

BCM61B

NPN/NPN matched double transistor

Rev. 02 — 28 August 2009

Product data sheet

1. Product profile

1.1 General description

NPN/NPN matched double transistor in a SOT143B small Surface-Mounted Device (SMD) plastic package. Matched version of BCV61.

PNP/PNP equivalent: BCM62B

1.2 Features

- Current gain matching

1.3 Applications

- Current mirror
- Differential amplifier

1.4 Quick reference data

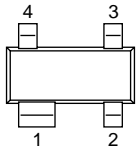
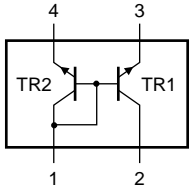
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------------|---------------------------|--|----------|------|------|------|
| Per transistor TR1 | | | | | | |
| V_{CEO} | collector-emitter voltage | open base | - | - | 45 | V |
| h_{FE} | DC current gain | $V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$ | 200 | 290 | 450 | |
| Per transistor | | | | | | |
| I_C | collector current | | - | - | 100 | mA |
| Per device | | | | | | |
| I_{C1}/I_{E2} | current matching | $V_{CE1} = 5\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 25\text{ °C}$ | [1] 0.92 | 1.02 | 1.12 | |

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

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Symbol |
|-----|---------------------------------|---|---|
| 1 | collector TR2, base TR1 and TR2 |  |  |
| 2 | collector TR1 | | |
| 3 | emitter TR1 | | |
| 4 | emitter TR2 | | |

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3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BCM61B | - | plastic surface-mounted package; 4 leads | SOT143B |

4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| BCM61B | *AC |

- [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 TR1 | | | | | |
| V_{CBO} | collector-base voltage | open emitter | - | 50 | V |
| V_{CEO} | collector-emitter voltage | open base | - | 45 | V |
| Per transistor | | | | | |
| V_{EBS} | emitter-base voltage | $V_{CB} = 0$ V | - | 6 | V |
| I_C | collector current | | - | 100 | mA |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | - | 200 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] - | 220 | mW |
| Per device | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] - | 390 | 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 PCB, single-sided copper, tin-plated and standard footprint.

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 |
| Per device | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] - | - | 321 | K/W |

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

7. Characteristics

Table 7. Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------------|--------------------------------------|---|---------|-----|-----|---------------|
| Per transistor TR1 | | | | | | |
| 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 | $V_{CE} = 5\text{ V};$ $I_C = 10\text{ }\mu\text{A}$ | - | 250 | - | |
| | | $V_{CE} = 5\text{ V};$ $I_C = 100\text{ }\mu\text{A}$ | 100 | - | - | |
| | | $V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$ | 200 | 290 | 450 | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 10\text{ mA};$ $I_B = 0.5\text{ mA}$ | - | 50 | 200 | mV |
| | | $I_C = 100\text{ mA};$ $I_B = 5\text{ mA}$ | - | 200 | 400 | mV |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 10\text{ mA};$ $I_B = 0.5\text{ mA}$ | [1] - | 760 | - | mV |
| | | $I_C = 100\text{ mA};$ $I_B = 5\text{ mA}$ | [1] - | 910 | - | mV |
| V_{BE} | base-emitter voltage | $V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$ | [2] 610 | 660 | 710 | mV |
| | | $V_{CE} = 5\text{ V};$ $I_C = 10\text{ mA}$ | [2] - | - | 770 | mV |
| C_c | collector capacitance | $V_{CB} = 10\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$ | - | - | 1.5 | pF |
| C_e | emitter capacitance | $V_{EB} = 0.5\text{ V};$ $I_C = i_c = 0\text{ A};$ $f = 1\text{ MHz}$ | - | 11 | - | pF |
| f_T | transition frequency | $V_{CE} = 5\text{ V};$ $I_C = 10\text{ mA};$ $f = 100\text{ MHz}$ | 100 | 250 | - | MHz |
| NF | noise figure | $V_{CE} = 5\text{ V};$ $I_C = 0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 10\text{ Hz to}$ 15.7 kHz | - | 2.8 | - | dB |
| | | $V_{CE} = 5\text{ V};$ $I_C = 0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 1\text{ kHz};$ $B = 200\text{ Hz}$ | - | 3.3 | - | dB |

