



# BC847QAS

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

29 July 2014

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

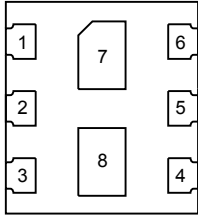
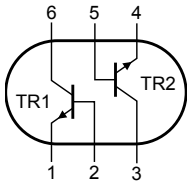
Table 1. Quick reference data

| 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           | $V_{CE} = 5\text{ V}; I_C = 2\text{ mA}; T_{amb} = 25\text{ °C}$ | 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>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

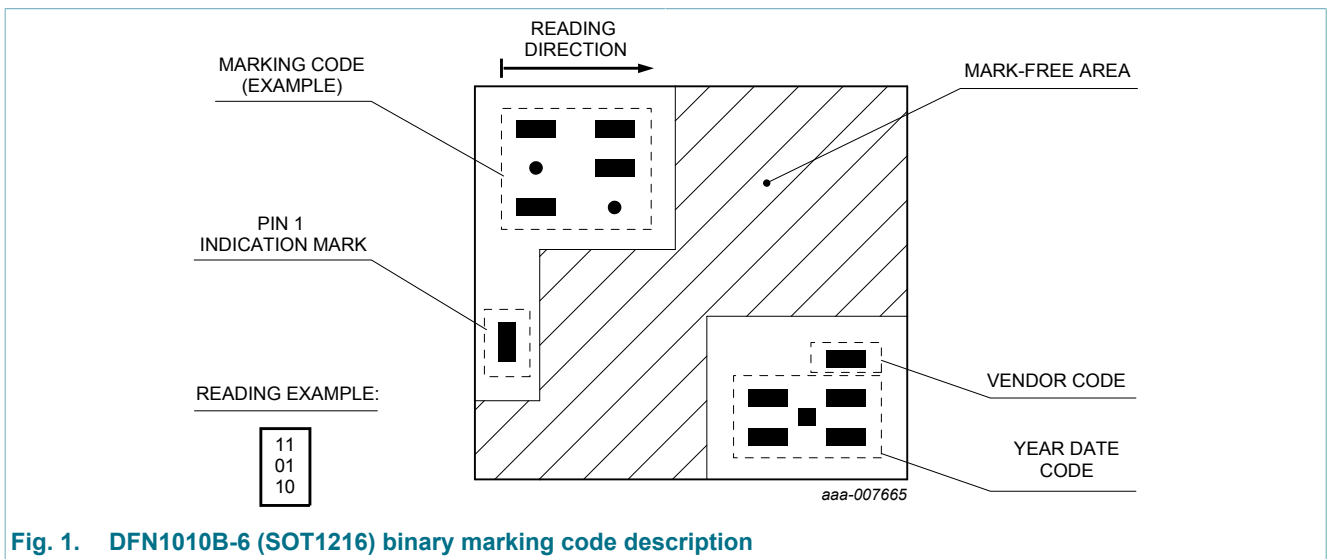
Table 3. Ordering information

| Type number | Package    |  |         |
|-------------|------------|--|---------|
|             | Name       | Description  | Version |
| 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     |



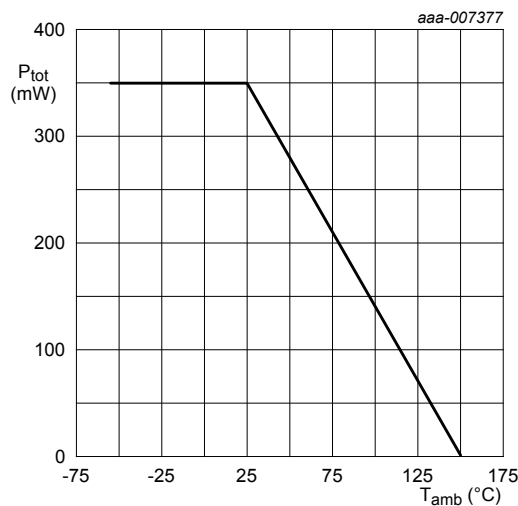
## 8. Limiting values

**Table 5. Limiting values**

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

| Symbol                | Parameter                 | Conditions                          |     | Min | Max | Unit |
|-----------------------|---------------------------|-------------------------------------|-----|-----|-----|------|
| <b>Per transistor</b> |                           |                                     |     |     |     |      |
| V <sub>CB0</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         |                                     |     | -   | 100 | mA   |
| P <sub>tot</sub>      | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 230 | mW   |
| <b>Per device</b>     |                           |                                     |     |     |     |      |
| 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.



