



# BC817RAPN

45 V, 500 mA NPN/PNP general-purpose double transistors

13 June 2017

Product data sheet

## 1. General description

NPN/PNP general-purpose double transistors in a leadless ultra small DFN1412-6 (SOT1268) Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: BC817RA

PNP/PNP complement: BC807RA

## 2. Features and benefits

- Reduces component count
- Reduces pick and place costs
- Low package height of 0.5 mm
- AEC-Q101 qualified

## 3. Applications

- General-purpose switching and amplification
- Mobile applications

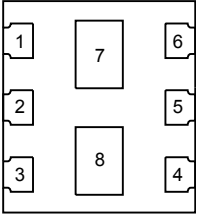
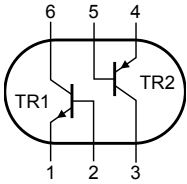
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                                                               | Parameter                 | Conditions                                                                                             | Min | Typ | Max | Unit |
|----------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| <b>Per transistor; for the PNP transistor with negative polarity</b> |                           |                                                                                                        |     |     |     |      |
| $V_{CEO}$                                                            | collector-emitter voltage | open base                                                                                              | -   | -   | 45  | V    |
| $I_C$                                                                | collector current         |                                                                                                        | -   | -   | 500 | mA   |
| $I_{CM}$                                                             | peak collector current    | single pulse; $t_p \leq 1$ ms                                                                          | -   | -   | 1   | A    |
| $h_{FE}$                                                             | DC current gain           | $V_{CE} = 1$ V; $I_C = 100$ mA; $T_{amb} = 25$ °C                                                      | 160 | -   | 400 |      |
|                                                                      |                           | $V_{CE} = 1$ V; $I_C = 500$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_{amb} = 25$ °C | 40  | -   | -   |      |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description   | Simplified outline                                                                                                                           | Graphic symbol                                                                                           |
|-----|--------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 1   | E1     | emitter TR1   |  <p>Transparent top view<br/><b>DFN1412-6 (SOT1268)</b></p> |  <p><i>sym019</i></p> |
| 2   | B1     | base TR1      |                                                                                                                                              |                                                                                                          |
| 3   | C2     | collector TR2 |                                                                                                                                              |                                                                                                          |
| 4   | E2     | emitter TR2   |                                                                                                                                              |                                                                                                          |
| 5   | B2     | base TR2      |                                                                                                                                              |                                                                                                          |
| 6   | C1     | collector TR1 |                                                                                                                                              |                                                                                                          |
| 7   | C1     | collector TR1 |                                                                                                                                              |                                                                                                          |
| 8   | C2     | collector TR2 |                                                                                                                                              |                                                                                                          |

6. Ordering information

Table 3. Ordering information

| Type number | Package   |                                                                                                                   |         |
|-------------|-----------|-------------------------------------------------------------------------------------------------------------------|---------|
|             | Name      | Description                                                                                                       | Version |
| BC817RAPN   | DFN1412-6 | plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals; body: 1.4 mm x 1.2 mm x 0.47 mm | SOT1268 |

