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Kind regards,

Team Nexperia



# PDA144EMB

PNP resistor-equipped transistor; R1 = 47 k $\Omega$ , R2 = 47 k $\Omega$

Rev. 2 — 4 May 2012

Product data sheet

## 1. Product profile

### 1.1 General description

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

NPN complement: PDTC144EMB.

### 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

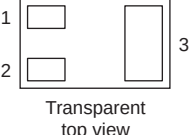
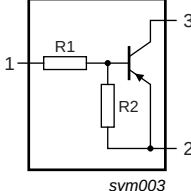
Table 1. Quick reference data

| Symbol           | Parameter                 | Conditions               | Min | Typ | Max  | Unit       |
|------------------|---------------------------|--------------------------|-----|-----|------|------------|
| V <sub>CEO</sub> | collector-emitter voltage | open base                | -   | -   | -50  | V          |
| I <sub>O</sub>   | output current            |                          | -   | -   | -100 | mA         |
| R1               | bias resistor 1 (input)   | T <sub>amb</sub> = 25 °C | 33  | 47  | 61   | k $\Omega$ |
| R2/R1            | bias resistor ratio       |                          | 0.8 | 1   | 1.2  |            |



## 2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description        | Simplified outline                                                                                            | Graphic symbol                                                                      |
|-----|--------|--------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | I      | input (base)       |  <p>SOT883B (DFN1006B-3)</p> |  |
| 2   | G      | GND (emitter)      |                                                                                                               |                                                                                     |
| 3   | O      | output (collector) |                                                                                                               |                                                                                     |

## 3. Ordering information

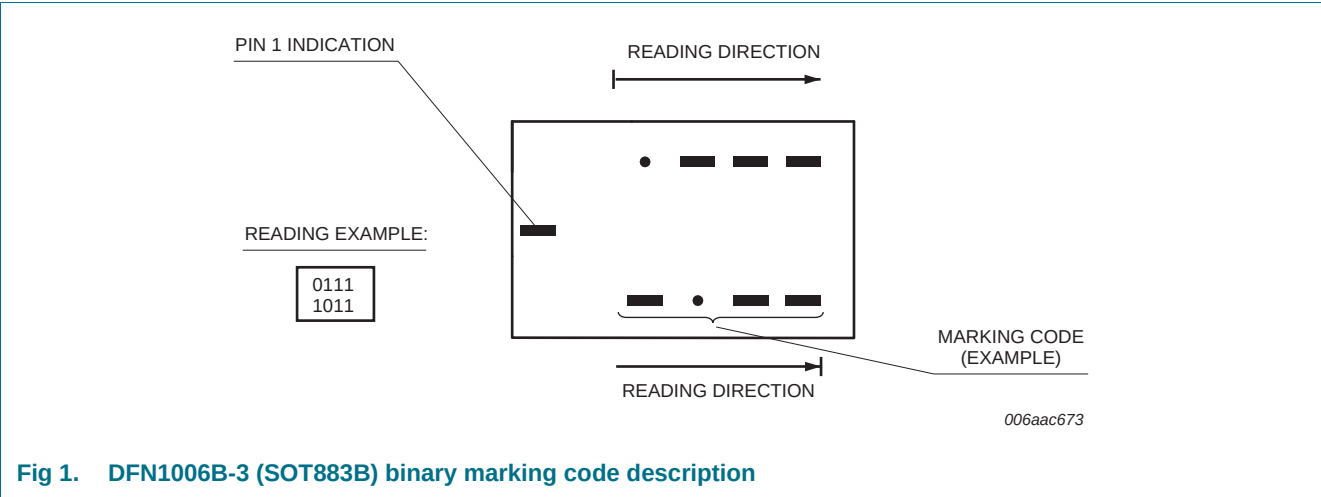
Table 3. Ordering information

| Type number | Package    |                                                                                |         |
|-------------|------------|--------------------------------------------------------------------------------|---------|
|             | Name       | Description                                                                    | Version |
| PDTA144EMB  | DFN1006B-3 | Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm | SOT883B |

