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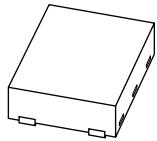
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Kind regards,

Team Nexperia



PBSS8510PA

100 V, 5.2 A NPN low V_{CEsat} (BISS) transistor

Rev. 1 — 17 May 2010

Product data sheet

1. Product profile

1.1 General description

NPN low V_{CEsat} Breakthrough In Small Signal (BISS) transistor, encapsulated in an ultra thin SOT1061 leadless small Surface-Mounted Device (SMD) plastic package with medium power capability.

PNP complement: PBSS9410PA.

1.2 Features and benefits

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- Smaller required Printed-Circuit Board (PCB) area than for conventional transistors
- Exposed heat sink for excellent thermal and electrical conductivity
- Leadless small SMD plastic package with medium power capability

1.3 Applications

- Loadswitch
- Battery-driven devices
- Power management
- Charging circuits
- Power switches (e.g. motors, fans)

1.4 Quick reference data

Table 1. Quick reference data

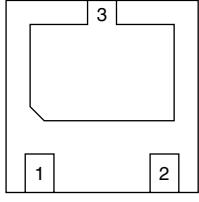
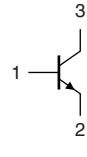
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-------------|---|----------------------------------|-----|-----|-----|------|-----------|
| V_{CEO} | collector-emitter voltage | open base | - | - | 100 | V | |
| I_C | collector current | | - | - | 5.2 | A | |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | - | - | 6 | A | |
| R_{CEsat} | collector-emitter saturation resistance | $I_C = 5.2$ A; $I_B = 260$ mA | [1] | - | 48 | 65 | $m\Omega$ |

[1] Pulse test: $t_p \leq 300$ μ s; $\delta \leq 0.02$.



2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|--|---|
| 1 | base | | |
| 2 | emitter | | |
| 3 | collector |  Transparent top view |  sym021 |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PBSS8510PA | HUSON3 | plastic thermal enhanced ultra thin small outline package; no leads; three terminals; body 2 x 2 x 0.65 mm | SOT1061 |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PBSS8510PA | AE |

5. Limiting values

Table 5. Limiting values

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

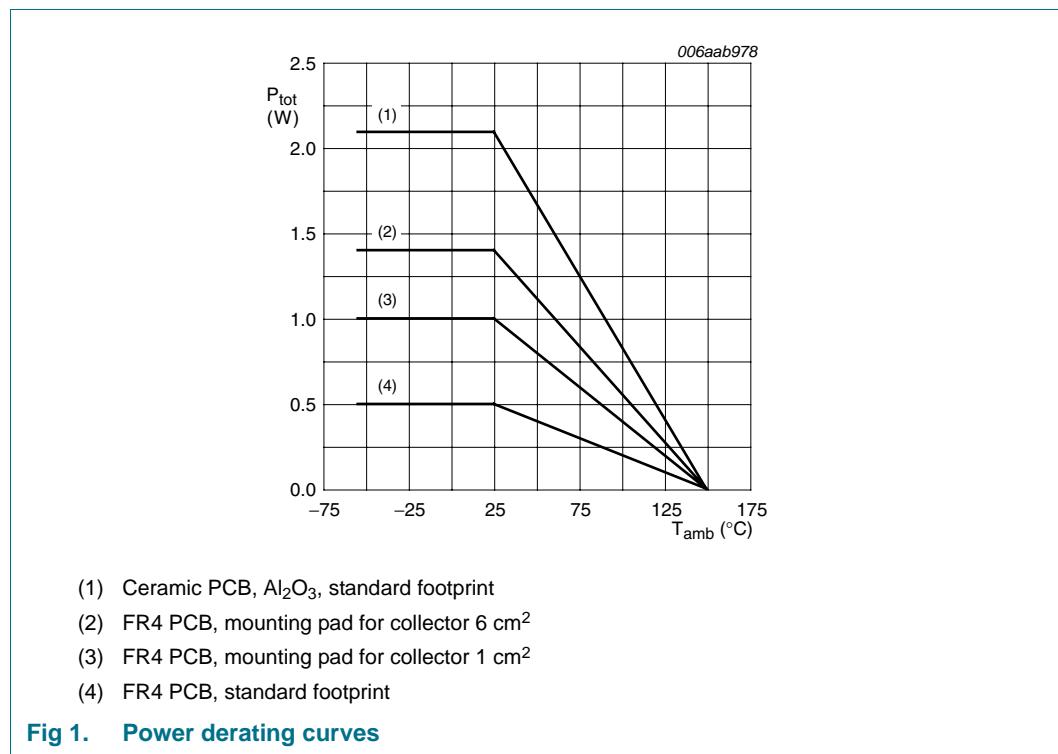
| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|---------------------------|--|-------|-----|------|
| V_{CBO} | collector-base voltage | open emitter | - | 100 | V |
| V_{CEO} | collector-emitter voltage | open base | - | 100 | V |
| V_{EBO} | emitter-base voltage | open collector | - | 6 | V |
| I_C | collector current | | - | 5.2 | A |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1 \text{ ms}$ | - | 6 | A |
| I_B | base current | | - | 600 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25 \text{ }^{\circ}\text{C}$ | [1] - | 500 | mW |
| | | | [2] - | 1 | W |
| | | | [3] - | 1.4 | W |
| | | | [4] - | 2.1 | W |

