



# PDTA114EMB

PNP resistor-equipped transistor; R1 = 10 k $\Omega$ , R2 = 10 k $\Omega$

Rev. 1 — 15 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: PDTC114EMB

### 1.2 Features and benefits

- 100 mA output current capability
- Reduces component count
- Built-in bias transistors
- 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

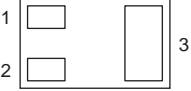
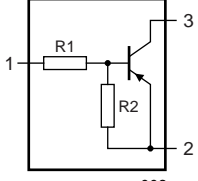
Table 1. Quick reference data

| 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 | 7   | 10  | 13   | 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>Transparent top view</p> |  <p><i>sym003</i></p> |
| 2   | G      | GND (emitter)      |   |  |
| 3   | O      | output (collector) |   |  |

**SOT883B (DFN1006B-3)**

## 3. Ordering information

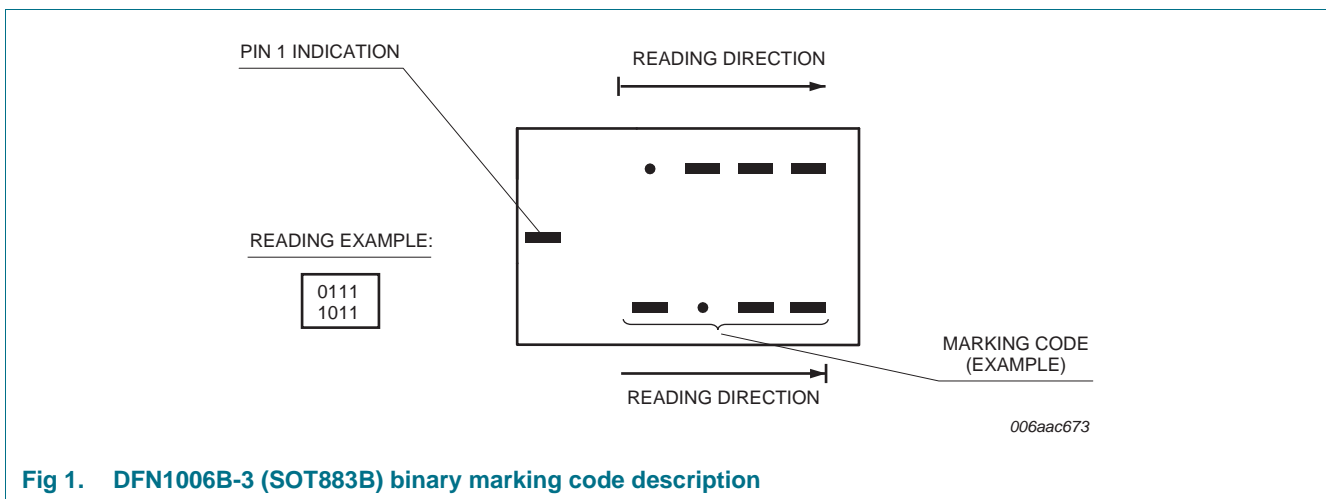
**Table 3. Ordering information**

| Type number | Package    |  |         |
|-------------|------------|--|---------|
|             | Name       | Description  | Version |
| PDTA114EMB  | 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 |
|-------------|--------------|
| PDTA114EMB  | 0001 1001    |



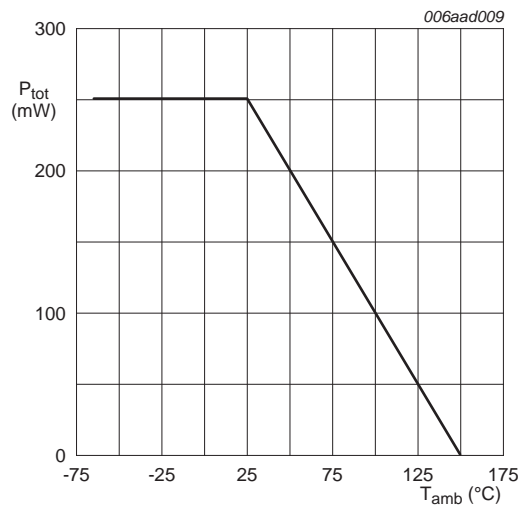
## 5. Limiting values

**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                      | -   | 40   | V    |
|                  |                           | negative                      | -   | -10  | 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      | [1] | 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

