



BC847BS

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

Rev. 03 — 18 February 2009

Product data sheet

1. Product profile

1.1 General description

NPN/NPN general-purpose transistor pair in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

PNP/PNP complement: BC857BS.

1.2 Features

- Low collector capacitance
- Low collector-emitter saturation voltage
- Closely matched current gain
- Reduces number of components and board space
- No mutual interference between the transistors

1.3 Applications

- General-purpose switching and amplification

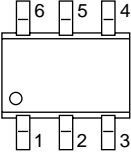
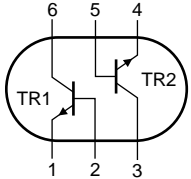
1.4 Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|---------------------------|--|-----|-----|-----|------|
| Per transistor | | | | | | |
| V_{CE0} | collector-emitter voltage | open base | - | - | 45 | V |
| I_C | collector current | | - | - | 100 | mA |
| h_{FE} | DC current gain | $V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$ | 200 | - | 450 | |

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|---------------|---|---|
| 1 | emitter TR1 |  |  |
| 2 | base TR1 | | |
| 3 | collector TR2 | | |
| 4 | emitter TR2 | | |
| 5 | base TR2 | | |
| 6 | collector TR1 | | |

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3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BC847BS | SC-88 | plastic surface-mounted package; 6 leads | SOT363 |

4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| BC847BS | 1F* |

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

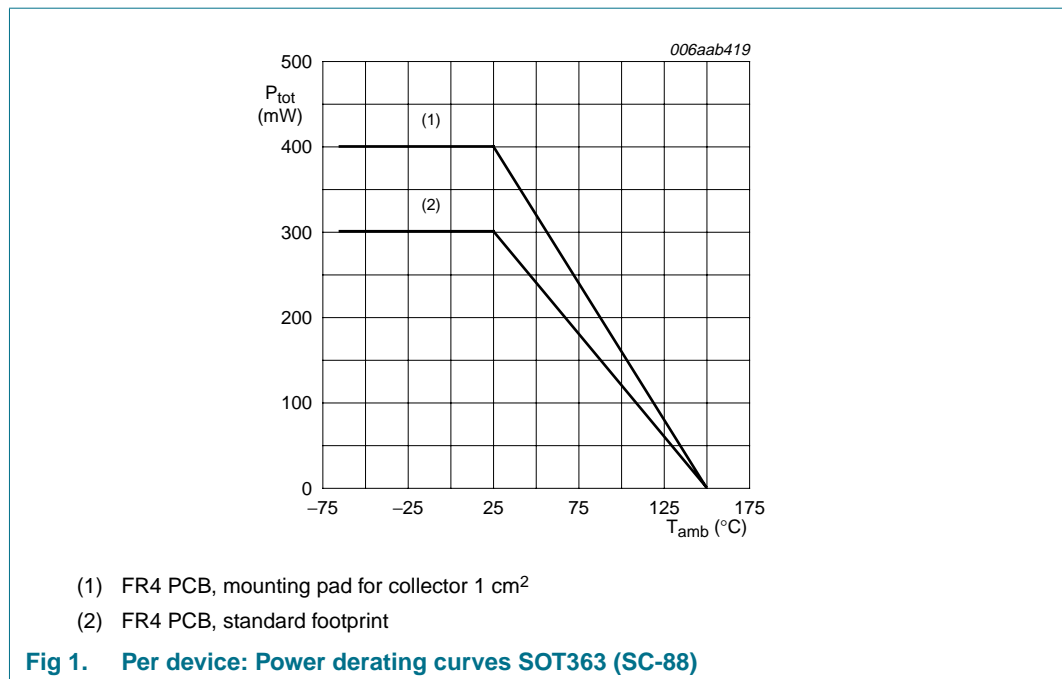
Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|-----------------------|---------------------------|----------------------------------|-----|------|------|----|
| Per transistor | | | | | | |
| V_{CBO} | collector-base voltage | open emitter | - | 50 | V | |
| V_{CEO} | collector-emitter voltage | open base | - | 45 | V | |
| V_{EBO} | emitter-base voltage | open collector | - | 5 | V | |
| I_C | collector current | | - | 100 | mA | |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | - | 200 | mA | |
| I_{BM} | peak base current | single pulse; $t_p \leq 1$ ms | - | 200 | mA | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 220 | mW |
| | | | [2] | - | 250 | mW |
| Per device | | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] | - | 300 | mW |
| | | | [2] | - | 400 | mW |
| T_j | junction temperature | | - | 150 | °C | |
| T_{amb} | ambient temperature | | -65 | +150 | °C | |
| T_{stg} | storage temperature | | -65 | +150 | °C | |

