

PBSS4160U

60 V, 1 A NPN low V_{CEsat} (BISS) transistor

Rev. 01 — 23 April 2004

Objective data sheet

1. Product profile

1.1 General description

NPN low V_{CEsat} (BISS) transistor in a SOT323 (SC-70) plastic package.
PNP complement: PBSS5160U.

1.2 Features

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High efficiency leading to less heat generation
- Reduces printed-circuit board area required
- Cost-effective replacement of medium power transistors BCP55 and BCX55.

1.3 Applications

- Major application segments
 - ◆ Automotive
 - ◆ Telecom infrastructure
 - ◆ Industrial.
- Power management
 - ◆ DC-to-DC conversion
 - ◆ Supply line switching.
- Peripheral driver
 - ◆ Inductive load driver (e.g. relays, buzzers and motors)
 - ◆ Driver in low voltage applications (e.g. lamps, and LEDs).

1.4 Quick reference data

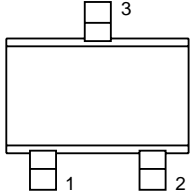
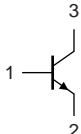
Table 1: Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|---------------------------|------------|-----|-----|-----|------------|
| V_{CEO} | collector-emitter voltage | | - | - | 60 | V |
| I_C | collector current (DC) | | - | - | 1 | A |
| I_{CM} | peak collector current | | - | - | 2 | A |
| R_{CEsat} | equivalent on-resistance | | - | - | 280 | m Ω |

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2. Pinning information

Table 2: Discrete pinning

| Pin | Description | Simplified outline | Symbol |
|-----|-------------|--|---|
| 1 | base |  <p style="text-align: center;">sot323_so</p> |  <p style="text-align: center;">sym021</p> |
| 2 | emitter | | |
| 3 | collector | | |

3. Ordering information

Table 3: Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PBSS4160U | - | plastic surface mounted package; 3 leads | SOT323 |

4. Marking

Table 4: Marking

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PBSS4160U | 52* |

[1] * = t: made in Malaysia.

5. 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 | - | 80 | V |
| V_{CEO} | collector-emitter voltage | open base | - | 60 | V |
| V_{EBO} | emitter-base voltage | open collector | - | 5 | V |
| I_C | collector current (DC) | | - | 1 | A |
| I_{CM} | peak collector current | $t = 1$ ms or limited by $T_{j(max)}$ | - | 2 | A |
| I_B | base current (DC) | | - | 300 | mA |
| I_{BM} | peak base current | $t_p \leq 300$ μ s; $\delta \leq 0.02$ | - | 1 | A |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] - | 250 | mW |
| | | | [2] - | 350 | mW |
| | | | [3] - | <tb> | mW |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | operating ambient temperature | | -65 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.

[2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 1 cm².

[3] Device mounted on a ceramic circuit board, Al₂O₃, standard footprint.

6. Thermal characteristics

Table 6: Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|---------------|---|-------------|----------|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] 500 | K/W |
| | | | [2] 357 | K/W |
| | | | [3] <tb> | K/W |

[1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.

[2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, mounting pad for collector 1 cm².

[3] Device mounted on a ceramic circuit board, Al₂O₃, standard footprint.

7. Characteristics

Table 7: Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|--------------------------------------|---|-----|--------|--------|----------------------|
| I_{CBO} | collector-base cut-off current | $V_{CB} = 60\text{ V}; I_E = 0\text{ A}$ | - | - | 100 | nA |
| | | $V_{CB} = 60\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^\circ\text{C}$ | - | - | 50 | μA |
| I_{CES} | collector-emitter cut-off current | $V_{CE} = 60\text{ V}; V_{BE} = 0\text{ V}$ | - | - | 100 | nA |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = 5\text{ V}; I_C = 0\text{ A}$ | - | - | 100 | nA |
| h_{FE} | DC current gain | $V_{CE} = 5\text{ V}; I_C = 1\text{ mA}$ | 250 | <tbid> | - | |
| | | $V_{CE} = 5\text{ V}; I_C = 500\text{ mA}$ | [1] | 200 | <tbid> | - |
| | | $V_{CE} = 5\text{ V}; I_C = 1\text{ A}$ | [1] | 100 | <tbid> | - |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 100\text{ mA}; I_B = 1\text{ mA}$ | - | <tbid> | 110 | mV |
| | | $I_C = 500\text{ mA}; I_B = 50\text{ mA}$ | - | <tbid> | 150 | mV |
| | | $I_C = 1\text{ A}; I_B = 100\text{ mA}$ | [1] | - | <tbid> | 280 |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 1\text{ A}; I_B = 50\text{ mA}$ | - | <tbid> | 1.1 | V |
| R_{CEsat} | equivalent on-resistance | $I_C = 1\text{ A}; I_B = 100\text{ mA}$ | [1] | - | <tbid> | 280 $\text{m}\Omega$ |
| V_{BEon} | base-emitter turn-on voltage | $V_{CE} = 5\text{ V}; I_C = 1\text{ A}$ | - | <tbid> | 0.9 | V |
| f_T | transition frequency | $I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 100\text{ MHz}$ | 150 | 220 | - | MHz |
| C_c | collector capacitance | $V_{CB} = 10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$ | - | 5.5 | 10 | pF |