7. Marking

Table 4. Marking codes

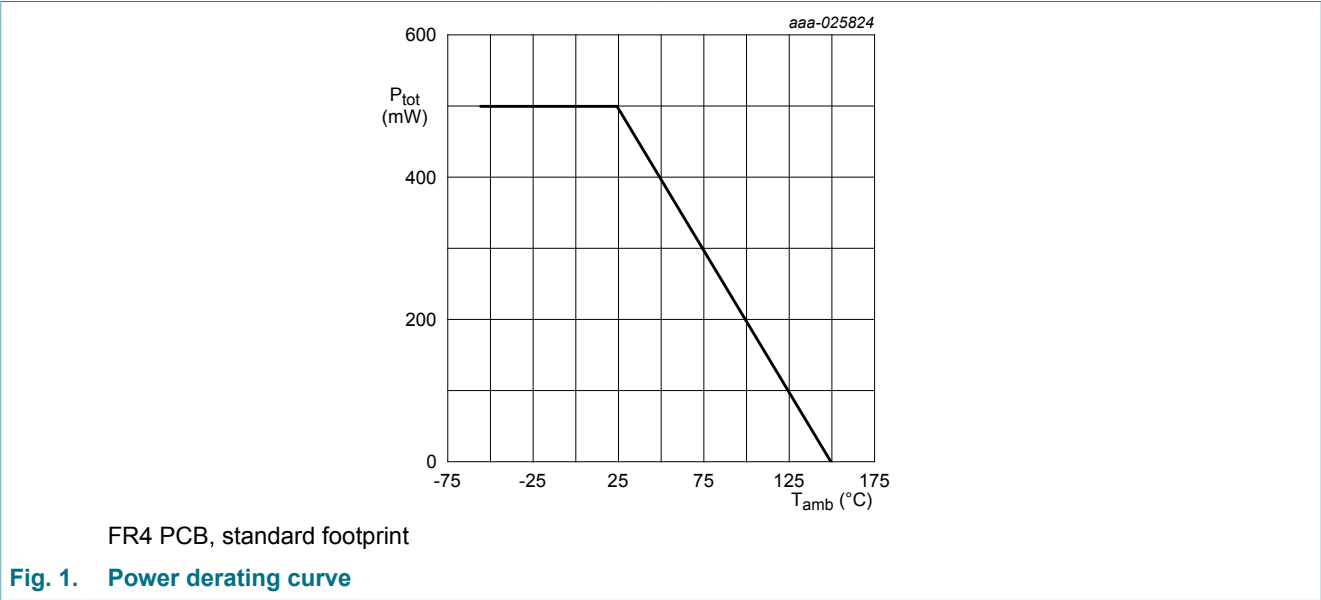
| Type number | Marking code |
|-------------|--------------|
| BC817RAPN   | A8           |

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol                                                        | Parameter                 | Conditions                          |     | Min | Max | Unit |
|---------------------------------------------------------------|---------------------------|-------------------------------------|-----|-----|-----|------|
| Per transistor; for the PNP transistor with negative polarity |                           |                                     |     |     |     |      |
| 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                      |     | -   | 5   | V    |
| I <sub>C</sub>                                                | collector current         |                                     |     | -   | 500 | mA   |
| I <sub>CM</sub>                                               | peak collector current    | single pulse; t <sub>p</sub> ≤ 1 ms |     | -   | 1   | A    |
| I <sub>BM</sub>                                               | peak base current         |                                     |     | -   | 200 | mA   |
| P <sub>tot</sub>                                              | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 350 | mW   |
| Per device                                                    |                           |                                     |     |     |     |      |
| P <sub>tot</sub>                                              | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 500 | 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 copper, tin-plated and standard footprint.

