



# BC847QAS

45 V, 100 mA NPN/NPN general-purpose transistor

8 July 2015

Product data sheet

## 1. General description

NPN/NPN general-purpose transistor in a leadless ultra small DFN1010B-6 (SOT1216) Surface-Mounted Device (SMD) plastic package.

PNP/PNP complement: BC857QAS.

NPN/PNP complement: BC847QAPN.

## 2. Features and benefits

- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified
- Low package height of 0.37 mm

## 3. Applications

- General-purpose switching and amplification
- Mobile applications

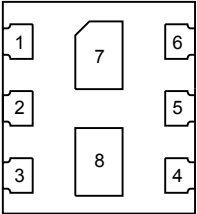
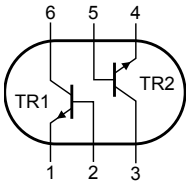
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                | Parameter                 | Conditions                                                                     | Min | Typ | Max | Unit |
|-----------------------|---------------------------|--------------------------------------------------------------------------------|-----|-----|-----|------|
| <b>Per transistor</b> |                           |                                                                                |     |     |     |      |
| $V_{CEO}$             | collector-emitter voltage | open base                                                                      | -   | -   | 45  | V    |
| $I_C$                 | collector current         |                                                                                | -   | -   | 100 | mA   |
| <b>Per transistor</b> |                           |                                                                                |     |     |     |      |
| $h_{FE}$              | DC current gain           | $V_{CE} = 5\text{ V}; I_C = 2\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | 200 | -   | 450 |      |



5. Pinning information

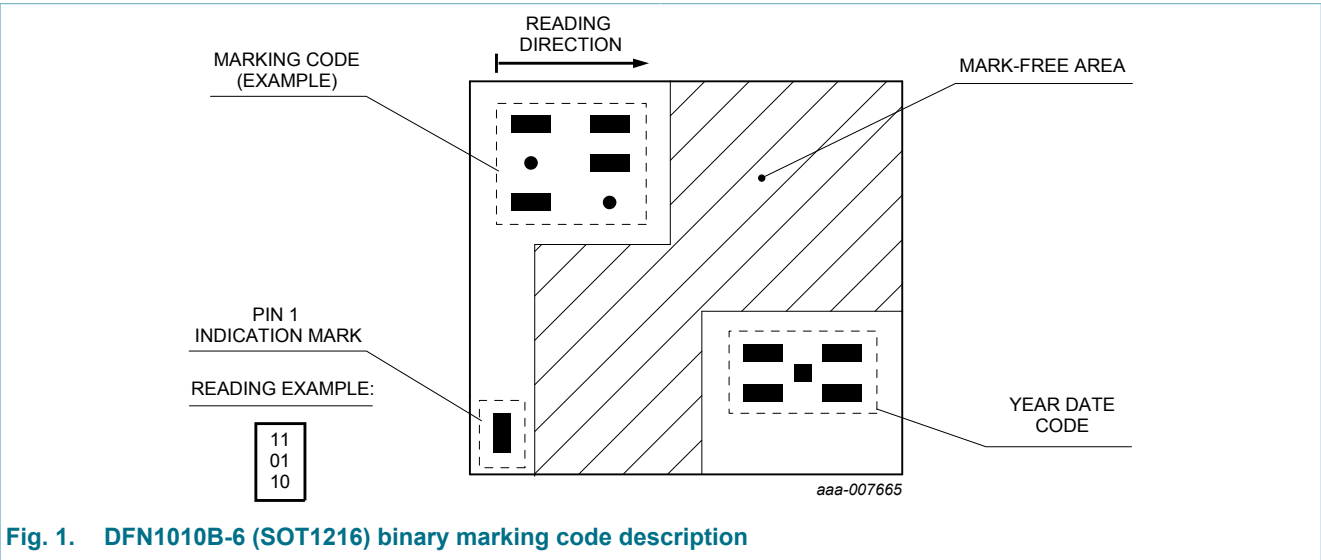
| Table 2. Pinning information |        |               |                                                                                                                                               |                                                                                                          |
|------------------------------|--------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Pin                          | Symbol | Description   | Simplified outline                                                                                                                            | Graphic symbol                                                                                           |
| 1                            | E1     | emitter TR1   |  <p>Transparent top view<br/><b>DFN1010B-6 (SOT1216)</b></p> |  <p><i>sym020</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 |
| BC847QAS                      | DFN1010B-6 | DFN1010B-6: plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals | SOT1216 |