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

8. Package outline

Plastic surface mounted package; 3 leads

SOT323

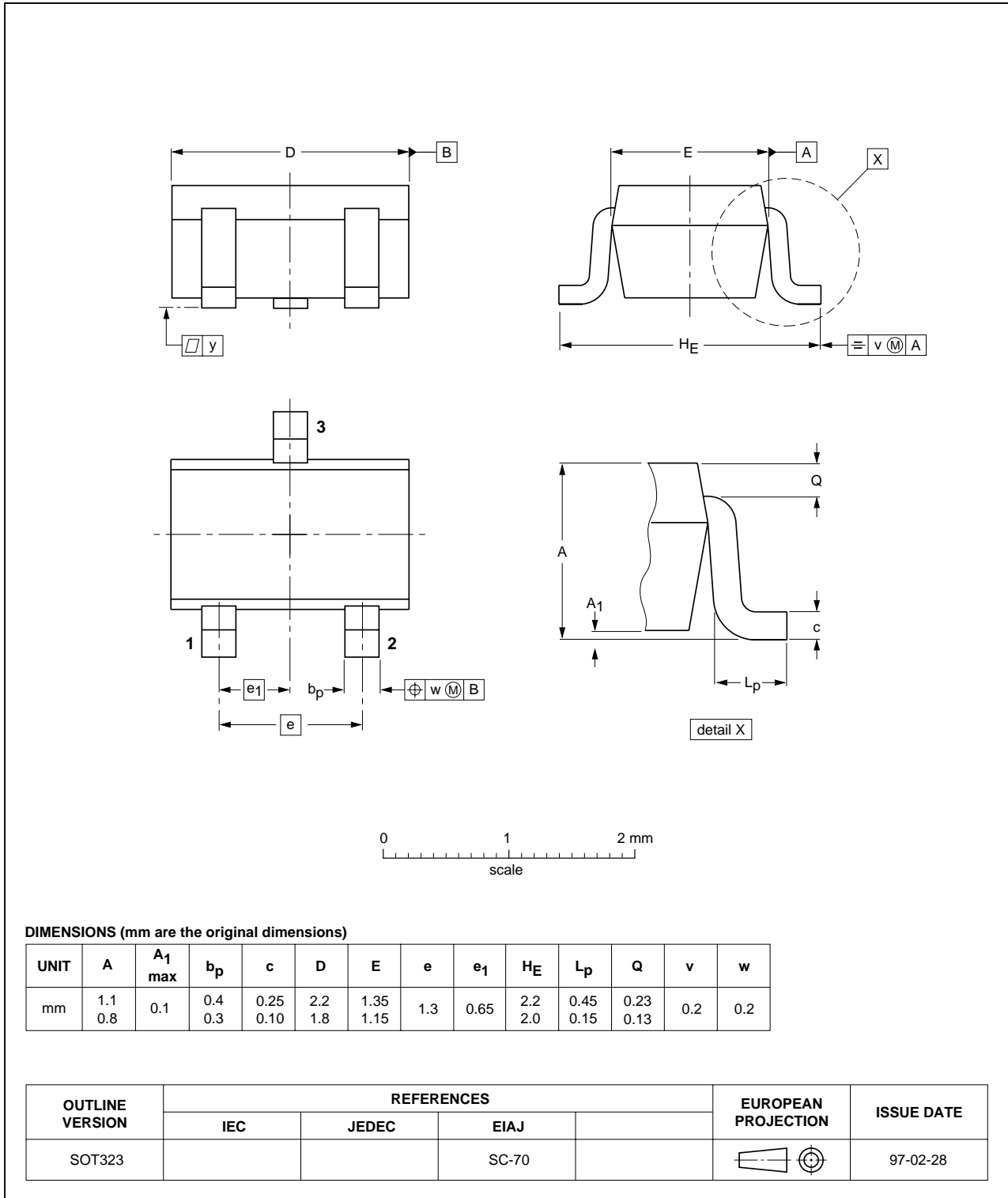


Fig 1. Package outline.

9. Revision history

Table 8: Revision history

| Document ID | Release date | Data sheet status | Change notice | Order number | Supersedes |
|-------------|--------------|-------------------|---------------|----------------|------------|
| PBSS4160U_1 | 20040423 | Objective data | - | 9397 750 12886 | - |

10. Data sheet status

| Level | Data sheet status ^[1] | Product status ^[2] ^[3] | Definition |
|-------|----------------------------------|--|--|
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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