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Kind regards,

Team Nexperia
PBSS9110T
100 V, 1 A
PNP low $V_{CEsat}$ (BISS) transistor

Product data sheet
Supersedes data of 2004 May 06

2004 May 13
100 V, 1 A
PNP low $V_{CE_{Sat}}$ (BISS) transistor

**FEATURES**
- SOT23 package
- Low collector-emitter saturation voltage $V_{CE_{Sat}}$
- High collector current capability: $I_C$ and $I_{CM}$
- Higher efficiency leading to less heat generation

**APPLICATIONS**
- Major application segments
  - Automotive 42 V power
  - Telecom infrastructure
  - Industrial
- DC-to-DC conversion
- Peripheral drivers
  - Driver in low supply voltage applications (e.g. lamps and LEDs).
  - Inductive load driver (e.g. relays, buzzers and motors).

**DESCRIPTION**
PNP low $V_{CE_{Sat}}$ transistor in a SOT23 plastic package.
NPN complement: PBSS8110T.

**MARKING**

<table>
<thead>
<tr>
<th>TYPE NUMBER</th>
<th>MARKING CODE$^{(1)}$</th>
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<tr>
<td>PBSS9110T</td>
<td>‘U7’</td>
</tr>
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**Note**
1. * = p: Made in Hong Kong.
2. * = t: Made in Malaysia.

**QUICK REFERENCE DATA**

<table>
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<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
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<tbody>
<tr>
<td>$V_{CEO}$</td>
<td>collector-emitter voltage</td>
<td>$-100$</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>collector current (DC)</td>
<td>$-1$</td>
<td>A</td>
</tr>
<tr>
<td>$I_{CM}$</td>
<td>repetitive peak collector current</td>
<td>$-3$</td>
<td>A</td>
</tr>
<tr>
<td>$R_{CE_{Sat}}$</td>
<td>equivalent on-resistance</td>
<td>$320$</td>
<td>mΩ</td>
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</table>

**PINNING**

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<thead>
<tr>
<th>PIN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>base</td>
</tr>
<tr>
<td>2</td>
<td>emitter</td>
</tr>
<tr>
<td>3</td>
<td>collector</td>
</tr>
</tbody>
</table>

![Fig.1 Simplified outline (SOT23) and symbol.](image)

**ORDERING INFORMATION**

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<tr>
<th>TYPE NUMBER</th>
<th>PACKAGE</th>
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<td>PBSS9110T</td>
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<td></td>
<td>NAME</td>
</tr>
<tr>
<td></td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td></td>
<td>VERSION</td>
</tr>
<tr>
<td>PBSS9110T</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>plastic surface mounted package; 3 leads</td>
</tr>
<tr>
<td></td>
<td>SOT23</td>
</tr>
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### LIMITING VALUES
In accordance with the Absolute Maximum Rating System (IEC 60134).

<table>
<thead>
<tr>
<th>SYMBOL</th>
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<th>CONDITIONS</th>
<th>MIN.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
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<tr>
<td>V_{CBO}</td>
<td>collector-base voltage</td>
<td>open emitter</td>
<td>–</td>
<td>−120</td>
<td>V</td>
</tr>
<tr>
<td>V_{CEO}</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>–</td>
<td>−100</td>
<td>V</td>
</tr>
<tr>
<td>V_{EBO}</td>
<td>emitter-base voltage</td>
<td>open collector</td>
<td>–</td>
<td>−5</td>
<td>V</td>
</tr>
<tr>
<td>I_{C}</td>
<td>collector current (DC)</td>
<td></td>
<td>–</td>
<td>−1</td>
<td>A</td>
</tr>
<tr>
<td>I_{CM}</td>
<td>peak collector current</td>
<td>limited by ( T_{j(\text{max})} )</td>
<td>–</td>
<td>−3</td>
<td>A</td>
</tr>
<tr>
<td>I_{B}</td>
<td>base current (DC)</td>
<td></td>
<td>–</td>
<td>−300</td>
<td>mA</td>
</tr>
<tr>
<td>P_{tot}</td>
<td>total power dissipation</td>
<td>( T_{\text{amb}} \leq 25 \degree C; \text{note 1} )</td>
<td>–</td>
<td>300</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( T_{\text{amb}} \leq 25 \degree C; \text{note 2} )</td>
<td>–</td>
<td>480</td>
<td>mW</td>
</tr>
<tr>
<td>T_{j}</td>
<td>junction temperature</td>
<td></td>
<td>–</td>
<td>150</td>
<td>\degree C</td>
</tr>
<tr>
<td>T_{amb}</td>
<td>operating ambient temperature</td>
<td></td>
<td>−65</td>
<td>+150</td>
<td>\degree C</td>
</tr>
<tr>
<td>T_{stg}</td>
<td>storage temperature</td>
<td></td>
<td>−65</td>
<td>+150</td>
<td>\degree C</td>
</tr>
</tbody>
</table>

### Notes
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated and 1 cm² collector mounting pad.

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Fig. 2 Power derating curves.