Table 7. Characteristics ...continued $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------------|----------------------|---|----------|------|------|------|
| Per transistor TR2 | | | | | | |
| V_{EBS} | emitter-base voltage | $V_{CB} = 0\text{ V};$ $I_E = -250\text{ mA}$ | - | - | -1.8 | V |
| | | $V_{CB} = 0\text{ V};$ $I_E = -10\text{ }\mu\text{A}$ | -400 | - | - | mV |
| Per device | | | | | | |
| I_{C1}/I_{E2} | current matching | $V_{CE1} = 5\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 25\text{ }^{\circ}\text{C}$ | [3] 0.92 | 1.02 | 1.12 | |
| | | $V_{CE1} = 5\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 150\text{ }^{\circ}\text{C}$ | [3] 0.93 | - | 1.13 | |
| | | $V_{CE1} = 3\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 25\text{ }^{\circ}\text{C}$ | [3] 0.91 | 1.01 | 1.11 | |
| | | $V_{CE1} = 1\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 25\text{ }^{\circ}\text{C}$ | [3] 0.9 | 1 | 1.1 | |

[1] V_{BEsat} decreases by about 1.7 mV/K with increasing temperature.

[2] V_{BE} decreases by about 2 mV/K with increasing temperature.

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

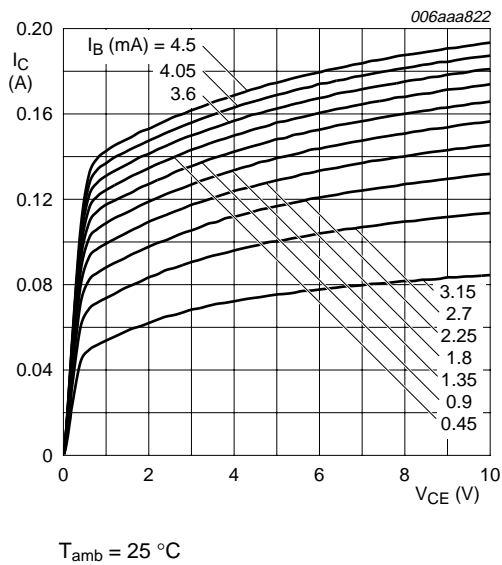


Fig 1. Collector current as a function of collector-emitter voltage; typical values

