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Electronic Components Sourcing Information

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## Product Reference Information

**Part Number:** BC857CQCZ  
**Manufacturer:** Nexperia USA Inc.  
**Package:** 3-XDFN Exposed Pad  
**Availability:** Please confirm with sales

### Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/bc857cqcz.html>

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### Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

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# BC857xQC series

45 V, 100 mA PNP general-purpose transistor

Rev. 1 — 27 October 2021

Product data sheet

## 1. General description

PNP general-purpose transistor in an ultra small DFN1412D-3 (SOT8009) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks.

Table 1. Product overview

| Type number | Package  |          | NPN complement: |
|-------------|----------|----------|-----------------|
|             | Nexperia | JEDEC    |                 |
| BC857AQC    | SOT8009  | MO-340CA | BC847AQC        |
| BC857BQC    |          |          | BC847BQC        |
| BC857CQC    |          |          | BC847CQC        |

## 2. Features and benefits

- High power dissipation capability
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Smaller footprint compared to conventional leaded SMD packages
- Low package height of 0.5 mm

## 3. Applications

- General-purpose switching and amplification
- Space restricted applications

## 4. Quick reference data

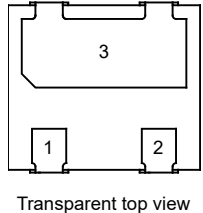
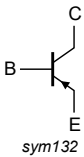
Table 2. Quick reference data

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

| Symbol    | Parameter                 | Conditions                                 | Min | Typ | Max  | Unit |
|-----------|---------------------------|--------------------------------------------|-----|-----|------|------|
| $V_{CEO}$ | collector-emitter voltage | open base                                  | -   | -   | -45  | V    |
| $I_C$     | collector current         |                                            | -   | -   | -100 | mA   |
| $I_{CM}$  | peak collector current    | single pulse; $t_p \leq 1\text{ ms}$       | -   | -   | -200 | mA   |
| $h_{FE}$  | DC current gain           |                                            |     |     |      |      |
|           | BC857AQC                  | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}$ | 125 | -   | 250  |      |
|           | BC857BQC                  |                                            | 220 | -   | 475  |      |
|           | BC857CQC                  |                                            | 420 | -   | 800  |      |

## 5. Pinning information

Table 3. Pinning

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

## 6. Ordering information

Table 4. Ordering information

| Type number | Package    |                                                                                                                                          |         |
|-------------|------------|------------------------------------------------------------------------------------------------------------------------------------------|---------|
|             | Name       | Description                                                                                                                              | Version |
| BC857AQC    | DFN1412D-3 | plastic leadless ultra small outline package with side-wettable flanks (SWF); 3 terminals; 0.8 mm pitch; body: 1.4 mm x 1.2 mm x 0.48 mm | SOT8009 |
| BC857BQC    |            |                                                                                                                                          |         |
| BC857CQC    |            |                                                                                                                                          |         |

## 7. Marking

Table 5. Marking

| Type number | Marking code |
|-------------|--------------|
| BC857AQC    | 9F           |
| BC857BQC    | 9G           |
| BC857CQC    | 9H           |

