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Kind regards,

Team Nexperia



# PBSS5130T

30 V; 1 A PNP low  $V_{CEsat}$  (BISS) transistor

9 July 2013

Product data sheet

## 1. General description

PNP low  $V_{CEsat}$  Breakthrough In Small Signal (BISS) transistor in a small SOT23 Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Small SMD plastic package
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability:  $I_C$  and  $I_{CM}$
- Higher efficiency due to less heat generation
- AEC-Q101 qualified

## 3. Applications

- DC-to-DC conversion
- Supply line switching
- Battery charger
- LCD backlighting
- Driver in low supply voltage applications (e.g. lamps and LEDs)

## 4. Quick reference data

Table 1. Quick reference data

| Symbol      | Parameter                               | Conditions   | Min | Typ | Max | Unit       |
|-------------|---|--|-----|-----|-----|------------|
| $V_{CEO}$   | collector-emitter voltage               | open base  | -   | -   | -30 | V          |
| $I_C$       | collector current                       |  | -   | -   | -1  | A          |
| $I_{CM}$    | peak collector current                  | single pulse; $t_p \leq 1$ ms  | -   | -   | -3  | A          |
| $R_{CEsat}$ | collector-emitter saturation resistance | $I_C = -500$ mA; $I_B = -50$ mA; pulsed;<br>$t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_{amb} = 25$ °C | -   | -   | 220 | m $\Omega$ |

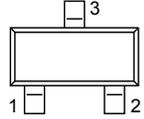
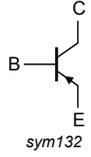


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## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline  | Graphic symbol  |
|-----|--------|-------------|---|---|
| 1   | B      | base        |  <p>TO-236AB (SOT23)</p> |  <p>sym132</p> |
| 2   | E      | emitter     |   |   |
| 3   | C      | collector   |   |   |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package  |  |         |
|-------------|----------|--|---------|
|             | Name     | Description                              | Version |
| PBSS5130T   | TO-236AB | plastic surface-mounted package; 3 leads | SOT23   |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PBSS5130T   | %3E          |

[1] % = placeholder for manufacturing site code

## 8. Limiting values

**Table 5. Limiting values**

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

| Symbol    | Parameter                 | Conditions                    |     | Min | Max  | Unit |
|-----------|---------------------------|-------------------------------|-----|-----|------|------|
| $V_{CBO}$ | collector-base voltage    | open emitter                  |     | -   | -30  | V    |
| $V_{CEO}$ | collector-emitter voltage | open base                     |     | -   | -30  | V    |
| $V_{EBO}$ | emitter-base voltage      | open collector                |     | -   | -5   | V    |
| $I_C$     | collector current         |                               |     | -   | -1   | A    |
| $I_{CM}$  | peak collector current    | single pulse; $t_p \leq 1$ ms |     | -   | -3   | A    |
| $I_{BM}$  | peak base current         |                               |     | -   | -300 | mA   |
| $P_{tot}$ | total power dissipation   | $T_{amb} \leq 25$ °C          | [1] | -   | 300  | mW   |
|           |                           |                               | [2] | -   | 480  | mW   |
| $T_j$     | junction temperature      |                               |     | -   | 150  | °C   |
| $T_{amb}$ | ambient temperature       |                               |     | -55 | 150  | °C   |
| $T_{stg}$ | storage temperature       |                               |     | -65 | 150  | °C   |

[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 cm<sup>2</sup>.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol        | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|---------------|---|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 417 | K/W  |
|               |   |             | [2] | -   | -   | 260 | K/W  |

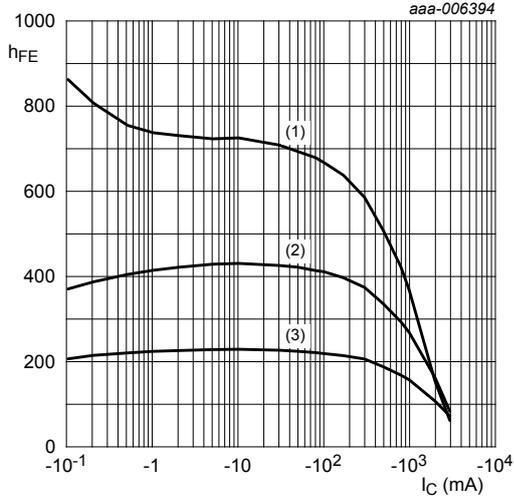
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