Table 5. Limiting values ...continued

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|----------------------|------------|-----|------|------|
| 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^2 .[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2 .[4] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.

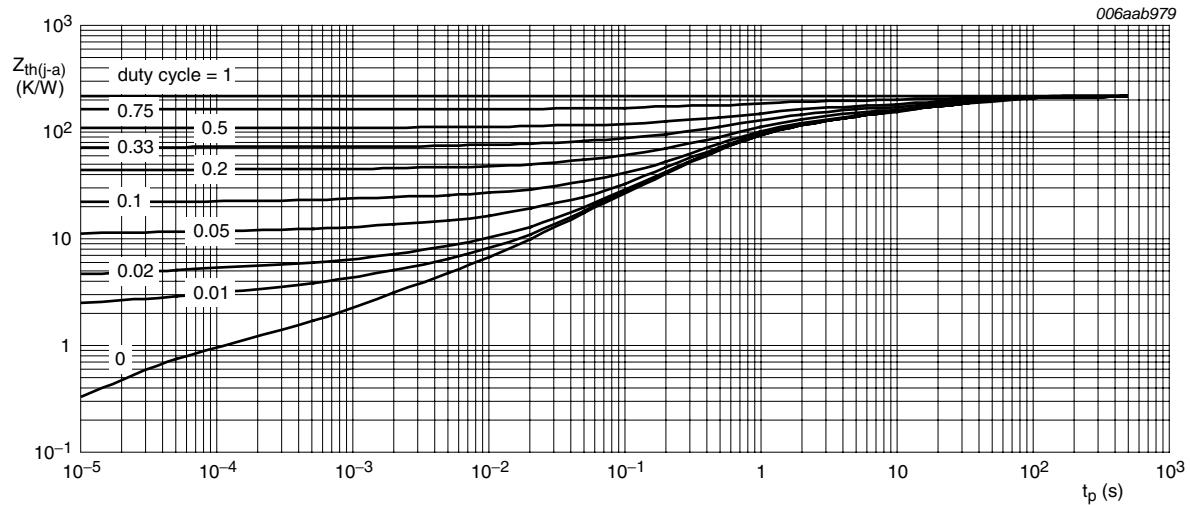
6. Thermal characteristics

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] | - | 250 | K/W |
| | | | [2] | - | 125 | K/W |
| | | | [3] | - | 90 | K/W |
| | | | [4] | - | 60 | K/W |

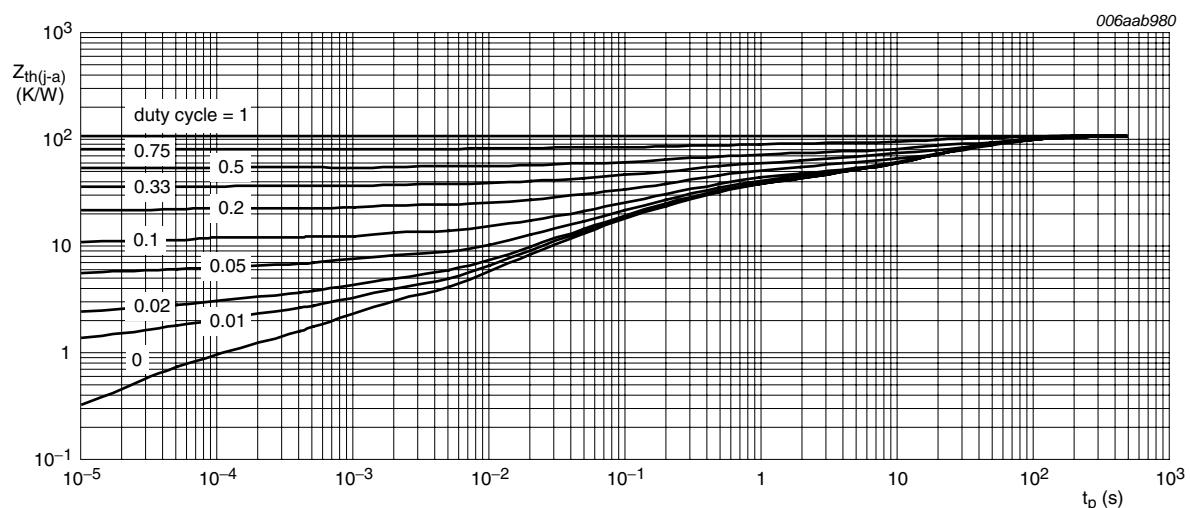
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2 .[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2 .[4] Device mounted on a ceramic PCB, Al_2O_3 , standard footprint.



