



BC857XQA series

45 V, 100 mA PNP general-purpose transistors

Rev. 1 — 26 August 2015

Product data sheet

1. Product profile

1.1 General description

PNP general-purpose transistors in a leadless ultra small DFN1010D-3 (SOT1215) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

Table 1. Product overview

| Type number | Package | | | NPN complement |
|-------------|-------------------------|-------|-------|----------------|
| | Nexperia | JEITA | JEDEC | |
| BC857AQA | DFN1010D-3 (SOT1215) | - | - | BC847AQA |
| BC857BQA | | | | BC847BQA |
| BC857CQA | | | | BC847CQA |

1.2 Features and benefits

- General-purpose transistors
- Three current gain selections
- Low package height of 0.37 mm
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- AEC-Q101 qualified

1.3 Applications

- General-purpose switching and amplification
- Mobile applications

1.4 Quick reference data

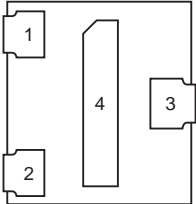
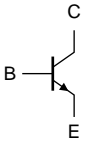
Table 2. Quick reference data

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------|--|-----|-----|------|------|
| V_{CEO} | collector-emitter voltage | open base | - | - | -45 | V |
| I_C | collector current | | - | - | -100 | mA |
| h_{FE} | DC current gain | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}$ | | | | |
| | BC857AQA | | 125 | - | 250 | |
| | BC857BQA | | 220 | - | 475 | |
| | BC857CQA | | 420 | - | 800 | |

2. Pinning information

Table 3. Pinning

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|---|
| 1 | B | base |  <p>Transparent top view</p> |  <p>sym123</p> |
| 2 | E | emitter | | |
| 3 | C | collector | | |
| 4 | C | collector | | |

3. Ordering information

Table 4. Ordering information

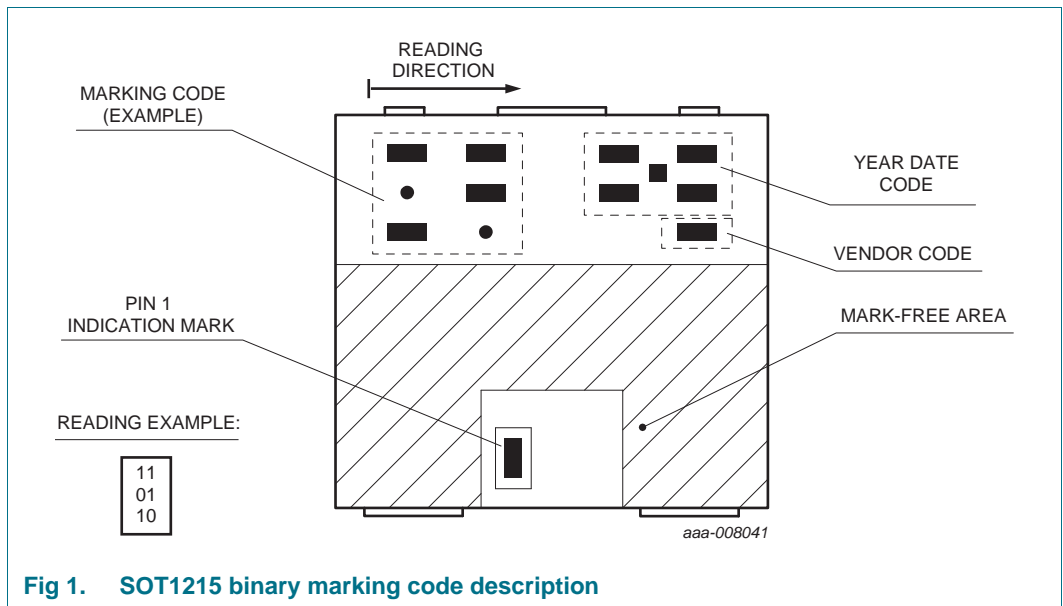
| Type number | Package | | |
|-------------|------------|--|---------|
| | Name | Description | Version |
| BC857AQA | DFN1010D-3 | plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.1 × 1.0 × 0.37 mm | SOT1215 |
| BC857BQA | | | |
| BC857CQA | | | |