FR4 PCB, standard footprint

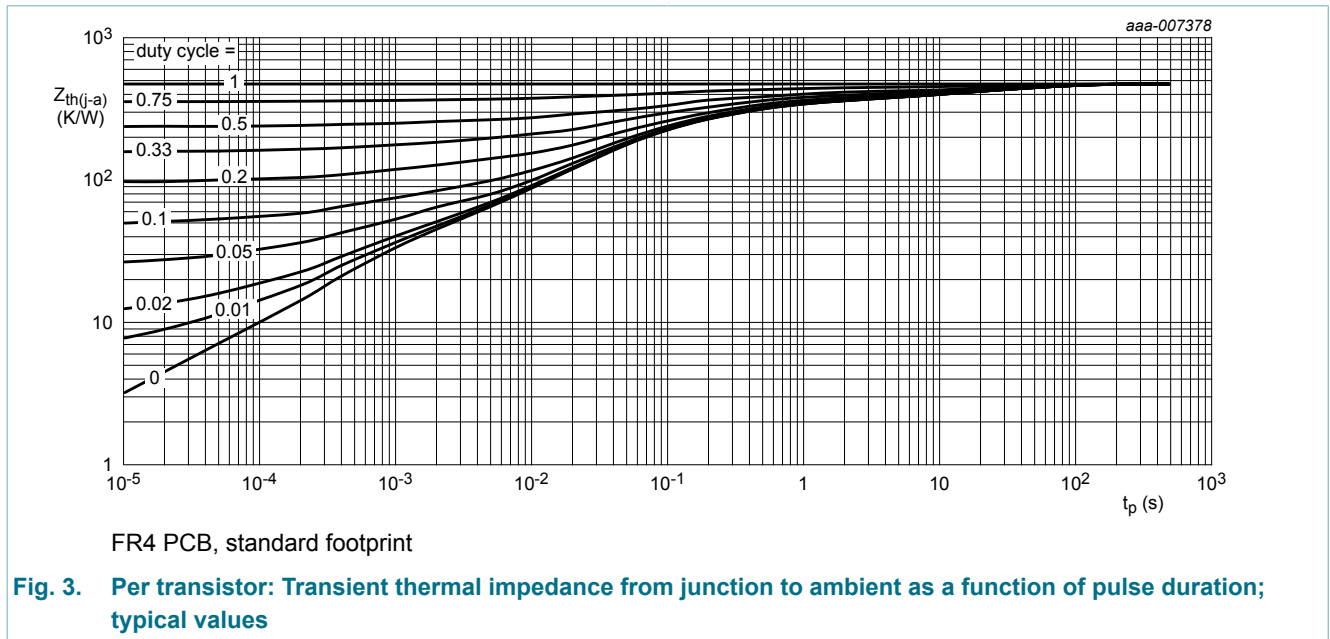
**Fig. 2. Per device: Power derating curve**

## 9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol                | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|-----------------------|---|-------------|-----|-----|-----|-----|------|
| <b>Per transistor</b> |   |             |     |     |     |     |      |
| $R_{th(j-a)}$         | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 543 | K/W  |
| <b>Per device</b>     |   |             |     |     |     |     |      |
| $R_{th(j-a)}$         | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 357 | K/W  |