(1) 1 cm² collector mounting pad.
(2) Standard footprint.
THERMAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to</td>
<td>in free air; note 1</td>
<td>417</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td>ambient</td>
<td>in free air; note 2</td>
<td>260</td>
<td>K/W</td>
</tr>
</tbody>
</table>

Notes
1. Device mounted on a printed-circuit board, single-sided copper, tin-plated and standard footprint.
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated and 1 cm² collector mounting pad.

Mounted on printed-circuit board; 1 cm² collector mounting pad.

(1) $\delta = 1$.  
(2) $\delta = 0.75$.  
(3) $\delta = 0.5$.  
(4) $\delta = 0.33$.  
(5) $\delta = 0.2$.  
(6) $\delta = 0.1$.  
(7) $\delta = 0.05$.  
(8) $\delta = 0.02$.  
(9) $\delta = 0.01$.  
(10) $\delta = 0$.

Fig.3 Transient thermal impedance as a function of pulse time; typical values.
Mounted on printed-circuit board; standard footprint.

(1) $\delta = 1.$  
(2) $\delta = 0.75.$  
(3) $\delta = 0.5.$  
(4) $\delta = 0.33.$  
(5) $\delta = 0.2.$  
(6) $\delta = 0.1.$  
(7) $\delta = 0.05.$  
(8) $\delta = 0.02.$  
(9) $\delta = 0.01.$  
(10) $\delta = 0.$

Fig.4 Transient thermal impedance as a function of pulse time; typical values.
## CHARACTERISTICS

\( T_j = 25 \, ^\circ\text{C} \) unless otherwise specified.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I_{CBO} )</td>
<td>collector-base cut-off current</td>
<td>( V_{CB} = -80 , \text{V}; , I_E = 0 , \text{A} )</td>
<td>–</td>
<td>–</td>
<td>–100</td>
<td>nA</td>
</tr>
<tr>
<td>( I_{CBO} )</td>
<td>( V_{CB} = -80 , \text{V}; , I_E = 0 , \text{A}; , T_j = 150 , ^\circ\text{C} )</td>
<td>–</td>
<td>–</td>
<td>–50</td>
<td>( \mu \text{A} )</td>
<td></td>
</tr>
<tr>
<td>( I_{CES} )</td>
<td>collector-emitter cut-off current</td>
<td>( V_{CE} = -80 , \text{V}; , V_{BE} = 0 , \text{A} )</td>
<td>–</td>
<td>–</td>
<td>–100</td>
<td>nA</td>
</tr>
<tr>
<td>( I_{EBO} )</td>
<td>emitter-base cut-off current</td>
<td>( V_{EB} = -4 , \text{V}; , I_C = 0 , \text{A} )</td>
<td>–</td>
<td>–</td>
<td>–100</td>
<td>nA</td>
</tr>
<tr>
<td>( h_{FE} )</td>
<td>DC current gain</td>
<td>( V_{CE} = -5 , \text{V}; , I_C = -1 , \text{mA} )</td>
<td>150</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>( V_{CESat} )</td>
<td>collector-emitter saturation voltage</td>
<td>( I_C = -250 , \text{mA}; , I_B = -25 , \text{mA} )</td>
<td>–</td>
<td>–</td>
<td>–120</td>
<td>mV</td>
</tr>
<tr>
<td>( V_{CESat} )</td>
<td>( I_C = -500 , \text{mA}; , I_B = -50 , \text{mA} )</td>
<td>–</td>
<td>–</td>
<td>–180</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>( V_{CESat} )</td>
<td>( I_C = -1 , \text{A}; , I_B = -100 , \text{mA} )</td>
<td>–</td>
<td>–</td>
<td>–320</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>( R_{CESat} )</td>
<td>equivalent on-resistance</td>
<td>( I_C = -1 , \text{A}; , I_B = -100 , \text{mA} )</td>
<td>–</td>
<td>170</td>
<td>320</td>
<td>mΩ</td>
</tr>
<tr>
<td>( V_{BESat} )</td>
<td>base-emitter saturation voltage</td>
<td>( I_C = -1 , \text{A}; , I_B = -100 , \text{mA} )</td>
<td>–</td>
<td>–</td>
<td>–1.1</td>
<td>V</td>
</tr>
<tr>
<td>( V_{BEon} )</td>
<td>base-emitter turn-on voltage</td>
<td>( V_{CE} = -5 , \text{V}; , I_C = -1 , \text{A} )</td>
<td>–</td>
<td>–</td>
<td>–1</td>
<td>V</td>
</tr>
<tr>
<td>( f_T )</td>
<td>transition frequency</td>
<td>( V_{CE} = -10 , \text{V}; , I_C = -50 , \text{mA}; , f = 100 , \text{MHz} )</td>
<td>100</td>
<td>–</td>
<td>–</td>
<td>MHz</td>
</tr>
<tr>
<td>( C_C )</td>
<td>collector capacitance</td>
<td>( V_{CB} = -10 , \text{V}; , I_E = I_I = 0 , \text{A}; , f = 1 , \text{MHz} )</td>
<td>–</td>
<td>–</td>
<td>17</td>
<td>pF</td>
</tr>
</tbody>
</table>

**Note**

1. Pulse test: \( t_p \leq 300 \, \mu\text{s}; \, \delta \leq 0.02 \).
**100 V, 1 A**
**PNP low $V_{CE\text{sat}}$(BISS) transistor**

**PBSS9110T**

---

**Fig. 5** DC current gain as a function of collector current; typical values.

$V_{CE} = -10$ V.