4. Marking

Table 5. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BC857AQA | 00 11 10 |
| BC857BQA | 00 11 11 |
| BC857CQA | 01 00 01 |

4.1 Binary marking code description



5. Limiting values

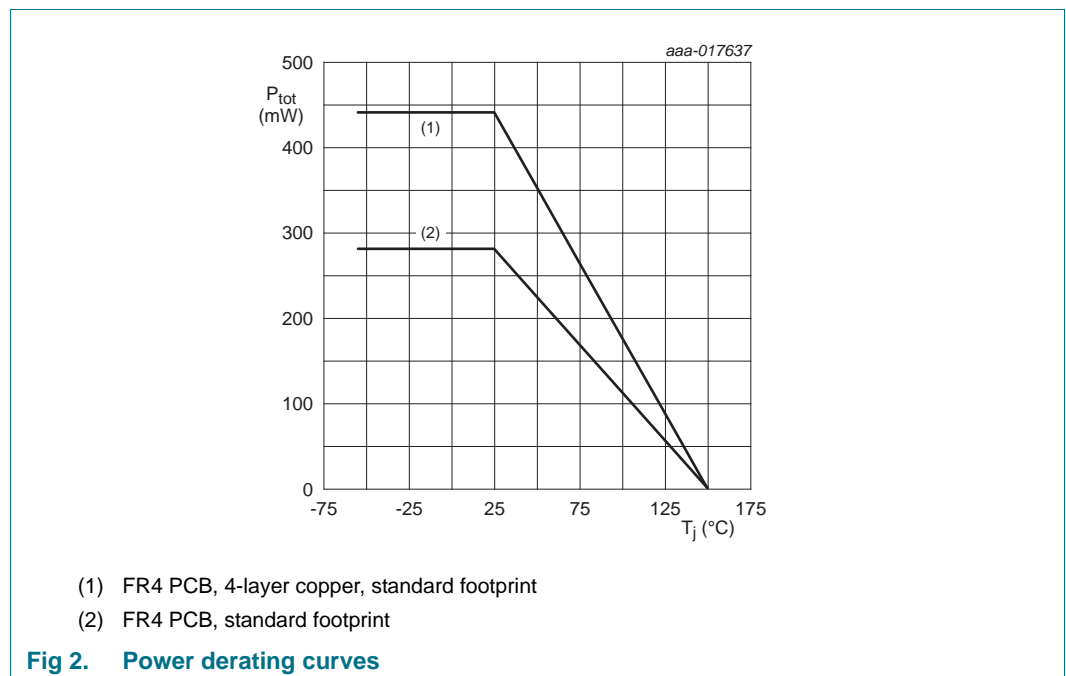
Table 6. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|---------------------------|----------------------------------|-----|------|------|
| V_{CBO} | collector-base voltage | open emitter | - | -50 | V |
| V_{CEO} | collector-emitter voltage | open base | - | -45 | V |
| V_{EBO} | emitter-base voltage | open collector | - | -6 | V |
| I_C | collector current | | - | -100 | mA |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | - | -200 | mA |
| I_{BM} | peak base current | single pulse; $t_p \leq 1$ ms | - | -100 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | 280 | mW |
| | | | [2] | 440 | mW |
| | | | | | |
| T_j | junction temperature | | - | +150 | °C |
| T_{amb} | ambient temperature | | -55 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

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

[2] Device mounted on an FR4 PCB, 4-layer copper; tin-plated and standard footprint.



6. 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] | - | - | 446 | K/W |
| | | | [2] | - | - | 284 | K/W |

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, 4-layer copper; tin-plated and standard footprint.