## 4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PDTA144EMB  | 0010 1011    |

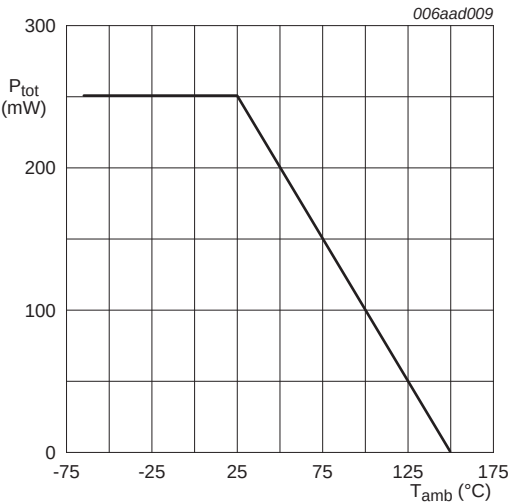


5. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol           | Parameter                 | Conditions                                   | Min | Max  | Unit |
|------------------|---------------------------|----------------------------------------------|-----|------|------|
| V <sub>CBO</sub> | collector-base voltage    | open emitter                                 | -   | -50  | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                                    | -   | -50  | V    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector                               | -   | -10  | V    |
| V <sub>I</sub>   | input voltage             | positive                                     | -   | 10   | V    |
|                  |                           | negative                                     | -   | -40  | V    |
| I <sub>O</sub>   | output current            |                                              | -   | -100 | mA   |
| I <sub>CM</sub>  | peak collector current    | pulsed; t <sub>p</sub> ≤ 1 ms                | -   | -100 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C <a href="#">[1]</a> | -   | 250  | mW   |
| T <sub>j</sub>   | junction temperature      |                                              | -   | 150  | °C   |
| T <sub>amb</sub> | ambient temperature       |                                              | -65 | 150  | °C   |
| T <sub>stg</sub> | storage temperature       |                                              | -65 | 150  | °C   |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



FR4 PCB, standard footprint

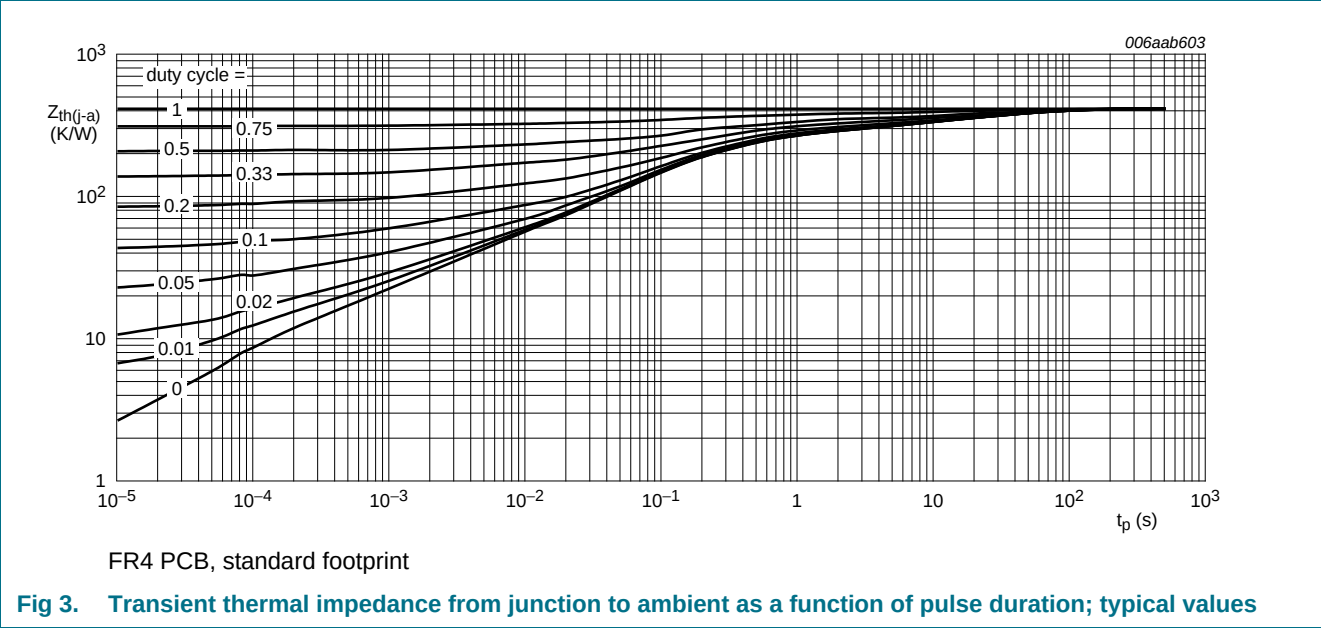
Fig 2. Power derating curve for DFN1006B-3 (SOT883B)