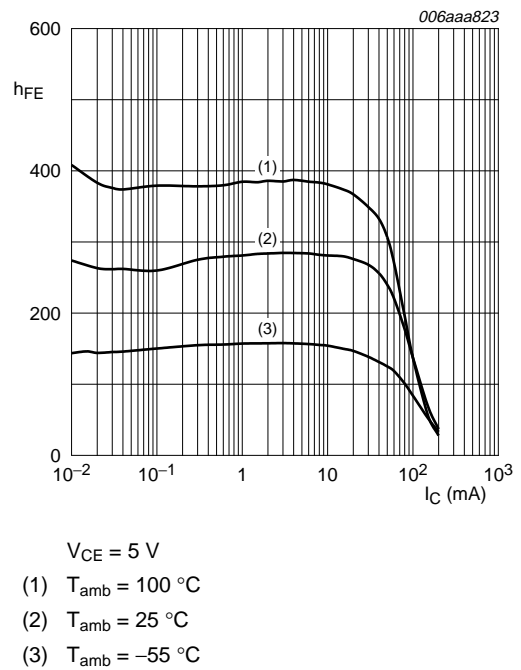


Fig 2. DC current gain as a function of collector current; typical values

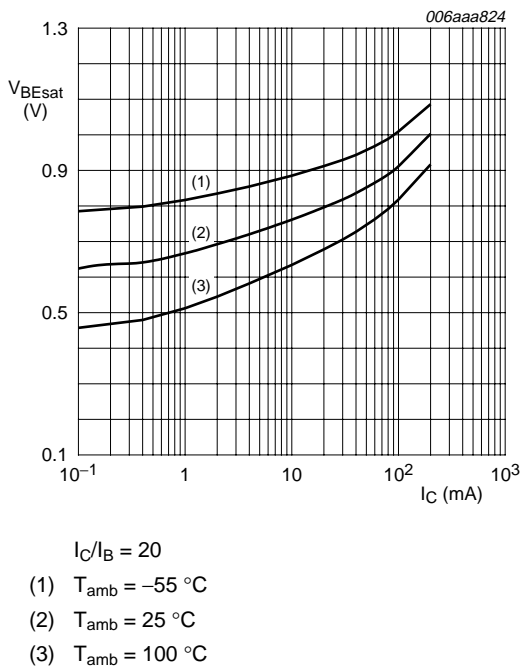


Fig 3. Base-emitter saturation voltage as a function of collector current; typical values

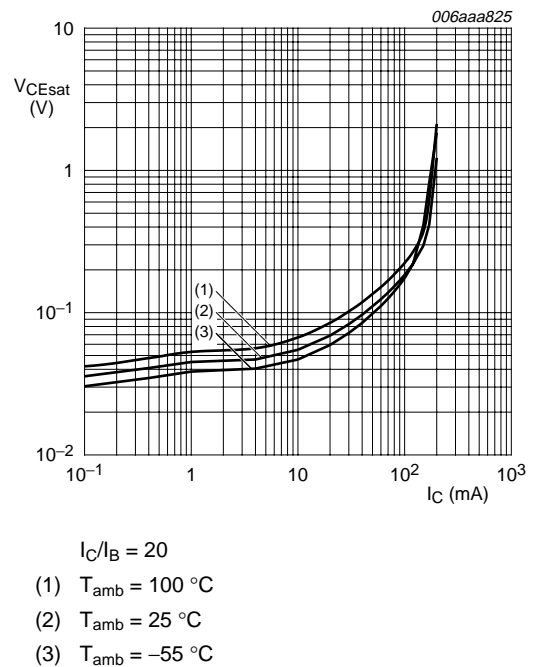
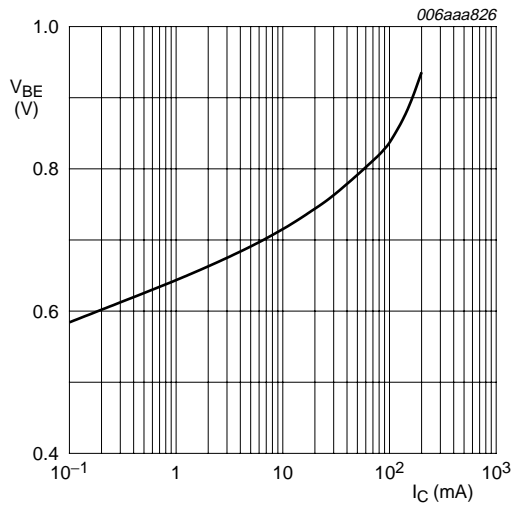
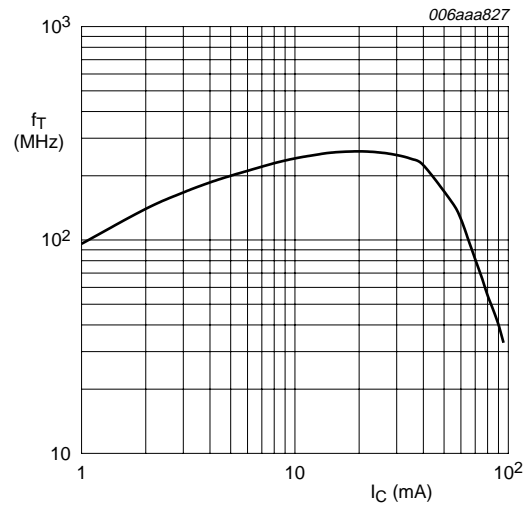


Fig 4. Collector-emitter saturation voltage as a function of collector current; typical values