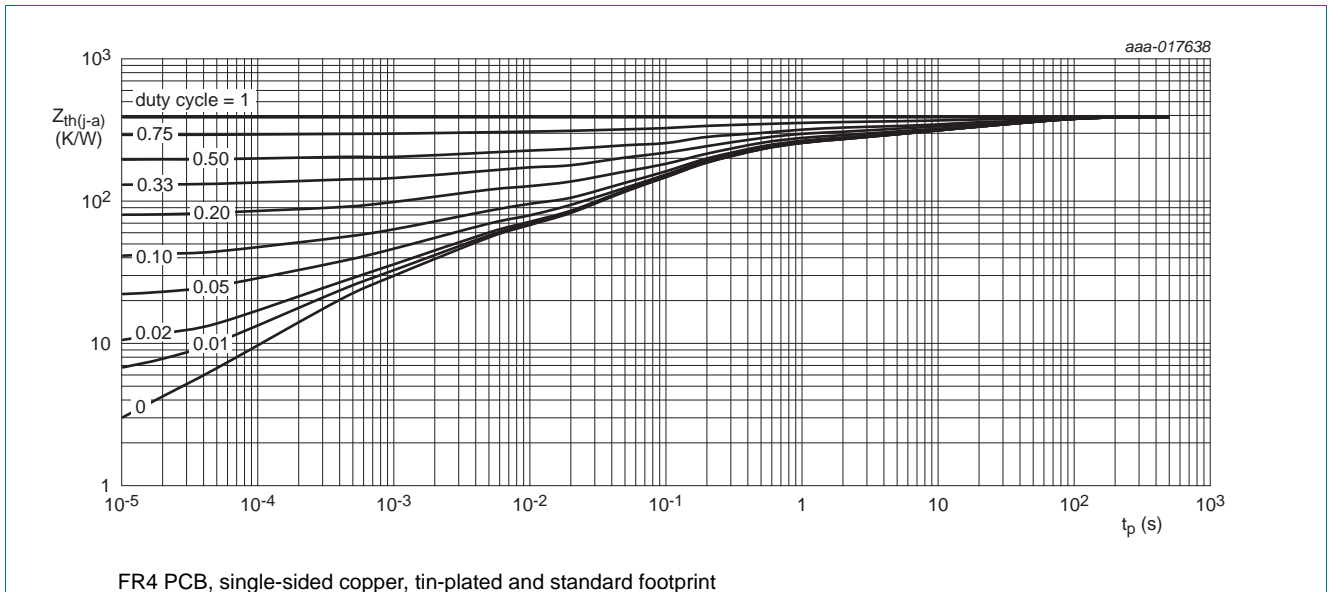


Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

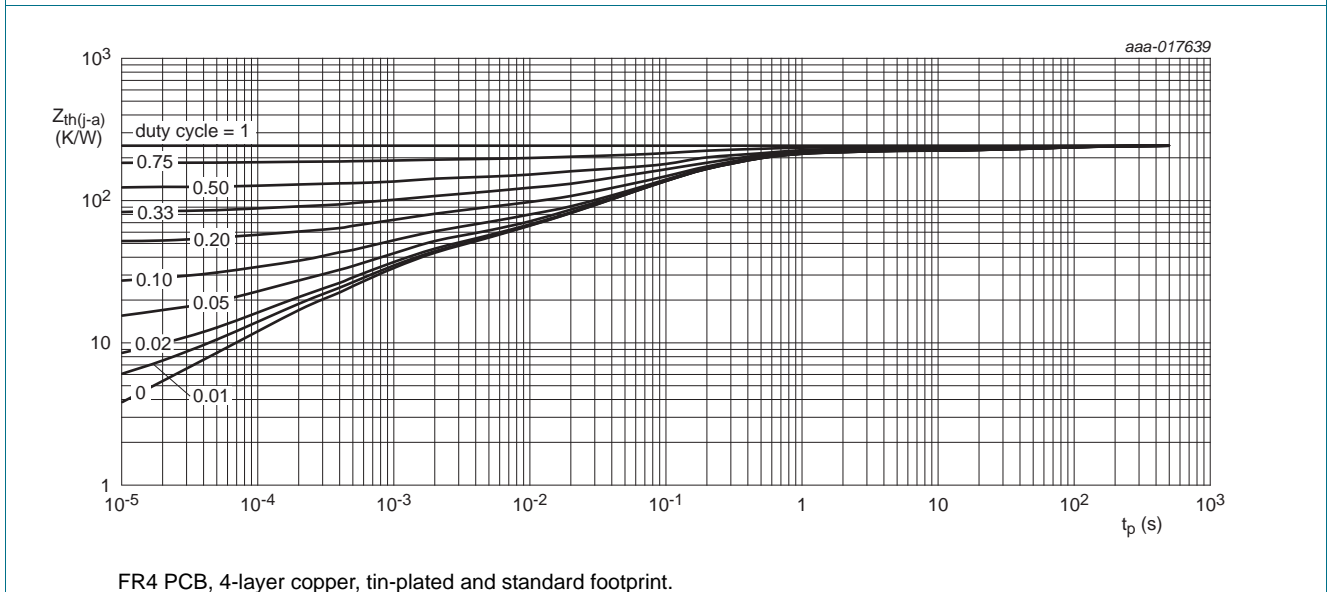


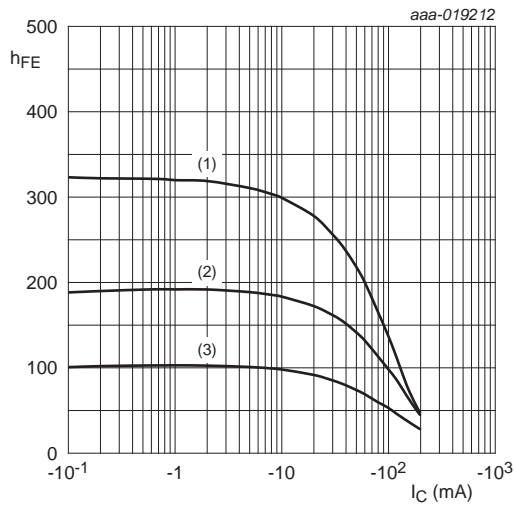
Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 8. Characteristics
T_{amb} = 25 °C unless otherwise specified.

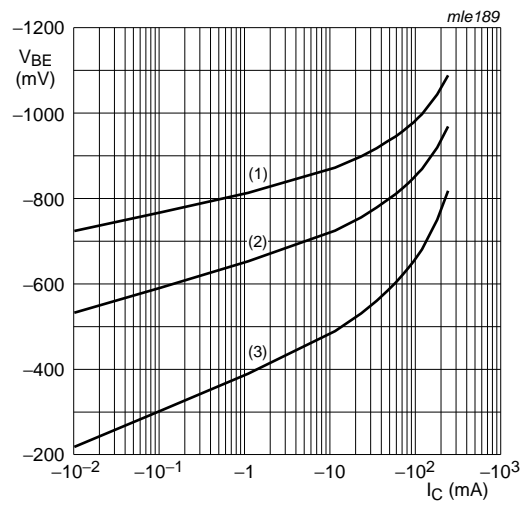
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------|--------------------------------------|---|------|------|------|------|
| I _{CBO} | collector-base cut-off current | V _{CB} = -30 V; I _E = 0 A | - | - | -15 | nA |
| | | V _{CB} = -30 V; I _E = 0 A; T _j = 150 °C | - | - | -5 | μA |
| I _{EBO} | emitter-base cut-off current | V _{EB} = -5 V; I _C = 0 A | - | - | -100 | nA |
| h _{FE} | DC current gain | V _{CE} = -5 V; I _C = -2 mA | | | | |
| | BC857AQA | | 125 | - | 250 | |
| | BC857BQA | | 220 | - | 475 | |
