PSS9012 series
20 V PNP general purpose transistors

Product specification
Supersedes data of 2003 May 15

2004 Aug 10
20 V PNP general purpose transistors

**FEATURES**
- High power dissipation: 710 mW
- Low collector capacitance
- Low collector-emitter saturation voltage
- High current capability.

**APPLICATIONS**
- General purpose switching and amplification.

**DESCRIPTION**
PNP general purpose transistor in a SOT54 (TO-92) leaded plastic package. NPN complement: PSS9013 series.

**MARKING**

<table>
<thead>
<tr>
<th>TYPE NUMBER</th>
<th>MARKING CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS9012G</td>
<td>S9012G</td>
</tr>
<tr>
<td>PSS9012H</td>
<td>S9012H</td>
</tr>
</tbody>
</table>

**QUICK REFERENCE DATA**

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{CEO}</td>
<td>collector-emitter voltage</td>
<td>−20</td>
<td>V</td>
</tr>
<tr>
<td>I_C</td>
<td>collector current (DC)</td>
<td>−500</td>
<td>mA</td>
</tr>
<tr>
<td>I_{CM}</td>
<td>peak collector current</td>
<td>−1</td>
<td>A</td>
</tr>
</tbody>
</table>

**PINNING**

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

**LIMITING VALUES**
In accordance with the Absolute Maximum System (IEC 60134).

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{CBO}</td>
<td>collector-base voltage</td>
<td>open emitter</td>
<td>−</td>
<td>−40</td>
<td>V</td>
</tr>
<tr>
<td>V_{CEO}</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>−</td>
<td>−20</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>−500</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{CM}</td>
<td>peak collector current</td>
<td>−1</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{BM}</td>
<td>peak base current</td>
<td>−100</td>
<td>mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P_{tot}</td>
<td>total power dissipation</td>
<td>T_{amb} ≤ 25 °C; note 1</td>
<td>−</td>
<td>710</td>
<td>mW</td>
</tr>
<tr>
<td>T_{stg}</td>
<td>storage temperature</td>
<td>−65</td>
<td>+150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>T_J</td>
<td>junction temperature</td>
<td>−150</td>
<td>°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T_{amb}</td>
<td>operating ambient temperature</td>
<td>−65</td>
<td>+150</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

**Note**
1. Device mounted on a FR4 printed-circuit board, single-sided copper, tinplated and 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 ambient</td>
<td>in free air; note 1</td>
<td>175</td>
<td>K/W</td>
</tr>
</tbody>
</table>

**Note**

1. Device mounted on a FR4 printed-circuit board, single-sided copper, tinplated and standard footprint.

## CHARACTERISTICS

$T_{amb} = 25 \, ^\circ C$ 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>$V_{CB} = -35 , V; I_E = 0$</td>
<td>–</td>
<td>–</td>
<td>–100</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CB} = -35 , V; I_E = 0; T_j = 150 , ^\circ C$</td>
<td>–</td>
<td>–</td>
<td>–50</td>
<td>µA</td>
</tr>
<tr>
<td>$I_{EBO}$</td>
<td>emitter-base cut-off current</td>
<td>$V_{EB} = -5 , V; I_C = 0$</td>
<td>–</td>
<td>–</td>
<td>–100</td>
<td>nA</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = -1 , V; I_C = -500 , mA$</td>
<td>40</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CE} = -1 , V; I_C = -50 , mA$</td>
<td>112</td>
<td>144</td>
<td>166</td>
<td>202</td>
</tr>
<tr>
<td>$V_{CEsat}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_C = -100 , mA; I_B = -10 , mA$</td>
<td>–</td>
<td>–60</td>
<td>–250</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = -500 , mA; I_B = -50 , mA$</td>
<td>–</td>
<td>–230</td>
<td>–600</td>
<td>mV</td>
</tr>
<tr>
<td>$V_{BEsat}$</td>
<td>base-emitter saturation voltage</td>
<td>$I_C = -500 , mA; I_B = -50 , mA$</td>
<td>–</td>
<td>–1</td>
<td>–1.2</td>
<td>V</td>
</tr>
<tr>
<td>$V_{BEon}$</td>
<td>base-emitter turn on voltage</td>
<td>$V_{CE} = -1 , V; I_C = -100mA$</td>
<td>–</td>
<td>–760</td>
<td>–1000</td>
<td>mV</td>
</tr>
<tr>
<td>$C_c$</td>
<td>collector capacitance</td>
<td>$V_{CB} = -6 , V; I_E = I_e = 0$</td>
<td>–</td>
<td>6</td>
<td>–</td>
<td>pF</td>
</tr>
</tbody>
</table>
20 V PNP general purpose transistors  

**Fig. 2** Transition frequency as a function of collector current; typical values.  

\( V_{CE} = -6 \, \text{V} \).  

