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Kind regards,

Team Nexperia
1. Product profile

1.1 General description
PNP high-voltage low $V_{CE\text{sat}}$ Breakthrough In Small Signal (BISS) transistor in a medium power SOT223 (SC-73) Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits
- High voltage
- Low collector-emitter saturation voltage $V_{CE\text{sat}}$
- High collector current capability $I_C$ and $I_{CM}$
- High collector current gain ($h_{FE}$) at high $I_C$
- AEC-Q101 qualified
- Medium power SMD plastic package

1.3 Applications
- Electronic ballasts
- LED driver for LED chain module
- LCD backlighting
- Automotive motor management
- Flyback converters
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

1.4 Quick reference data

Table 1. Quick reference data

<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>$V_{CE\text{SM}}$</td>
<td>collector-emitter peak voltage</td>
<td>$V_{BE} = 0$</td>
<td>-</td>
<td>-</td>
<td>–500</td>
<td>V</td>
</tr>
<tr>
<td>$V_{CEO}$</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-</td>
<td>–500</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>collector current</td>
<td></td>
<td>-</td>
<td>-</td>
<td>–0.25</td>
<td>A</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = -10$ V; $I_C = -50$ mA</td>
<td>80</td>
<td>160</td>
<td>300</td>
<td></td>
</tr>
</tbody>
</table>

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

PBHV9050Z
500 V, 250 mA PNP high-voltage low $V_{CE\text{sat}}$ (BISS) transistor
Rev. 1 — 19 August 2010 Product data sheet
2. Pinning information

Table 2. Pinning

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>collector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>emitter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>collector</td>
<td></td>
<td></td>
</tr>
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</table>

3. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBHV9050Z</td>
<td>SC-73</td>
<td>SOT223</td>
<td>plastic surface-mounted package with increased heat sink; 4 leads</td>
<td></td>
</tr>
</tbody>
</table>

4. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBHV9050Z</td>
<td>V9050Z</td>
</tr>
</tbody>
</table>

5. Limiting values

Table 5. Limiting values

<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>-500 V</td>
<td>V</td>
</tr>
<tr>
<td>V_{CEO}</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-500 V</td>
<td>V</td>
</tr>
<tr>
<td>V_{CESM}</td>
<td>collector-emitter peak voltage</td>
<td>V_{BE} = 0</td>
<td>-</td>
<td>-500 V</td>
<td>V</td>
</tr>
<tr>
<td>V_{EBO}</td>
<td>emitter-base voltage</td>
<td>open collector</td>
<td>-</td>
<td>-6 V</td>
<td>V</td>
</tr>
<tr>
<td>I_C</td>
<td>collector current</td>
<td>-</td>
<td>-0.25 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{CM}</td>
<td>peak collector current</td>
<td>single pulse; t_p ≤ 1 ms</td>
<td>-</td>
<td>-0.5 A</td>
<td></td>
</tr>
<tr>
<td>I_{BM}</td>
<td>peak base current</td>
<td>single pulse; t_p ≤ 1 ms</td>
<td>-</td>
<td>-200 mA</td>
<td></td>
</tr>
</tbody>
</table>
**6. Thermal characteristics**

**Table 6.** Thermal characteristics  
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

<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>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1]</td>
<td>-</td>
<td>175</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{th(j-sp)}$</td>
<td>thermal resistance from junction to solder point</td>
<td>-</td>
<td>[2]</td>
<td>-</td>
<td>90</td>
<td>K/W</td>
</tr>
</tbody>
</table>


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

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

Table 7. Characteristics

<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>$V_{CB} = -360 \text{ V}; I_E = 0 \text{ A}$</td>
<td>-</td>
<td>-</td>
<td>-100</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CB} = -360 \text{ V}; I_E = 0 \text{ A}; T_J = 150 \degree \text{ C}$</td>
<td>-</td>
<td>-</td>
<td>-10</td>
<td>µA</td>
</tr>
<tr>
<td>$I_{CES}$</td>
<td>collector-emitter cut-off current</td>
<td>$V_{CE} = -360 \text{ V}; V_{BE} = 0 \text{ V}$</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>$V_{EB} = -5 \text{ V}; I_C = 0 \text{ A}$</td>
<td>-</td>
<td>-</td>
<td>-100</td>
<td>nA</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = -10 \text{ V}$</td>
<td>$I_C = -10 \text{ mA}$</td>
<td>![100]</td>
<td>160</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = -50 \text{ mA}$</td>
<td>![80]</td>
<td>160</td>
<td>300</td>
<td>Unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = -100 \text{ mA}$</td>
<td>![70]</td>
<td>150</td>
<td>-</td>
<td>Unit</td>
</tr>
<tr>
<td>$V_{CEsat}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_C = -20 \text{ mA}; I_B = -2 \text{ mA}$</td>
<td>![115]</td>
<td>-</td>
<td>-200</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = -50 \text{ mA}; I_B = -10 \text{ mA}$</td>
<td>![95]</td>
<td>-</td>
<td>-200</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = -100 \text{ mA}; I_B = -20 \text{ mA}$</td>
<td>![140]</td>
<td>-</td>
<td>-350</td>
<td>mV</td>
</tr>
<tr>
<td>$V_{BEsat}$</td>
<td>base-emitter saturation voltage</td>
<td>$I_C = -50 \text{ mA}; I_B = -10 \text{ mA}$</td>
<td>![0.75]</td>
<td>-</td>
<td>0.9</td>
<td>V</td>
</tr>
<tr>
<td>$t_d$</td>
<td>delay time</td>
<td>$V_{CC} = -20 \text{ V}$; $I_C = -10 \text{ mA}$</td>
<td>-</td>
<td>75</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_r$</td>
<td>rise time</td>
<td>$I_C = -0.05 \text{ A}$; $I_B = -5 \text{ mA}$; $I_{Bon} = 10 \text{ mA}$</td>
<td>-</td>
<td>1600</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{on}$</td>
<td>turn-on time</td>
<td>$I_B = 10 \text{ mA}$</td>
<td>-</td>
<td>1675</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_s$</td>
<td>storage time</td>
<td>-</td>
<td>1200</td>
<td>-</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>$t_t$</td>
<td>fall time</td>
<td>-</td>
<td>550</td>
<td>-</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>$t_{off}$</td>
<td>turn-off time</td>
<td>-</td>
<td>1750</td>
<td>-</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>$f_T$</td>
<td>transition frequency</td>
<td>$V_{CE} = -10 \text{ V}$; $I_E = -10 \text{ mA}$; $f = 100 \text{ MHz}$</td>
<td>-</td>
<td>50</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td>$C_C$</td>
<td>collector capacitance</td>
<td>$V_{CB} = -20 \text{ V}$; $I_E = i_e = 0 \text{ A}$; $f = 1 \text{ MHz}$</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$C_e$</td>
<td>emitter capacitance</td>
<td>$V_{EB} = -0.5 \text{ V}$; $I_C = i_C = 0 \text{ A}$; $f = 1 \text{ MHz}$</td>
<td>-</td>
<td>170</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>