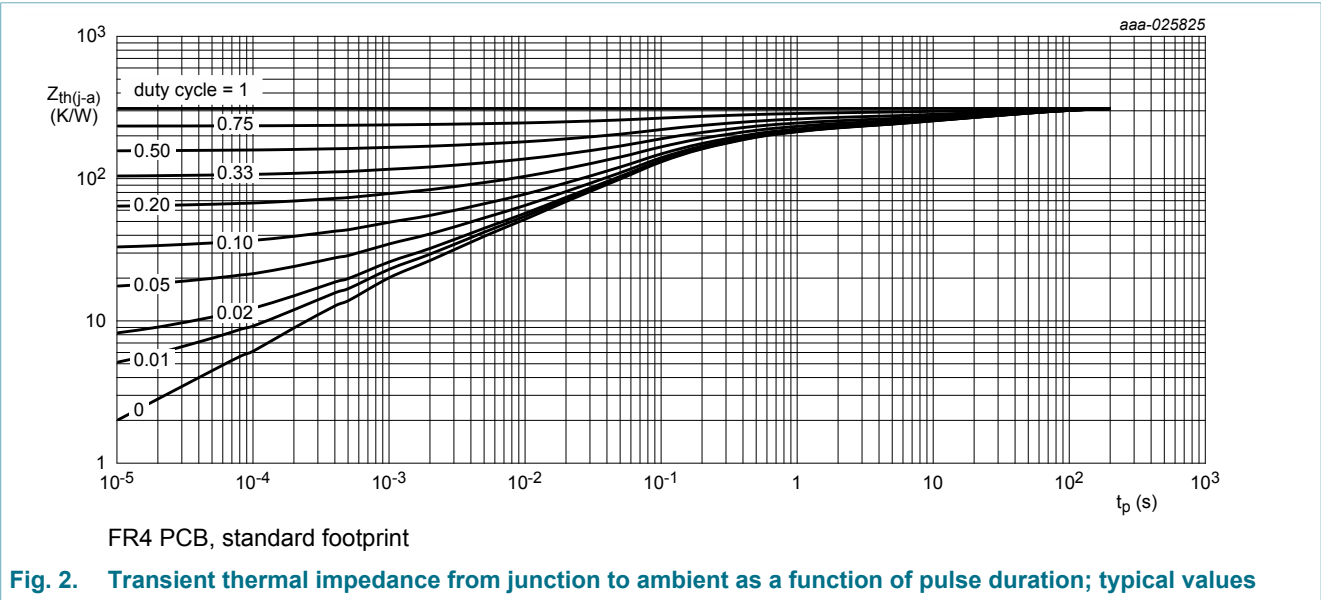


9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol         | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|----------------|---------------------------------------------|-------------|-----|-----|-----|-----|------|
| Per transistor |                                             |             |     |     |     |     |      |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 358 | K/W  |
| Per device     |                                             |             |     |     |     |     |      |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 250 | K/W  |

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



10. Characteristics

Table 7. Characteristics

| Symbol                                                        | Parameter                            | Conditions                                                                                                                                         | Min | Typ | Max | Unit          |
|---------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|
| Per transistor; for the PNP transistor with negative polarity |                                      |                                                                                                                                                    |     |     |     |               |
| $I_{CBO}$                                                     | collector-base cut-off current       | $V_{CB} = 20\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                     | -   | -   | 100 | nA            |
|                                                               |                                      | $V_{CB} = 20\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ }^{\circ}\text{C}$                                                                        | -   | -   | 5   | $\mu\text{A}$ |
| $I_{EBO}$                                                     | emitter-base cut-off current         | $V_{EB} = 5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                      | -   | -   | 100 | nA            |
| $h_{FE}$                                                      | DC current gain                      | $V_{CE} = 1\text{ V}; I_C = 100\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                   | 160 | -   | 400 |               |
|                                                               |                                      | $V_{CE} = 1\text{ V}; I_C = 500\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$ | 40  | -   | -   |               |
| $V_{CEsat}$                                                   | collector-emitter saturation voltage | $I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$  | -   | -   | 700 | mV            |
| $V_{BE}$                                                      | base-emitter voltage                 | $V_{CE} = 1\text{ V}; I_C = 500\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                   | -   | -   | 1.2 | V             |
| Per transistor                                                |                                      |                                                                                                                                                    |     |     |     |               |
| $C_C$                                                         | collector capacitance                | $V_{CB} = 10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                 | -   | 3   | -   | pF            |
|                                                               |                                      | $V_{CB} = -10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                | -   | 6   | -   | pF            |
| $f_T$                                                         | transition frequency                 | $V_{CE} = 5\text{ V}; I_C = 10\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                | 100 | -   | -   | MHz           |
|                                                               |                                      | $V_{CE} = -5\text{ V}; I_C = -10\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                              | 80  | -   | -   | MHz           |

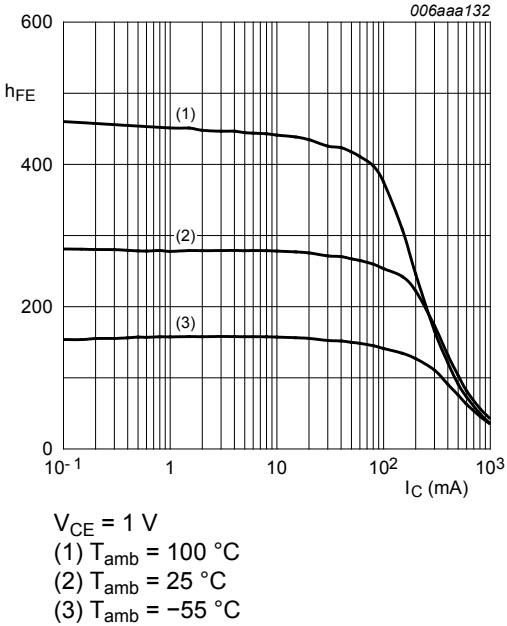


Fig. 3. NPN transistor: DC current gain as a function of collector current; typical values