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

(1) \( I_B = -140 \, \mu\text{A} \).  
(2) \( I_B = -120 \, \mu\text{A} \).  
(3) \( I_B = -100 \, \mu\text{A} \).  
(4) \( I_B = -80 \, \mu\text{A} \).  
(5) \( I_B = -60 \, \mu\text{A} \).  
(6) \( I_B = -40 \, \mu\text{A} \).  
(7) \( I_B = -20 \, \mu\text{A} \).  

**Fig. 4** DC current gain as a function of collector current; typical values.  

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

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

\( V_{CE} = -2 \, \text{V} \).  
(1) \( T_{\text{amb}} = 100 \, ^\circ \text{C} \).  
(2) \( T_{\text{amb}} = 25 \, ^\circ \text{C} \).  
(3) \( T_{\text{amb}} = -55 \, ^\circ \text{C} \).
**Philips Semiconductors**

**Product specification**

**20 V PNP general purpose transistors**

**PSS9012 series**

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

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

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

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

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**Fig. 8** Collector-emitter equivalent on-resistance as a function of collector current; typical values.

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

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**Fig. 9** Collector-emitter equivalent on-resistance as a function of collector current; typical values.

- $I_C/I_B = 20$.
- (1) $T_{amb} = 25 \, ^\circ C$.
- (2) $T_{amb} = 100 \, ^\circ C$.
- (3) $T_{amb} = -55 \, ^\circ C$.
Fig. 10 Base-emitter saturation voltage as a function of collector current; typical values.

- $V_{BE_{sat}}$ vs. $I_C$ for $I_C/I_B = 10$.
  - $T_{amb} = -55 \degree C$.
  - $T_{amb} = 25 \degree C$.
  - $T_{amb} = 100 \degree C$.

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

- $V_{BE_{sat}}$ vs. $I_C$ for $I_C/I_B = 20$.
  - $T_{amb} = -55 \degree C$.
  - $T_{amb} = 25 \degree C$.
  - $T_{amb} = 100 \degree C$.

Fig. 12 Base-emitter voltage as a function of collector current; typical values.

- $V_{BE}$ vs. $I_C$ for $V_{CE} = -1 V$.
  - $T_{amb} = -55 \degree C$.
  - $T_{amb} = 25 \degree C$.
  - $T_{amb} = 100 \degree C$.

Fig. 13 Base-emitter voltage as a function of collector current; typical values.

- $V_{BE}$ vs. $I_C$ for $V_{CE} = -2 V$.
  - $T_{amb} = -55 \degree C$.
  - $T_{amb} = 25 \degree C$.
  - $T_{amb} = 100 \degree C$. 
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PSS9012 series

PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads

SOT54

DIMENSIONS (mm are the original dimensions)

<table>
<thead>
<tr>
<th>UNIT</th>
<th>A</th>
<th>b</th>
<th>b₁</th>
<th>c</th>
<th>D</th>
<th>d</th>
<th>E</th>
<th>e₁</th>
<th>L</th>
<th>L₁ max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>5.2</td>
<td>5.0</td>
<td>0.46</td>
<td>0.66</td>
<td>0.45</td>
<td>4.8</td>
<td>1.7</td>
<td>4.2</td>
<td>2.54</td>
<td>1.27</td>
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Note
1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION

REFERENCES

IEC  JEDEC  JEITA

SOT54  TO-92   SC-43A

EUROPEAN PROJECTION

ISSUE DATE

07-02-28
04-06-28

2004 Aug 10
DATA SHEET STATUS

<table>
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<th>LEVEL</th>
<th>DATA SHEET STATUS(^{(1)})</th>
<th>PRODUCT STATUS(^{2(3)})</th>
<th>DEFINITION</th>
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<tr>
<td>I</td>
<td>Objective data Development</td>
<td>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.</td>
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<td>II</td>
<td>Preliminary data Qualification</td>
<td>This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.</td>
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<tr>
<td>III</td>
<td>Product data Production</td>
<td>This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).</td>
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</table>

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