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².



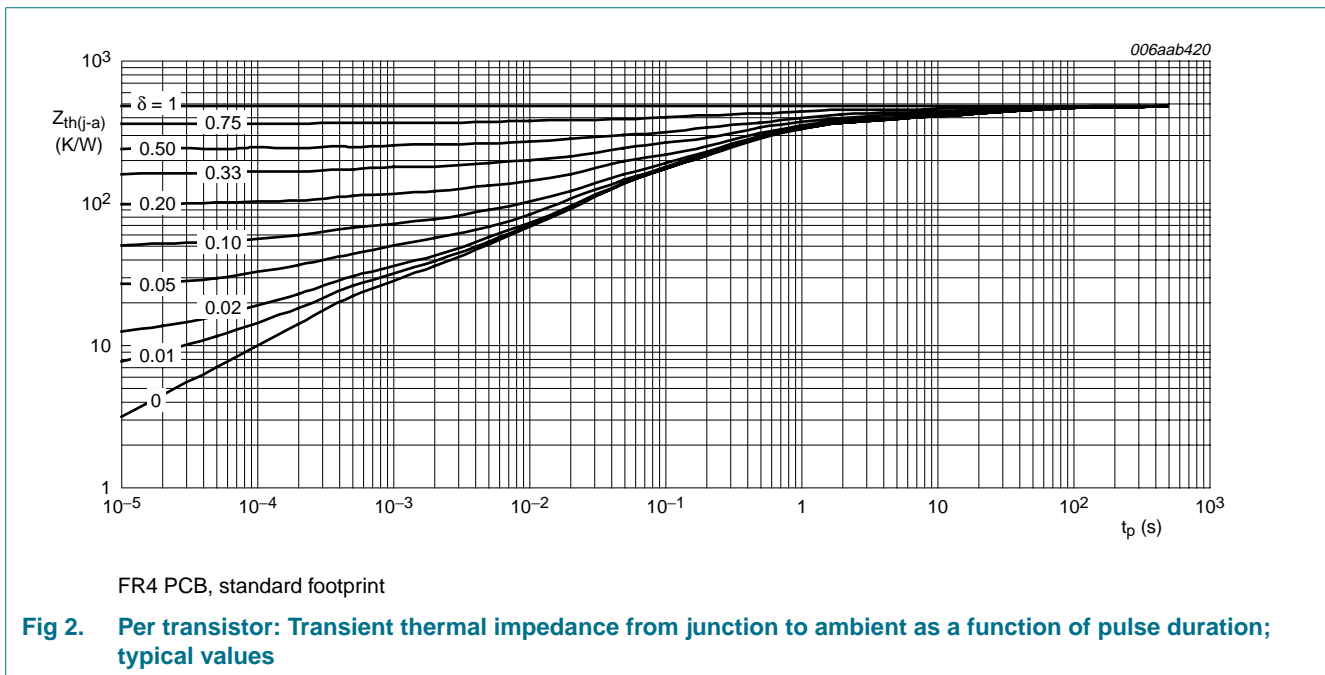
6. Thermal characteristics

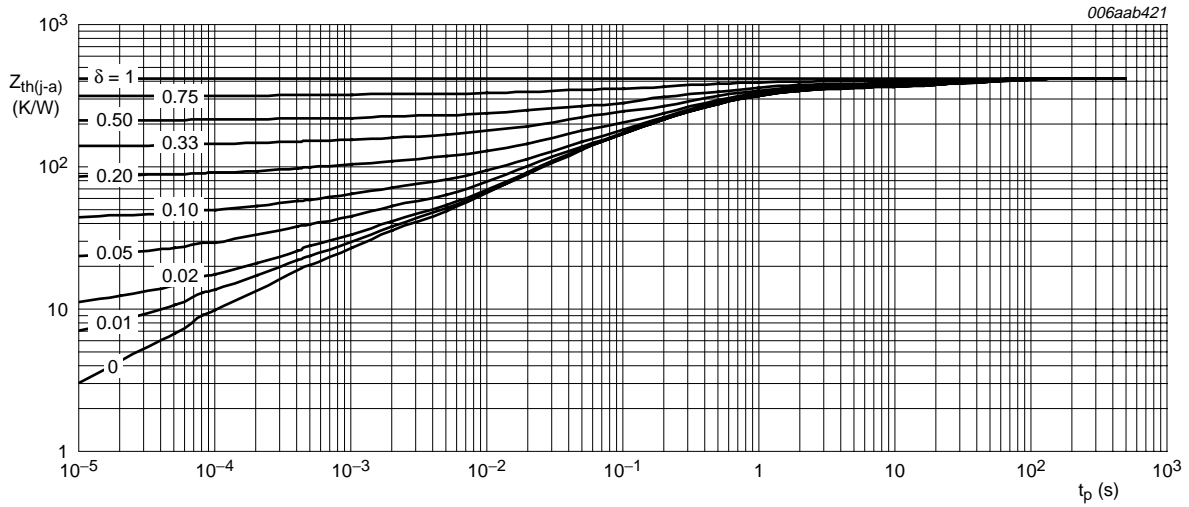
Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|--|-------------|-----|-----|-----|------|
| Per transistor | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | 568 | K/W |
| | | | [2] | - | 500 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | - | - | 230 | K/W |
| Per device | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | 416 | K/W |
| | | | [2] | - | 313 | K/W |

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².





