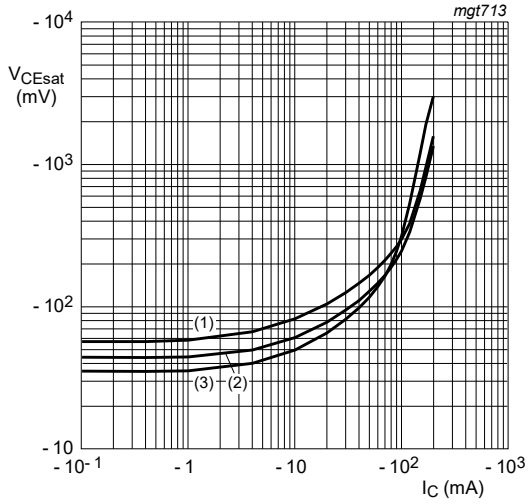

$V_{CE}$ = -5 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



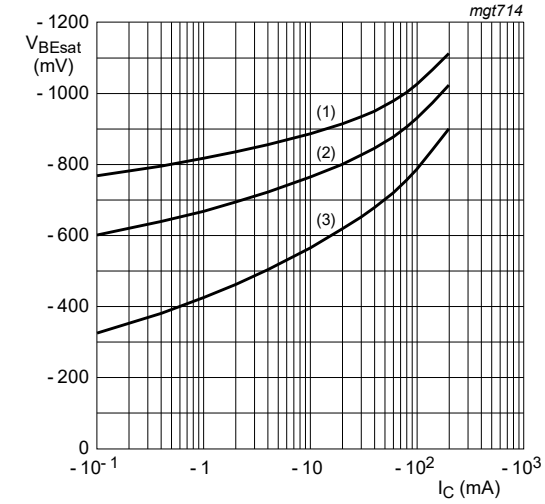

$V_{CE}$ = -5 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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



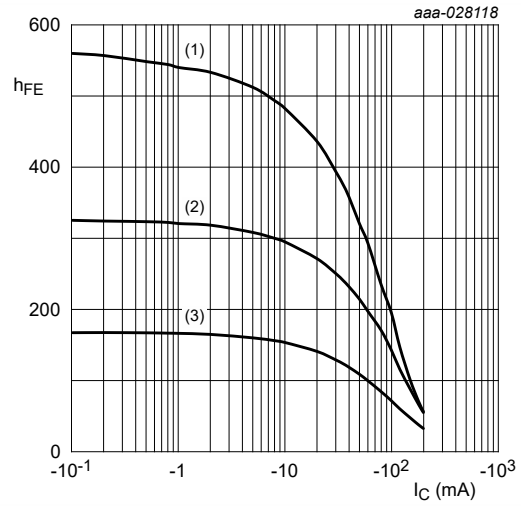

$I_C/I_B$ = 20
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



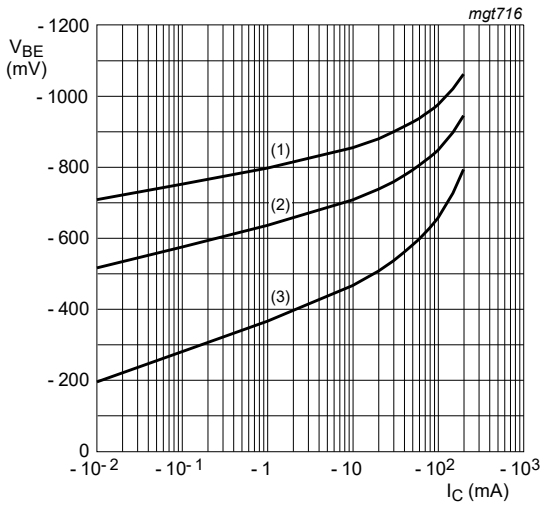

$I_C/I_B$ = 20
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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