| | BC857CQA | | 420 | - | 800 | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = -10 mA; I _B = -0.5 mA | - | - | -200 | mV |
| | | I _C = -100 mA; I _B = -5 mA [1] | - | - | -400 | mV |
| V _{BEsat} | base-emitter saturation voltage | I _C = -10 mA; I _B = -0.5 mA | - | -760 | - | mV |
| | | I _C = -100 mA; I _B = -5 mA [1] | - | -900 | - | mV |
| V _{BE} | base-emitter voltage | I _C = -2 mA; V _{CE} = -5 V | -600 | - | -750 | mV |
| | | I _C = -10 mA; V _{CE} = -5 V | - | - | -820 | mV |
| f _T | transition frequency | V _{CE} = -5 V; I _C = -10 mA; f = 100 MHz | 100 | - | - | MHz |
| C _c | collector capacitance | V _{CB} = -10 V; I _E = i _e = 0 A; f = 1 MHz | - | - | 2.5 | pF |
| C _e | emitter capacitance | V _{EB} = -0.5 V; I _C = i _c = 0 A; f = 1 MHz | - | 10 | - | pF |
| NF | noise figure | I _C = -200 μA; V _{CE} = -5 V; R _S = 2 kΩ; f = 1 kHz; B = 200 Hz | - | - | 10 | dB |