8. Limiting values

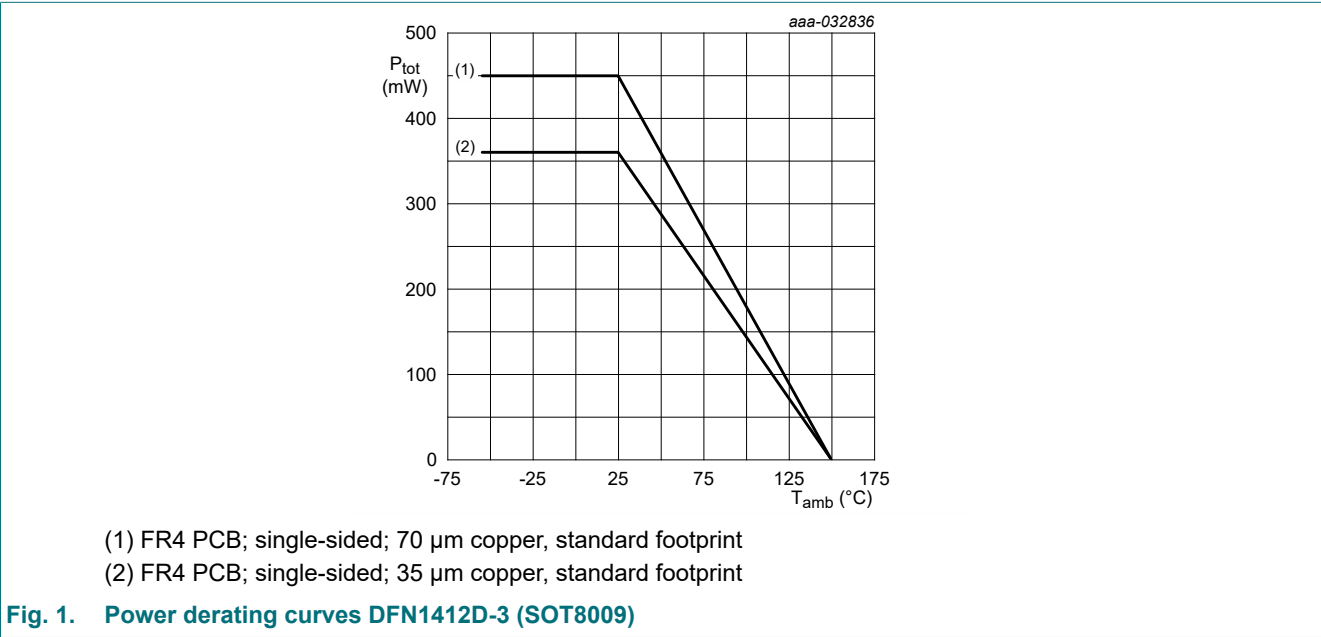
Table 6. Limiting values

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

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

| Symbol           | Parameter                 | Conditions                          | Min | Max  | Unit |    |
|------------------|---------------------------|-------------------------------------|-----|------|------|----|
| V <sub>CBO</sub> | collector-base voltage    | open emitter                        | -   | -50  | V    |    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                           | -   | -45  | V    |    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector                      | -   | -6   | V    |    |
| I <sub>C</sub>   | collector current         |                                     | -   | -100 | mA   |    |
| I <sub>CM</sub>  | peak collector current    | single pulse; t <sub>p</sub> ≤ 1 ms | -   | -200 | mA   |    |
| I <sub>BM</sub>  | peak base current         | single pulse; t <sub>p</sub> ≤ 1 ms | -   | -100 | mA   |    |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -    | 360  | mW |
|                  |                           |                                     | [2] | -    | 450  | mW |
| T <sub>j</sub>   | junction temperature      |                                     | -   | 150  | °C   |    |
| T <sub>amb</sub> | ambient temperature       |                                     | -55 | 150  | °C   |    |
| T <sub>stg</sub> | storage temperature       |                                     | -65 | 150  | °C   |    |

- [1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided; 35  $\mu\text{m}$  copper; tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB; single-sided; 70  $\mu\text{m}$  copper; tin-plated and standard footprint.



9. Thermal characteristics

Table 7. Thermal characteristics  
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

| Symbol               | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|----------------------|---------------------------------------------|-------------|-----|-----|-----|-----|------|
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 348 | K/W  |
|                      |                                             |             | [2] | -   | -   | 278 | K/W  |

- [1] Device mounted on an FR4 PCB; single-sided; 35 µm copper; tin-plated and standard footprint.  
 [2] Device mounted on an FR4 PCB; single-sided; 70 µm copper; tin-plated and standard footprint.