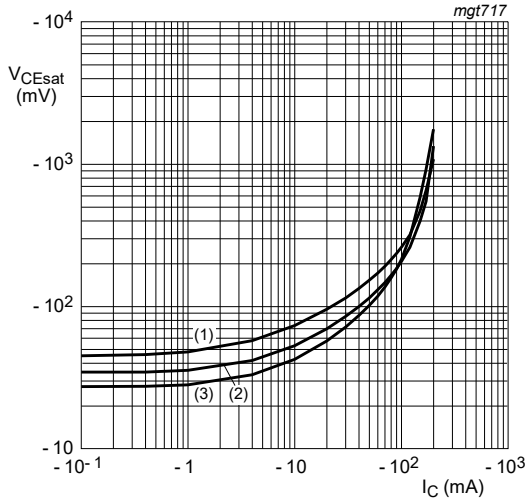

$V_{CE}$ = -5 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



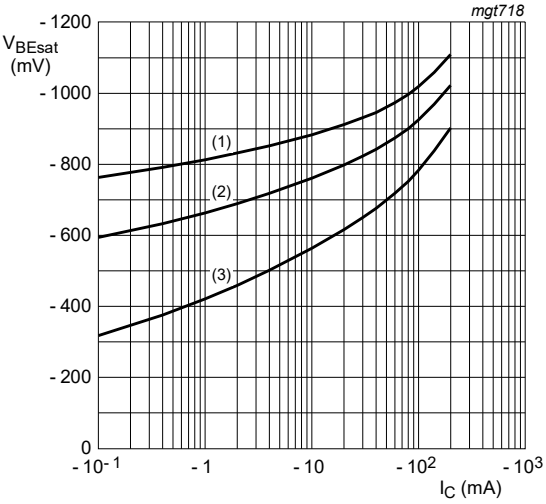

$V_{CE}$ = -5 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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