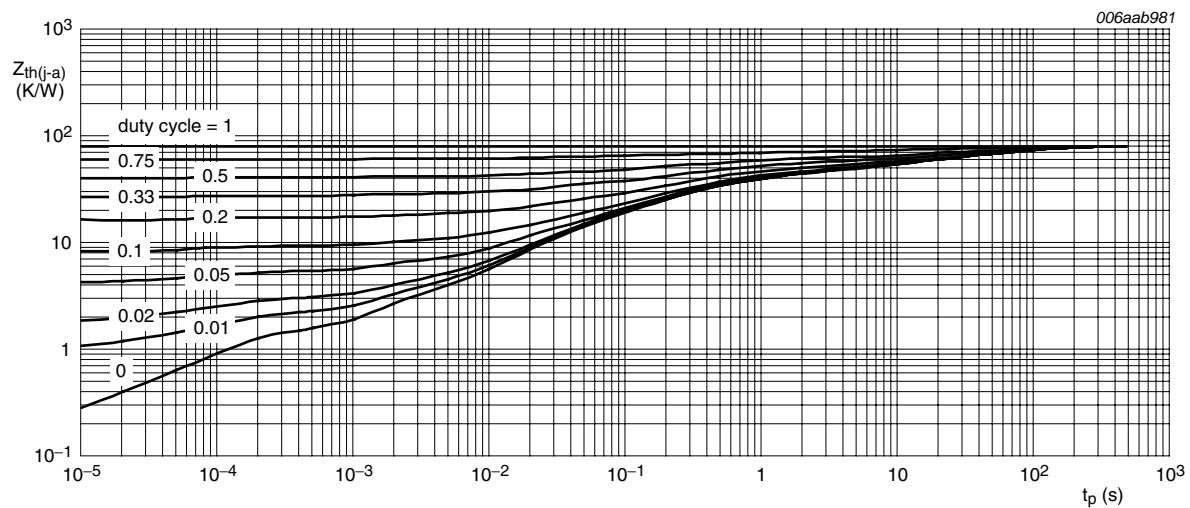
FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



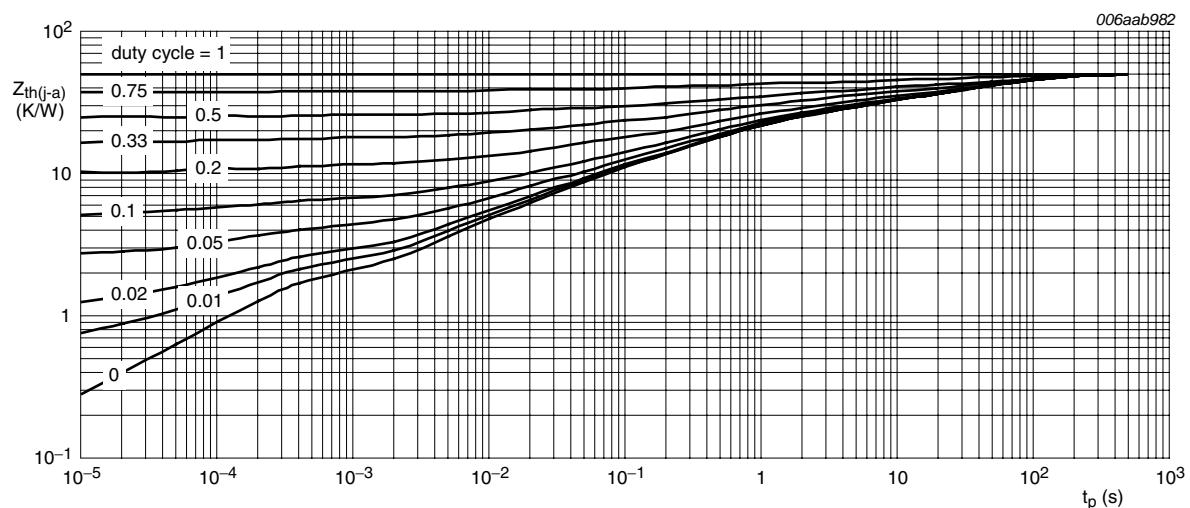
FR4 PCB, mounting pad for collector 1 cm^2