[1] Pulse test: t_p ≤ 300 μs; δ = 0.02



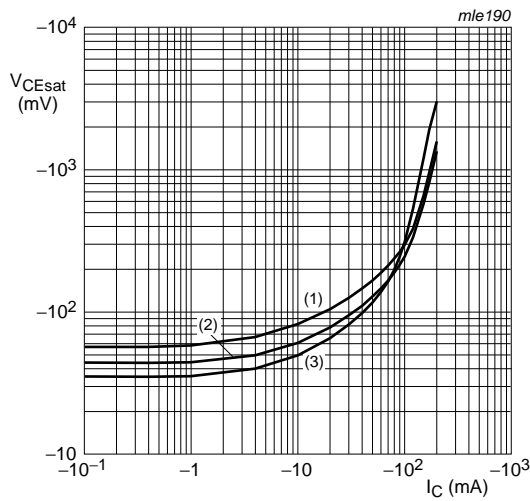
$V_{CE} = -5 \text{ V}$
 (1) $T_{amb} = 150 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

Fig 5. BC857AQA: DC current gain as a function of collector current; typical values



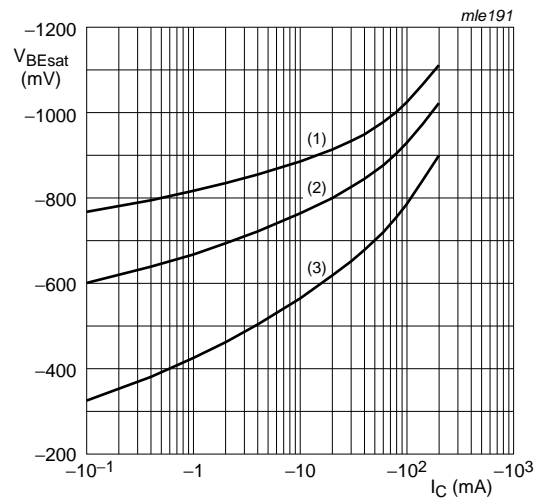
$V_{CE} = -5 \text{ V}$
 (1) $T_{amb} = -55 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = 150 \text{ }^\circ\text{C}$

Fig 6. BC857AQA: Base-emitter voltage as a function of collector current; typical values



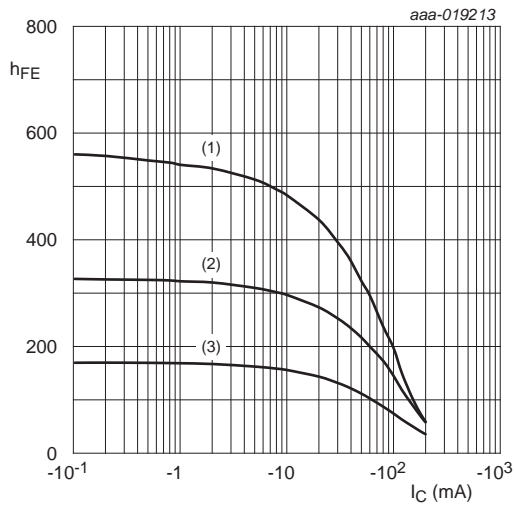
$I_C/I_B = 20$
 (1) $T_{amb} = 150 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

Fig 7. BC857AQA: Collector-emitter saturation voltage as a function of collector current; typical values



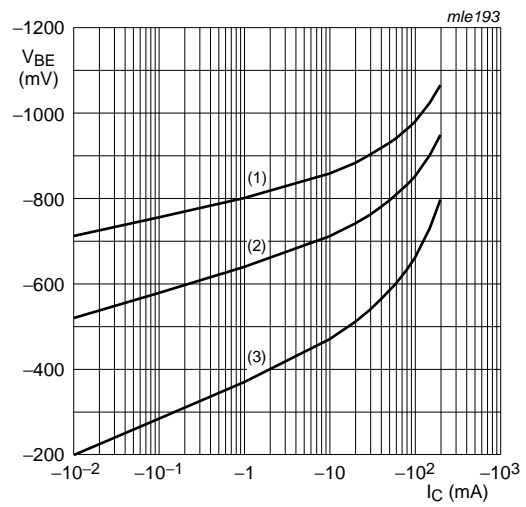
$I_C/I_B = 20$
 (1) $T_{amb} = -55 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = 150 \text{ }^\circ\text{C}$