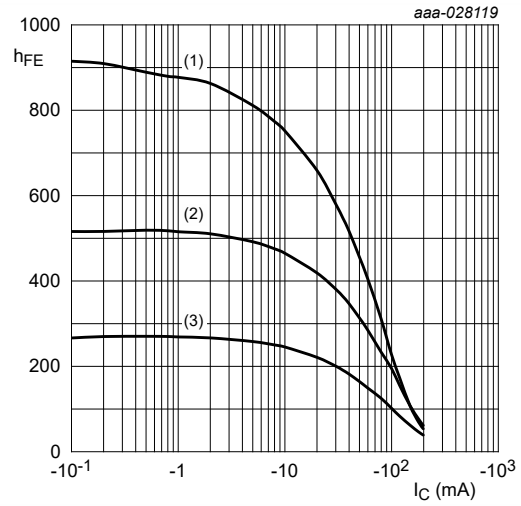

$I_C/I_B$ = 20
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



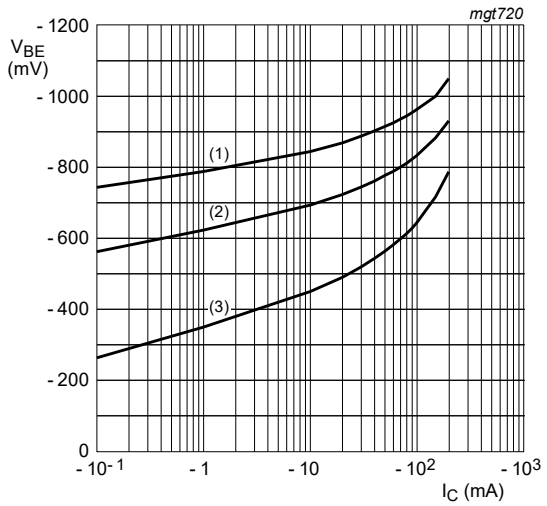

$I_C/I_B$ = 20
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

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



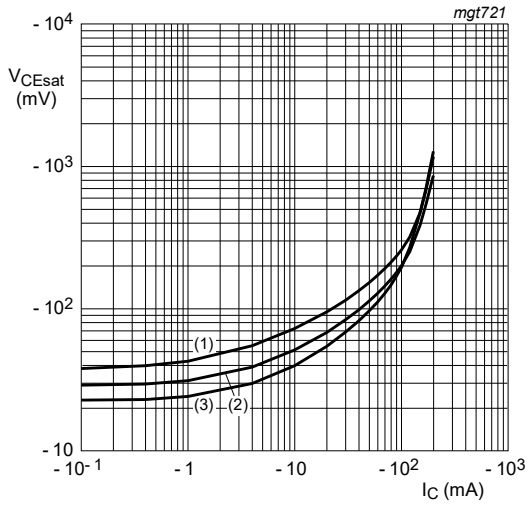

$V_{CE}$ = -5 V
(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -55 °C

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



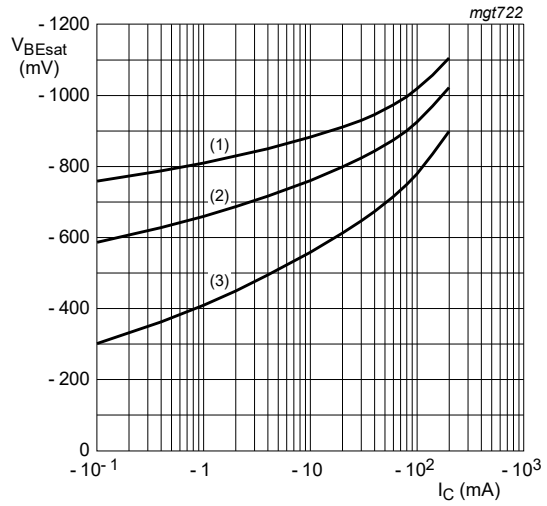

$V_{CE}$ = -5 V
(1) $T_{amb}$ = -55 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = 150 °C