## 10. Characteristics

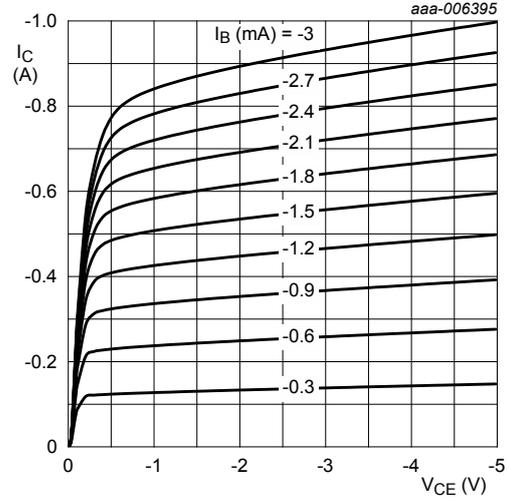
Table 7. Characteristics

| Symbol             | Parameter                               | Conditions   | Min | Typ | Max   | Unit |
|--------------------|---|--|-----|-----|-------|------|
| I <sub>CBO</sub>   | collector-base cut-off current          | V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C  | -   | -   | -100  | nA   |
|                    |   | V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C   | -   | -   | -50   | μA   |
| I <sub>EBO</sub>   | emitter-base cut-off current            | V <sub>EB</sub> = -4 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> = -2 V; I <sub>C</sub> = -100 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C  | 300 | 450 | -     |      |
|                    |   | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C  | 260 | 350 | -     |      |
|                    |   | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -1 A; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C     | 210 | 290 | -     |      |
| V <sub>CEsat</sub> | collector-emitter saturation voltage    | I <sub>C</sub> = -100 mA; I <sub>B</sub> = -1 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C  | -   | -   | -100  | mV   |
|                    |   | I <sub>C</sub> = -1 A; I <sub>B</sub> = -50 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C    | -   | -   | -225  | mV   |
| R <sub>CEsat</sub> | collector-emitter saturation resistance | I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C | -   | -   | 220   | mΩ   |
| V <sub>BEsat</sub> | base-emitter saturation voltage         | I <sub>C</sub> = -2 A; I <sub>B</sub> = -200 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C   | -   | -   | -1.1  | V    |
| V <sub>BEon</sub>  | base-emitter turn-on voltage            | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -100 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C  | -   | -   | -0.75 | V    |
| f <sub>T</sub>     | transition frequency                    | V <sub>CE</sub> = -10 V; I <sub>C</sub> = -100 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C                               | 100 | 200 | -     | MHz  |
| 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               | -   | -   | 28    | pF   |



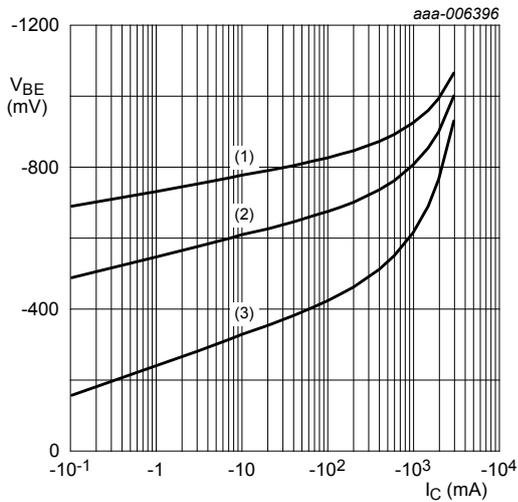
$V_{CE} = -2$  V  
 (1)  $T_{amb} = 150^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = -55^\circ\text{C}$