Fig 8. BC857AQA: Base-emitter saturation voltage as a function of collector current; typical values



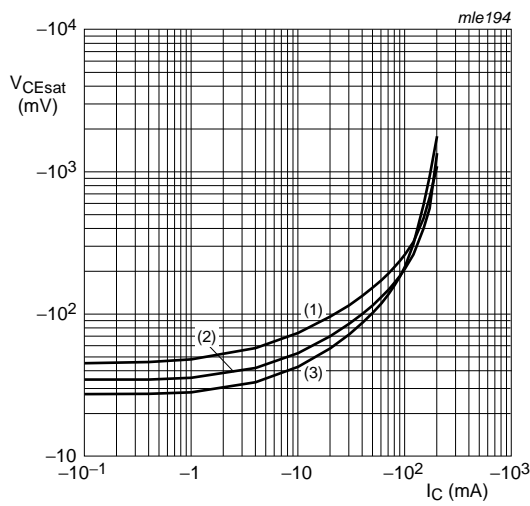
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 9. BC857BQA: DC current gain as a function of collector current; typical values



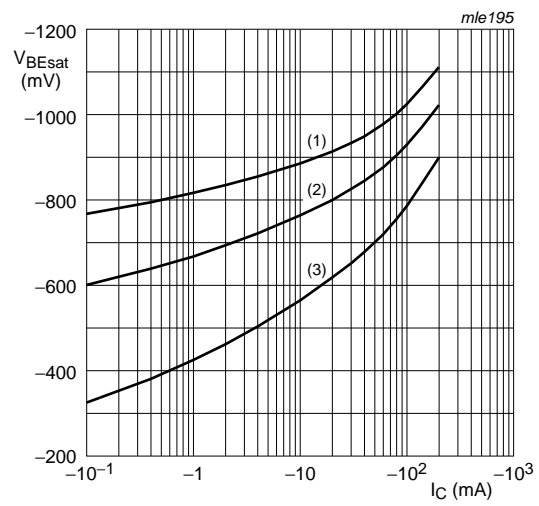
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig 10. BC857BQA: Base-emitter voltage as a function of collector current; typical values



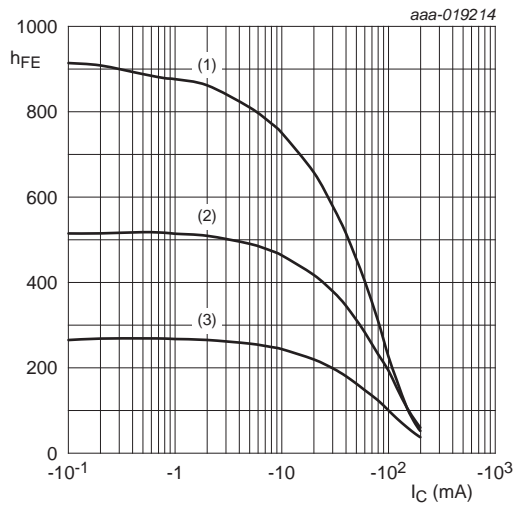
$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 11. BC857BQA: Collector-emitter saturation voltage as a function of collector current; typical values



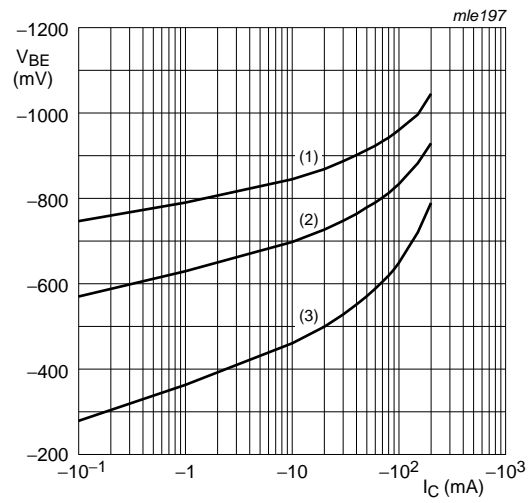
$I_C/I_B = 20$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig 12. BC857BQA: Base-emitter saturation voltage as a function of collector current; typical values