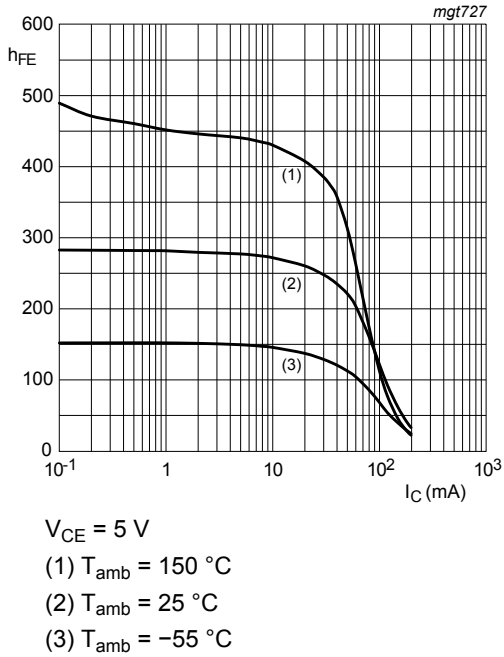
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



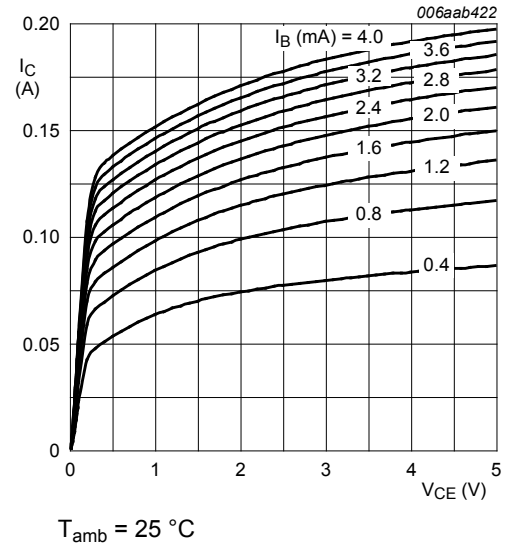
## 10. Characteristics

Table 7. Characteristics

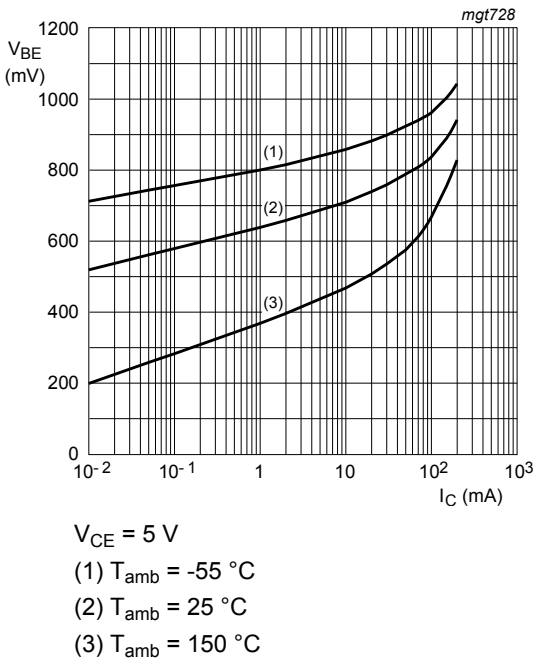
| Symbol                | Parameter                            | Conditions   | Min | Typ | Max | Unit |
|-----------------------|--------------------------------------|--|-----|-----|-----|------|
| <b>Per transistor</b> |                                      |  |     |     |     |      |
| I <sub>CBO</sub>      | collector-base cut-off current       | V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C  | -   | -   | 5   | μA   |
|                       |                                      | V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C   | -   | -   | 15  | nA   |
| I <sub>EBO</sub>      | emitter-base cut-off current         | V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C  | -   | -   | 100 | nA   |
| h <sub>FE</sub>       | DC current gain                      | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 2 mA; T <sub>amb</sub> = 25 °C   | 200 | -   | 450 |      |
| V <sub>CEsat</sub>    | collector-emitter saturation voltage | I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA; T <sub>amb</sub> = 25 °C  | -   | -   | 100 | mV   |
|                       |                                      | I <sub>C</sub> = 100 mA; I <sub>B</sub> = 5 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C    | -   | -   | 300 | mV   |
| V <sub>BEsat</sub>    | base-emitter saturation voltage      | I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA; T <sub>amb</sub> = 25 °C  | -   | 760 | -   | mV   |
|                       |                                      | I <sub>C</sub> = 100 mA; I <sub>B</sub> = 5 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C    | -   | 900 | -   | mV   |
| V <sub>BE</sub>       | base-emitter voltage                 | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 2 mA; T <sub>amb</sub> = 25 °C   | 600 | 660 | 725 | mV   |
|                       |                                      | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 10 mA; T <sub>amb</sub> = 25 °C  | -   | 710 | 820 | mV   |
| C <sub>C</sub>        | collector capacitance                | V <sub>CB</sub> = 10 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C                | -   | -   | 4   | pF   |
| C <sub>E</sub>        | emitter capacitance                  | V <sub>EB</sub> = 0.5 V; I <sub>C</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C                                     | -   | 11  | -   | pF   |
| f <sub>T</sub>        | transition frequency                 | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 10 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C                                   | 100 | -   | -   | MHz  |
| NF                    | noise figure                         | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 0.2 mA; R <sub>S</sub> = 2 kΩ; f = 1 MHz; B = 200 Hz; T <sub>amb</sub> = 25 °C | -   | -   | 10  | dB   |