**Fig. 1. DC current gain as a function of collector current; typical values**



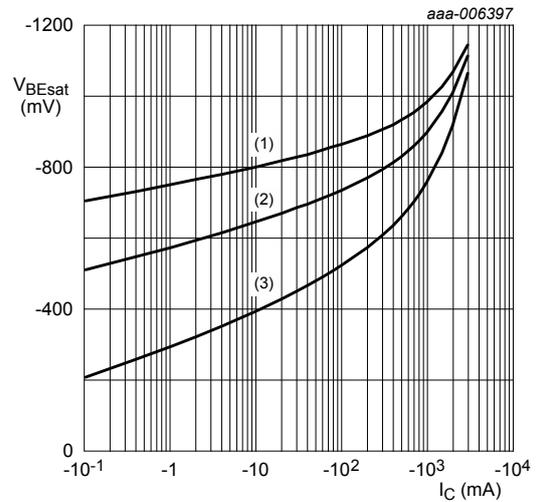
$T_{amb} = 25^\circ\text{C}$

**Fig. 2. Collector current as a function of collector-emitter voltage; typical values**



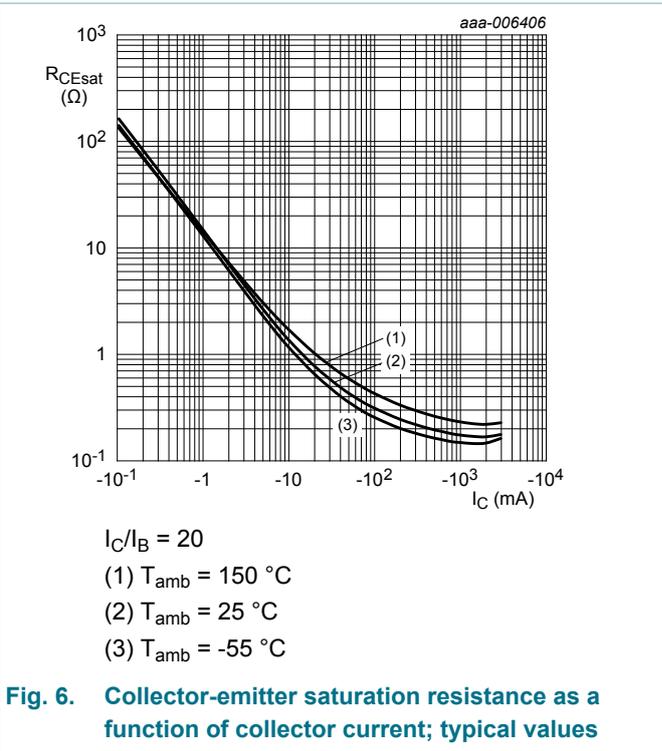
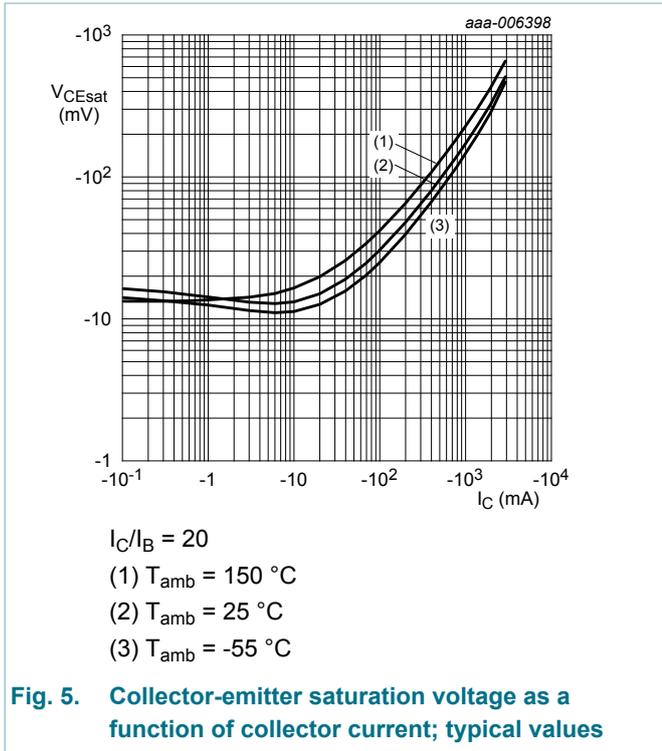
$V_{CE} = -2$  V  
 (1)  $T_{amb} = 150^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = -55^\circ\text{C}$