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



FR4 PCB, mounting pad for collector 6 cm^2

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



Ceramic PCB, Al_2O_3 , standard footprint

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

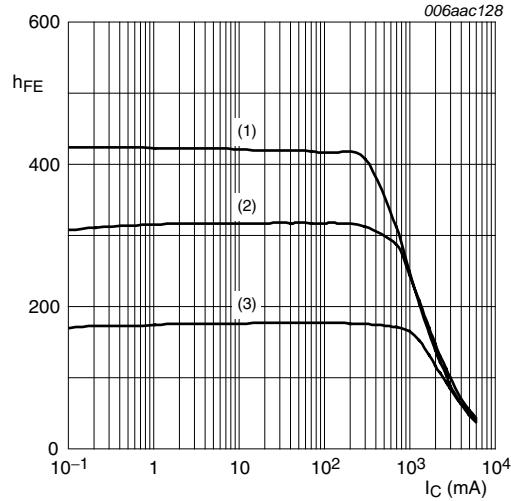
7. Characteristics

Table 7. Characteristics

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

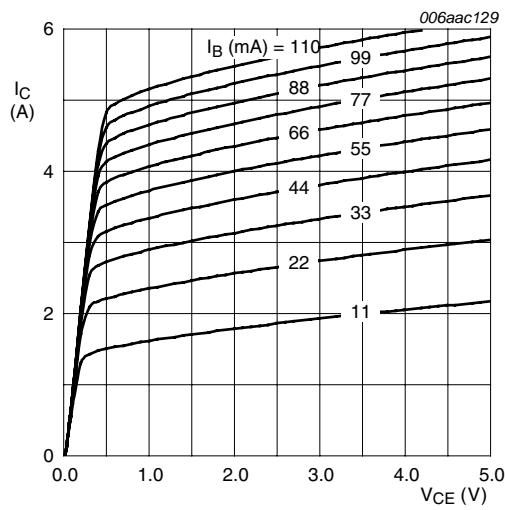
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-------------|---|---|-----|------|------|------------------|---|
| I_{CBO} | collector-base cut-off current | $V_{CB} = 80\text{ V}; I_E = 0\text{ A}$ | - | - | 100 | nA | |
| | | $V_{CB} = 80\text{ V}; I_E = 0\text{ A}; T_j = 150^\circ\text{C}$ | - | - | 50 | μA | |
| I_{CES} | collector-emitter cut-off current | $V_{CE} = 80\text{ V}; V_{BE} = 0\text{ V}$ | - | - | 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 | $V_{CE} = 2\text{ V}$ | [1] | | | | |
| | | $I_C = 0.5\text{ A}$ | 180 | 285 | - | | |
| | | $I_C = 1\text{ A}$ | 150 | 235 | - | | |
| | | $I_C = 2\text{ A}$ | 95 | 145 | - | | |
| | | $I_C = 6\text{ A}$ | 30 | 45 | - | | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 0.5\text{ A}; I_B = 50\text{ mA}$ | [1] | - | 30 | mV | |
| | | $I_C = 1\text{ A}; I_B = 50\text{ mA}$ | [1] | - | 55 | mV | |
| | | $I_C = 1\text{ A}; I_B = 10\text{ mA}$ | [1] | - | 120 | mV | |
| | | $I_C = 4\text{ A}; I_B = 400\text{ mA}$ | [1] | - | 170 | mV | |
| | | $I_C = 5.2\text{ A}; I_B = 260\text{ mA}$ | [1] | - | 250 | mV | |
| R_{CEsat} | collector-emitter saturation resistance | $I_C = 5.2\text{ A}; I_B = 260\text{ mA}$ | [1] | - | 48 | $\text{m}\Omega$ | |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 1\text{ A}; I_B = 10\text{ mA}$ | [1] | - | 0.79 | 0.9 | V |
| | | $I_C = 5.2\text{ A}; I_B = 260\text{ mA}$ | [1] | - | 1 | 1.1 | V |
| V_{BEon} | base-emitter turn-on voltage | $V_{CE} = 2\text{ V}; I_C = 2\text{ A}$ | [1] | - | 0.77 | 0.9 | V |
| t_d | delay time | $V_{CC} = 9\text{ V}; I_C = 2\text{ A}; I_{Bon} = 0.1\text{ A}; I_{Boff} = -0.1\text{ A}$ | - | 24 | - | ns | |
| t_r | rise time | | - | 246 | - | ns | |
| t_{on} | turn-on time | | - | 270 | - | ns | |
| t_s | storage time | | - | 735 | - | ns | |
| t_f | fall time | | - | 230 | - | ns | |
| t_{off} | turn-off time | | - | 965 | - | ns | |
| f_T | transition frequency | $V_{CE} = 10\text{ V}; I_C = 100\text{ mA}; f = 100\text{ MHz}$ | 95 | 150 | - | MHz | |
| C_c | collector capacitance | $V_{CB} = 10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$ | - | 16.5 | 20 | pF | |