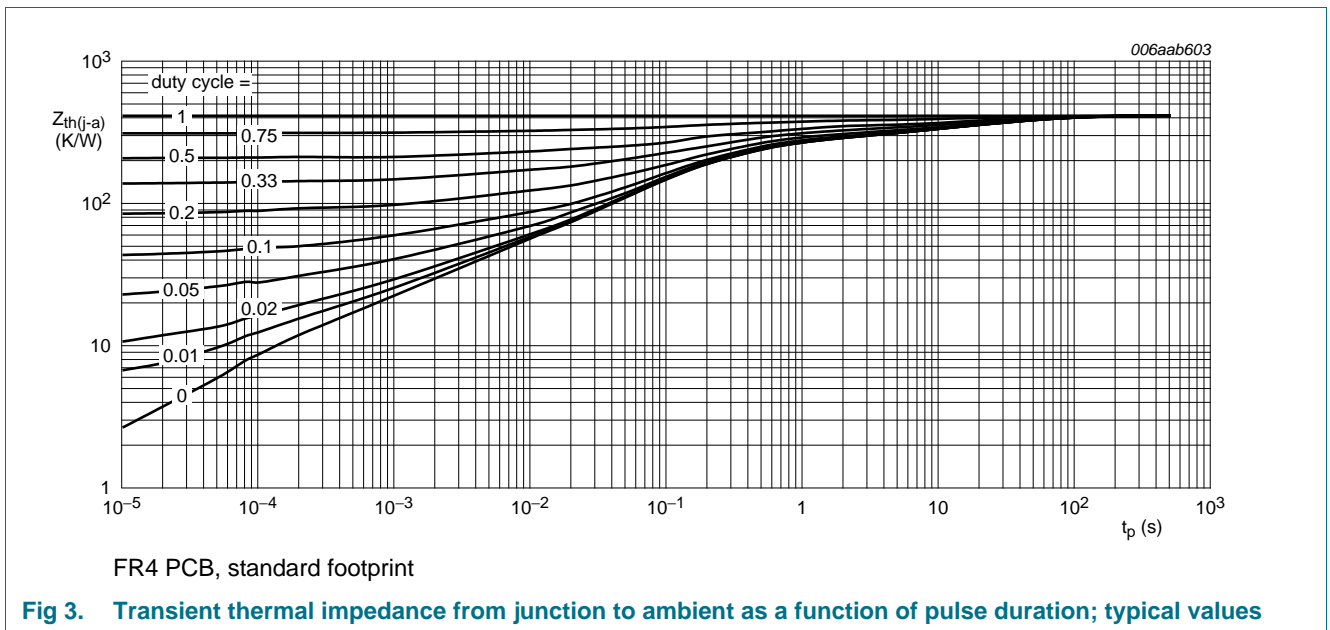
**Fig 2. Power derating curve for DFN1006B-3 (SOT883B)**

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol        | Parameter                                   | Conditions | Min | Typ | Max | Unit |
|---------------|---|------------|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | [1]        | -   | -   | 500 | K/W  |

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

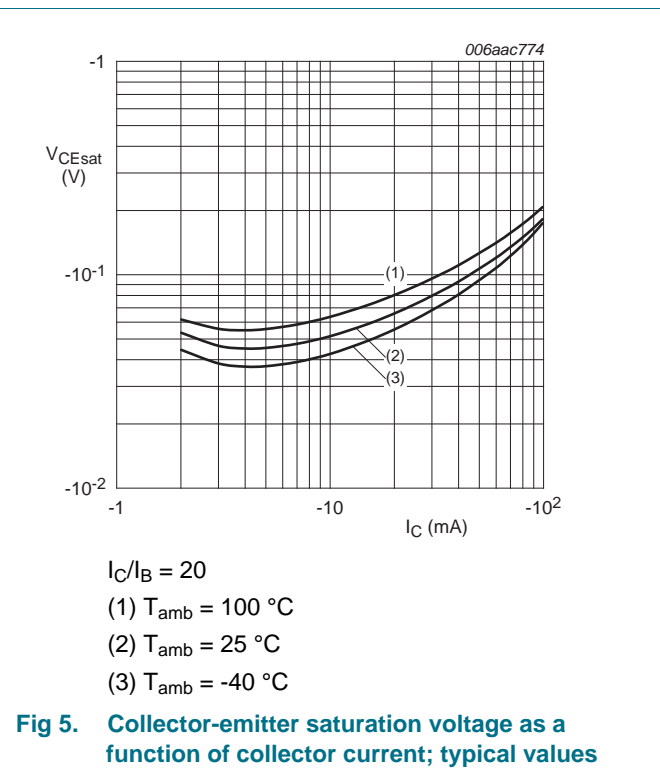
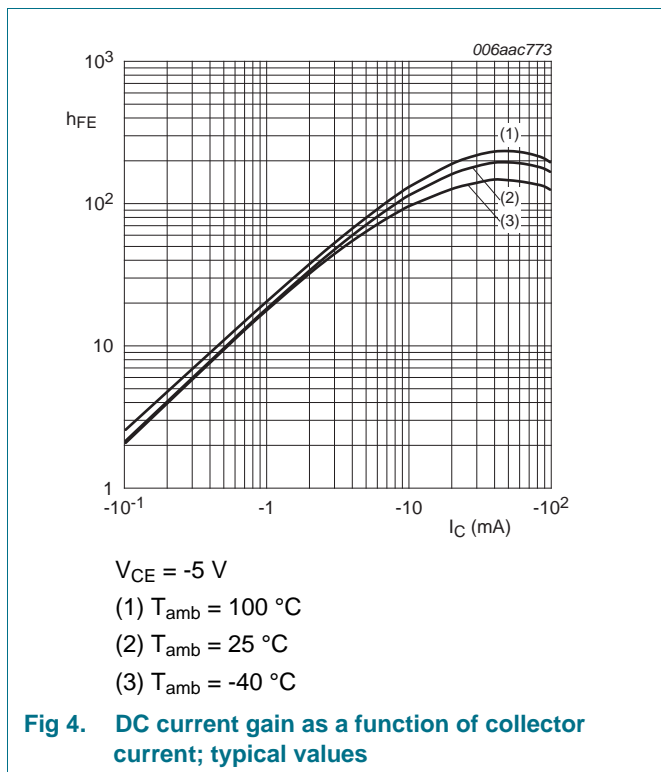