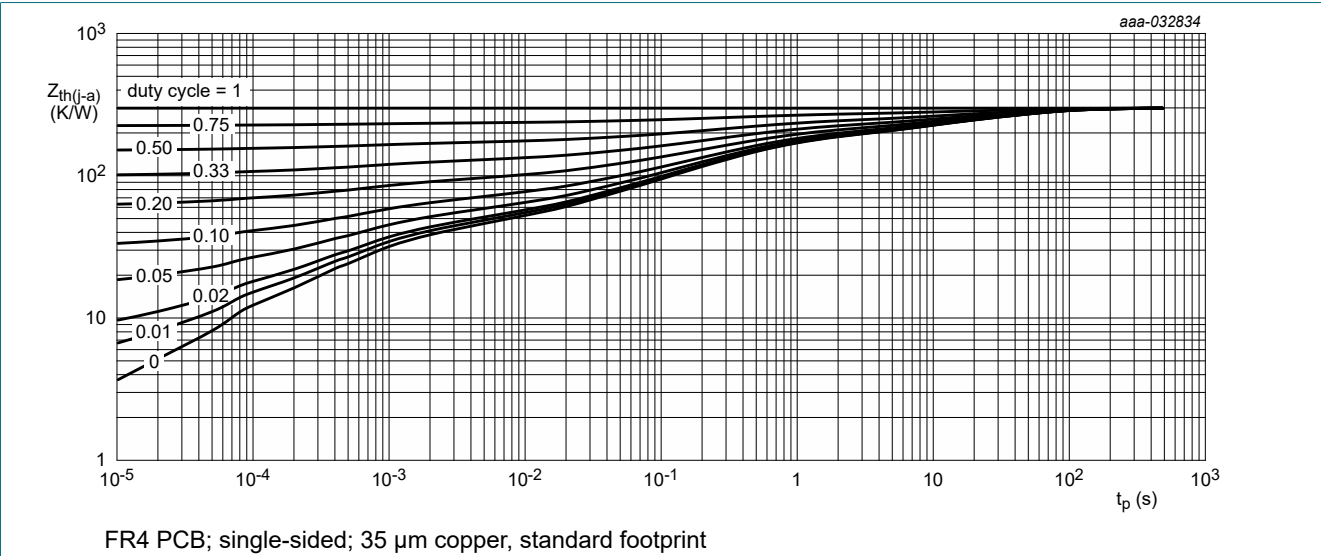


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

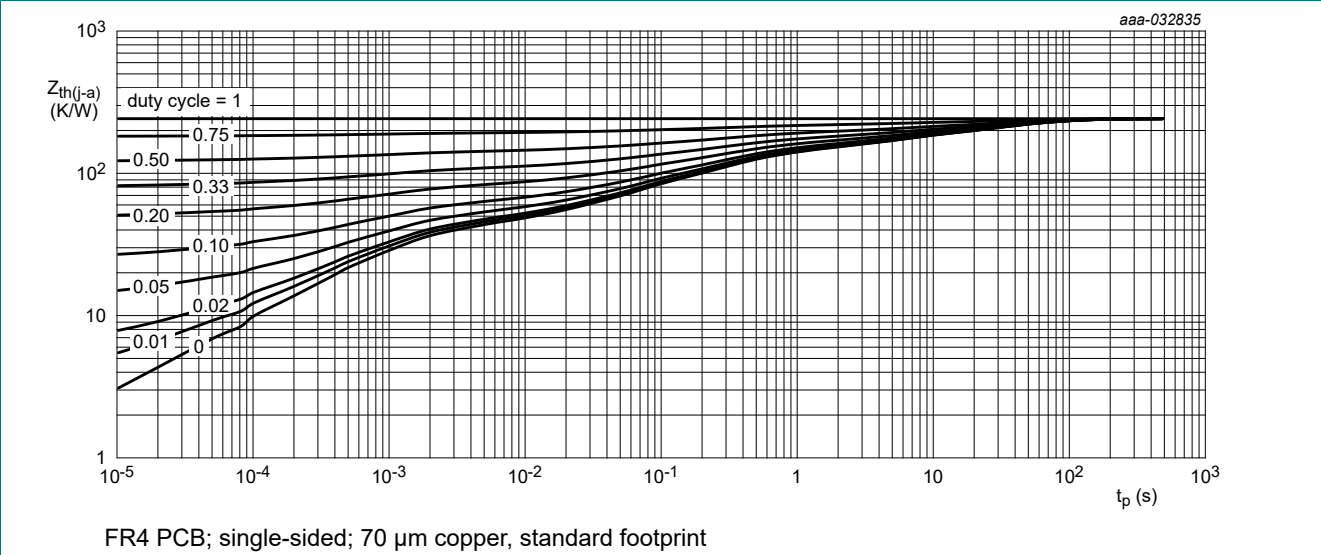


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 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     | $I_C = -100\text{ }\mu\text{A}$ ; $I_E = 0\text{ A}$                                                                           | -50  | -    | -    | V             |
| $V_{(BR)CES}$ | collector-emitter peak voltage       | $I_C = -2\text{ mA}$ ; $I_E = 0\text{ A}$                                                                                      | -45  | -    | -    | V             |
| $V_{(BR)EBO}$ | emitter-base breakdown voltage       | $I_E = -100\text{ }\mu\text{A}$ ; $I_C = 0\text{ A}$                                                                           | -6   | -    | -    | V             |
| $I_{CBO}$     | collector-base cut-off current       | $V_{CB} = -30\text{ V}$ ; $I_E = 0\text{ A}$                                                                                   | -    | -    | -15  | nA            |
|               |                                      | $V_{CB} = -30\text{ V}$ ; $I_E = 0\text{ A}$ ; $T_j = 150\text{ °C}$                                                           | -    | -    | -5   | $\mu\text{A}$ |
| $I_{EBO}$     | emitter-base cut-off current         | $V_{EB} = -5\text{ V}$ ; $I_C = 0\text{ A}$                                                                                    | -    | -    | -100 | nA            |
| $h_{FE}$      | DC current gain                      |                                                                                                                                |      |      |      |               |
|               | BC857AQC                             | $V_{CE} = -5\text{ V}$ ; $I_C = -2\text{ mA}$                                                                                  | 125  | -    | 250  |               |
|               | BC857BQC                             |                                                                                                                                | 220  | -    | 475  |               |
|               | BC857CQC                             |                                                                                                                                | 420  | -    | 800  |               |