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



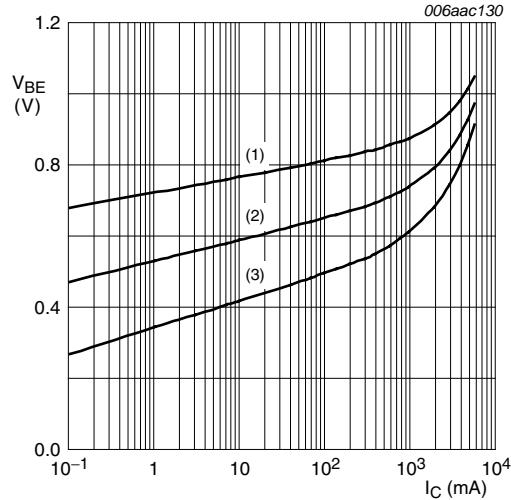
$V_{CE} = 2 \text{ V}$
 (1) $T_{amb} = 100 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig 6. DC current gain as a function of collector current; typical values



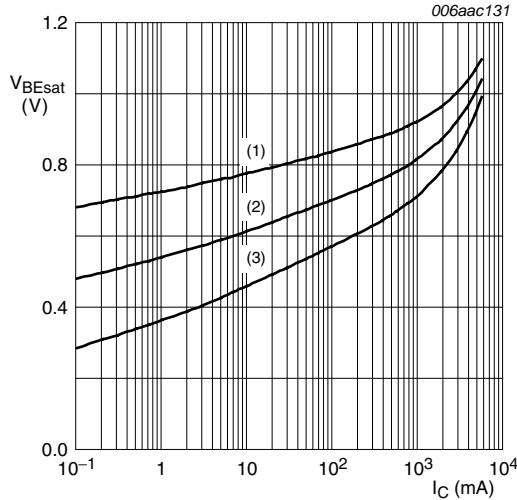
$T_{amb} = 25 \text{ }^{\circ}\text{C}$

Fig 7. Collector current as a function of collector-emitter voltage; typical values



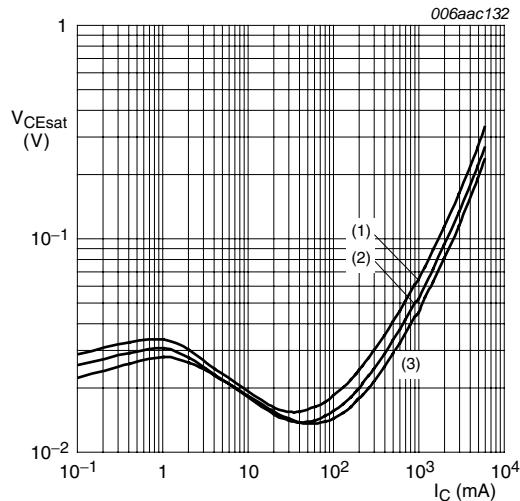
$V_{CE} = 2 \text{ V}$
 (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100 \text{ }^{\circ}\text{C}$