6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol        | Parameter                                   | Conditions  | Min | Typ | Max | Unit |
|---------------|---------------------------------------------|-------------|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | -   | -   | 500 | K/W  |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

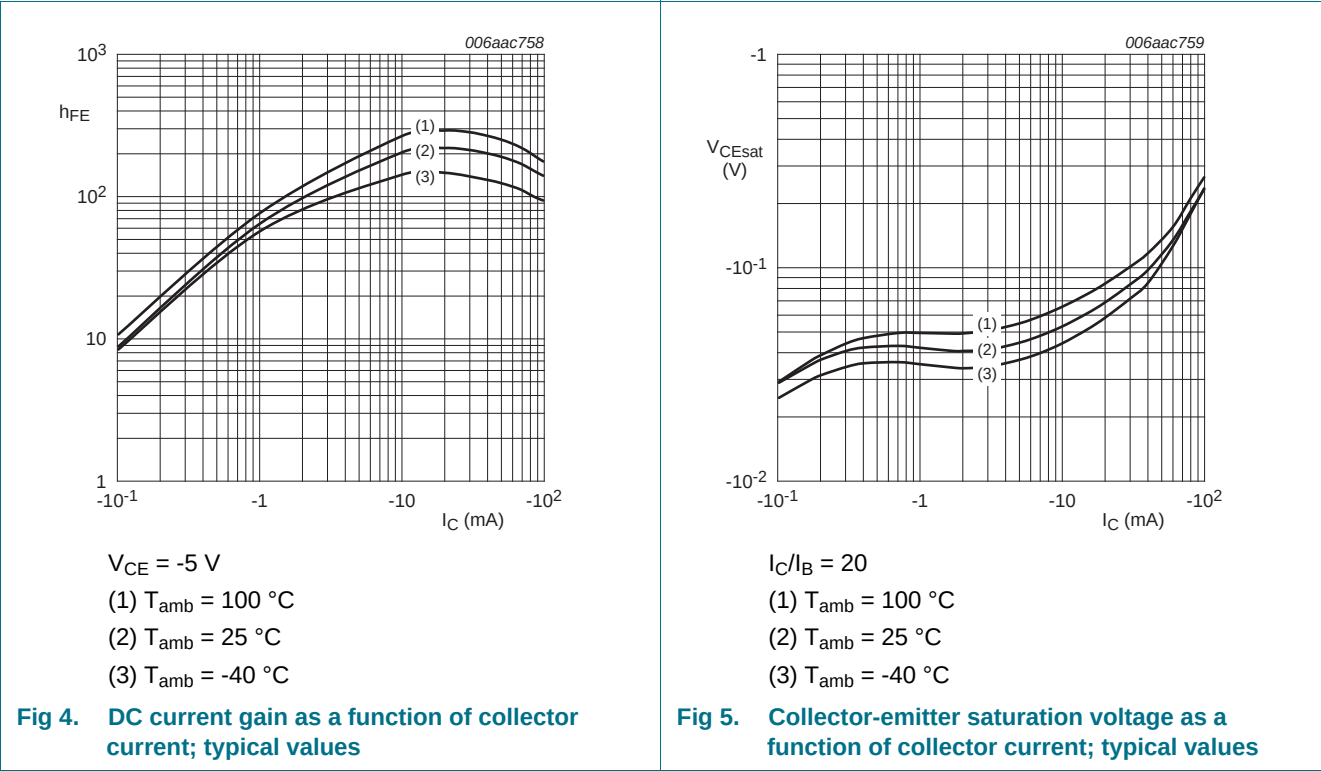


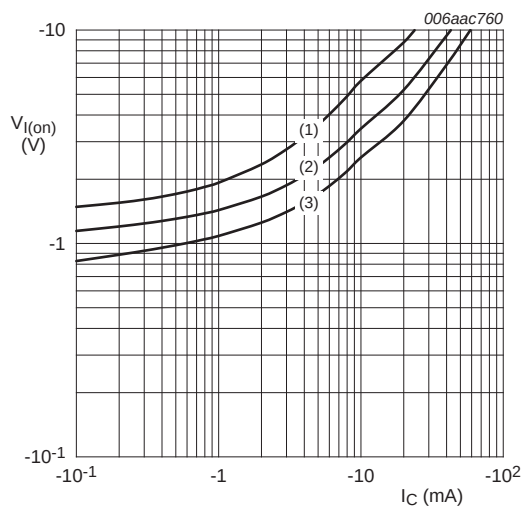
7. Characteristics

Table 7. Characteristics

| Symbol       | Parameter                            | Conditions                                                                                                              | Min | Typ  | Max  | Unit |
|--------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----|------|------|------|
| $I_{CBO}$    | collector-base cut-off current       | $V_{CB} = -50\text{ V}$ ; $I_E = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$                                                 | -   | -    | -100 | nA   |
| $I_{CEO}$    | collector-emitter cut-off current    | $V_{CE} = -30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$                                                 | -   | -    | -1   | μA   |
|              |                                      | $V_{CE} = -30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_j = 150\text{ °C}$                                                    | -   | -    | -5   | μA   |
| $I_{EBO}$    | emitter-base cut-off current         | $V_{EB} = -5\text{ V}$ ; $I_C = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$                                                  | -   | -    | -90  | μA   |