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



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

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

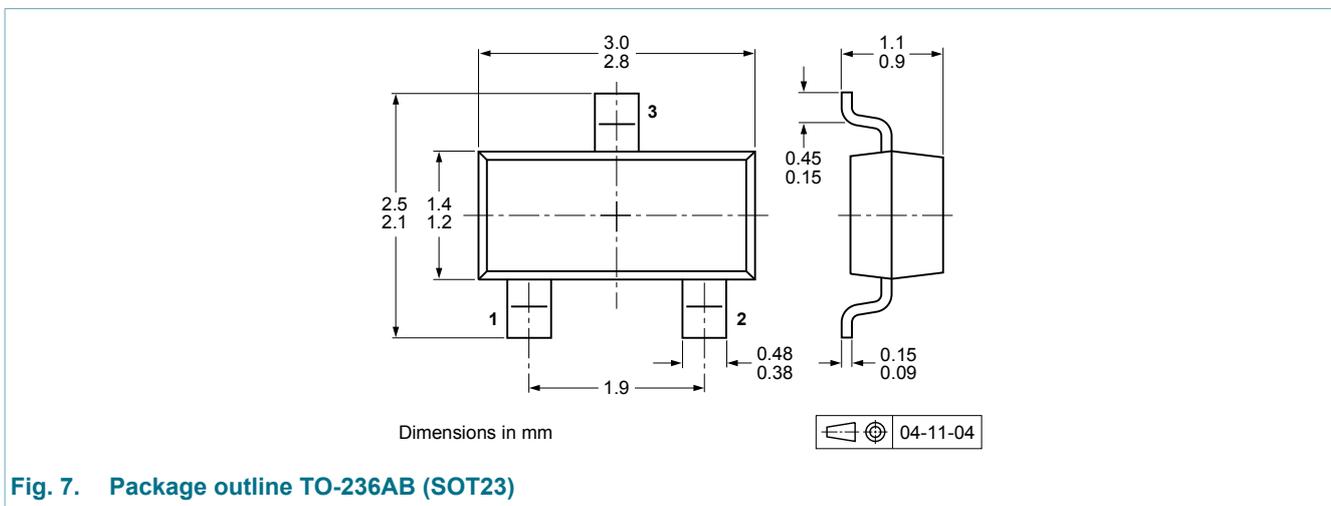


## 11. Test information

### 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

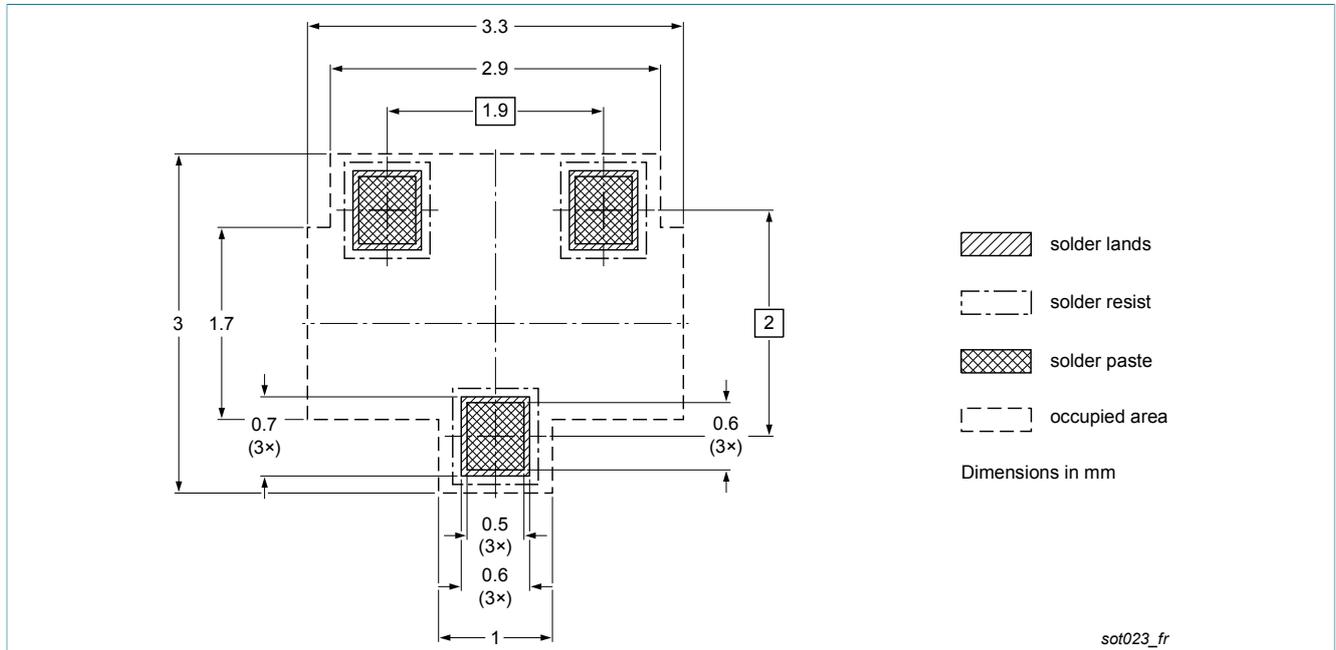


Fig. 8. Reflow soldering footprint for TO-236AB (SOT23)