7. Marking

| Table 4. Marking codes |              |
|------------------------|--------------|
| Type number            | Marking code |
| BC847QAS               | 00 01 00     |

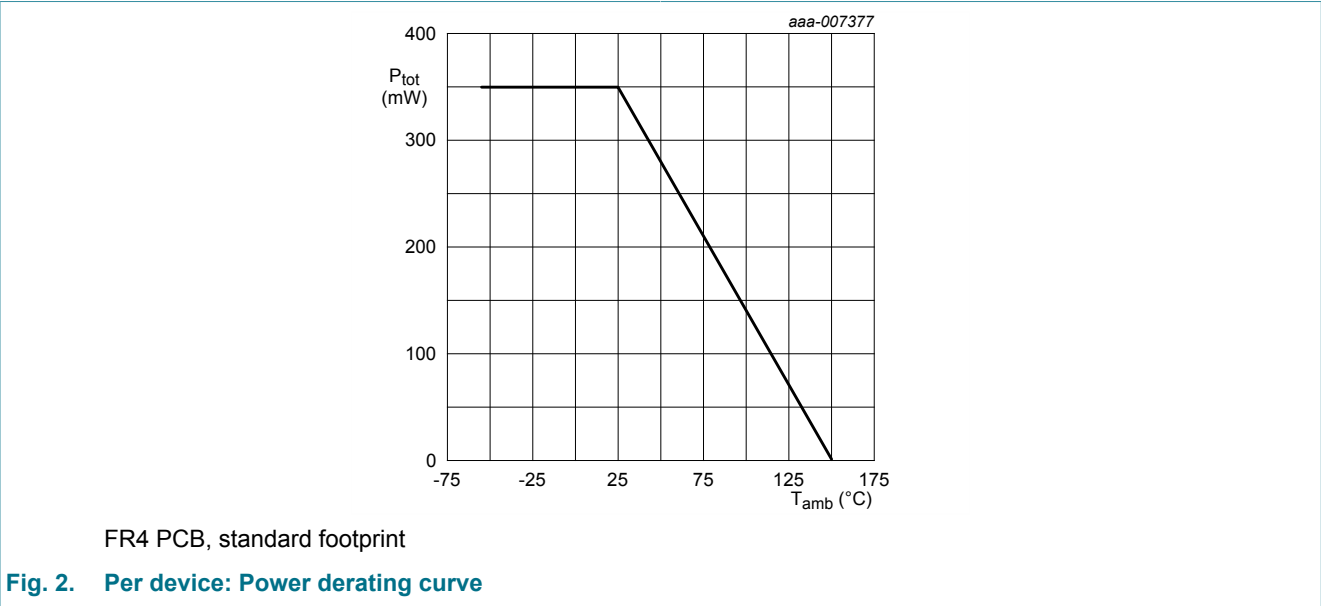


8. Limiting values

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                      |     | -   | 6   | V    |
| I <sub>C</sub>   | collector current         | single pulse; t <sub>p</sub> ≤ 1 ms |     | -   | 100 | mA   |
| I <sub>CM</sub>  | peak collector current    |                                     |     | -   | 200 | mA   |
| I <sub>BM</sub>  | peak base current         |                                     |     | -   | 100 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 230 | mW   |
| Per device       |                           |                                     |     |     |     |      |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 350 | 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.