| $h_{FE}$     | DC current gain                      | $V_{CE} = -5\text{ V}$ ; $I_C = -5\text{ mA}$ ; $T_{amb} = 25\text{ °C}$                                                | 80  | -    | -    |      |
| $V_{CEsat}$  | collector-emitter saturation voltage | $I_C = -10\text{ mA}$ ; $I_B = -0.5\text{ mA}$ ; $T_{amb} = 25\text{ °C}$                                               | -   | -    | -150 | mV   |
| $V_{I(off)}$ | off-state input voltage              | $V_{CE} = -5\text{ V}$ ; $I_C = -100\text{ μA}$ ; $T_{amb} = 25\text{ °C}$                                              | -   | -1.2 | -0.8 | V    |
| $V_{I(on)}$  | on-state input voltage               | $V_{CE} = -0.3\text{ V}$ ; $I_C = -2\text{ mA}$ ; $T_{amb} = 25\text{ °C}$                                              | -3  | -1.6 | -    | V    |
| R1           | bias resistor 1 (input)              | $T_{amb} = 25\text{ °C}$                                                                                                | 33  | 47   | 61   | kΩ   |
| R2/R1        | bias resistor ratio                  |                                                                                                                         | 0.8 | 1    | 1.2  |      |
| $C_C$        | collector capacitance                | $V_{CB} = -10\text{ V}$ ; $I_E = 0\text{ A}$ ; $i_e = 0\text{ A}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$       | -   | -    | 3    | pF   |
| $f_T$        | transition frequency                 | $V_{CE} = -5\text{ V}$ ; $I_C = -10\text{ mA}$ ; $f = 100\text{ MHz}$ ; <a href="#">[1]</a><br>$T_{amb} = 25\text{ °C}$ | -   | 180  | -    | MHz  |

[1] Characteristics of built-in transistor.