| $V_{CEsat}$   | collector-emitter saturation voltage | $I_C = -10\text{ mA}$ ; $I_B = -0.5\text{ mA}$                                                                                 | -    | -    | -300 | mV            |
|               |                                      | $I_C = -100\text{ mA}$ ; $I_B = -5\text{ mA}$ [1]                                                                              | -    | -    | -650 | mV            |
| $V_{BE}$      | base-emitter voltage                 | $V_{CE} = -5\text{ V}$ ; $I_C = -2\text{ mA}$ [2]                                                                              | -600 | -    | -750 | mV            |
|               |                                      | $V_{CE} = -5\text{ V}$ ; $I_C = -10\text{ mA}$ [2]                                                                             | -    | -    | -820 | mV            |
| $V_{BEsat}$   | base-emitter saturation voltage      | $I_C = -10\text{ mA}$ ; $I_B = -0.5\text{ mA}$                                                                                 | -    | -700 | -    | mV            |
|               |                                      | $I_C = -100\text{ mA}$ ; $I_B = -5\text{ mA}$ [1]                                                                              | -    | -850 | -    | mV            |
| $f_T$         | transition frequency                 | $V_{CE} = -5\text{ V}$ ; $I_C = -10\text{ mA}$ ; $f = 100\text{ MHz}$                                                          | 100  | -    | -    | MHz           |
| $C_c$         | collector capacitance                | $V_{CB} = -10\text{ V}$ ; $I_E = I_C = 0\text{ A}$ ; $f = 1\text{ MHz}$                                                        | -    | 2    | -    | pF            |
| $C_e$         | emitter capacitance                  | $V_{EB} = -0.5\text{ V}$ ; $I_C = I_E = 0\text{ A}$ ; $f = 1\text{ MHz}$                                                       | -    | 10   | -    | pF            |
| NF            | noise figure                         | $V_{CE} = -5\text{ V}$ ; $I_C = -200\text{ }\mu\text{A}$ ; $R_S = 2\text{ k}\Omega$ ; $f = 1\text{ kHz}$ ; $B = 200\text{ Hz}$ | -    | -    | 10   | dB            |