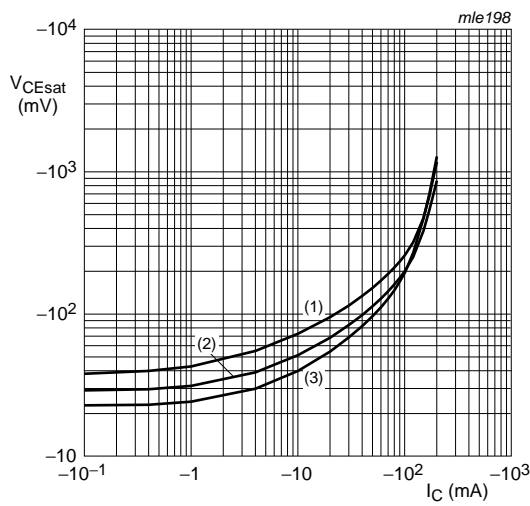
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 13. BC857CQA: DC current gain as a function of collector current; typical values



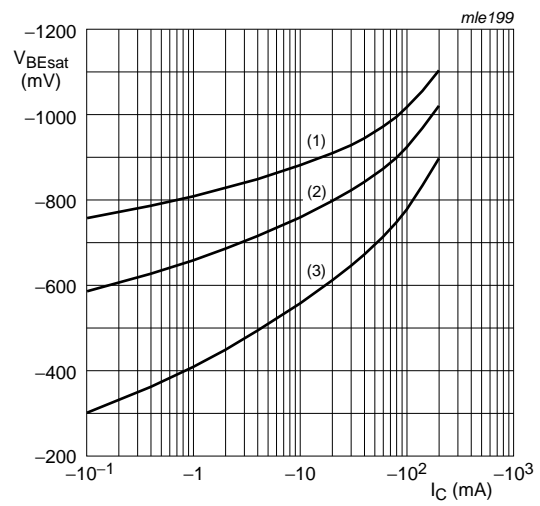
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig 14. BC857CQA: Base-emitter voltage as a function of collector current; typical values



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

Fig 15. BC857CQA: Collector-emitter saturation voltage as a function of collector current; typical values



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

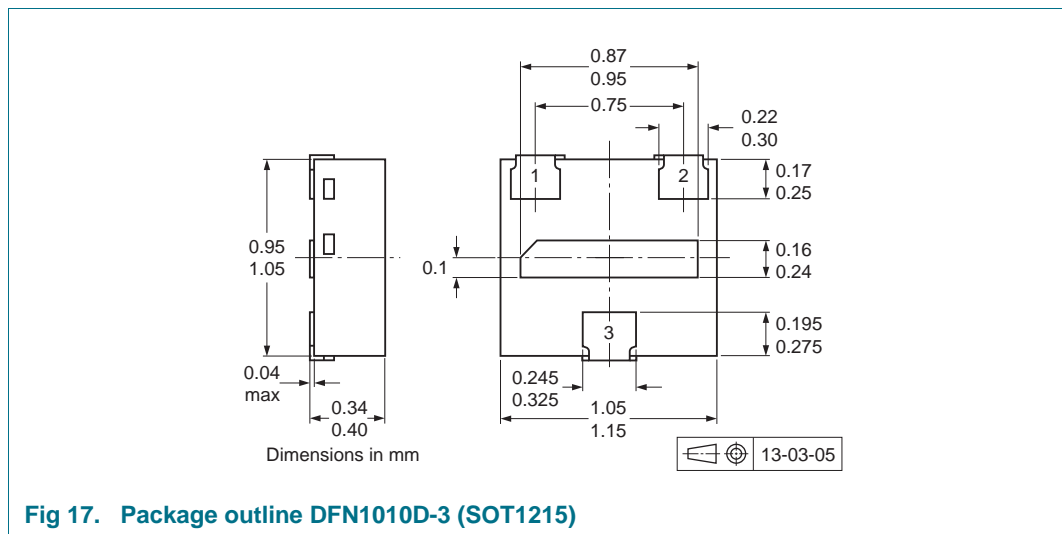
Fig 16. BC857CQA: Base-emitter saturation voltage as a function of collector current; typical values

8. Test information

8.1 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.