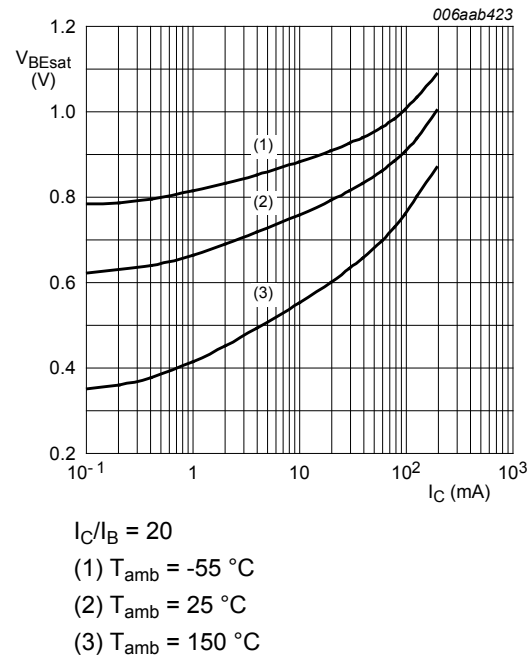
**Fig. 4. DC current gain as a function of collector current; typical values**



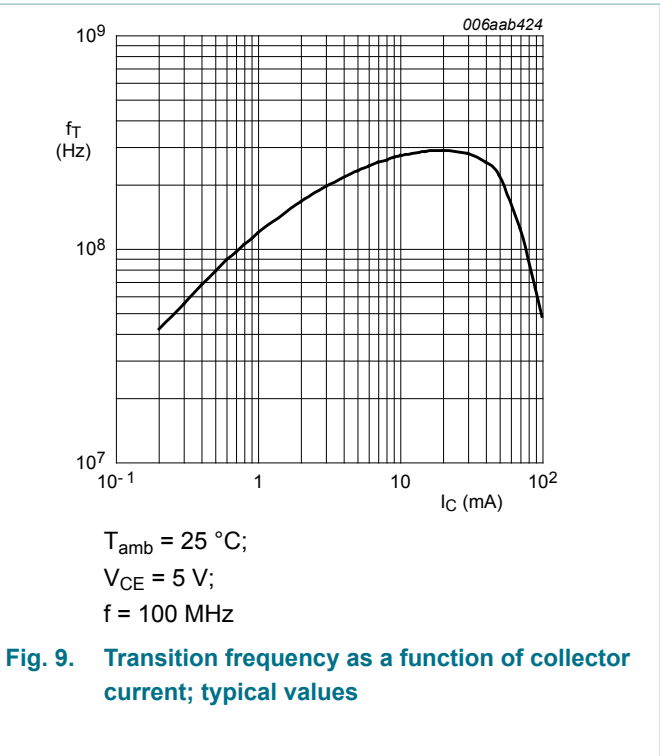
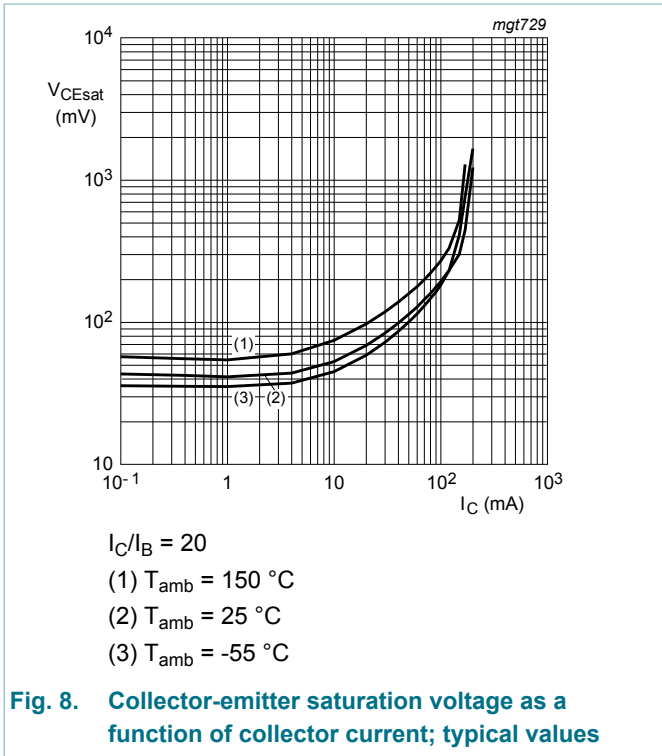
**Fig. 5. Collector current as a function of collector-emitter voltage; typical values**