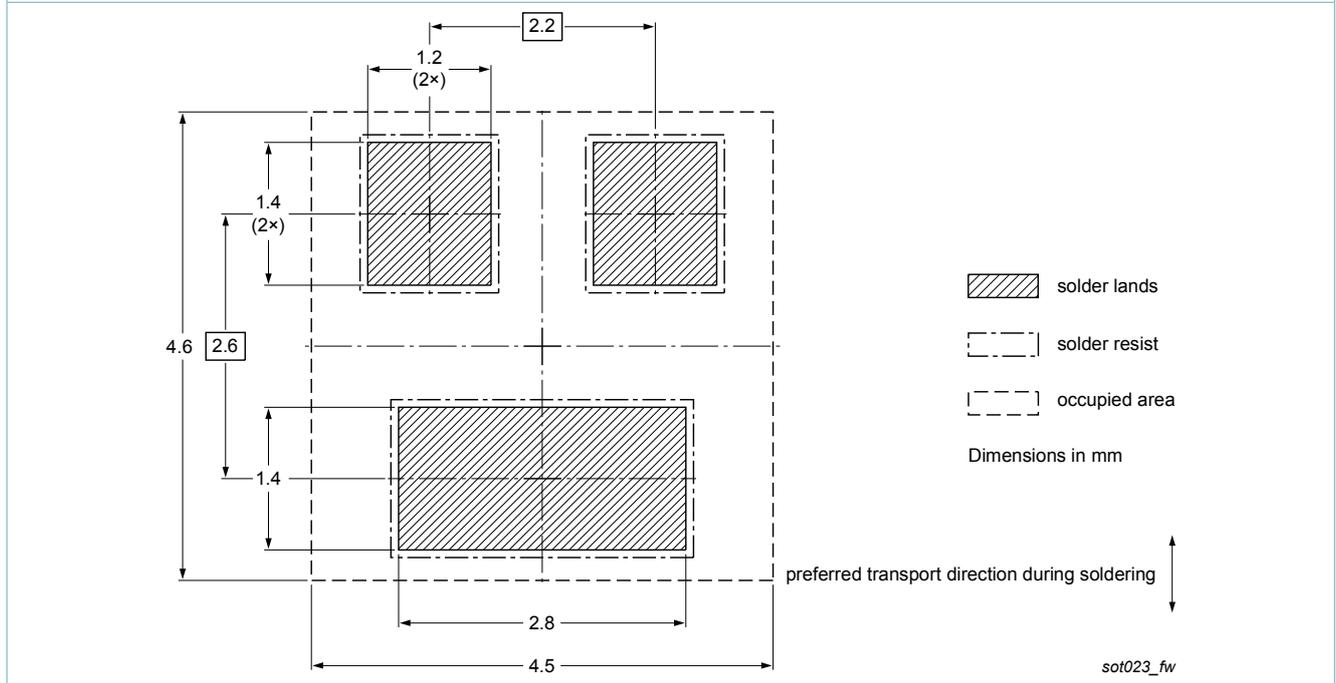


Fig. 9. Wave soldering footprint for TO-236AB (SOT23)

## 14. Revision history

Table 8. Revision history

| Data sheet ID  | Release date   | Data sheet status  | Change notice | Supersedes    |
|----------------|--|--------------------|---------------|---------------|
| PBSS5130T v.2  | 20130709   | Product data sheet | -             | PBSS5130T v.1 |
| Modifications: | <ul style="list-style-type: none"> <li>The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Sections "General description", "Features and benefits" and "Applications": updated</li> <li>Section "Marking": updated</li> <li>Table "Limiting values": ambient temperature <math>T_{amb}</math> updated</li> <li>Table "Characteristics": base-emitter saturation voltage <math>V_{BEsat}</math> added</li> <li>Figures 1 to 6: added</li> <li>Section "Test information": added</li> <li>Figure "Package outline TO-236AB (SOT23)": replaced by minimized outline drawing</li> <li>Section "Soldering": added</li> <li>Section "Legal information": updated</li> </ul> |                    |               |               |
| PBSS5130T v.1  | 20031212   | 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.
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