



# BCM857BV

PNP/PNP matched double transistor

4 July 2023

Product data sheet

## 1. General description

PNP/PNP matched double transistor in an ultra small and flat lead SOT666 Surface-Mounted Device (SMD) plastic package. The transistors are fully isolated internally.

## 2. Features and benefits

- Current gain matching
- Base-emitter voltage matching
- Drop-in replacement for standard double transistors

## 3. Applications

- Current mirror
- Differential amplifier

## 4. Quick reference data

Table 1. Quick reference data

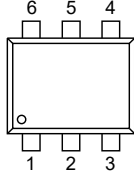
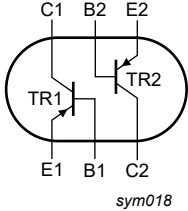
| Symbol                | Parameter                     | Conditions   | Min | Typ | Max  | Unit |
|-----------------------|-------------------------------|--|-----|-----|------|------|
| <b>Per transistor</b> |                               |  |     |     |      |      |
| $V_{CE0}$             | collector-emitter voltage     | open base  | -   | -   | -45  | V    |
| $I_C$                 | collector current             |  | -   | -   | -100 | mA   |
| $h_{FE}$              | DC current gain               | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | 200 | 290 | 450  |      |
| <b>Per device</b>     |                               |  |     |     |      |      |
| $h_{FE1}/h_{FE2}$     | DC current gain matching      | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | [1] | 0.9 | 1    | -    |
| $V_{BE1}-V_{BE2}$     | base-emitter voltage matching |  | [2] | -   | -    | 2 mV |

[1] The smaller of the two values is taken as the numerator.

[2] The smaller of the two values is subtracted from the larger value.

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description   | Simplified outline   | Graphic symbol   |
|-----|--------|---------------|--|--|
| 1   | E1     | emitter TR1   |  <p style="text-align: center;"><b>SOT666</b></p> |  <p style="text-align: center;"><i>sym018</i></p> |
| 2   | B1     | base TR1      |  |  |
| 3   | C2     | collector TR2 |  |  |
| 4   | E2     | emitter TR2   |  |  |
| 5   | B2     | base TR2      |  |  |
| 6   | C1     | collector TR1 |  |  |

## 6. Ordering information

Table 3. Ordering information

| Type number              | Package |   |                        |
|--------------------------|---------|---|------------------------|
|                          | Name    | Description   | Version                |
| <a href="#">BCM857BV</a> | SOT666  | plastic, surface-mounted package; 6 leads; 0.5 mm pitch; 1.6 mm x 1.2 mm x 0.55 mm body | <a href="#">SOT666</a> |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BCM857BV    | 3B           |

## 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> |                           |                               |         |      |      |
| $V_{CBO}$             | 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    | $t_p \leq 1$ ms; single pulse | -       | -200 | mA   |
| $P_{tot}$             | total power dissipation   | $T_{amb} \leq 25$ °C          | [1] [2] | 200  | mW   |
| <b>Per device</b>     |                           |                               |         |      |      |
| $P_{tot}$             | total power dissipation   | $T_{amb} \leq 25$ °C          | [1] [2] | 300  | 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] Reflow soldering is the only recommended soldering method.

## 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] [2] | -   | -   | 625 | K/W  |
| <b>Per device</b>     |   |             |         |     |     |     |      |
| $R_{th(j-a)}$         | thermal resistance from junction to ambient | in free air | [1] [2] | -   | -   | 416 | K/W  |

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

[2] Reflow soldering is the only recommended soldering method.