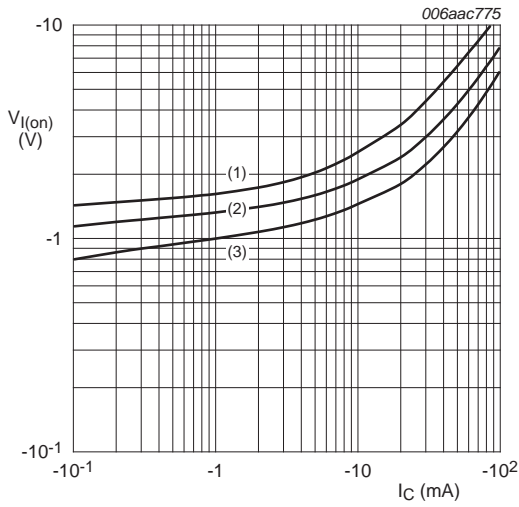
## 7. Characteristics

**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         | $V_{EB} = -5\text{ V}$ ; $I_C = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$   | -    | -    | -400 | μA   |
| $h_{FE}$     | DC current gain                      | $V_{CE} = -5\text{ V}$ ; $I_C = -5\text{ mA}$ ; $T_{amb} = 25\text{ °C}$   | 30   | -    | -    |      |
| $V_{CEsat}$  | 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              | $V_{CE} = -5\text{ V}$ ; $I_C = 100\text{ μA}$ ; $T_{amb} = 25\text{ °C}$  | -    | -1.1 | -0.8 | V    |
| $V_{I(on)}$  | on-state input voltage               | $V_{CE} = -0.3\text{ V}$ ; $I_C = -10\text{ mA}$ ; $T_{amb} = 25\text{ °C}$  | -2.5 | -1.8 | -    | V    |
| R1           | bias resistor 1 (input)              | $T_{amb} = 25\text{ °C}$   | 7    | 10   | 13   | kΩ   |
| R2/R1        | bias resistor ratio                  |  | 0.8  | 1    | 1.2  |      |
| $C_C$        | collector capacitance                | $V_{CB} = -10\text{ V}$ ; $I_E = 0\text{ A}$ ; $i_e = 0\text{ A}$ ;<br>$f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$ | -    | -    | 3    | pF   |
| $f_T$        | transition frequency                 | $V_{CE} = -5\text{ V}$ ; $I_C = -10\text{ mA}$ ; $f = 100\text{ MHz}$ ;<br>$T_{amb} = 25\text{ °C}$                  | [1]  | 180  | -    | MHz  |

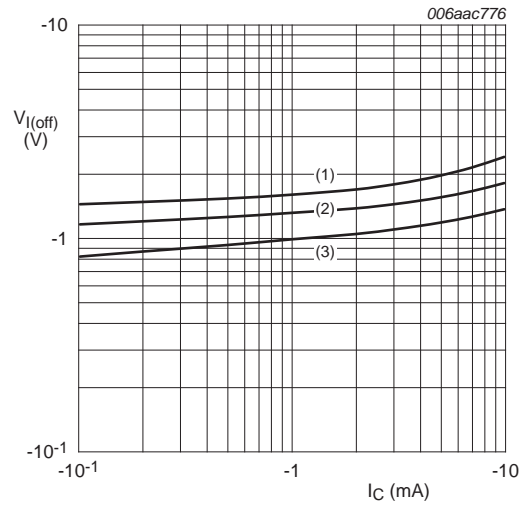
[1] Characteristics of built-in transistor.