FR4 PCB, mounting pad for collector 1 cm²

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

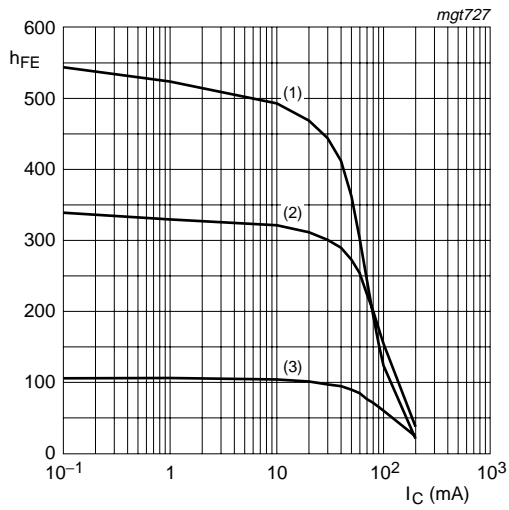
7. Characteristics

Table 7. Characteristics

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

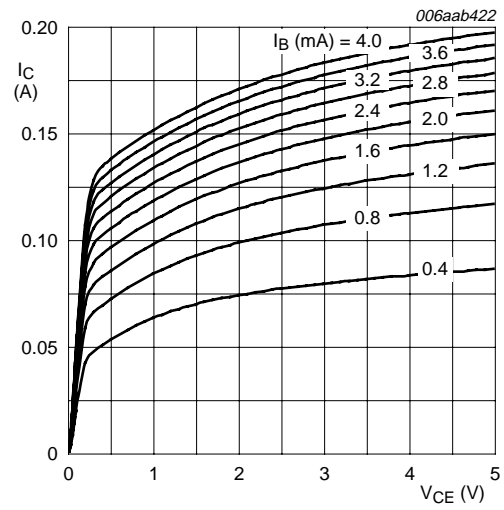
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|--------------------------------------|---|-----|-----|-----|---------------|
| Per transistor | | | | | | |
| I_{CBO} | collector-base cut-off current | $V_{CB} = 30\text{ V}; I_E = 0\text{ A}$ | - | - | 15 | nA |
| | | $V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$ | - | - | 5 | μA |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = 5\text{ V}; I_C = 0\text{ A}$ | - | - | 100 | nA |
| h_{FE} | DC current gain | $V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$ | 200 | - | 450 | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$ | - | - | 100 | mV |