## 10. Characteristics

Table 7. Characteristics

| Symbol                | Parameter                            | Conditions   |     | Min  | Typ  | Max  | Unit          |
|-----------------------|--------------------------------------|--|-----|------|------|------|---------------|
| <b>Per transistor</b> |                                      |  |     |      |      |      |               |
| $I_{CBO}$             | collector-base cut-off current       | $V_{CB} = -30\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$                                      |     | -    | -    | -15  | nA            |
|                       |                                      | $V_{CB} = -30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^\circ\text{C}$   |     | -    | -    | -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                      | $V_{CE} = -5\text{ V}; I_C = -10\text{ }\mu\text{A}; T_{amb} = 25\text{ }^\circ\text{C}$                           |     | -    | 250  | -    |               |
|                       |                                      | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$                                     |     | 200  | 290  | 450  |               |
| $V_{CEsat}$           | collector-emitter saturation voltage | $I_C = -10\text{ mA}; I_B = -0.5\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$                                    |     | -    | -50  | -200 | mV            |
|                       |                                      | $I_C = -100\text{ mA}; I_B = -5\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$                                     |     | -    | -200 | -400 | mV            |
| $V_{BEsat}$           | base-emitter saturation voltage      | $I_C = -10\text{ mA}; I_B = -0.5\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$                                    | [1] | -    | -760 | -    | mV            |
|                       |                                      | $I_C = -100\text{ mA}; I_B = -5\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$                                     | [1] | -    | -920 | -    | mV            |
| $V_{BE}$              | base-emitter voltage                 | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$                                     | [2] | -600 | -650 | -700 | mV            |
|                       |                                      | $V_{CE} = -5\text{ V}; I_C = -10\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$                                    | [2] | -    | -    | -760 | mV            |
| $C_c$                 | collector capacitance                | $V_{CB} = -10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$  |     | -    | -    | 2.2  | pF            |
| $C_e$                 | emitter capacitance                  | $V_{EB} = -0.5\text{ V}; I_C = 0\text{ A}; i_c = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$ |     | -    | 10   | -    | 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  | 175  | -    | MHz           |
| NF                    | noise figure                         | $V_{CE} = -5\text{ V}; I_C = -0.2\text{ mA}; R_S = 2\text{ k}\Omega; f = 10\text{ kHz to }15.7\text{ kHz}$         |     | -    | 1.6  | -    | dB            |
|                       |                                      | $V_{CE} = -5\text{ V}; I_C = -0.2\text{ mA}; f = 1\text{ kHz}; B = 200\text{ Hz}$                                  |     | -    | 3.1  | -    | dB            |
| <b>Per device</b>     |                                      |  |     |      |      |      |               |
| $h_{FE1}/h_{FE2}$     | DC current gain matching             | $V_{CE} = -5\text{ V}; I_C = -2\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$                                     | [3] | 0.9  | 1    | -    |               |
| $V_{BE1}-V_{BE2}$     | base-emitter voltage matching        |  | [4] | -    | -    | 2    | mV            |

[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] The smaller of the two values is taken as the numerator.

[4] The smaller of the two values is subtracted from the larger value.

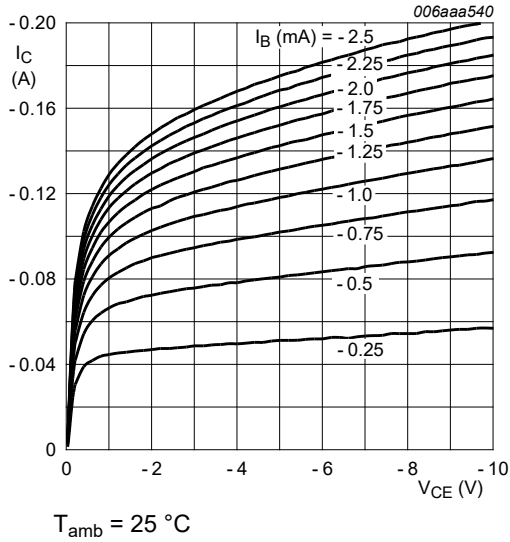


Fig. 1. Collector current as a function of collector-emitter voltage; typical values