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

[2]  $V_{BE}$  decreases by about 2 mV/K with increasing temperature.



Fig. 4. BC857AQC: DC current gain as a function of collector current; typical values



Fig. 5. BC857AQC: Base-emitter voltage as a function of collector current; typical values

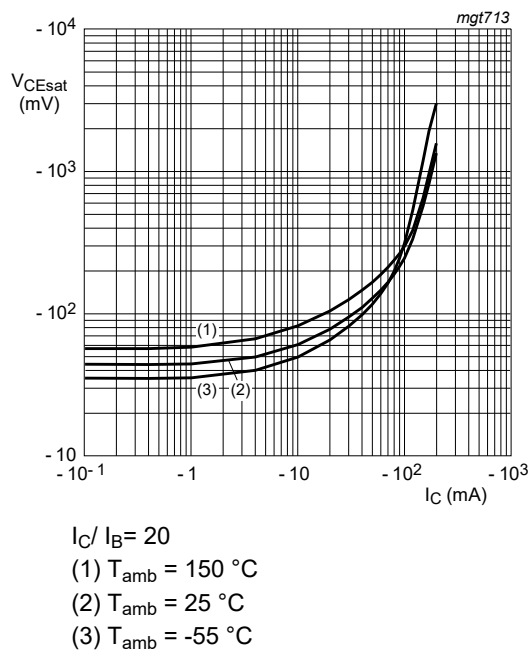


Fig. 6. BC857AQC: Collector-emitter saturation voltage as a function of collector current; typical values

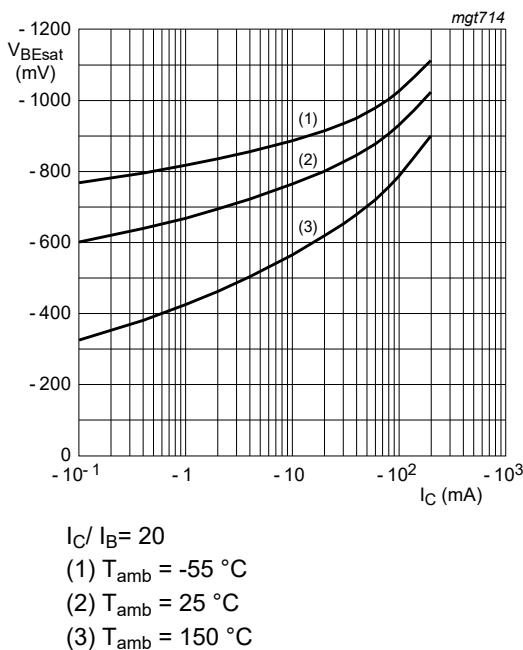


Fig. 7. BC857AQC: Base-emitter saturation voltage as a function of collector current; typical values



Fig. 8. BC857BQC: DC current gain as a function of collector current; typical values