| | | $I_C = 100\text{ mA}; I_B = 5\text{ mA}$ | [1] | - | 300 | mV |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$ | - | 755 | - | mV |
| V_{BE} | base-emitter voltage | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$ | 580 | 655 | 700 | mV |
| C_c | collector capacitance | $I_E = I_e = 0\text{ A}; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$ | - | - | 1.5 | pF |
| C_e | emitter capacitance | $I_C = I_c = 0\text{ A}; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$ | - | 11 | - | pF |
| f_T | transition frequency | $I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$ | 100 | - | - | MHz |

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



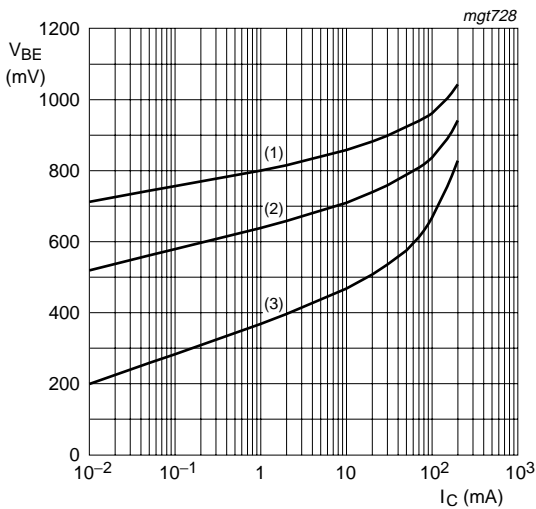
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



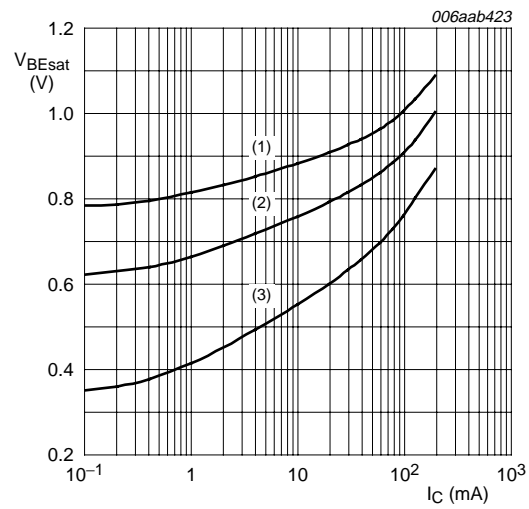
$T_{amb} = 25\text{ }^{\circ}\text{C}$

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



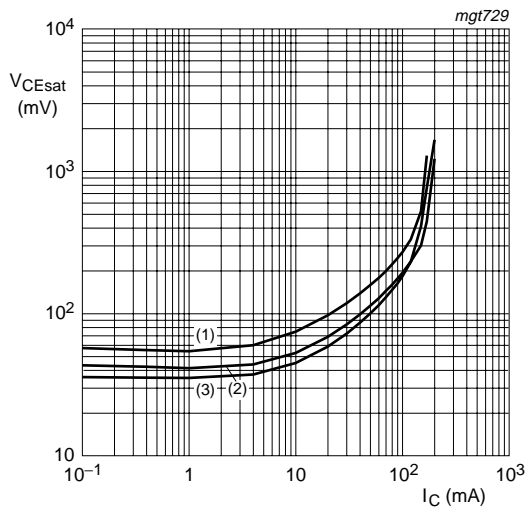
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 150\text{ }^{\circ}\text{C}$