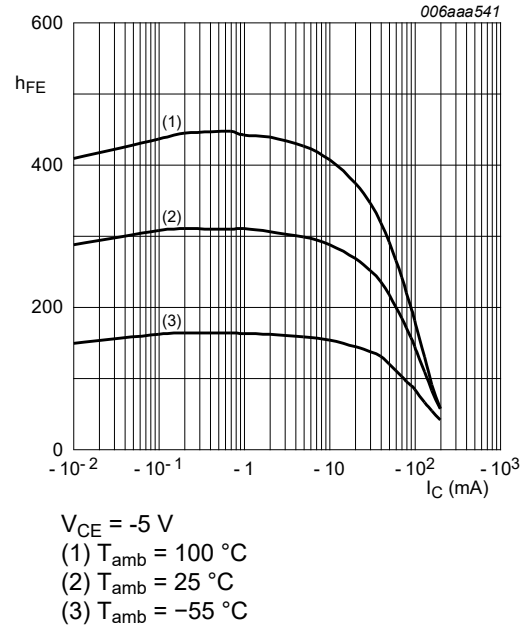


Fig. 2. DC current gain as a function of collector current; typical values

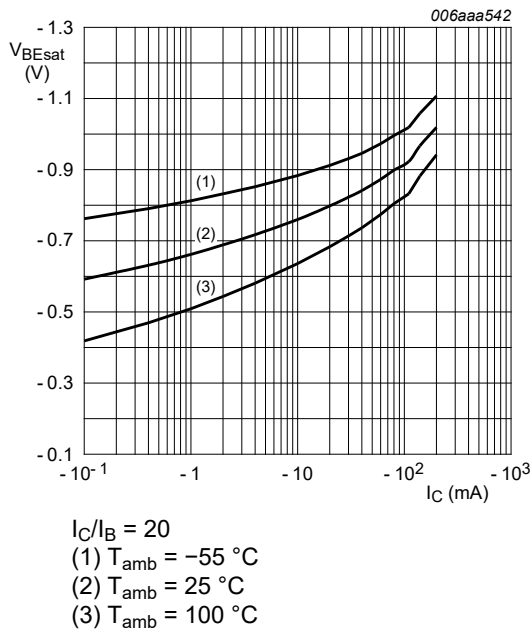


Fig. 3. Base-emitter saturation voltage as a function of collector current; typical values

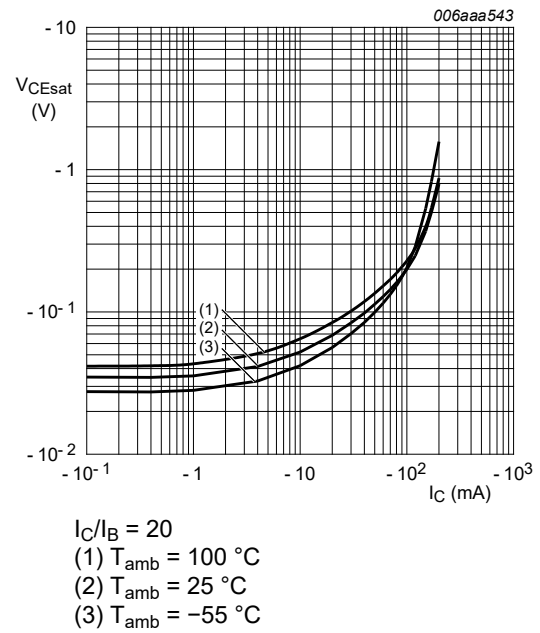
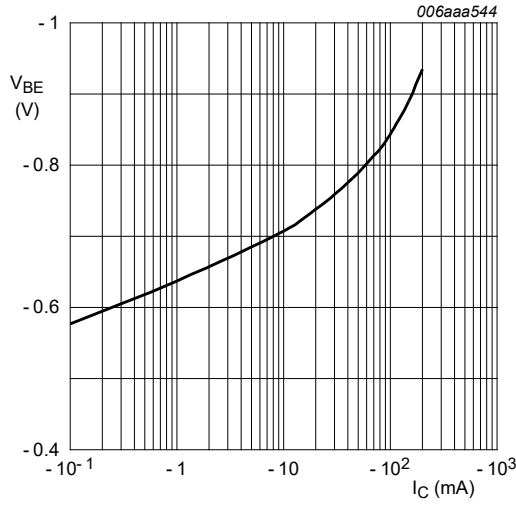
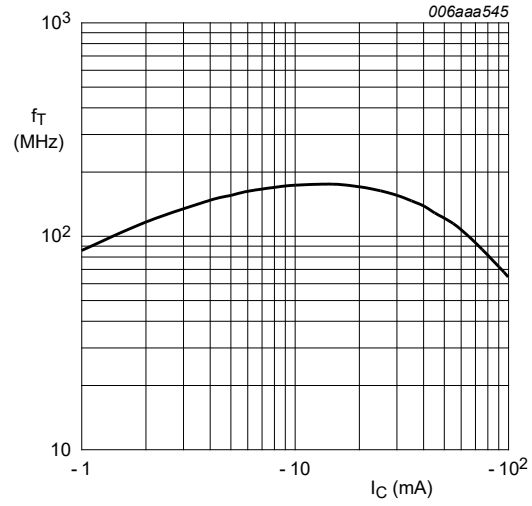


Fig. 4. Collector-emitter saturation voltage as a function of collector current; typical values