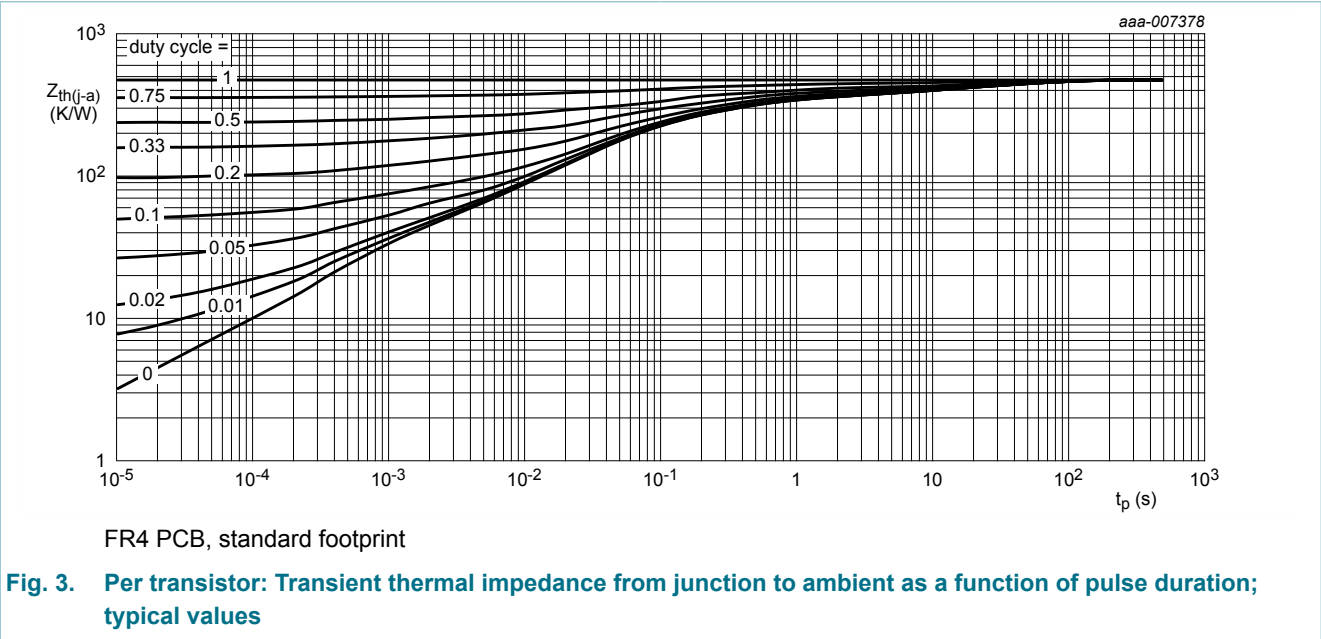


9. Thermal characteristics

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] | -   | -   | 543 | K/W  |
| Per device     |                                             |             |     |     |     |     |      |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 357 | 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          |
|-----------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|---------------|
| <b>Per transistor</b> |                                      |                                                                                                                                                  |  |     |     |     |               |
| $I_{CBO}$             | collector-base cut-off current       | $V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$                                                                      |  | -   | -   | 5   | $\mu\text{A}$ |
|                       |                                      | $V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                   |  | -   | -   | 15  | nA            |
| $I_{EBO}$             | 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                      | $V_{CE} = 5\text{ V}; I_C = 2\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                   |  | 200 | -   | 450 |               |
| $V_{CEsat}$           | collector-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                  |  | -   | -   | 100 | mV            |
|                       |                                      | $I_C = 100\text{ mA}; I_B = 5\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$ |  | -   | -   | 300 | mV            |
| $V_{BEsat}$           | base-emitter saturation voltage      | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                  |  | -   | 760 | -   | mV            |
|                       |                                      | $I_C = 100\text{ mA}; I_B = 5\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$ |  | -   | 900 | -   | mV            |
| $V_{BE}$              | base-emitter voltage                 | $V_{CE} = 5\text{ V}; I_C = 2\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                   |  | 600 | 660 | 725 | mV            |
|                       |                                      | $V_{CE} = 5\text{ V}; I_C = 10\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                  |  | -   | 710 | 820 | mV            |
| $C_C$                 | collector capacitance                | $V_{CB} = 10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                               |  | -   | -   | 4   | pF            |
| $C_E$                 | emitter capacitance                  | $V_{EB} = 0.5\text{ V}; I_C = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                |  | -   | 11  | -   | 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           |
| NF                    | noise figure                         | $V_{CE} = 5\text{ V}; I_C = 0.2\text{ mA}; R_S = 2\text{ k}\Omega; f = 1\text{ MHz}; B = 200\text{ Hz}; T_{amb} = 25\text{ }^{\circ}\text{C}$    |  | -   | -   | 10  | dB            |