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



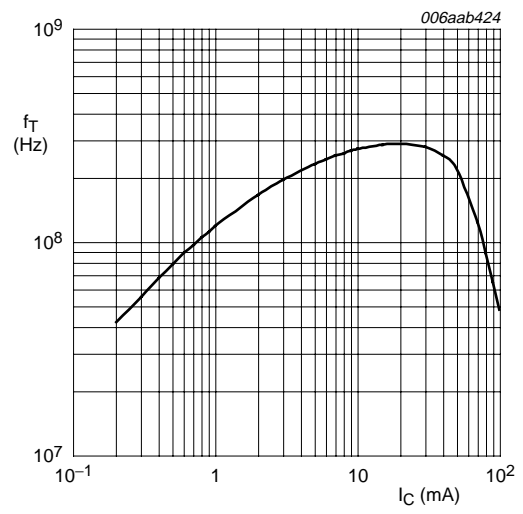
$I_C/I_B = 20$
 (1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 150\text{ }^{\circ}\text{C}$

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



- $I_C/I_B = 20$
- (1) $T_{amb} = 150\text{ }^\circ\text{C}$
 - (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 - (3) $T_{amb} = -55\text{ }^\circ\text{C}$

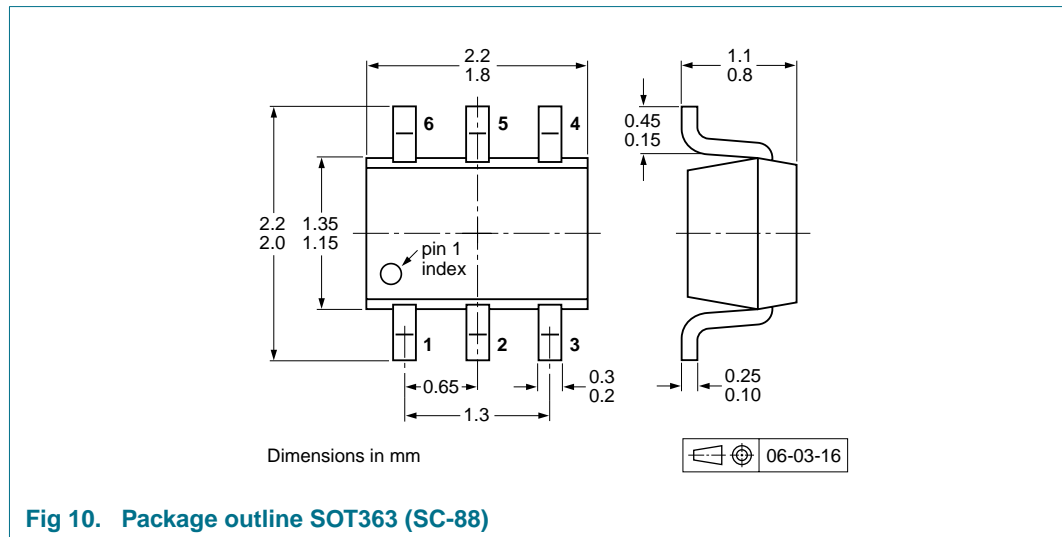
Fig 8. Per transistor: Collector-emitter saturation voltage as a function of collector current; typical values



$V_{CE} = 5\text{ V}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

Fig 9. Per transistor: Transition frequency as a function of collector current; typical values

8. Package outline



9. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity | |
|-------------|---------|------------------------------------|---------------------|-------|
| | | | 3000 | 10000 |
| BC847BS | SOT363 | 4 mm pitch, 8 mm tape and reel; T1 | ^[2] -115 | -135 |
| | | 4 mm pitch, 8 mm tape and reel; T2 | ^[3] -125 | -165 |

[1] For further information and the availability of packing methods, see [Section 13](#).