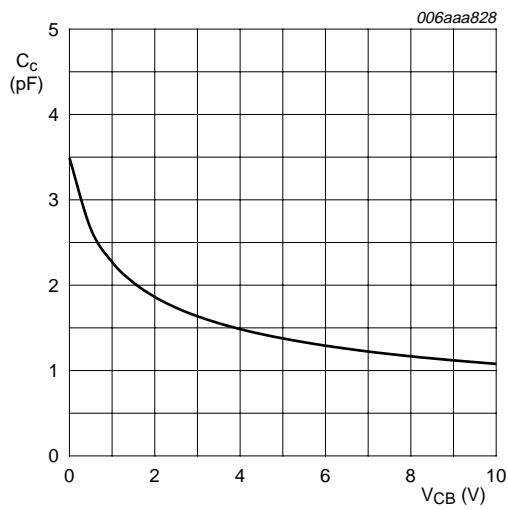
$V_{CE} = 5$ V; $T_{amb} = 25$ °C

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



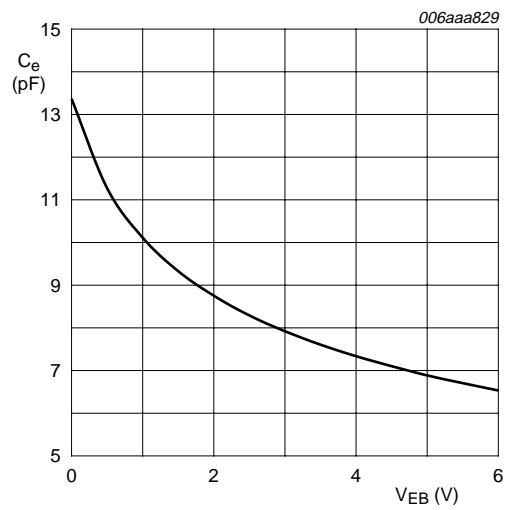
$V_{CE} = 5$ V; $T_{amb} = 25$ °C

Fig 6. Transition frequency as a function of collector current; typical values



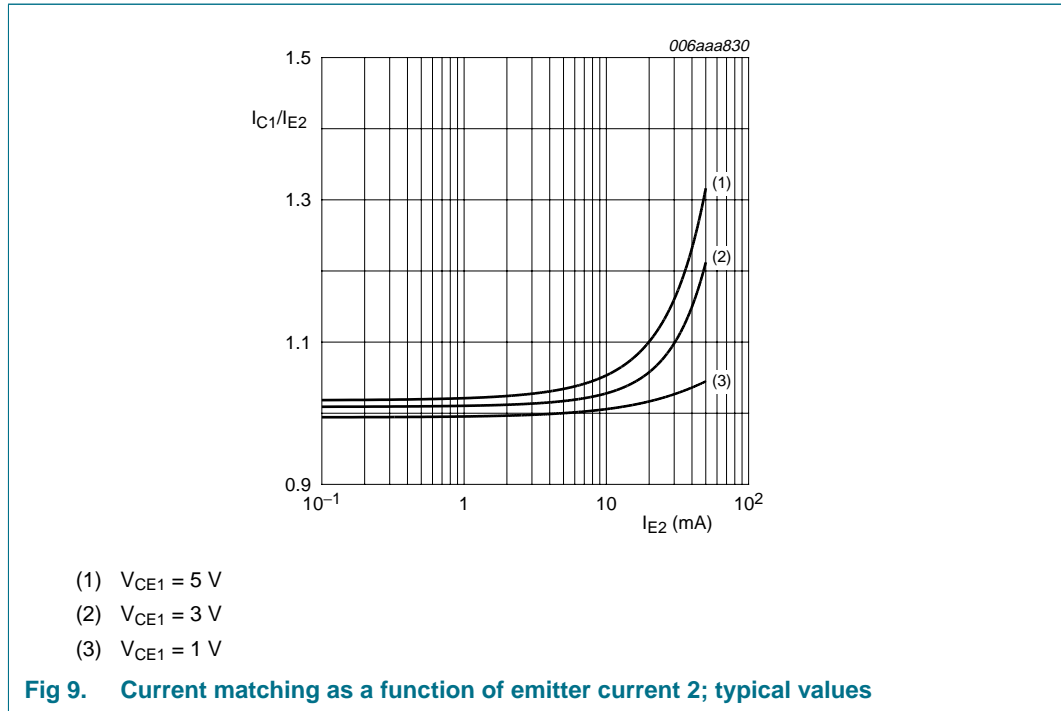
$f = 1$ MHz; $T_{amb} = 25$ °C

Fig 7. Collector capacitance as a function of collector-base voltage; typical values