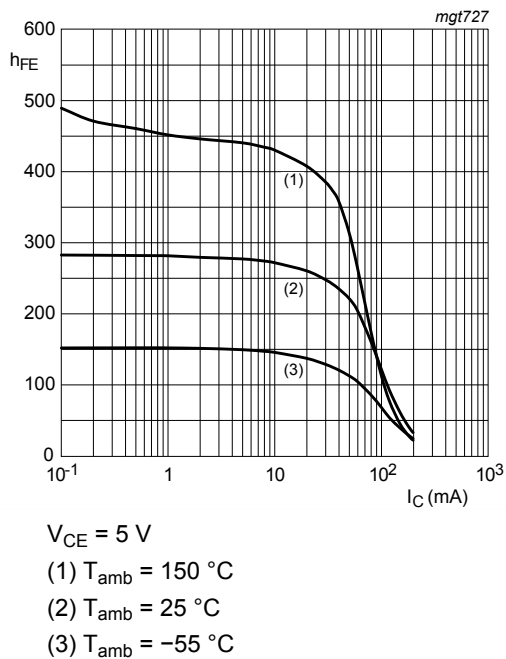


Fig. 4. DC current gain as a function of collector current; typical values

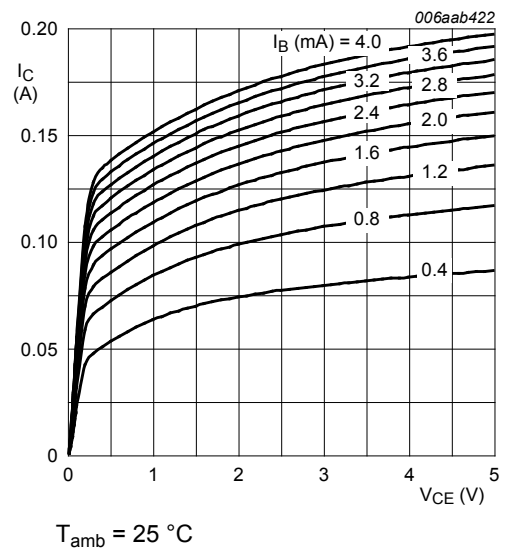


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

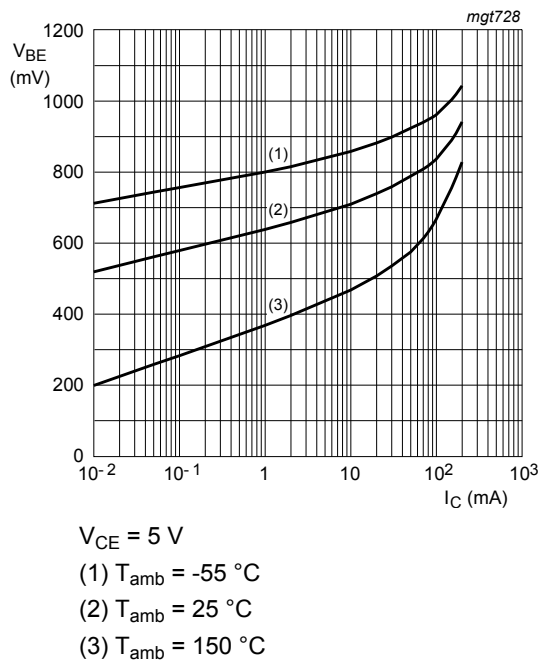


Fig. 6. Base-emitter voltage as a function of collector current; typical values

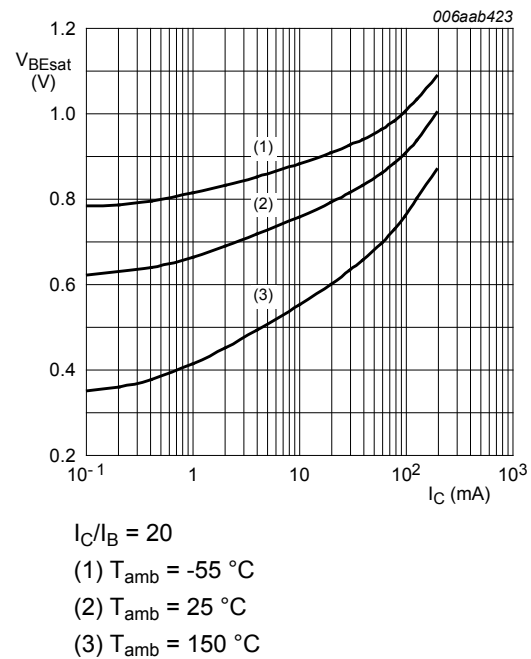