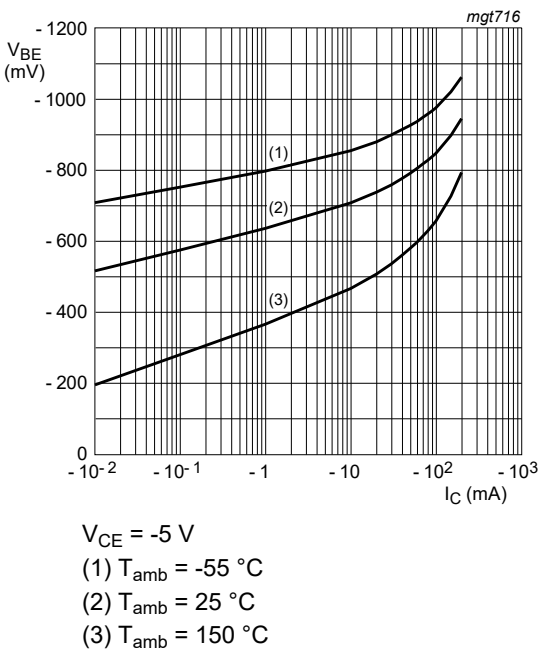


Fig. 9. BC857BQC: Base-emitter voltage as a function of collector current; typical values

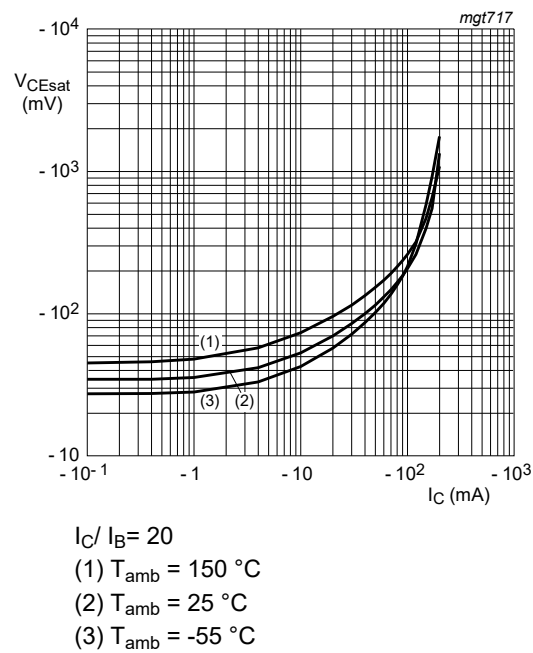


Fig. 10. BC857BQC: Collector-emitter saturation voltage as a function of collector current; typical values

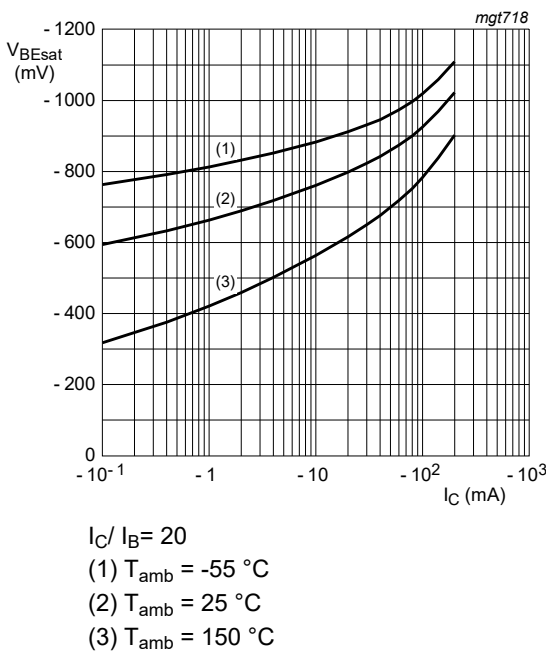


Fig. 11. BC857BQC: Base-emitter saturation voltage as a function of collector current; typical values



Fig. 12. BC857CQC: DC current gain as a function of collector current; typical values



Fig. 13. BC857CQC: Base-emitter voltage as a function of collector current; typical values