**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**

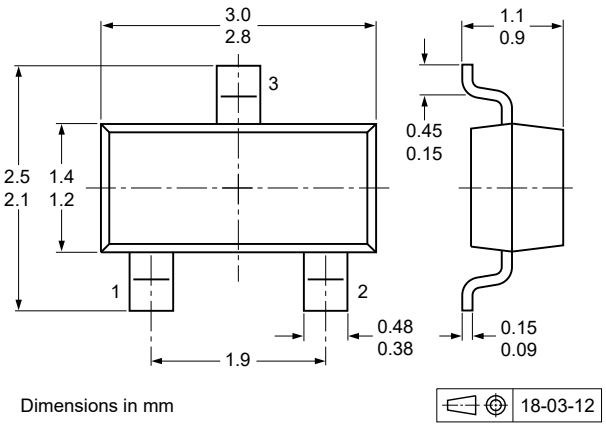



**Fig. 14. Package outline SOT23 (TO-236AB)**

## 12. Soldering

**Table 10. Soldering**

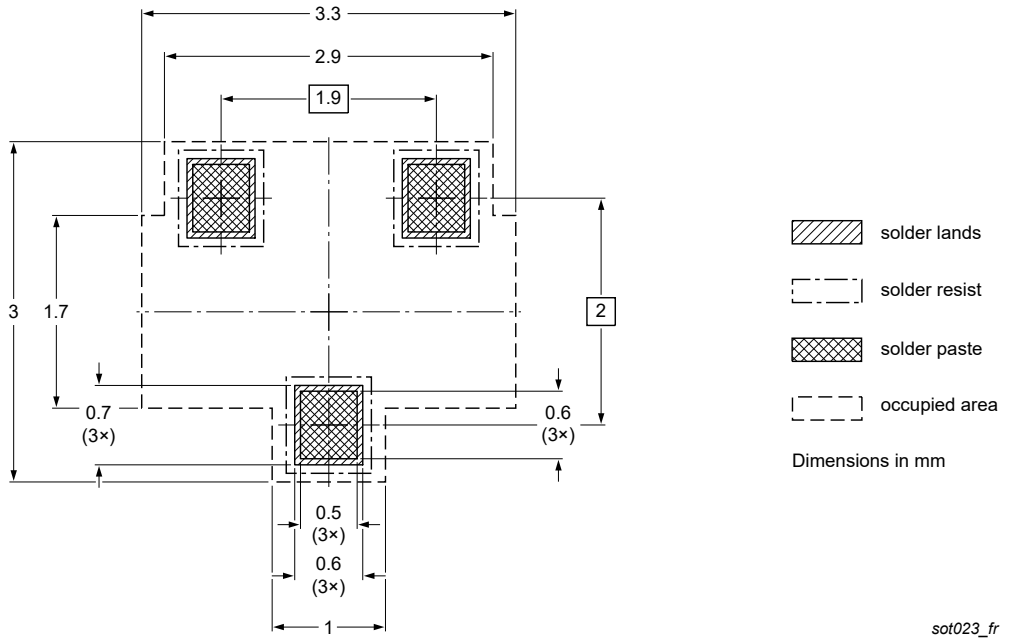



**Fig. 15. Reflow soldering footprint SOT23 (TO-236AB)**

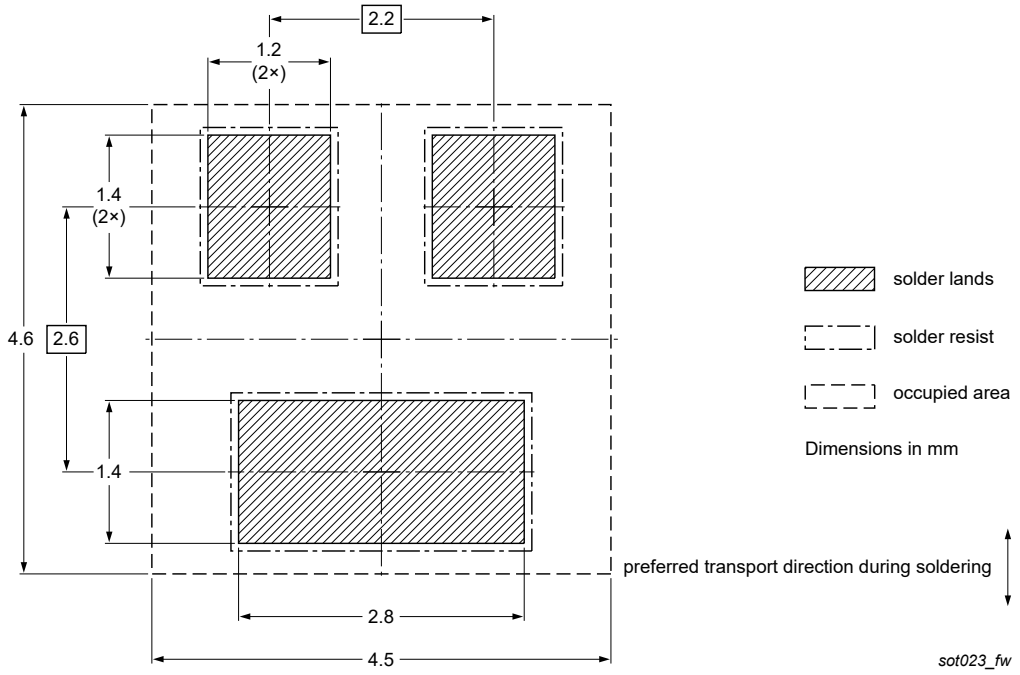



**Fig. 16. Wave soldering footprint SOT23 (TO-236AB)**

## 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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# Contents

1. General description....1
2. Features and benefits....1
3. Applications....1
4. Quick reference data....2
5. Pinning information....2
6. Ordering information....2
7. Marking....3
8. Limiting values....3
9. Thermal characteristics....4
10. Characteristics....5
11. Package outline....9
12. Soldering....10
13. Revision history....11
14. Legal information....12



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