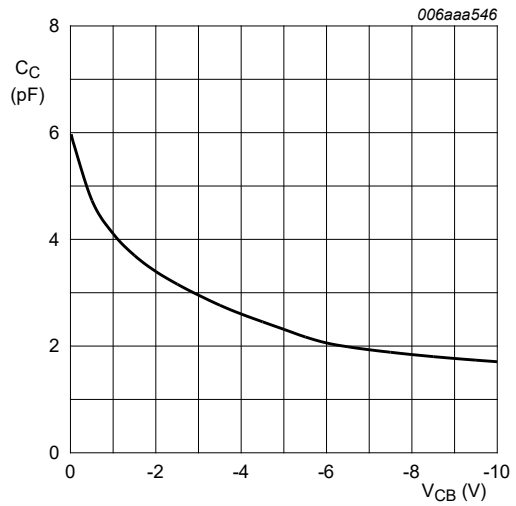
$V_{CE} = -5$  V;  $T_{amb} = 25$  °C

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



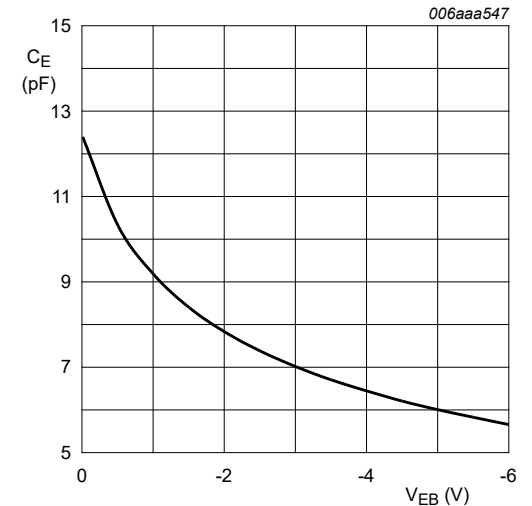
$V_{CE} = -5$  V;  $T_{amb} = 25$  °C

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

## 11. Application information

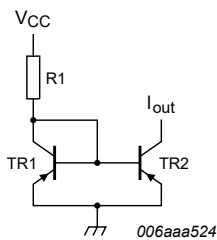


Fig. 9. Current mirror

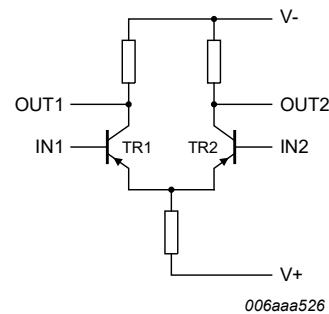


Fig. 10. Differential amplifier

## 12. Package outline

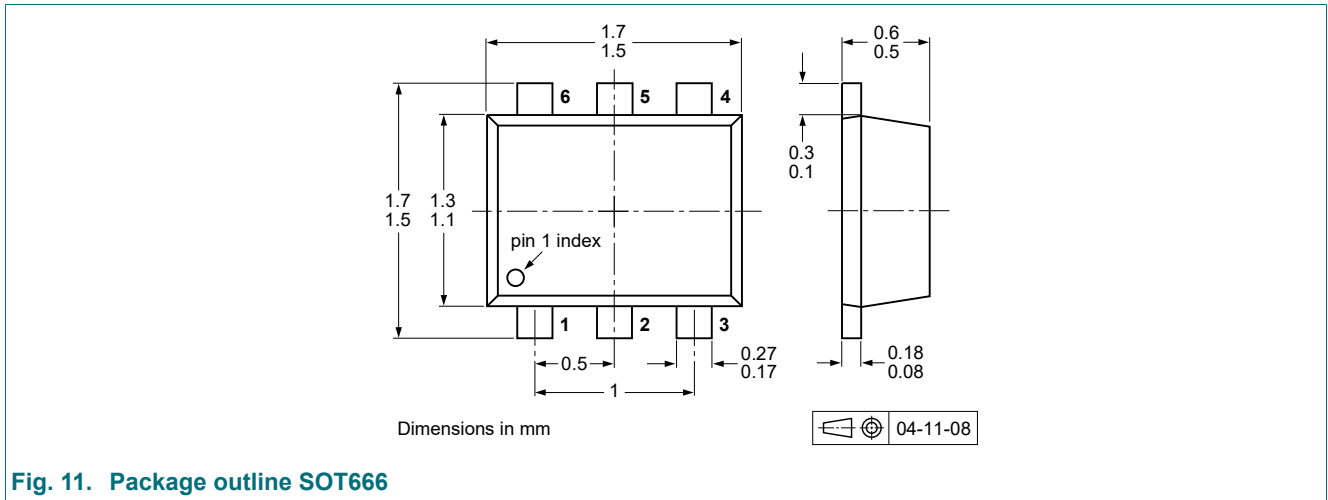


Fig. 11. Package outline SOT666

## 13. Soldering

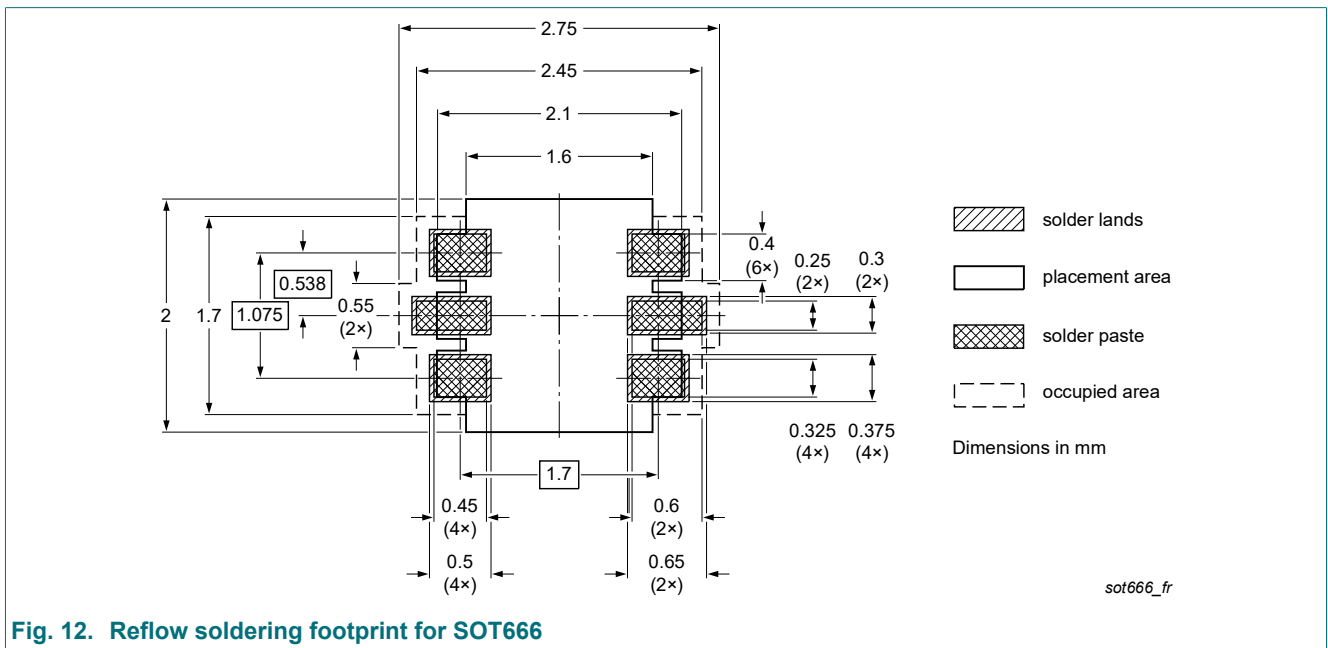


Fig. 12. Reflow soldering footprint for SOT666

## 14. Revision history

Table 8. Revision history

| Data sheet ID    | Release date  | Data sheet status  | Change notice | Supersedes       |
|------------------|---|--------------------|---------------|------------------|
| BCM857BV v.7     | 20230704  | Product data sheet | -             | BCM857BV_BS_DS_6 |
| Modifications:   | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Family data sheet splitted to single type data sheets.</li> <li>Section "Packing information" removed.</li> </ul> |                    |               |                  |
| BCM857BV_BS_DS_6 | 20090828  |                    |               | BCM857BV_BS_DS_5 |
| BCM857BV_BS_DS_5 | 20060627  | Product data sheet | -             | BCM857BS_DS_4    |
| BCM857BS_DS_4    | 20060216  | Product data sheet | -             | BCM857BS_DS_3    |
| BCM857BS_DS_3    | 20060130  | Product data sheet | -             | BCM857BS_2       |
| BCM857BS_2       | 20050411  | Product data sheet | -             | BCM857BS_1       |
| BCM857BS_1       | 20040914  | Product data sheet | -             | -                |

## 15. Legal information

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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.                                     |

- [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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