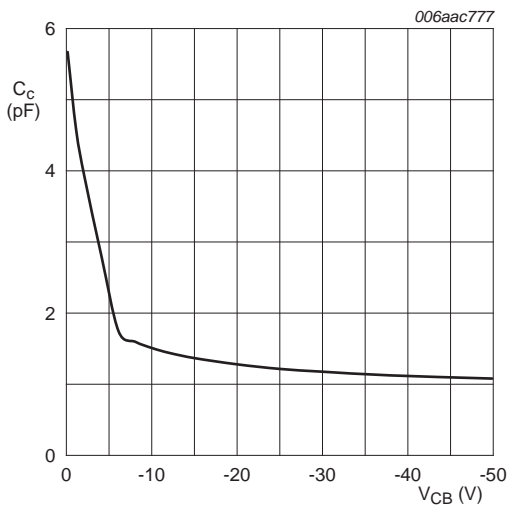
$V_{CE} = -0.3\text{ V}$   
 (1)  $T_{amb} = -40\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100\text{ }^\circ\text{C}$

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



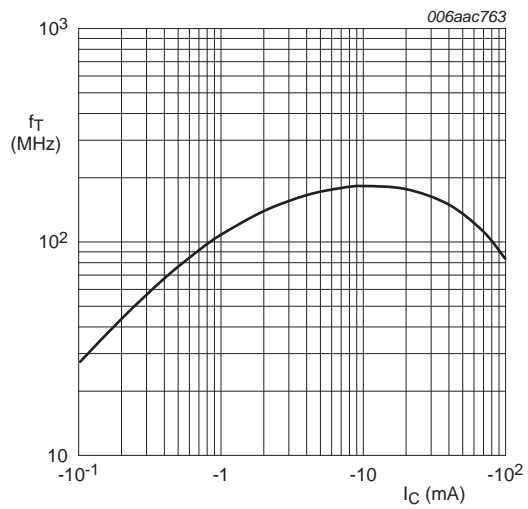
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -40\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100\text{ }^\circ\text{C}$

**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**



**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

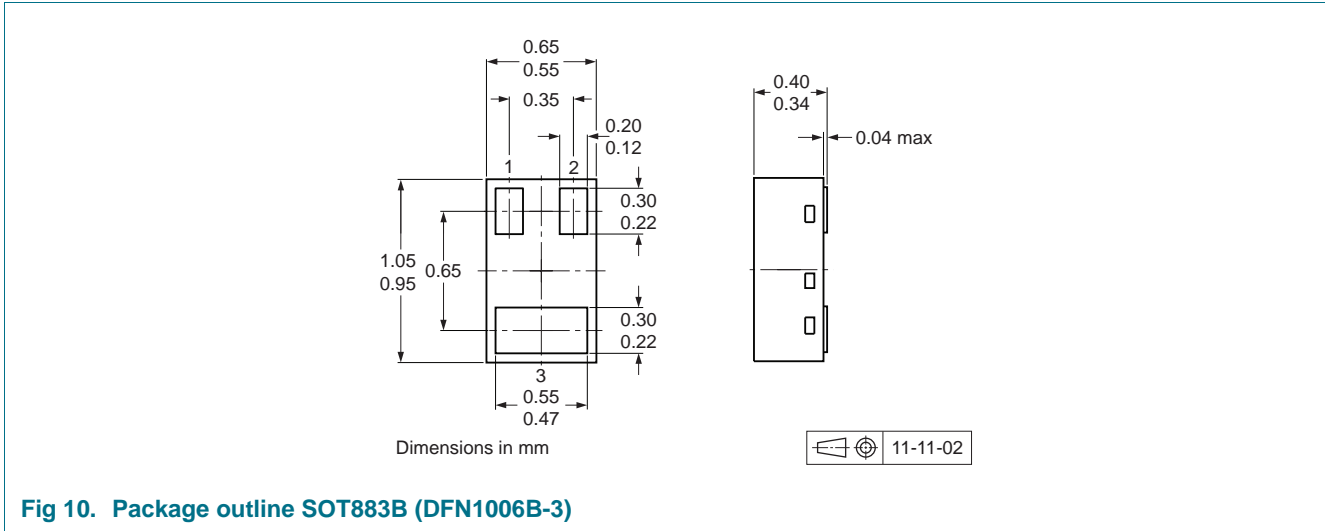


Fig 10. Package outline SOT883B (DFN1006B-3)

