1. Product profile

1.1 General description

NPN/PNP general-purpose transistor in a small SOT143B Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- Low current (max. 100 mA)
- Low voltage (max. 30 V)
- Matched pair
- AEC-Q101 qualified
- Small SMD plastic package

1.3 Applications

- General-purpose switching and amplification

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_{CEO}</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>I_C</td>
<td>collector current</td>
<td></td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>h_{FE}</td>
<td>DC current gain</td>
<td>V_{CE} = 5 V; I_C = 2 mA</td>
<td>75</td>
<td>-</td>
<td>800</td>
<td></td>
</tr>
</tbody>
</table>

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, 3</td>
<td>collector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>common base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>common emitter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCV65</td>
<td></td>
<td>plastic surface-mounted package; 4 leads</td>
<td>SOT143B</td>
</tr>
</tbody>
</table>

4. Marking

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code(^{[1]})</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCV65</td>
<td>97*</td>
</tr>
</tbody>
</table>

\(^{[1]}\) * = -: made in Hong Kong  
* = p: made in Hong Kong  
* = t: made in Malaysia  
* = W: made in China

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>Per transistor; for the PNP transistor with negative polarity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V(_{CBO})</td>
<td>collector-base voltage</td>
<td>open emitter</td>
<td>-</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>V(_{CEO})</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>I(_C)</td>
<td>collector current</td>
<td>-</td>
<td>100</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>I(_CM)</td>
<td>peak collector current</td>
<td>-</td>
<td>200</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>I(_BM)</td>
<td>peak base current</td>
<td>-</td>
<td>200</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Per device</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P(_{tot})</td>
<td>total power dissipation</td>
<td>(T_{amb} \leq 25^\circ C)</td>
<td>-</td>
<td>250</td>
<td>mW</td>
</tr>
<tr>
<td>T(_J)</td>
<td>junction temperature</td>
<td>-</td>
<td>150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>T(_{amb})</td>
<td>ambient temperature</td>
<td>-65</td>
<td>+150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>T(_{stg})</td>
<td>storage temperature</td>
<td>-65</td>
<td>+150</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>
6. Thermal characteristics

Table 6. Thermal 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>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air [1]</td>
<td>-</td>
<td>-</td>
<td>500</td>
<td>kW</td>
</tr>
</tbody>
</table>


7. Characteristics

Table 7. Characteristics

$T_j = 25 \, ^\circ C$ 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>$V_{CB} = 30 , V$; $I_E = 0 , A$</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CB} = 30 , V$; $I_E = 0 , A$; $T_j = 150 , ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>$\mu A$</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = 5 , V$; $I_C = 2 , mA$</td>
<td>75</td>
<td>-</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>$V_{CE_{sat}}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_C = 10 , mA$; $I_B = 0.5 , mA$</td>
<td>-</td>
<td>90</td>
<td>300</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = 100 , mA$; $I_B = 5 , mA$</td>
<td>-</td>
<td>250</td>
<td>650</td>
<td>mV</td>
</tr>
<tr>
<td>$V_{BE_{sat}}$</td>
<td>base-emitter saturation voltage</td>
<td>$I_C = 10 , mA$; $I_B = 0.5 , mA$</td>
<td>[1]</td>
<td>700</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = 100 , mA$; $I_B = 5 , mA$</td>
<td>[1]</td>
<td>900</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td>$V_{BE}$</td>
<td>base-emitter voltage</td>
<td>$I_C = 2 , mA$; $V_{CE} = 5 , V$</td>
<td>[2]</td>
<td>580</td>
<td>650</td>
<td>750 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = 10 , mA$; $V_{CE} = 5 , V$</td>
<td>[2]</td>
<td>820</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

[1] $V_{BE_{sat}}$ decreases by about 1.7 mV/K with increasing temperature.