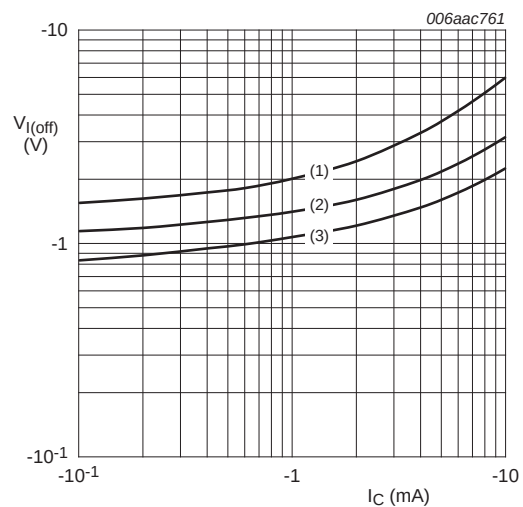
$V_{CE} = -0.3\text{ V}$

(1)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$

(3)  $T_{amb} = 100\text{ }^{\circ}\text{C}$

Fig 6. On-state input voltage as a function of collector current; typical values



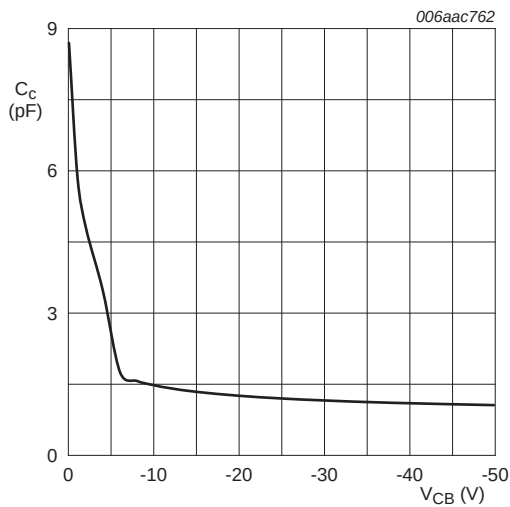
$V_{CE} = -5\text{ V}$

(1)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$

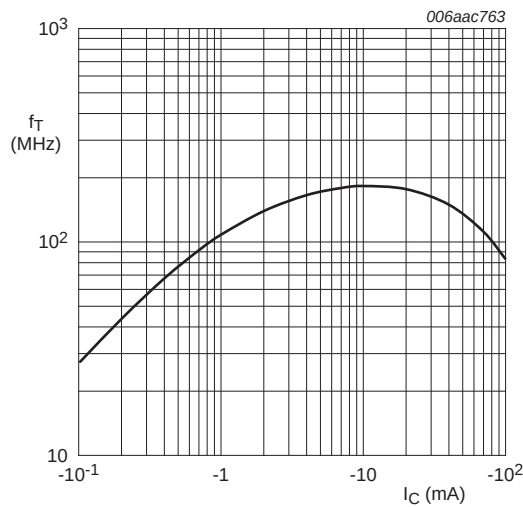
(3)  $T_{amb} = 100\text{ }^{\circ}\text{C}$

Fig 7. Off-state input voltage as a function of collector current; typical values



$f = 1\text{ MHz}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig 8. Collector capacitance as a function of collector-base voltage; typical values of built-in transistor



$V_{CE} = -5\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig 9. Transition frequency as a function of collector current; typical values of built-in transistor