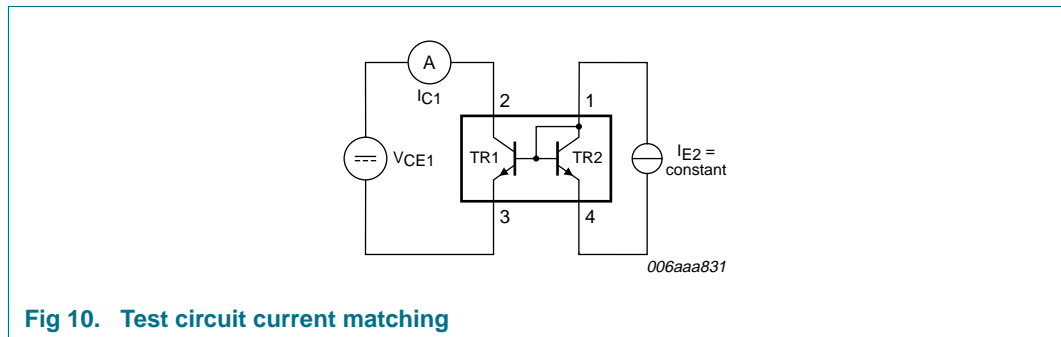


$f = 1$ MHz; $T_{amb} = 25$ °C

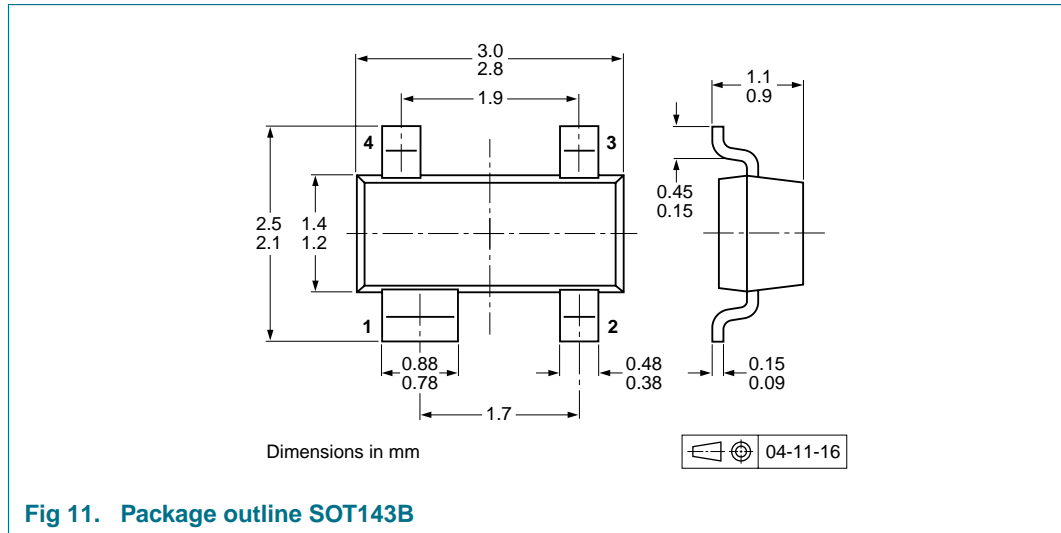
Fig 8. Emitter capacitance as a function of emitter-base voltage; typical values



8. Test information



9. Package outline



10. 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 |
| BCM61B | SOT143B | 4 mm pitch, 8 mm tape and reel | -215 | -235 |