1. $T_{\text{amb}} = 100$ °C.
2. $T_{\text{amb}} = 25$ °C.
3. $T_{\text{amb}} = -55$ °C.

**Fig. 6** Base-emitter voltage as a function of collector current; typical values.

$V_{CE} = -10$ V.

1. $T_{\text{amb}} = 100$ °C.
2. $T_{\text{amb}} = 25$ °C.
3. $T_{\text{amb}} = -55$ °C.

---

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

$I_{C}/I_{B} = 10$.

1. $T_{\text{amb}} = 100$ °C.
2. $T_{\text{amb}} = 25$ °C.
3. $T_{\text{amb}} = -55$ °C.

**Fig. 8** Collector-emitter saturation voltage as a function of collector current; typical values.

$T_{\text{amb}} = 25$ °C.

1. $I_{C}/I_{B} = 50$.
2. $I_{C}/I_{B} = 20$. 

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2004 May 13
100 V, 1 A
PNP low $V_{CE_{Sat}}$ (BISS) transistor

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

$I_C/I_B = 10$.
(1) $T_{amb} = -55 ^{\circ}C$.
(2) $T_{amb} = 25 ^{\circ}C$.
(3) $T_{amb} = 100 ^{\circ}C$.

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

$I_C/I_B = 20$.
$T_{amb} = 25 ^{\circ}C$.

**Fig. 11** Equivalent on-resistance as a function of collector current; typical values.

$I_C/I_B = 10$.
(1) $T_{amb} = -55 ^{\circ}C$.
(2) $T_{amb} = 25 ^{\circ}C$.
(3) $T_{amb} = 100 ^{\circ}C$.

**Fig. 12** Equivalent on-resistance as a function of collector current; typical values.

$T_{amb} = 25 ^{\circ}C$.
(1) $I_C/I_B = 50$.
(2) $I_C/I_B = 20$. 

$V_{BE_{Sat}}$ (V)

$R_{CE_{Sat}}$ ($\Omega$)
T_{amb} = 25 \degree C.

(1) I_B = 45 mA.  (5) I_B = 27 mA.  (9) I_B = 9 mA.
(2) I_B = 40.5 mA.  (6) I_B = 22.5 mA.  (10) I_B = 4.5 mA.
(3) I_B = 36 mA.  (7) I_B = 18 mA.
(4) I_B = 31.5 mA.  (8) I_B = 13.5 mA.

Fig.13 Collector current as a function of collector-emitter voltage; typical values.
100 V, 1 A
PNP low $V_{CE\text{sat}}$ (BISS) transistor

PBSS9110T

PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT23

DIMENSIONS (mm are the original dimensions)

<table>
<thead>
<tr>
<th>UNIT</th>
<th>A</th>
<th>$A_1$</th>
<th>$b_p$</th>
<th>$c$</th>
<th>D</th>
<th>$E_1$</th>
<th>$e$</th>
<th>$e_1$</th>
<th>$H_E$</th>
<th>$L_p$</th>
<th>$Q$</th>
<th>$v$</th>
<th>$w$</th>
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<tr>
<td>mm</td>
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<td>0.9</td>
<td>0.48</td>
<td>0.15</td>
<td>3.0</td>
<td>1.4</td>
<td>1.9</td>
<td>0.95</td>
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<td>2.1</td>
<td>0.45</td>
<td>0.55</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td></td>
<td>0.38</td>
<td>0.09</td>
<td>2.8</td>
<td>1.2</td>
<td></td>
<td></td>
<td>2.1</td>
<td>0.45</td>
<td>0.15</td>
<td>0.45</td>
<td>0.1</td>
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OUTLINE VERSION

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<th>JEDEC</th>
<th>JEITA</th>
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<td>TO-236AB</td>
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REFERENCES

EUROPEAN PROJECTION

ISSUE DATE

04-11-04
06-03-16
100 V, 1 A
PNP low $V_{CE\text{sat}}$ (BISS) transistor

PBSS9110T

**DATA SHEET STATUS**

<table>
<thead>
<tr>
<th>DOCUMENT STATUS(1)</th>
<th>PRODUCT STATUS(2)</th>
<th>DEFINITION</th>
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<td>Objective data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
</tr>
<tr>
<td>Preliminary data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
</tr>
</tbody>
</table>

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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, except for package outline drawings which were updated to the latest version.

Contact information

For additional information please visit: http://www.nxp.com
For sales offices addresses send e-mail to: salesaddresses@nxp.com