## 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

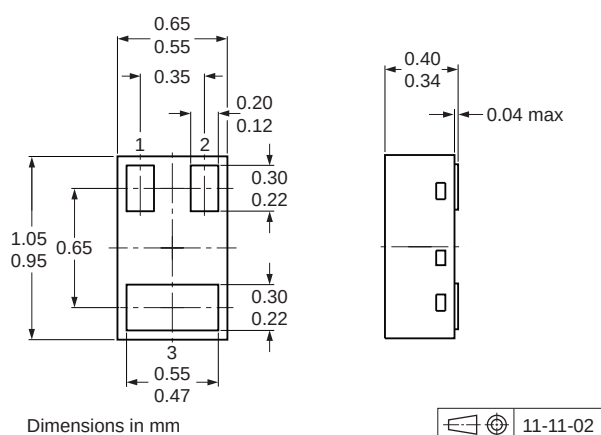
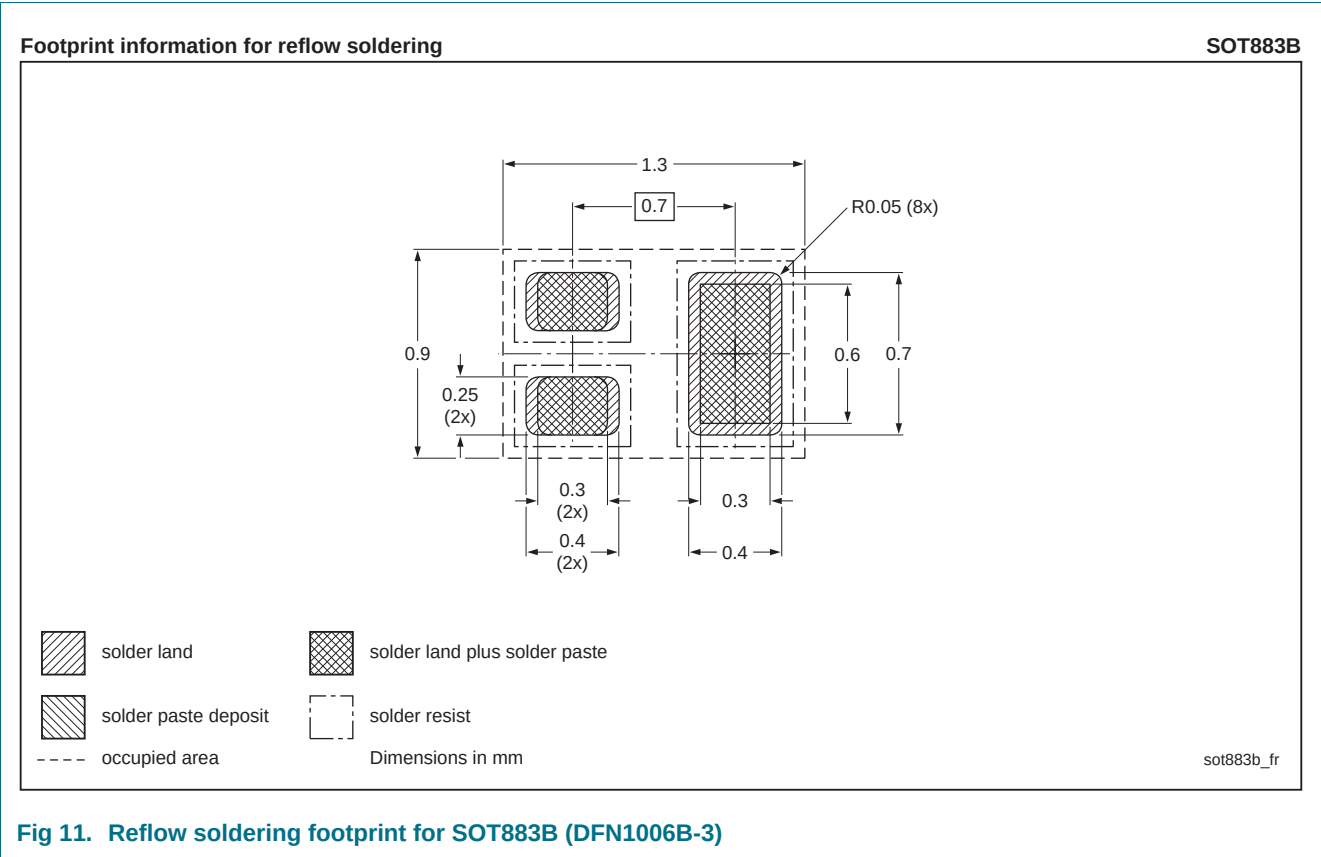


Fig 10. Package outline SOT883B (DFN1006B-3)



10. Soldering



## 11. Revision history

Table 8. Revision history

| Document ID    | Release date                                                                                                  | Data sheet status  | Change notice | Supersedes     |
|----------------|---------------------------------------------------------------------------------------------------------------|--------------------|---------------|----------------|
| PDTA144EMB v.2 | 20120504                                                                                                      | Product data sheet | -             | PDTA144EMB v.1 |
| Modifications: | <ul style="list-style-type: none"><li><a href="#">7 "Characteristics"</a>: parameter name corrected</li></ul> |                    |               |                |
| PDTA144EMB v.1 | 20120425                                                                                                      | Product data sheet | -             | -              |

## 12. Legal information

### 12.1 Data sheet status

| Document status <sup>[1] [2]</sup> | Product status <sup>[3]</sup> | Definition                                                                            |
|------------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet       | Development                   | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet     | Qualification                 | This document contains data from the preliminary specification.                       |
| Product [short] data sheet         | Production                    | This document contains the product specification.                                     |

[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".

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