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Kind regards,

Team Nexperia
1. Product profile

1.1 General description

NPN Resistor-Equipped Transistor (RET) in a leadless ultra small DFN1006B-3 (SOT883B) Surface-Mounted Device (SMD) plastic package.

PNP complement: PDTA144WMB.

1.2 Features and benefits

- 100 mA output current capability
- Reduces component count
- Built-in bias resistors
- Reduces pick and place costs
- Simplifies circuit design
- AEC-Q101 qualified
- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm

1.3 Applications

- Low-current peripheral driver
- Control of IC inputs
- Replaces general-purpose transistors in digital applications
- Mobile applications

1.4 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&lt;sub&gt;CEO&lt;/sub&gt;</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-</td>
<td>50</td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;O&lt;/sub&gt;</td>
<td>output current</td>
<td></td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>R1</td>
<td>bias resistor 1 (input)</td>
<td>T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>33</td>
<td>47</td>
<td>61</td>
<td>kΩ</td>
</tr>
<tr>
<td>R2/R1</td>
<td>bias resistor ratio</td>
<td></td>
<td>0.37</td>
<td>0.47</td>
<td>0.57</td>
<td></td>
</tr>
</tbody>
</table>
2. 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>I</td>
<td>input (base)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>G</td>
<td>GND (emitter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>O</td>
<td>output (collector)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DFN1006B-3 (SOT883B)

3. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDTC144WMB</td>
<td>DFN1006B-3</td>
<td>Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm</td>
<td>SOT883B</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>PDTC144WMB</td>
<td>0011 1111</td>
</tr>
</tbody>
</table>

Fig 1. DFN1006B-3 (SOT883B) binary marking code description
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>50</td>
<td>V</td>
</tr>
<tr>
<td>( V_{CEO} )</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>50</td>
<td>V</td>
</tr>
<tr>
<td>( V_{EBO} )</td>
<td>emitter-base voltage</td>
<td>open collector</td>
<td>-</td>
<td>10</td>
<td>V</td>
</tr>
<tr>
<td>( V_I )</td>
<td>input voltage</td>
<td>positive</td>
<td>-</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>negative</td>
<td>-</td>
<td>-10</td>
<td>V</td>
</tr>
<tr>
<td>( I_O )</td>
<td>output current</td>
<td>-</td>
<td>100</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>( I_{CM} )</td>
<td>peak collector current</td>
<td>pulsed; ( t_p \leq 1 ) ms</td>
<td>-</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>( P_{tot} )</td>
<td>total power dissipation</td>
<td>( T_{amb} \leq 25 ) °C</td>
<td>[1]</td>
<td>-</td>
<td>250</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>


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>[1]</td>
<td>-</td>
<td>500</td>
<td>K/W</td>
</tr>
</tbody>
</table>


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

6. Thermal characteristics
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} = 50 V; I_{E} = 0 A; Tamb = 25 °C</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>I_{CEO}</td>
<td>collector-emitter cut-off current</td>
<td>V_{CE} = 30 V; I_{B} = 0 A; Tamb = 25 °C</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_{CE} = 30 V; I_{B} = 0 A; T_{j} = 150 °C</td>
<td>-</td>
<td>5</td>
<td>-</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 A; Tamb = 25 °C</td>
<td>-</td>
<td>-</td>
<td>110</td>
<td>µA</td>
</tr>
<tr>
<td>h_{FE}</td>
<td>DC current gain</td>
<td>V_{CE} = 5 V; I_{C} = 5 mA; Tamb = 25 °C</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>V_{CEsat}</td>
<td>collector-emitter saturation voltage</td>
<td>I_{C} = 10 mA; I_{B} = 0.5 mA; Tamb = 25 °C</td>
<td>-</td>
<td>-</td>
<td>150</td>
<td>mV</td>
</tr>
<tr>
<td>V_{I(off)}</td>
<td>off-state input voltage</td>
<td>V_{CE} = 5 V; I_{C} = 100 µA; Tamb = 25 °C</td>
<td>-</td>
<td>1.7</td>
<td>1.2</td>
<td>V</td>
</tr>
<tr>
<td>V_{I(on)}</td>
<td>on-state input voltage</td>
<td>V_{CE} = 0.3 V; I_{C} = 2 mA; Tamb = 25 °C</td>
<td>4</td>
<td>2.7</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>R1</td>
<td>bias resistor 1 (input)</td>
<td>Tamb = 25 °C</td>
<td>33</td>
<td>47</td>
<td>61</td>
<td>kΩ</td>
</tr>
<tr>
<td>R2/R1</td>
<td>bias resistor ratio</td>
<td></td>
<td>0.37</td>
<td>0.47</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>C_{C}</td>
<td>collector capacitance</td>
<td>V_{CB} = 10 V; I_{E} = 0 A; I_{B} = 0 A; f = 1 MHz; Tamb = 25 °C</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
<td>pF</td>
</tr>
<tr>
<td>f_{T}</td>
<td>transition frequency</td>
<td>V_{CE} = 5 V; I_{C} = 10 mA; f = 100 MHz; Tamb = 25 °C</td>
<td>[1]</td>
<td>230</td>
<td>-</td>
<td>MHz</td>
</tr>
</tbody>
</table>

NXP Semiconductors

NPN resistor-equipped transistor; R1 = 47 kΩ, R2 = 22 kΩ

- **Fig 4.** DC current gain as a function of collector current; typical values
- **Fig 5.** Collector-emitter saturation voltage as a function of collector current; typical values
- **Fig 6.** On-state input voltage as a function of collector current; typical values
- **Fig 7.** Off-state input voltage as a function of collector current; typical values

**NCE = 5 V**
(1) Tamb = 100 °C
(2) Tamb = 25 °C
(3) Tamb = -40 °C

**IC/IB = 20**
(1) Tamb = 100 °C
(2) Tamb = 25 °C
(3) Tamb = -40 °C

**VCE = 0.3 V**
(1) Tamb = -40 °C
(2) Tamb = 25 °C
(3) Tamb = 100 °C

**VCE = 5 V**
(1) Tamb = -40 °C
(2) Tamb = 25 °C
(3) Tamb = 100 °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.
NXP Semiconductors

NPN resistor-equipped transistor; R1 = 47 kΩ, R2 = 22 kΩ

9. Package outline

![Package outline diagram]

Fig 10. DFN1006B-3 (SOT883B)

10. Soldering

![Soldering footprint diagram]

Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)
11. Revision history

Table 8. 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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<tr>
<td>PDTC144WMB v.1</td>
<td>20120702</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
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NXP Semiconductors PDTC144WMB
NPN resistor-equipped transistor; R1 = 47 kΩ, R2 = 22 kΩ
12. Legal information

12.1 Data sheet status

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</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.nxp.com.

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