Fig 8. Base-emitter voltage as a function of collector current; typical values



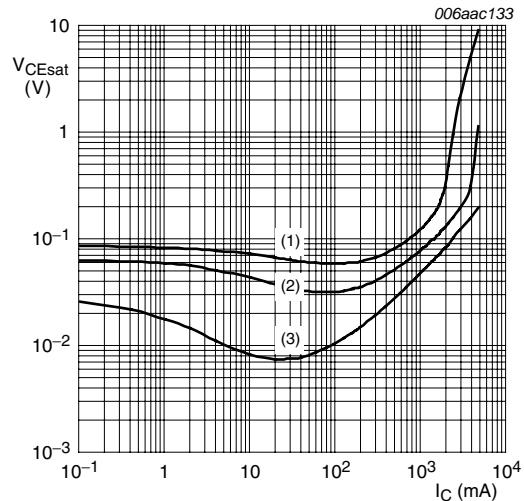
$I_C/I_B = 20$
 (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100 \text{ }^{\circ}\text{C}$

Fig 9. Base-emitter saturation voltage as a function of collector current; typical values



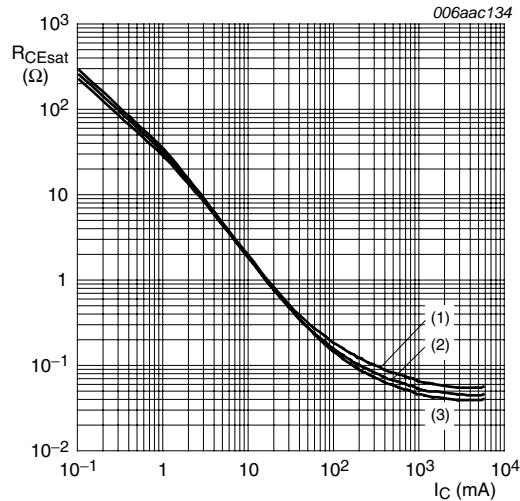
$I_C/I_B = 20$
 (1) $T_{amb} = 100 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig 10. Collector-emitter saturation voltage as a function of collector current; typical values



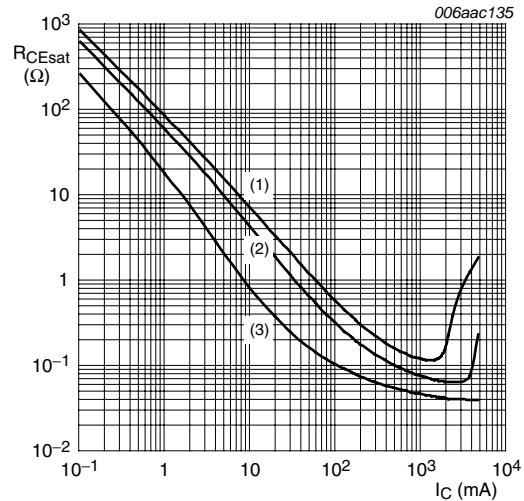
$T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (1) $I_C/I_B = 100$
 (2) $I_C/I_B = 50$
 (3) $I_C/I_B = 10$

Fig 11. Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$
 (1) $T_{amb} = 100 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig 12. Collector-emitter saturation resistance as a function of collector current; typical values



$T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (1) $I_C/I_B = 100$
 (2) $I_C/I_B = 50$
 (3) $I_C/I_B = 10$

Fig 13. Collector-emitter saturation resistance as a function of collector current; typical values