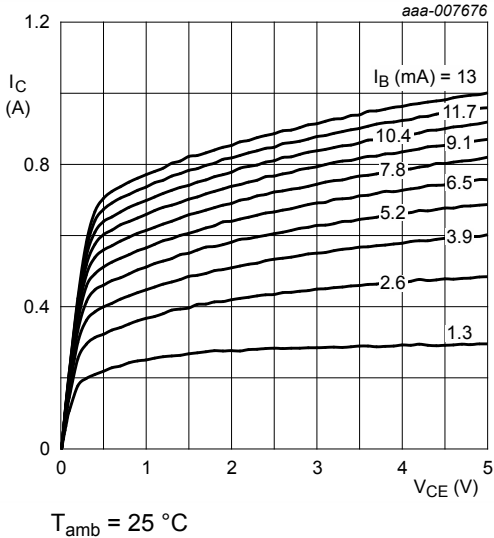
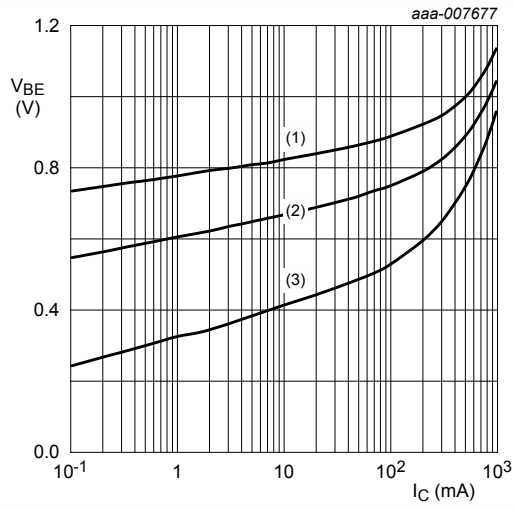
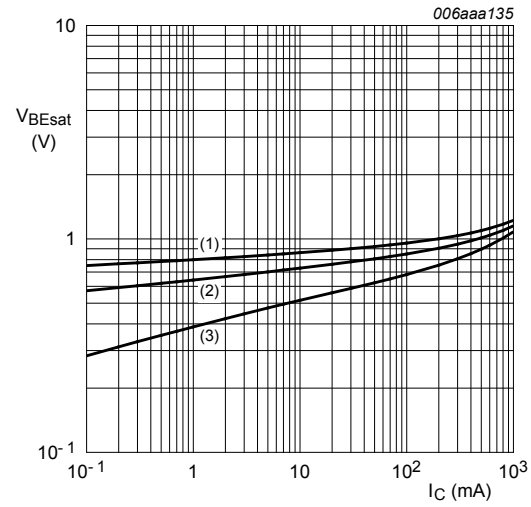


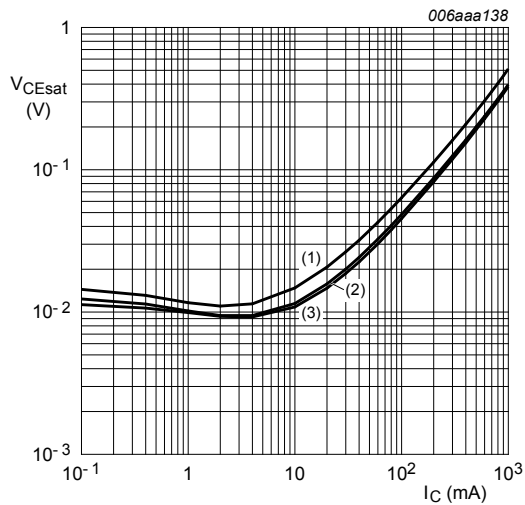
Fig. 4. NPN transistor: Collector current as a function of collector-emitter voltage; typical values



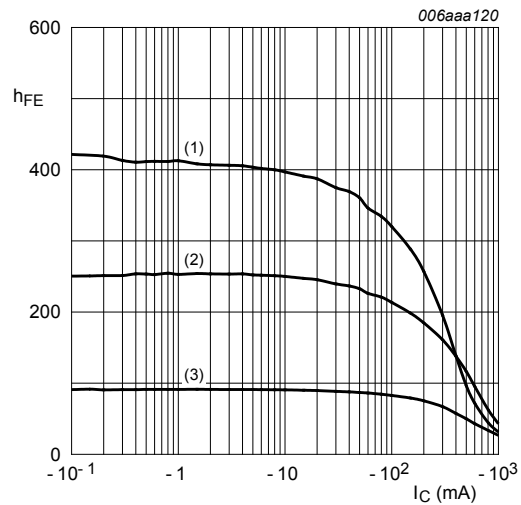
**Fig. 5. NPN transistor: Base-emitter voltage as a function of collector current; typical values**



