



# BC817RA

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

14 September 2018

Product data sheet

## 1. General description

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

PNP/PNP complement: BC807RA

NPN/PNP complement: BC817RAPN

## 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

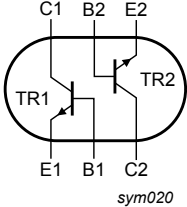
Table 1. Quick reference data

| Symbol         | Parameter                 | Conditions                                            | Min | Typ | Max | Unit |
|----------------|---------------------------|-------------------------------------------------------|-----|-----|-----|------|
| Per transistor |                           |                                                       |     |     |     |      |
| $V_{CEO}$      | 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; $T_{amb} = 25$ °C [1] | 40  | -   | -   |      |

[1] Pulse test:  $t_p \leq 300$   $\mu$ s;  $\delta \leq 0.02$

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description   | Simplified outline                                                                                                                        | Graphic symbol                                                                                    |
|-----|--------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1   | E1     | emitter TR1   |  <p>Transparent top view<br/>DFN1412-6<br/>(SOT1268)</p> |  <p>sym020</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 |
| BC817RA     | 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 |
|-------------|--------------|
| BC817RA     | A7           |

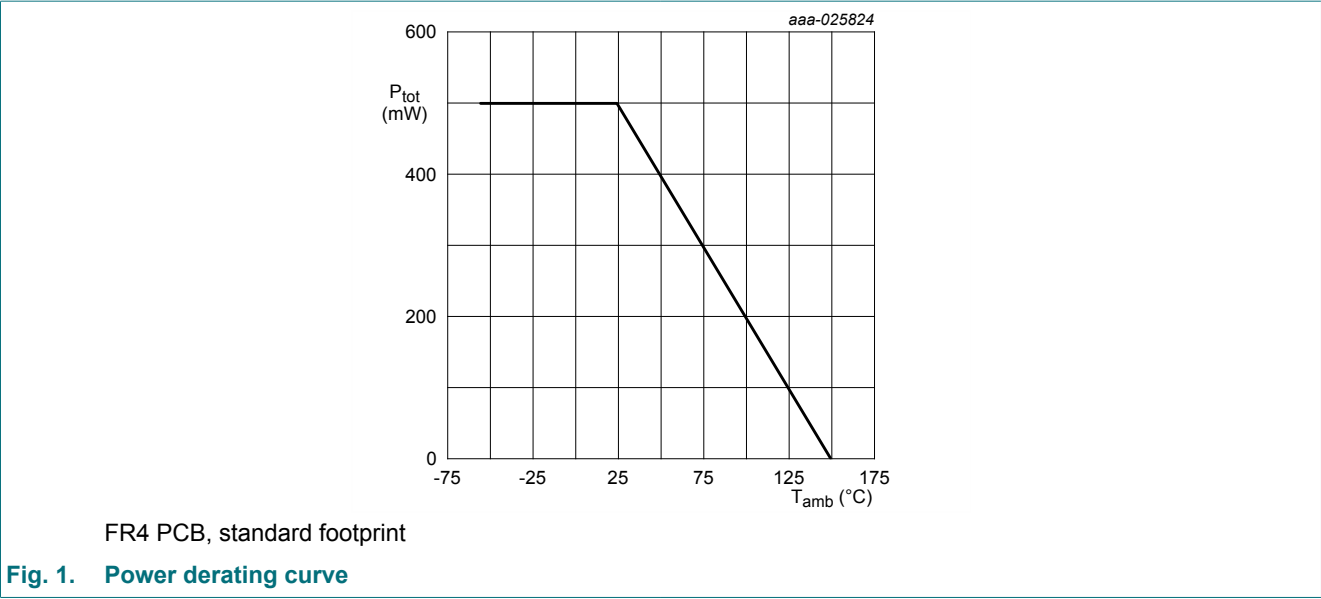
8. Limiting values

Table 5. Limiting values

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

| Symbol           | Parameter                 | Conditions                          |     | Min | Max | Unit |
|------------------|---------------------------|-------------------------------------|-----|-----|-----|------|
| Per transistor   |                           |                                     |     |     |     |      |
| 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.