8. Test information

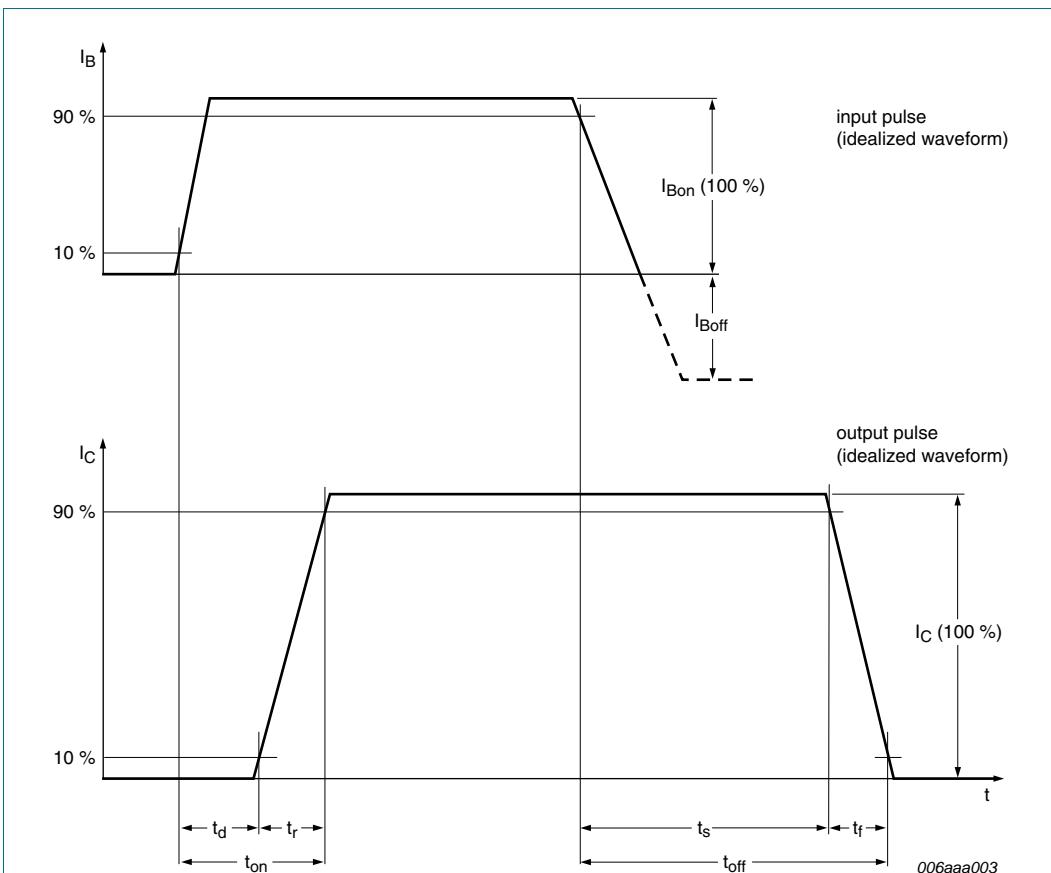
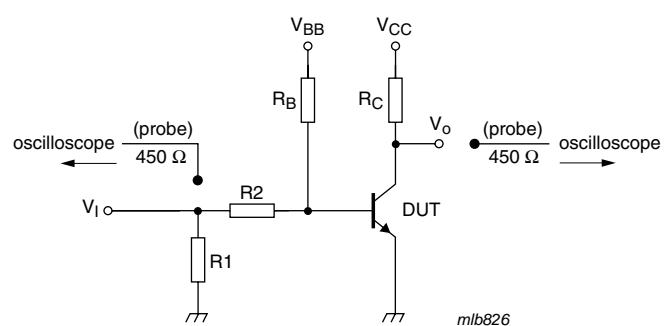


Fig 14. BISS transistor switching time definition



$V_{CC} = 9$ V; $I_C = 2$ A; $I_{Bon} = 0.1$ A; $I_{Boff} = -0.1$ A

Fig 15. Test circuit for switching times

9. Package outline

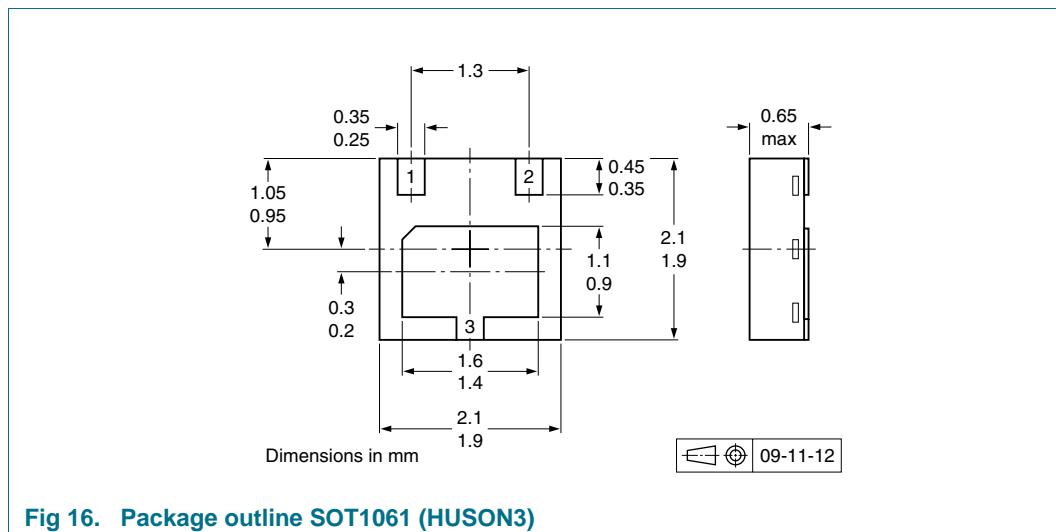


Fig 16. Package outline SOT1061 (HUSON3)