## 10. Soldering

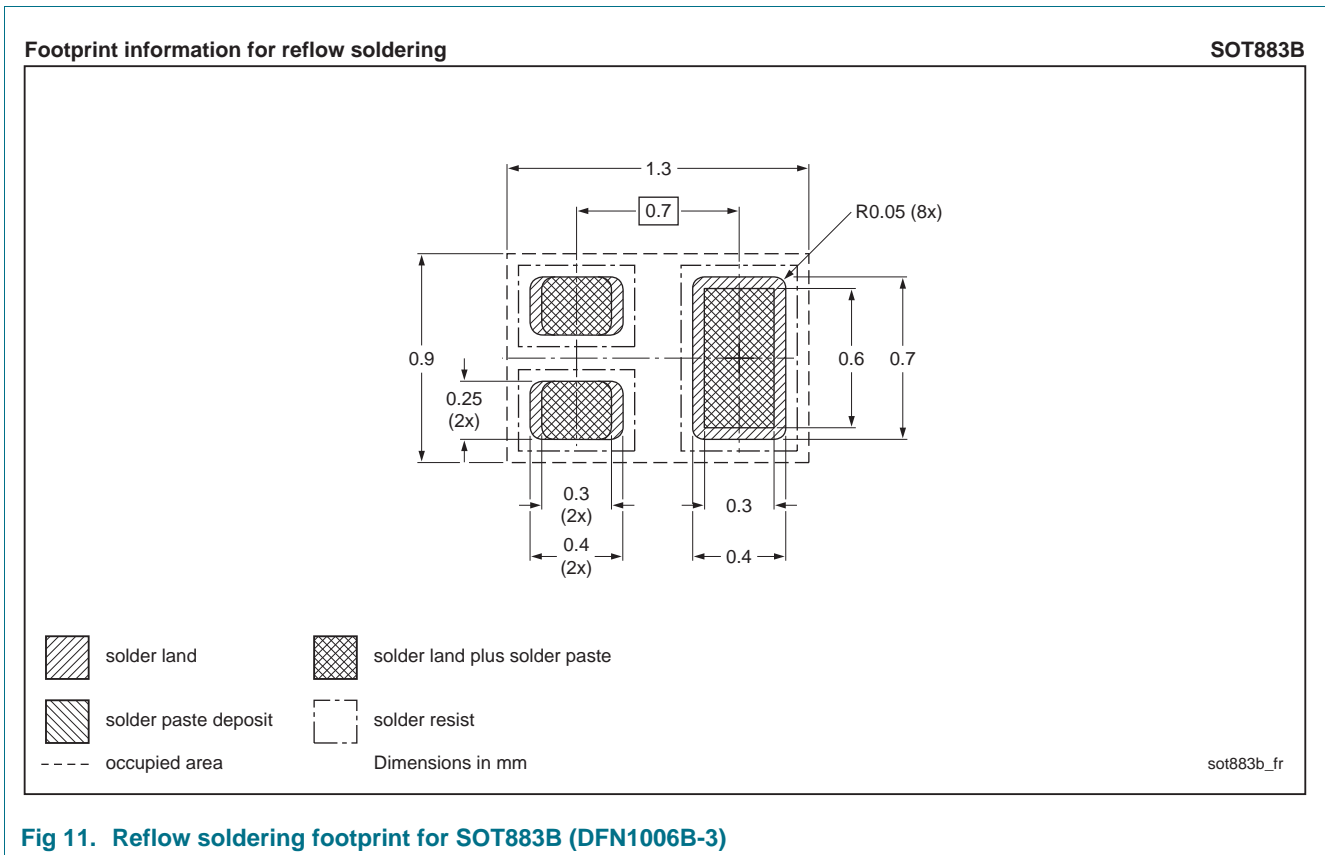


Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)

## 11. Revision history

Table 8. Revision history

| Document ID    | Release date | Data sheet status  | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PDTA114EMB v.1 | 20120515     | Product data sheet | -             | -          |

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| Document status <sup>[1]</sup> [2] | 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.                                     |

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