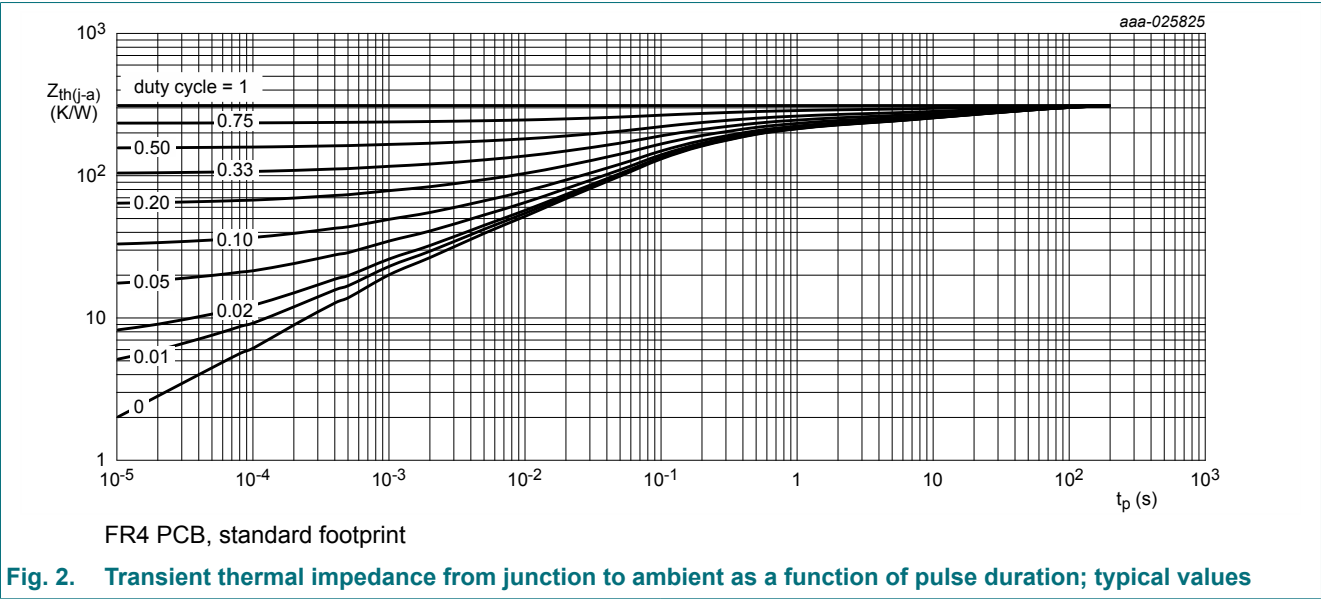


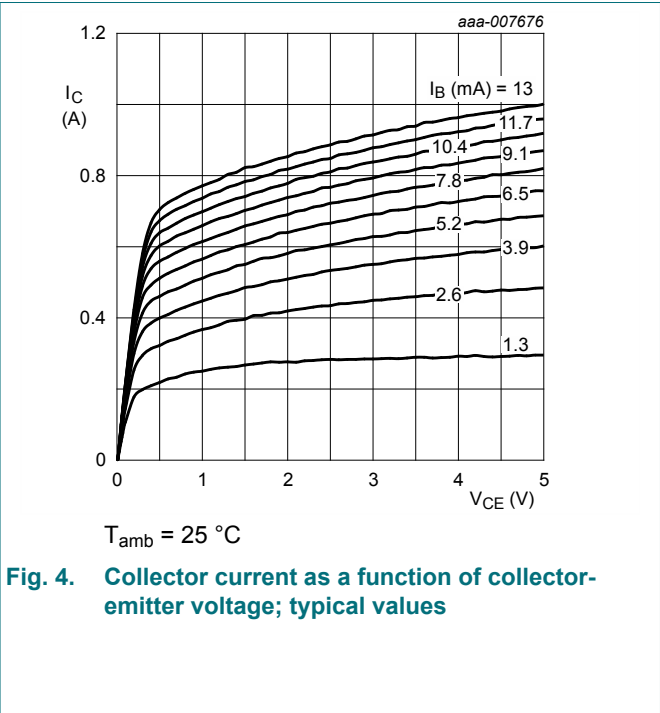
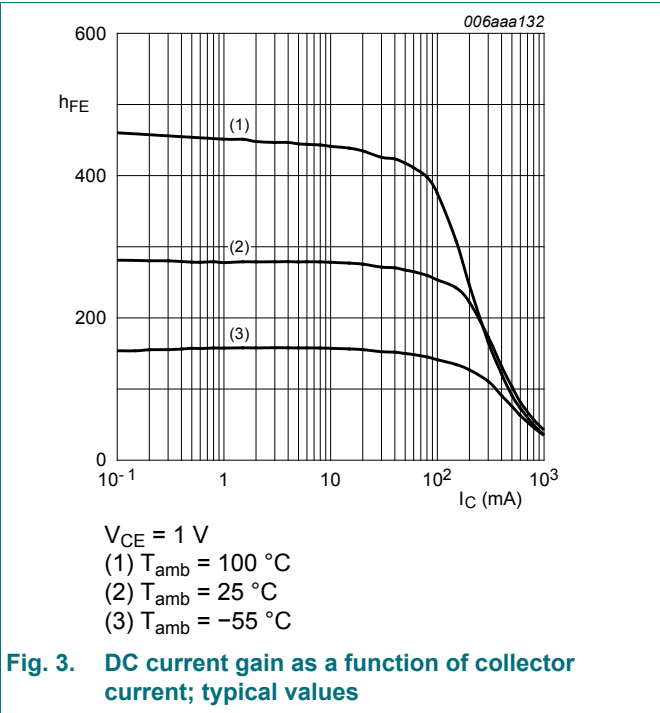
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