9. Package outline



10. Soldering

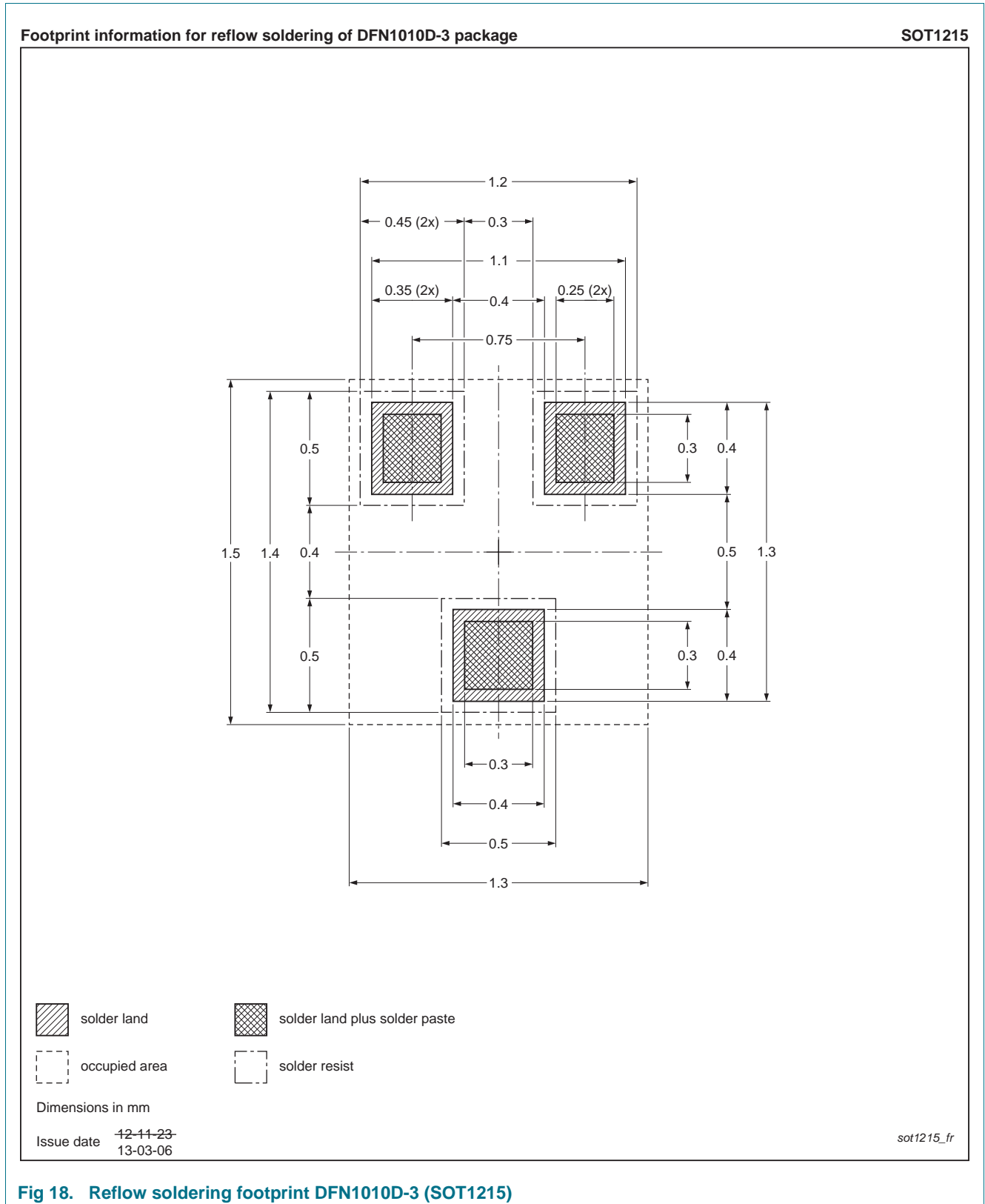


Fig 18. Reflow soldering footprint DFN1010D-3 (SOT1215)

11. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|--------------|--------------------|---------------|------------|
| BC857XQA_SER v.1 | 20150826 | Product data sheet | - | - |

12. Legal information

12.1 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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For sales office addresses, please send an email to: salesaddresses@nexperia.com

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