10. Packing information

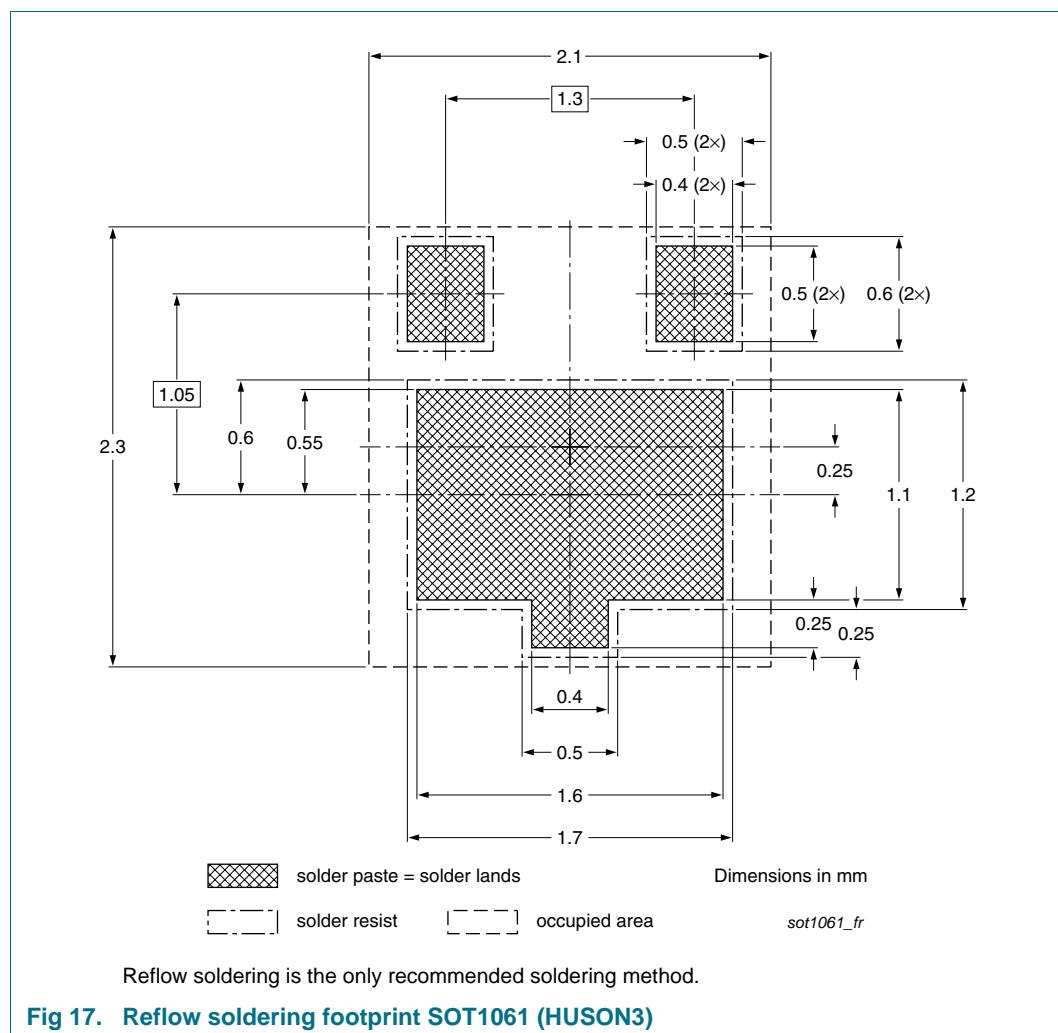
Table 8. Packing methods

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

| Type number | Package | Description | Packing quantity |
|-------------|---------|--------------------------------|------------------|
| PBSS8510PA | SOT1061 | 4 mm pitch, 8 mm tape and reel | 3000 -115 |

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

11. Soldering



12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PBSS8510PA v.1 | 20100517 | Product data sheet | - | - |

13. Legal information

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. |
| Product [short] data sheet | Production | This document contains the product specification. |

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[2] The term 'short data sheet' is explained in section "Definitions".

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