**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**

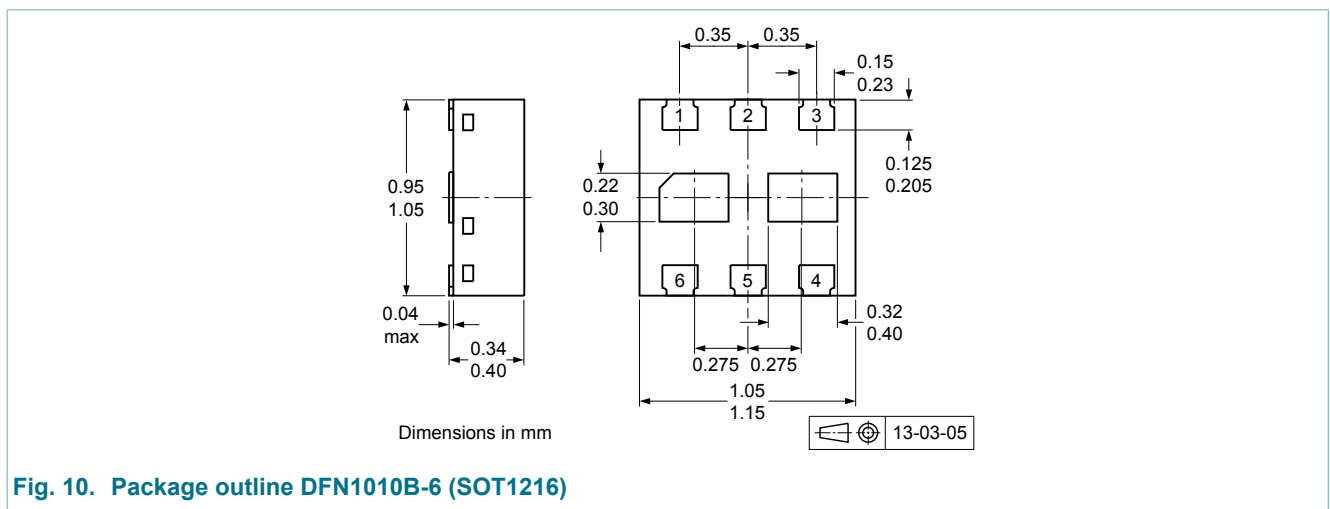


## 11. Test information

### 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





### 13. Soldering

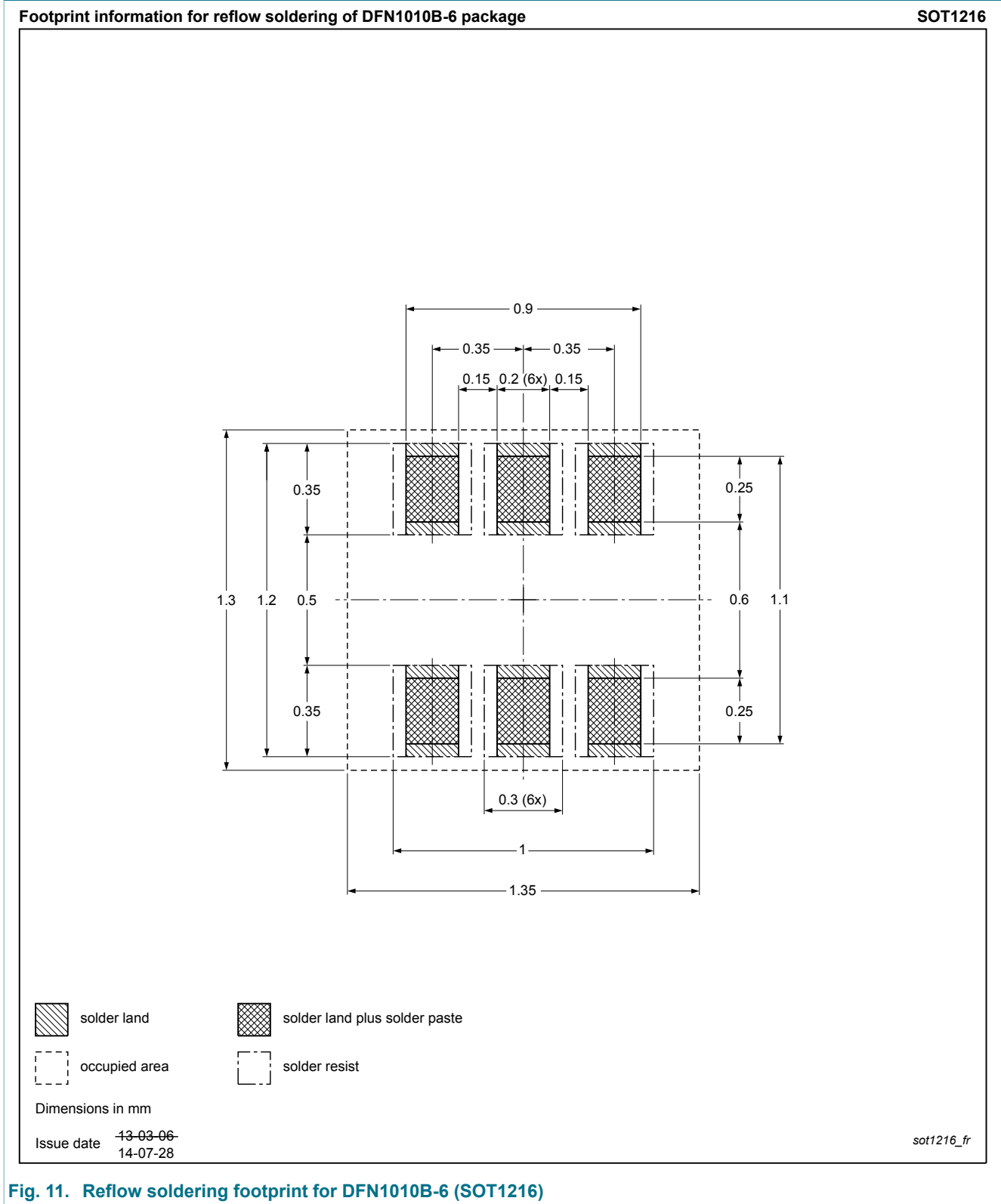


Fig. 11. Reflow soldering footprint for DFN1010B-6 (SOT1216)

## 14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BC847QAS v.1  | 20140729     | Product data sheet | -             | -          |

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| 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.                                     |

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