1. General description

NPN general-purpose transistor in a leadless ultra small DFN1006B-3 (SOT883B) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm
- Power dissipation comparable to SOT23
- AEC-Q101 qualified

3. Applications

- General-purpose switching and amplification
- Mobile applications

4. Quick reference data

<table>
<thead>
<tr>
<th>Table 1. Quick reference data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>$V_{CEO}$</td>
</tr>
<tr>
<td>$I_C$</td>
</tr>
<tr>
<td>$h_{FE}$</td>
</tr>
</tbody>
</table>

nexperia
5. Pinning information

Table 2. Pinning information

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

DFN1006B-3 (SOT883B)

6. 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>BC846BMB</td>
<td>DFN1006B-3</td>
<td>plastic, leadless ultra small plastic package; 3 solder lands; 0.35 mm pitch; 1.0 mm x 0.6 mm x 0.37 mm body</td>
<td>SOT883B</td>
<td></td>
</tr>
<tr>
<td>BC846BMB/S501</td>
<td>DFN1006B-3</td>
<td>plastic, leadless ultra small plastic package; 3 solder lands; 0.35 mm pitch; 1.0 mm x 0.6 mm x 0.37 mm body</td>
<td>SOT883B</td>
<td></td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC846BMB</td>
<td>0100 1011</td>
</tr>
<tr>
<td>BC846BMB/S501</td>
<td>0100 1011</td>
</tr>
</tbody>
</table>

Fig. 1. DFN1006B-3 (SOT883B) binary marking code description
8. Limiting values

Table 5. Limiting values

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>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>80</td>
<td>V</td>
</tr>
<tr>
<td>$V_{CEO}$</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>65</td>
<td>V</td>
</tr>
<tr>
<td>$V_{EBO}$</td>
<td>emitter-base voltage</td>
<td>open collector</td>
<td>-</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>collector current</td>
<td></td>
<td>-</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>$I_{CM}$</td>
<td>peak collector current</td>
<td>single pulse; $t_p \leq 1 \text{ ms}$</td>
<td>-</td>
<td>200</td>
<td>mA</td>
</tr>
<tr>
<td>$I_{BM}$</td>
<td>peak base current</td>
<td></td>
<td>-</td>
<td>200</td>
<td>mA</td>
</tr>
<tr>
<td>$P_{tot}$</td>
<td>total power dissipation</td>
<td>$T_{amb} \leq 25 \degree C$</td>
<td>[1]</td>
<td>-</td>
<td>250  mW</td>
</tr>
<tr>
<td>$T_j$</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{amb}$</td>
<td>ambient temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{stg}$</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>°C</td>
</tr>
</tbody>
</table>


![Power derating curve for DFN1006B-3 (SOT883B)](image)

FR4 PCB, standard footprint

Fig. 2. Power derating curve for DFN1006B-3 (SOT883B)
9. 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</td>
<td></td>
<td></td>
<td>500</td>
<td>K/W</td>
</tr>
</tbody>
</table>


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
## 10. 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>$V_{CB} = 30 ; V; ; I_E = 0 ; A; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>nA</td>
</tr>
<tr>
<td>$I_{EBO}$</td>
<td>emitter-base cut-off current</td>
<td>$V_{EB} = 5 ; V; ; I_C = 0 ; A; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>µA</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = 5 ; V; ; I_C = 2 ; mA; ; T_{amb} = 25 ; ^\circ C$</td>
<td>200</td>
<td>-</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>$V_{CE_{sat}}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_C = 10 ; mA; ; I_B = 0.5 ; mA; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>900</td>
<td>450</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = 100 ; mA; ; I_B = 5 ; mA; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>200</td>
<td>400</td>
<td>mV</td>
</tr>
<tr>
<td>$V_{BE_{sat}}$</td>
<td>base-emitter saturation voltage</td>
<td>$I_C = 10 ; mA; ; I_B = 0.5 ; mA; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>760</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td>$V_{BE}$</td>
<td>base-emitter voltage</td>
<td>$V_{CE} = 5 ; V; ; I_C = 2 ; mA; ; T_{amb} = 25 ; ^\circ C$</td>
<td>580</td>
<td>660</td>
<td>700</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CE} = 5 ; V; ; I_C = 10 ; mA; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>770</td>
<td>mV</td>
</tr>
<tr>
<td>$C_c$</td>
<td>collector capacitance</td>
<td>$V_{CB} = 10 ; V; ; I_E = 0 ; A; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>pF</td>
</tr>
<tr>
<td>$C_e$</td>
<td>emitter capacitance</td>
<td>$V_{EB} = 0.5 ; V; ; I_C = 0 ; A; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>11</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$f_T$</td>
<td>transition frequency</td>
<td>$V_{CE} = 5 ; V; ; I_C = 10 ; mA; ; T_{amb} = 25 ; ^\circ C$</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td>NF</td>
<td>noise figure</td>
<td>$V_{CE} = 5 ; V; ; I_C = 200 ; \mu A; ; R_S = 2 ; k\Omega; ; T_{amb} = 25 ; ^\circ C$</td>
<td>-</td>
<td>2</td>
<td>10</td>
<td>dB</td>
</tr>
</tbody>
</table>

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

### Fig. 5. Base-emitter voltage as a function of collector current; typical values
11. Test information

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.

12. Package outline

Fig. 8. Package outline DFN1006B-3 (SOT883B)
13. Soldering

Footprint information for reflow soldering of DFN1006B-3 (SOT883B) package

SOT883B

Issue date 13-07-02
20-02-25

Fig. 9. Reflow soldering footprint for DFN1006B-3 (SOT883B)
14. Revision history

Table 8. Revision history

<table>
<thead>
<tr>
<th>Data sheet ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>20200727</td>
<td>Product data sheet</td>
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<td>BC846BMB v.1</td>
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<td>Modifications:</td>
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<tr>
<td></td>
<td></td>
<td>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Legal texts have been adapted to the new company name where appropriate.</td>
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<td>BC846BMB v.1</td>
<td>20120515</td>
<td>Product data sheet</td>
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</table>
15. Legal information

Data sheet status

<table>
<thead>
<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</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 https://www.nexperia.com.

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Nexperia

65 V, 100 mA NPN general-purpose transistor

Product data sheet

BC846BMB

27 July 2020
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