[2] $V_{BE}$ decreases by about 2 mV/K with increasing temperature.
**Nexperia**

**BCV65**

NPN/PNP general-purpose transistor

---

**Fig 1.** TR1 (NPN): DC current gain as a function of collector current; typical values

- $V_{CE} = 5 \, \text{V}$
- (1) $T_{amb} = 150 \, \text{°C}$
- (2) $T_{amb} = 25 \, \text{°C}$
- (3) $T_{amb} = -55 \, \text{°C}$

---

**Fig 2.** TR1 (NPN): Base-emitter voltage as a function of collector current; typical values

- $V_{CE} = 5 \, \text{V}$
- (1) $T_{amb} = -55 \, \text{°C}$
- (2) $T_{amb} = 25 \, \text{°C}$
- (3) $T_{amb} = 150 \, \text{°C}$

---

**Fig 3.** TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values

- $I_{C}/I_{B} = 20$
- (1) $T_{amb} = 150 \, \text{°C}$
- (2) $T_{amb} = 25 \, \text{°C}$
- (3) $T_{amb} = -55 \, \text{°C}$

---

**Fig 4.** TR1 (NPN): Base-emitter saturation voltage as a function of collector current; typical values

- $I_{C}/I_{B} = 10$
- (1) $T_{amb} = -55 \, \text{°C}$
- (2) $T_{amb} = 25 \, \text{°C}$
- (3) $T_{amb} = 150 \, \text{°C}$
Nexperia  
BCV65  
NPN/PNP general-purpose transistor

Fig 5. TR2 (PNP): DC current gain as a function of collector current; typical values

![Graph showing hFE vs. IC for different temperatures]

- $V_{CE} = -5\,\text{V}$
  - (1) $T_{\text{amb}} = 150^\circ\text{C}$
  - (2) $T_{\text{amb}} = 25^\circ\text{C}$
  - (3) $T_{\text{amb}} = -55^\circ\text{C}$

Fig 6. TR2 (PNP): Base-emitter voltage as a function of collector current; typical values

![Graph showing VBE vs. IC for different temperatures]

- $V_{CE} = -5\,\text{V}$
  - (1) $T_{\text{amb}} = -55^\circ\text{C}$
  - (2) $T_{\text{amb}} = 25^\circ\text{C}$
  - (3) $T_{\text{amb}} = 150^\circ\text{C}$

Fig 7. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

![Graph showing VCEsat vs. IC for different temperatures]

- $I_C/I_B = 20$
  - (1) $T_{\text{amb}} = 150^\circ\text{C}$
  - (2) $T_{\text{amb}} = 25^\circ\text{C}$
  - (3) $T_{\text{amb}} = -55^\circ\text{C}$

Fig 8. TR2 (PNP): Base-emitter saturation voltage as a function of collector current; typical values

![Graph showing VBEsat vs. IC for different temperatures]

- $I_C/I_B = 20$
  - (1) $T_{\text{amb}} = -55^\circ\text{C}$
  - (2) $T_{\text{amb}} = 25^\circ\text{C}$
  - (3) $T_{\text{amb}} = 150^\circ\text{C}$
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

Fig 9. Package outline SOT143B

10. Packing information
Please refer to packing information on www.nexperia.com.
11. Soldering

![Fig 10. Reflow soldering footprint SOT143B](sot143b_fr)

![Fig 11. Wave soldering footprint SOT143B](sot143b_fw)
12. Revision history

Table 9. 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>
</tr>
</thead>
<tbody>
<tr>
<td>BCV65 v.4</td>
<td>20100727</td>
<td>Product data sheet</td>
<td>-</td>
<td>BCV65 _3</td>
</tr>
<tr>
<td>BCV65 _3</td>
<td>19990422</td>
<td>Product specification</td>
<td>-</td>
<td>BCV65 CNNV _2</td>
</tr>
<tr>
<td>BCV65 CNNV _2</td>
<td>19970422</td>
<td>Product specification</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Modifications:

- The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.
- Legal texts have been adapted to the new company name where appropriate.
- Section 1 "Product profile": amended
- Section 3 "Ordering information": added
- Section 4 "Marking": updated
- Figure 1, 2, 3, 4, 5, 6, 7 and 8: added
- Figure 9: superseded by minimized package outline drawing
- Section 8 "Test information": added
- Section 10 "Packing information": added
- Section 11 "Soldering": added
- Section 13 "Legal information": updated
13. Legal information

13.1 Data sheet status

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<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.nexperia.com

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http://www.nexperia.com
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13.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.
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