| Symbol         | Parameter                            | Conditions                                                                                                         | Min | Typ | Max | Unit          |
|----------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|
| Per transistor |                                      |                                                                                                                    |     |     |     |               |
| $I_{CBO}$      | 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 |               |
|                |                                      | $V_{CE} = 1\text{ V}; I_C = 500\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                   | [1] | 40  | -   |               |
| $V_{CEsat}$    | collector-emitter saturation voltage | $I_C = 500\text{ mA}; I_B = 50\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                    | [1] | -   | 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] | -   | 1.2 | V             |
| $C_c$          | 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            |
| $f_T$          | 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           |

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



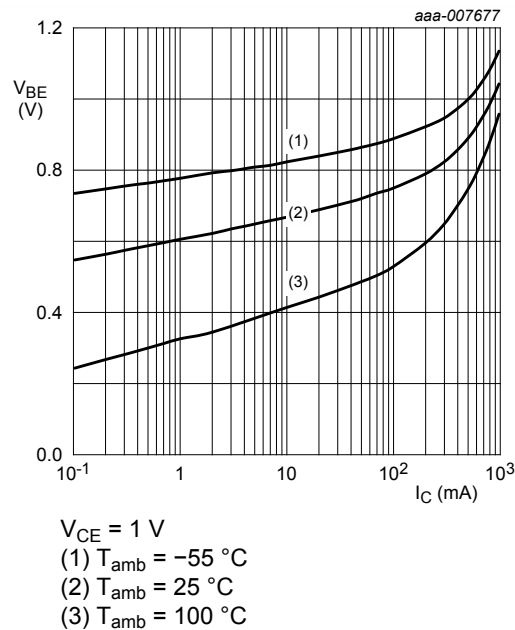


Fig. 5. Base-emitter voltage as a function of collector current; typical values

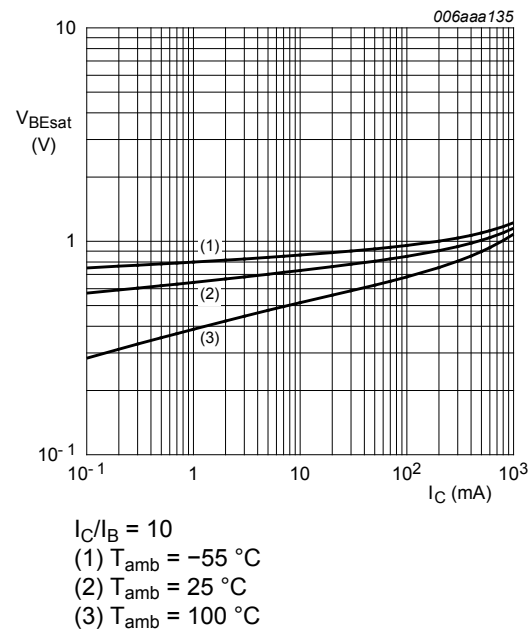


Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values

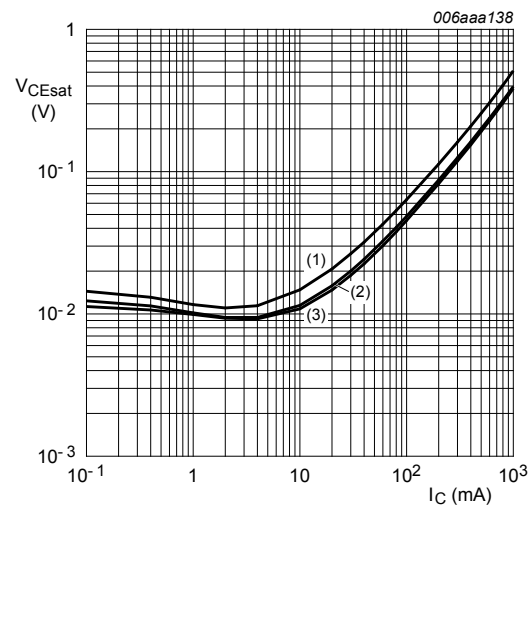


Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values

# 11. Test information

## 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

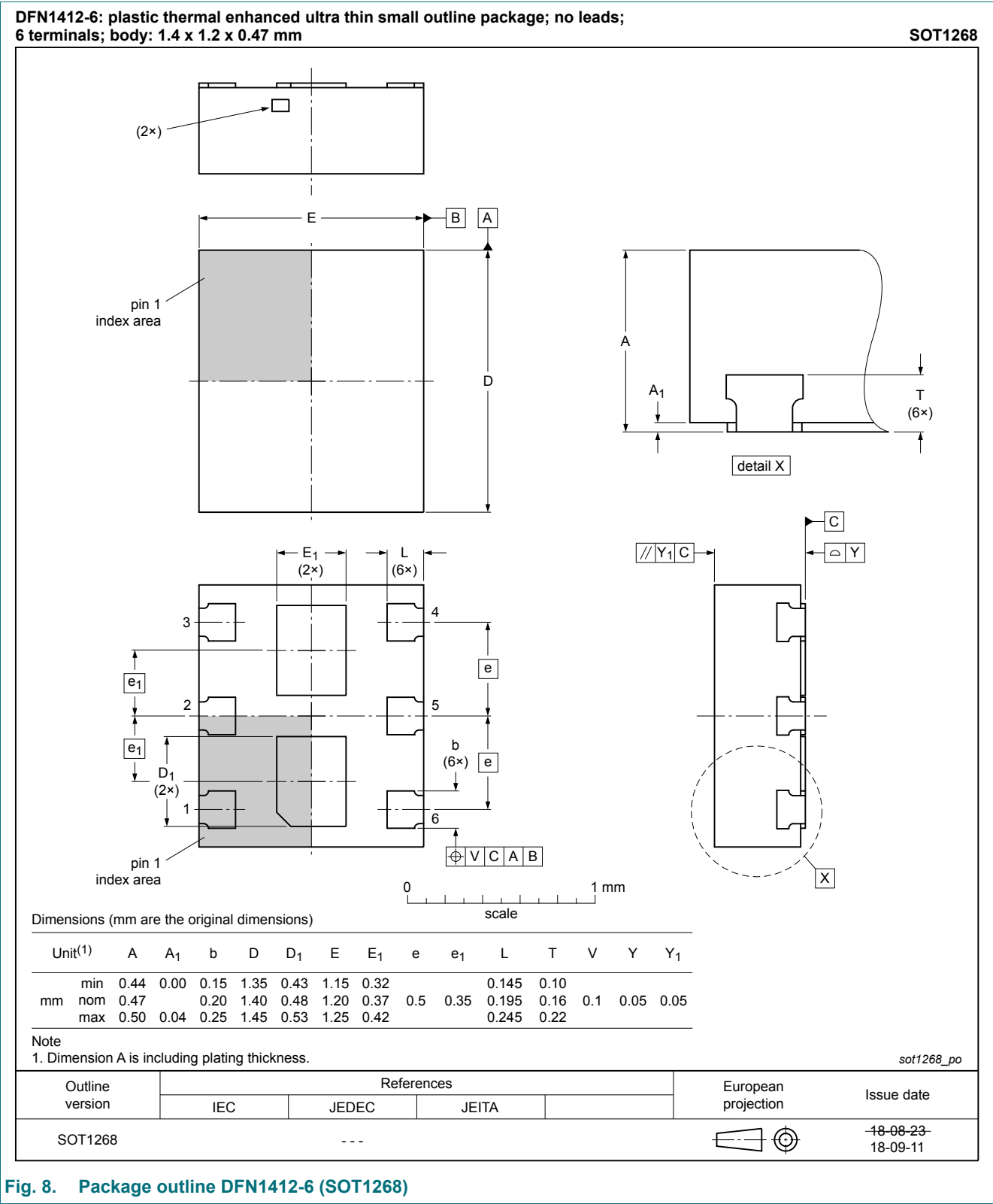


Fig. 8. Package outline DFN1412-6 (SOT1268)