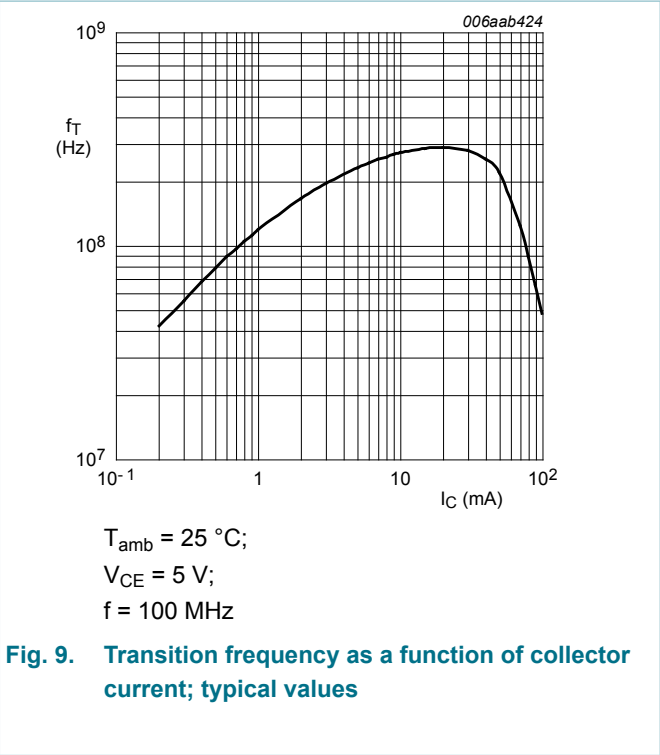
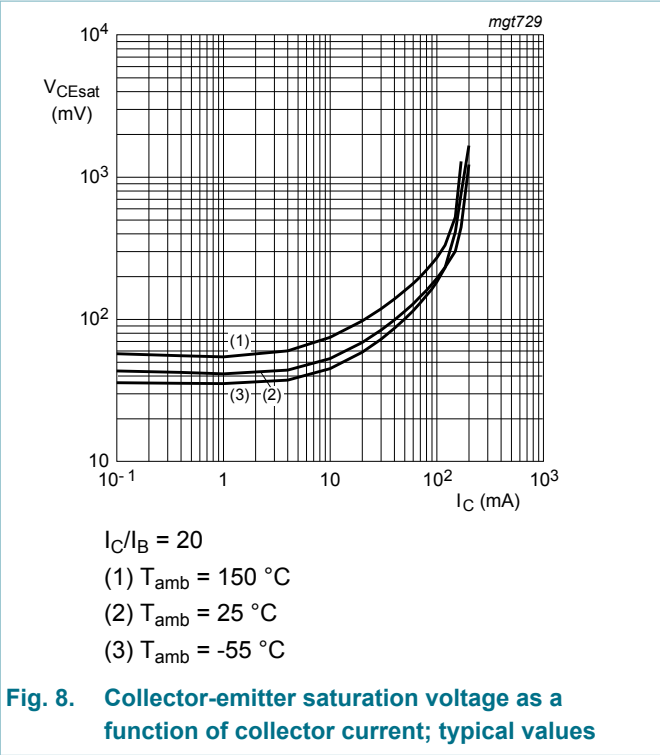


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values



## 11. Test information

### 11.1 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.

## 12. Package outline

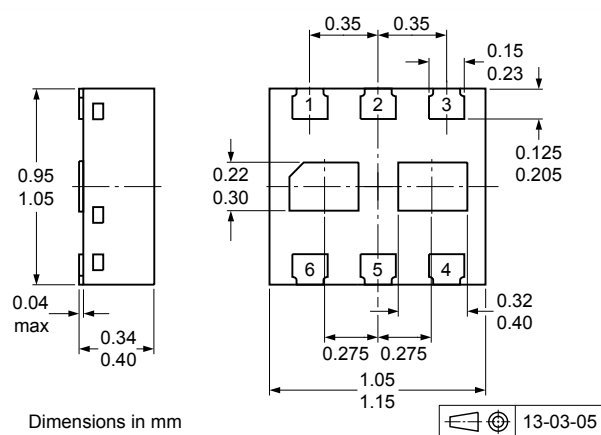


Fig. 10. Package outline DFN1010B-6 (SOT1216)