**Fig. 6. NPN transistor: Base-emitter saturation voltage as a function of collector current; typical values**



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



**Fig. 8. PNP transistor: DC current gain as a function of collector current; typical values**

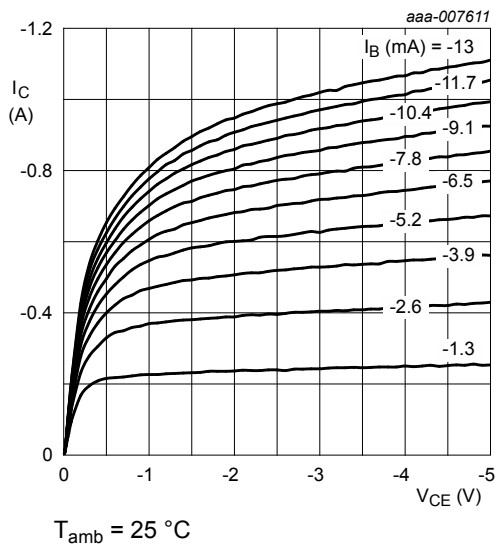


Fig. 9. PNP transistor: Collector current as a function of collector-emitter voltage; typical values

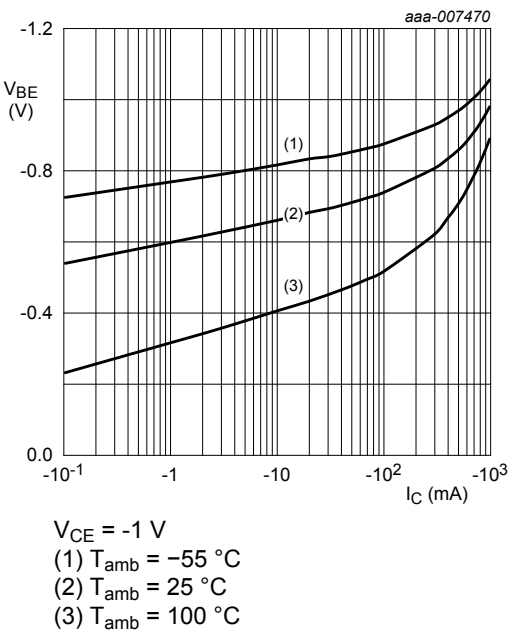


Fig. 10. PNP transistor: Base-emitter voltage as a function of collector current; typical values

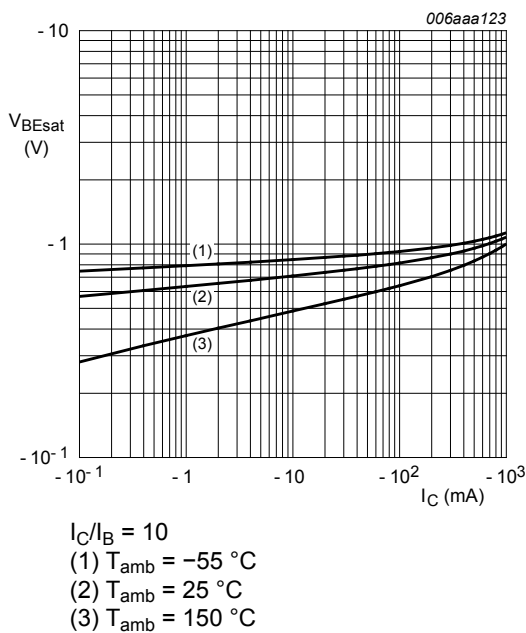


Fig. 11. PNP transistor: Base-emitter saturation voltage as a function of collector current; typical values

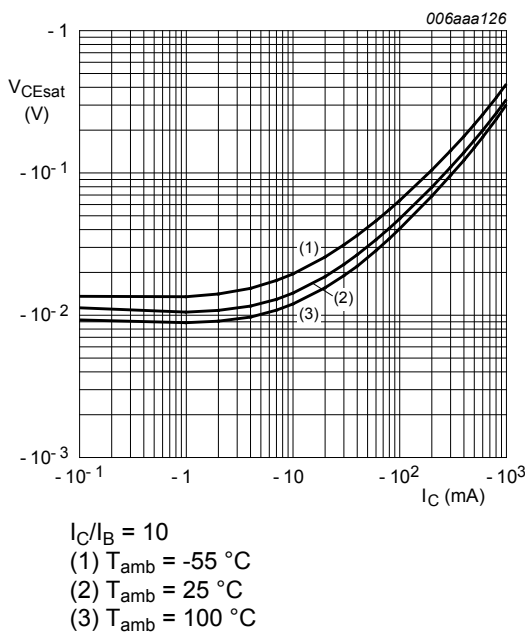


Fig. 12. PNP transistor: Collector-emitter saturation voltage as a function of collector current; typical values

## 11. Test information

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### 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.