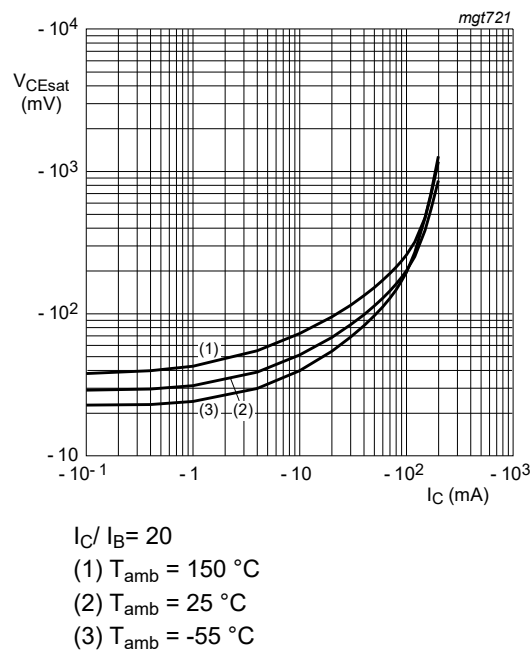


Fig. 14. BC857CQC: Collector-emitter saturation voltage as a function of collector current; typical values

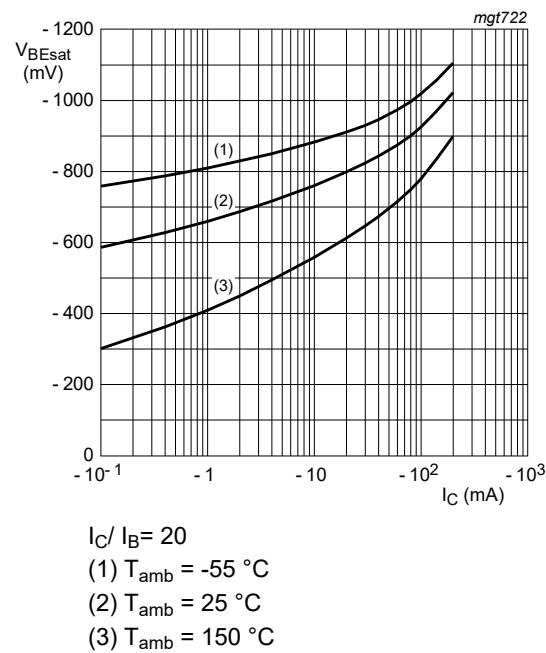


Fig. 15. BC857CQC: Base-emitter saturation voltage as a function of collector current; typical values

11. Package outline

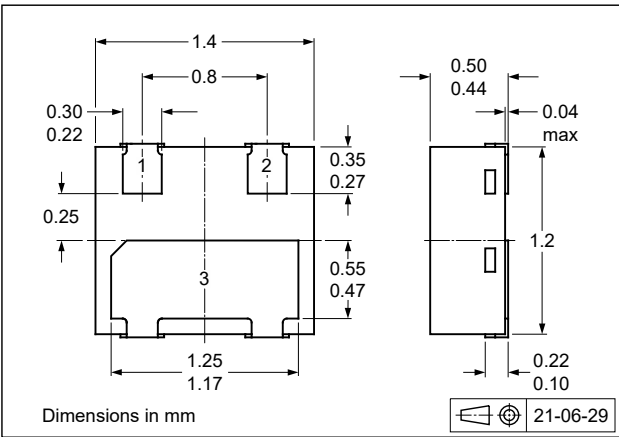


Fig. 16. Package outline DFN1412D-3 (SOT8009)