13. Soldering

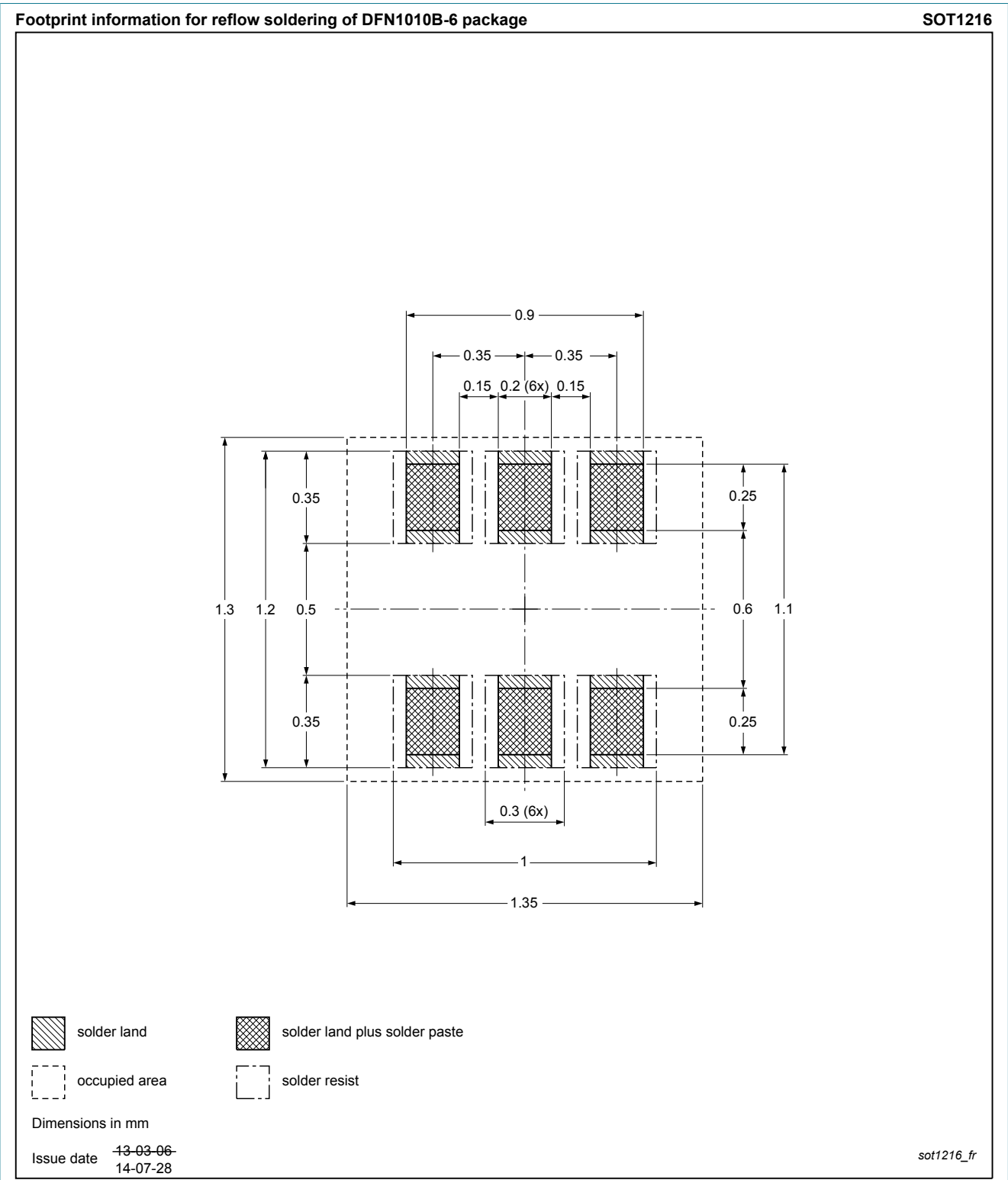


Fig. 11. Reflow soldering footprint for DFN1010B-6 (SOT1216)

## 14. Revision history

Table 8. Revision history

| Data sheet ID | Release date                                                                            | Data sheet status  | Change notice | Supersedes   |
|---------------|-----------------------------------------------------------------------------------------|--------------------|---------------|--------------|
| BC847QAS v.2  | 20150708                                                                                | Product data sheet | -             | BC847QAS v.1 |
| Modification: | <ul style="list-style-type: none"><li>Change of binary marking code position.</li></ul> |                    |               |              |
| BC847QAS v.1  | 20140729                                                                                | Product data sheet | -             | -            |

## 15. Legal information

### 15.1 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".
- [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 URL <http://www.nxp.com>.

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