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

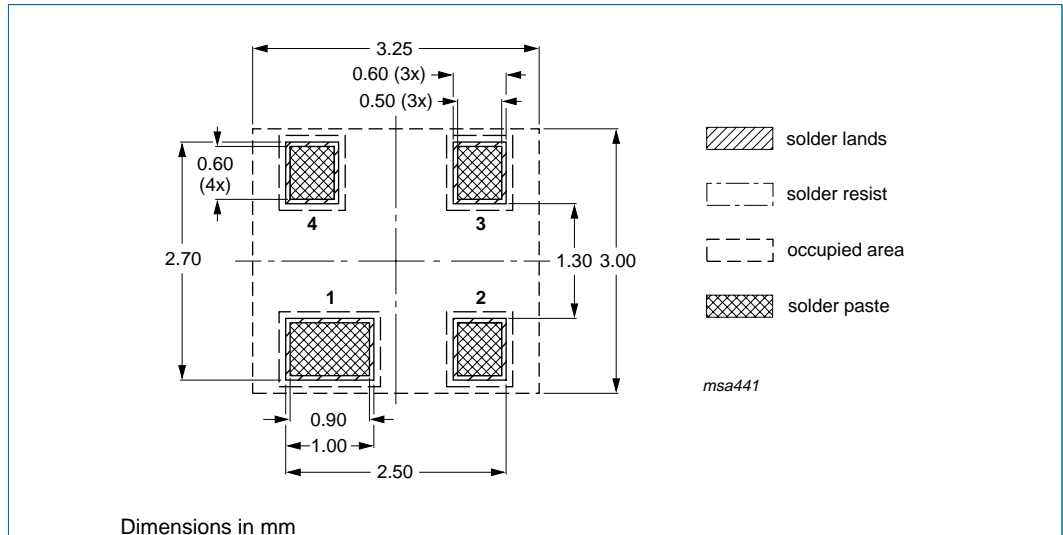


Fig 12. Reflow soldering footprint SOT143B

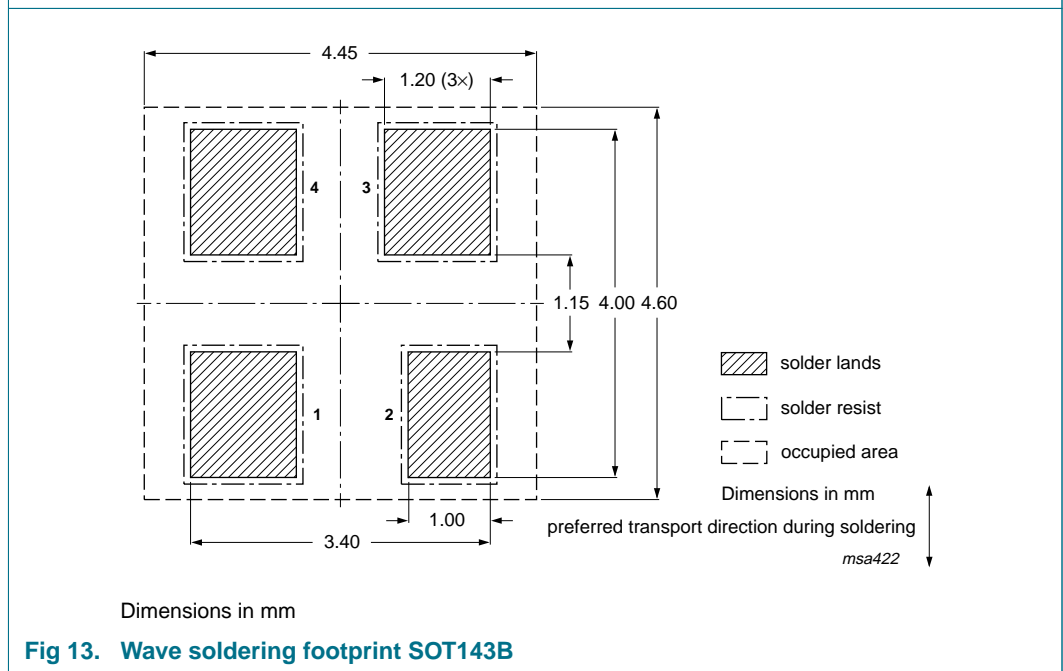


Fig 13. Wave soldering footprint SOT143B

12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|---|---------------|------------|
| BCM61B_2 | 20090828 | Product data sheet | - | BCM61B_1 |
| Modifications: | | <ul style="list-style-type: none">This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content.Figure 13 "Wave soldering footprint SOT143B": updated | | |
| BCM61B_1 | 20060919 | Product data sheet | - | - |

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13.1 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. |
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[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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