12. Soldering

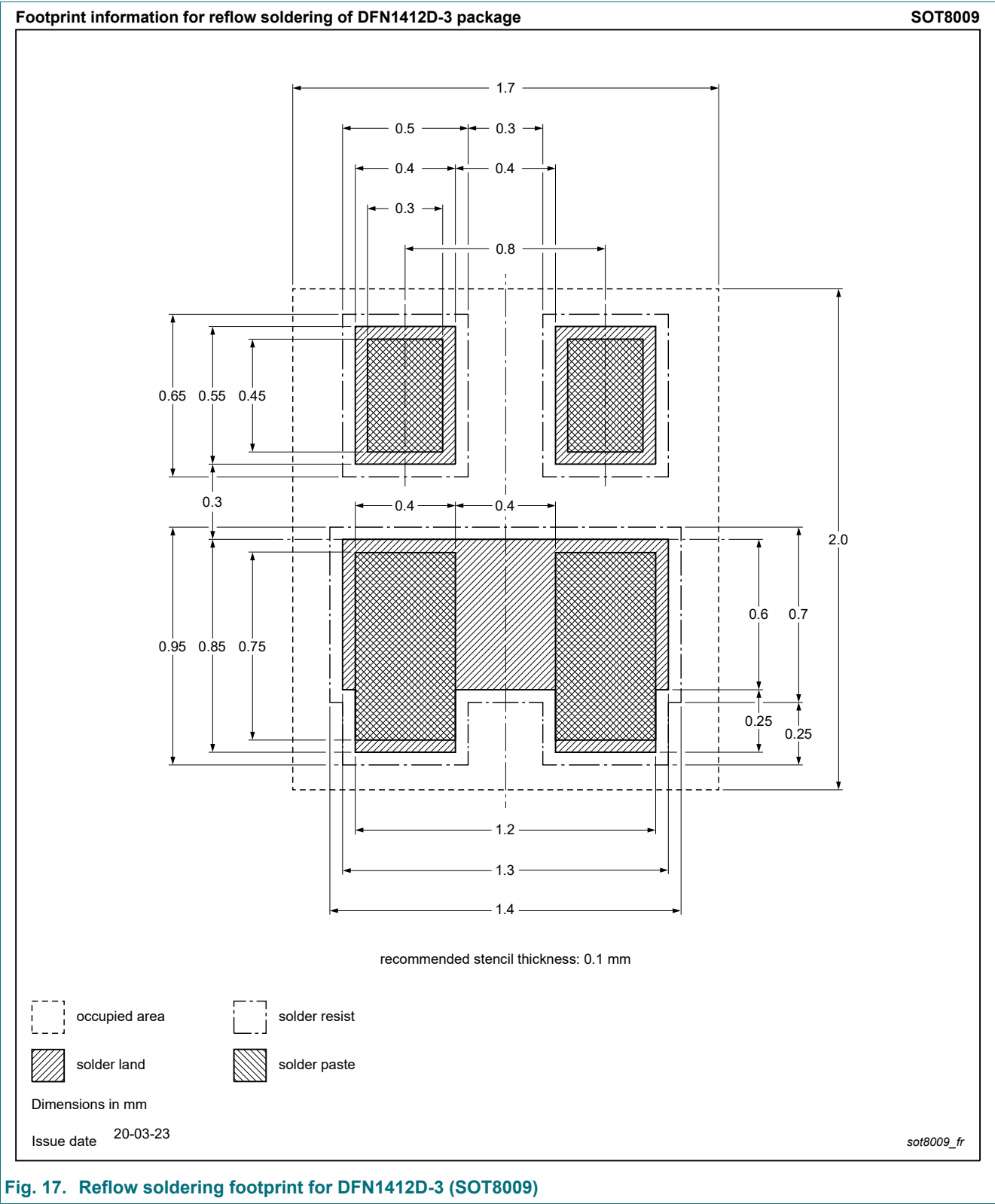


Fig. 17. Reflow soldering footprint for DFN1412D-3 (SOT8009)

## 13. Revision history

Table 9. Revision history

| Data sheet ID    | Release date | Data sheet status  | Change notice | Supersedes |
|------------------|--------------|--------------------|---------------|------------|
| BC857XQC_SER v.1 | 20211027     | Product data sheet | -             | -          |

## 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. |
| 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.
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