[2] T1: normal taping

[3] T2: reverse taping

10. Soldering

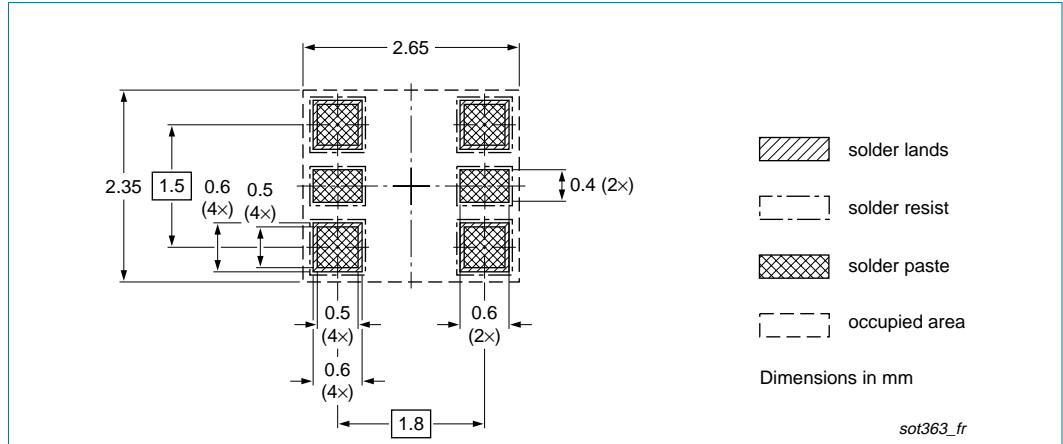


Fig 11. Reflow soldering footprint SOT363 (SC-88)

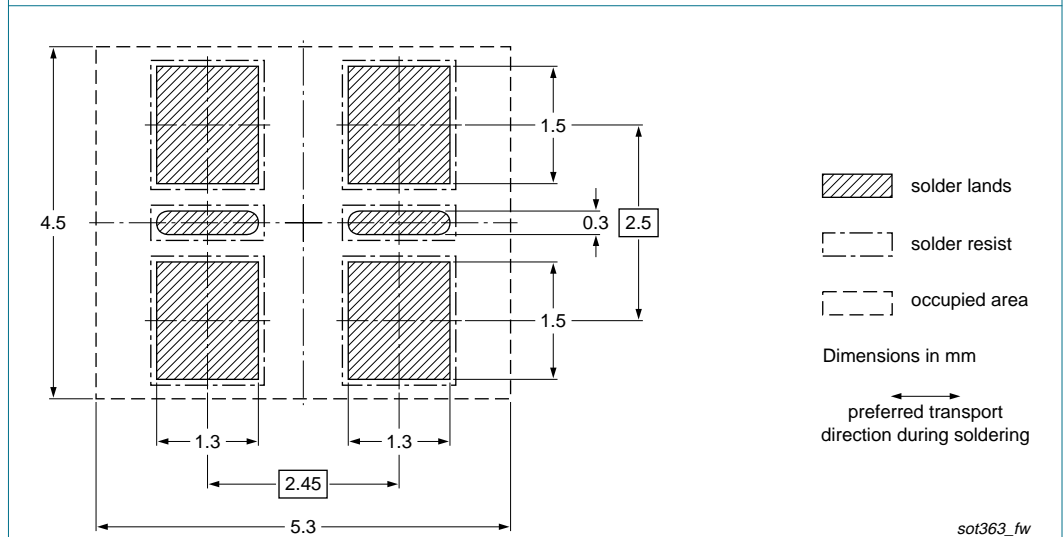


Fig 12. Wave soldering footprint SOT363 (SC-88)

11. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|---|---------------|------------|
| BC847BS_3 | 20090218 | Product data sheet | - | BC847BS_2 |
| Modifications: | | <ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP.• Legal texts have been adapted to the new company name where appropriate.• Section 4 "Marking": updated• Section 7 "Characteristics": enhanced• Section 9 "Packing information": added• Section 10 "Soldering": added• Section 12 "Legal information": updated | | |
| BC847BS_2 | 19990428 | Product specification | - | BC847BS_1 |
| BC847BS_1 | 19970714 | Product specification | - | - |

12. Legal information

12.1 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.nexperia.com>.

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13. Contact information

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