12. Package outline

DFN1412-6: plastic thermal enhanced ultra thin small outline package; no leads;  
6 terminals; body: 1.4 x 1.2 x 0.47 mm

SOT1268

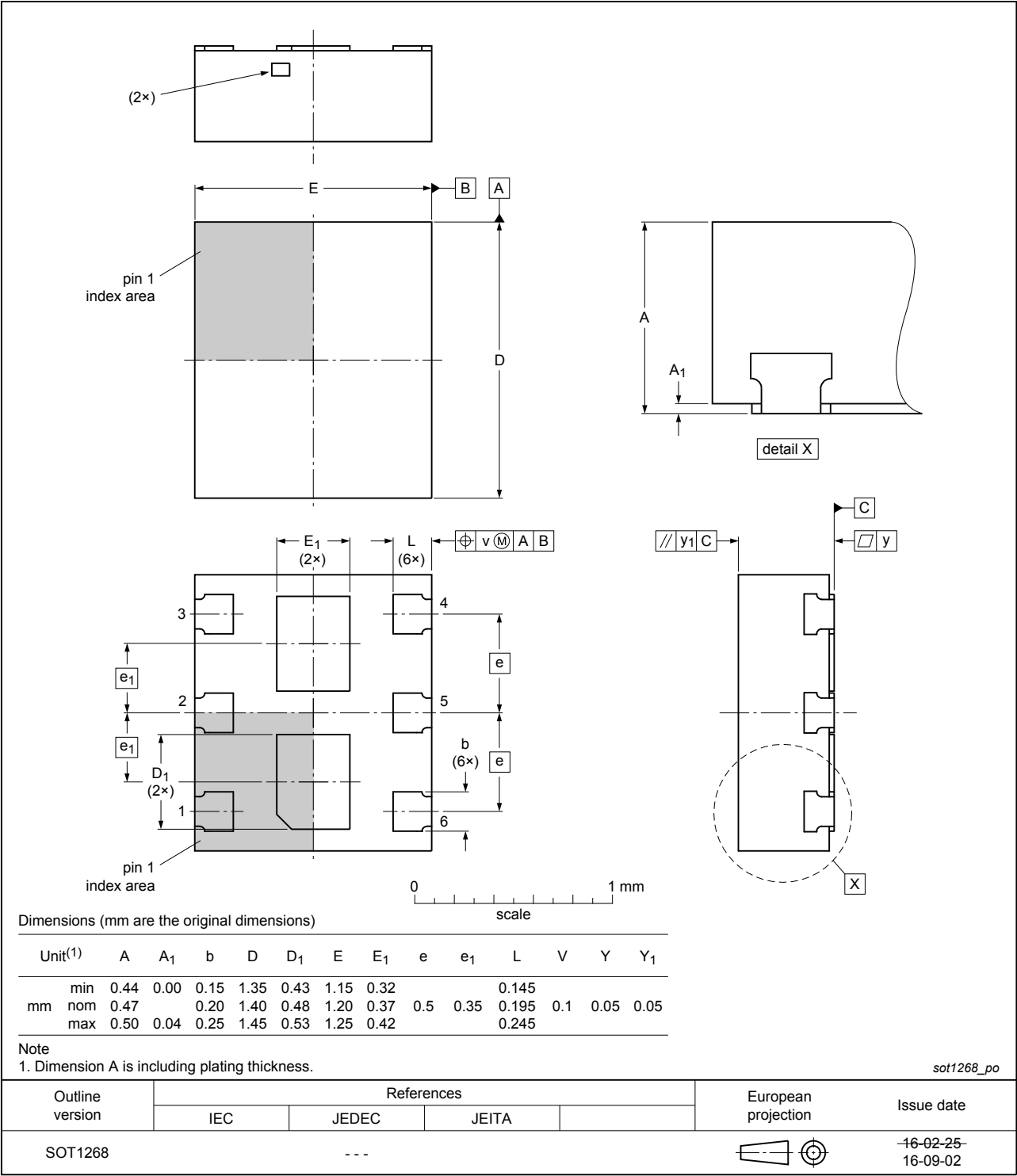
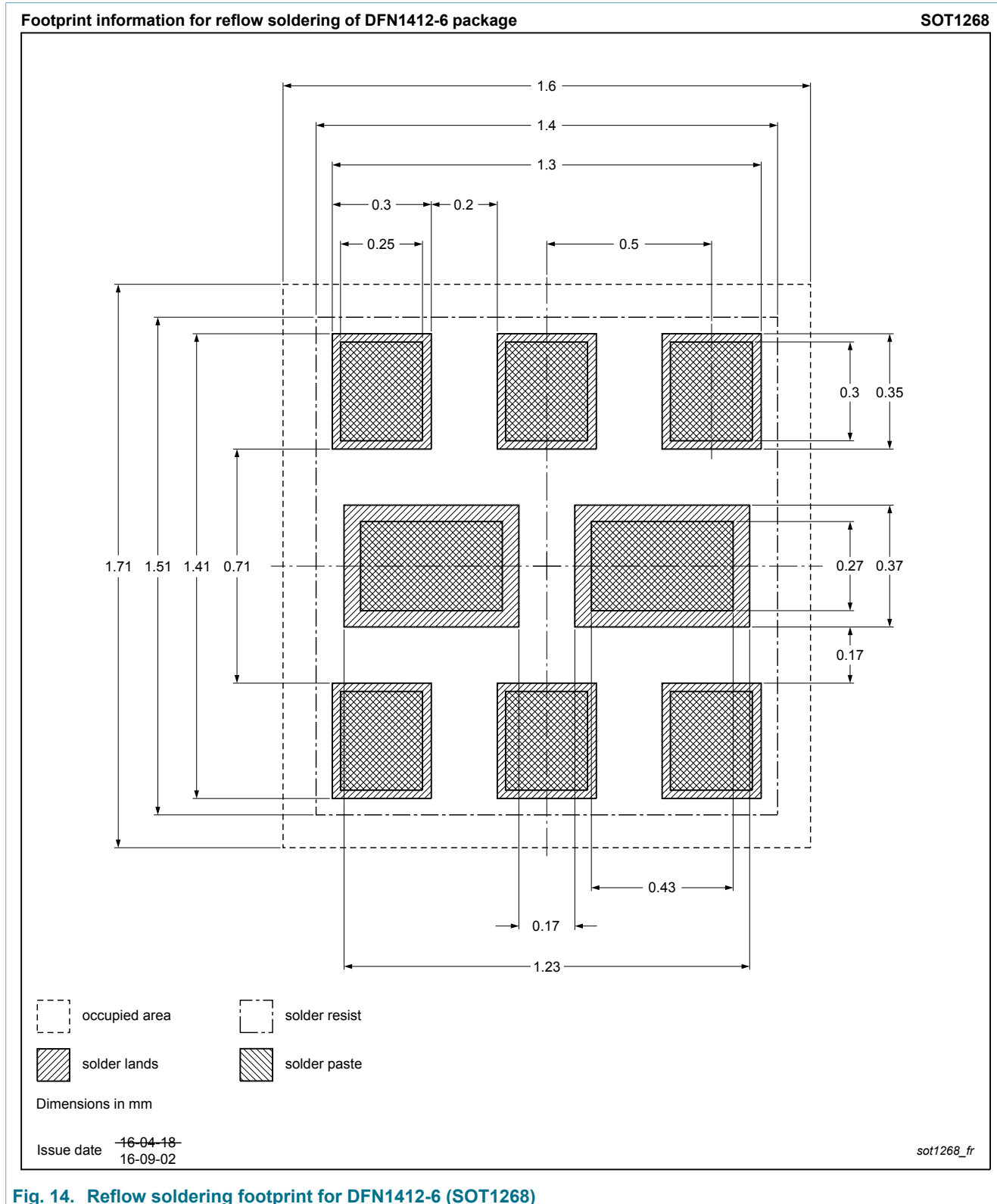


Fig. 13. Package outline DFN1412-6 (SOT1268)

## 13. Soldering



**Fig. 14. Reflow soldering footprint for DFN1412-6 (SOT1268)**

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BC817RAPN v.1 | 20170613     | Product data sheet | -             | -          |

## 15. 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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16. Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 3

9. Thermal characteristics..... 4

10. Characteristics.....5

11. Test information..... 8

12. Package outline..... 9

13. Soldering..... 10

14. Revision history.....11

15. Legal information..... 12

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