13. Soldering

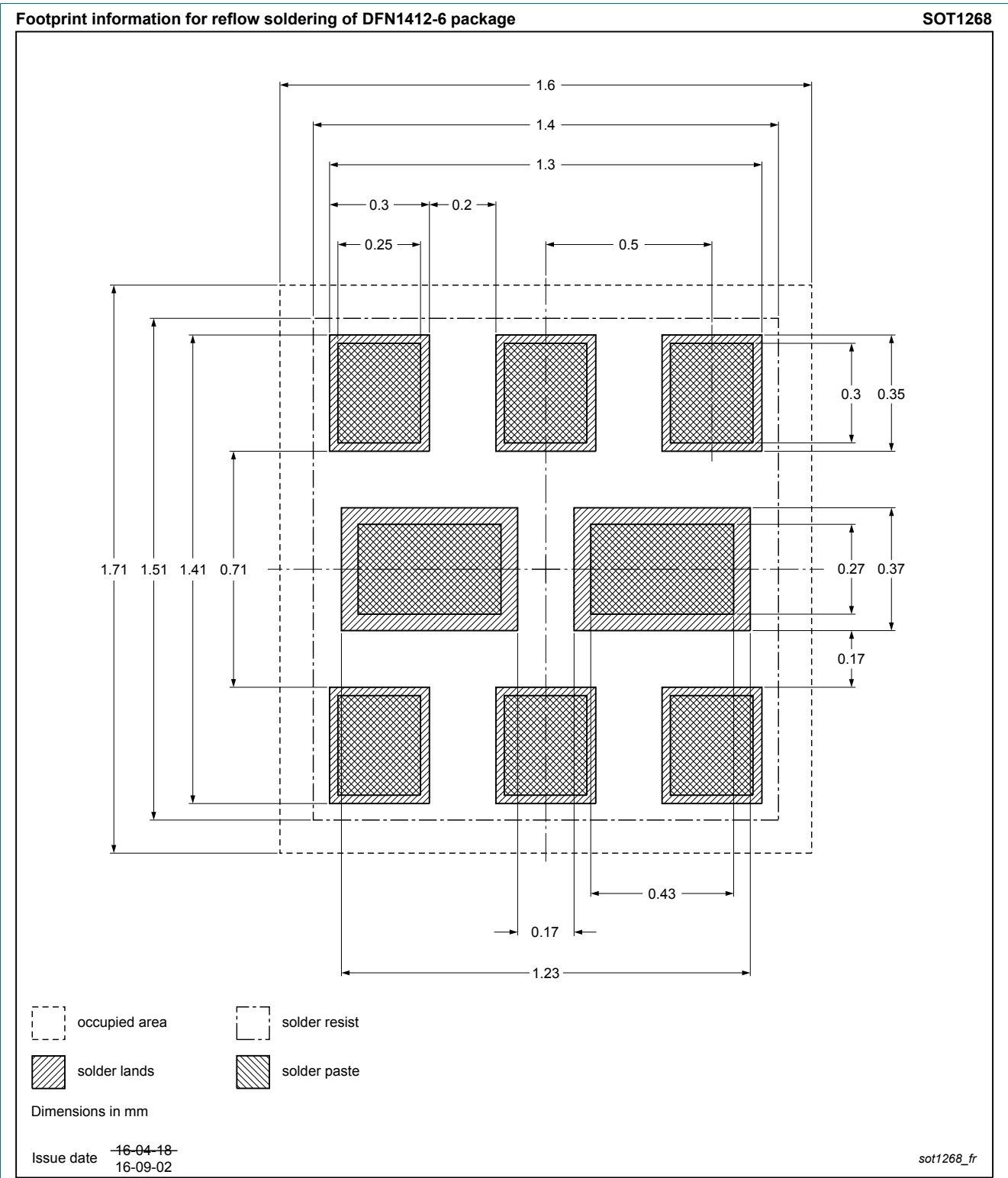


Fig. 9. Reflow soldering footprint for DFN1412-6 (SOT1268)

14. Revision history

Table 8. Revision history

| Data sheet ID  | Release date                                    | Data sheet status  | Change notice | Supersedes  |
|----------------|-------------------------------------------------|--------------------|---------------|-------------|
| BC817RA v.2    | 20180914                                        | Product data sheet | -             | BC817RA v.1 |
| Modifications: | • Package outline drawing updated: Unit T added |                    |               |             |
| BC817RA v.1    | 20170620                                        | Product data sheet | -             | -           |

## 15. 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.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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