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

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Product data sheet

Rev. 1 — 19 August 2010

5 of 13
500 V, 250 mA PNP high-voltage low $V_{CE_{sat}}$ (BISS) transistor

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

- $V_{CE} = -10$ V
- (1) $T_{amb} = 100$ °C
- (2) $T_{amb} = 25$ °C
- (3) $T_{amb} = -55$ °C

**Fig 5.** Collector current as a function of collector-emitter voltage; typical values

- $T_{amb} = 25$ °C

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

- $V_{CE} = -10$ V
- (1) $T_{amb} = -55$ °C
- (2) $T_{amb} = 25$ °C
- (3) $T_{amb} = 100$ °C

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

- $I_{C/IB} = 5$
- (1) $T_{amb} = -55$ °C
- (2) $T_{amb} = 25$ °C
- (3) $T_{amb} = 100$ °C
**Fig 8.** Collector-emitter saturation voltage as a function of collector current; typical values

- $I_{C/IB} = 5$
- $T_{amb} = 100 \, ^\circ C$
- $T_{amb} = 25 \, ^\circ C$
- $T_{amb} = -55 \, ^\circ C$

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

- $T_{amb} = 25 \, ^\circ C$
- $I_{C/IB} = 20$
- $I_{C/IB} = 10$
- $I_{C/IB} = 5$

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

- $I_{C/IB} = 5$
- $T_{amb} = 100 \, ^\circ C$
- $T_{amb} = 25 \, ^\circ C$
- $T_{amb} = -55 \, ^\circ C$

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

- $T_{amb} = 25 \, ^\circ C$
- $I_{C/IB} = 20$
- $I_{C/IB} = 10$
- $I_{C/IB} = 5$
8. Test information

8.1 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.

9. Package outline

10. Packing information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Packing quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBHV9050Z</td>
<td>SOT223</td>
<td>8 mm pitch, 12 mm tape and reel</td>
<td>-115 -135</td>
</tr>
</tbody>
</table>

[1] For further information and the availability of packing methods, see Section 14.
11. Soldering

Fig 14. Reflow soldering footprint SOT223 (SC-73)

Fig 15. Wave soldering footprint SOT223 (SC-73)
## 12. Revision history

<table>
<thead>
<tr>
<th>Document ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<tbody>
<tr>
<td>PBHV9050Z v.1</td>
<td>20100819</td>
<td>Product data sheet</td>
<td>-</td>
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</table>
13. Legal information

13.1 Data sheet status

<table>
<thead>
<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<tr>
<td>Objective [short] data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
</tr>
<tr>
<td>Preliminary [short] data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product [short] data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
</tr>
</tbody>
</table>

[1] Please consult the most recently issued document before initiating or completing a design.

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

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at URL: http://www.nxp.com.

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14. Contact information

For more information, please visit: http://www.nxp.com

For sales office addresses, please send an email to: salesaddresses@nxp.com
15. Contents

1 Product profile .............................. 1
1.1 General description ..................... 1
1.2 Features and benefits ................... 1
1.3 Applications .............................. 1
1.4 Quick reference data .................... 1
2 Pinning information ....................... 2
3 Ordering information ...................... 2
4 Marking ..................................... 2
5 Limiting values ............................. 2
6 Thermal characteristics ................... 3
7 Characteristics ............................. 5
8 Test information ............................ 8
  8.1 Quality information ...................... 8
9 Package outline ............................. 8
10 Packing information ....................... 8
11 Soldering ................................... 9
12 Revision history ........................... 10
13 Legal information .......................... 11
  13.1 Data sheet status ....................... 11
  13.2 Definitions ............................. 11
  13.3 Disclaimers ............................. 11
  13.4 Trademarks ............................. 12
14 Contact information ....................... 12
15 Contents ................................. 13