



# PDTC124XMB

NPN resistor-equipped transistor; R1 = 22 k $\Omega$ , R2 = 47 k $\Omega$

Rev. 1 — 26 June 2012

Product data sheet

## 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: PDTA124XMB.

### 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

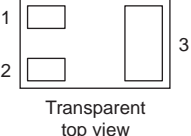
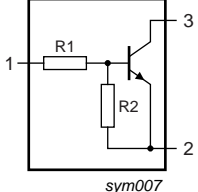
Table 1. Quick reference data

| 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 | 15.4 | 22  | 28.6 | k $\Omega$ |
| R2/R1            | bias resistor ratio       |                          | 1.7  | 2.1 | 2.6  |            |



## 2. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description        | Simplified outline   | Graphic symbol   |
|-----|--------|--------------------|--|--|
| 1   | I      | input (base)       |  <p>Transparent top view</p> <p><b>DFN1006B-3 (SOT883B)</b></p> |  <p><i>sym007</i></p> |
| 2   | G      | GND (emitter)      |  |  |
| 3   | O      | output (collector) |  |  |

## 3. Ordering information

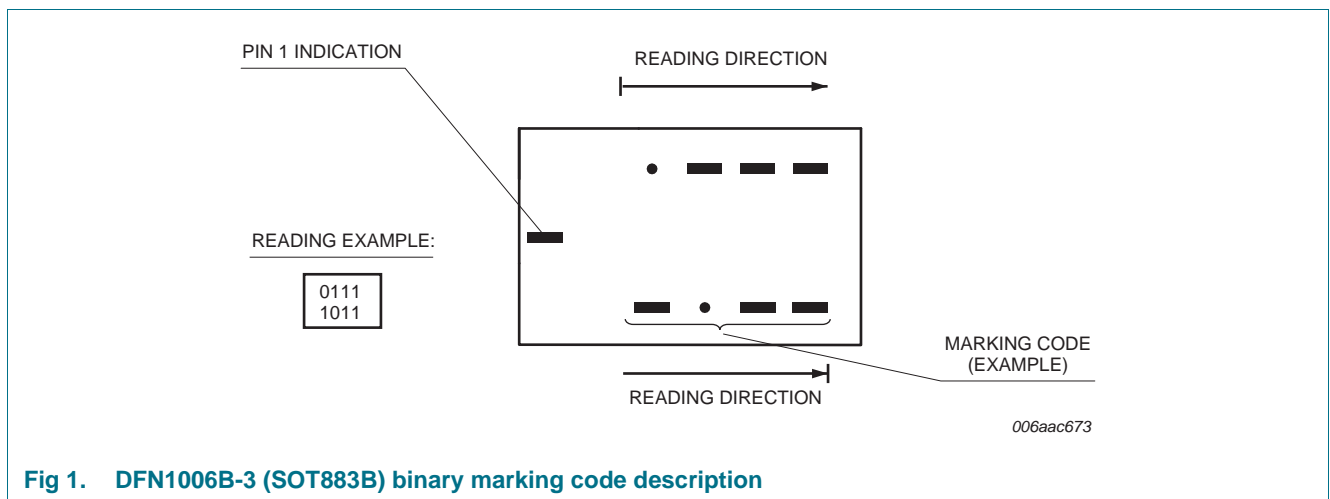
**Table 3. Ordering information**

| Type number | Package    |  |         |
|-------------|------------|--|---------|
|             | Name       | Description  | Version |
| PDTC124XMB  | 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 |
|-------------|--------------|
| PDTC124XMB  | 0011 1001    |



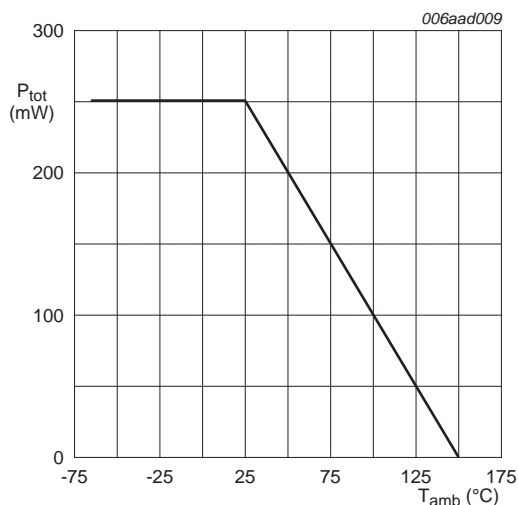
## 5. Limiting values

**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                | -   | 7   | V    |
| V <sub>I</sub>   | input voltage             | positive                      | -   | 40  | V    |
|                  |                           | negative                      | -   | -7  | 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

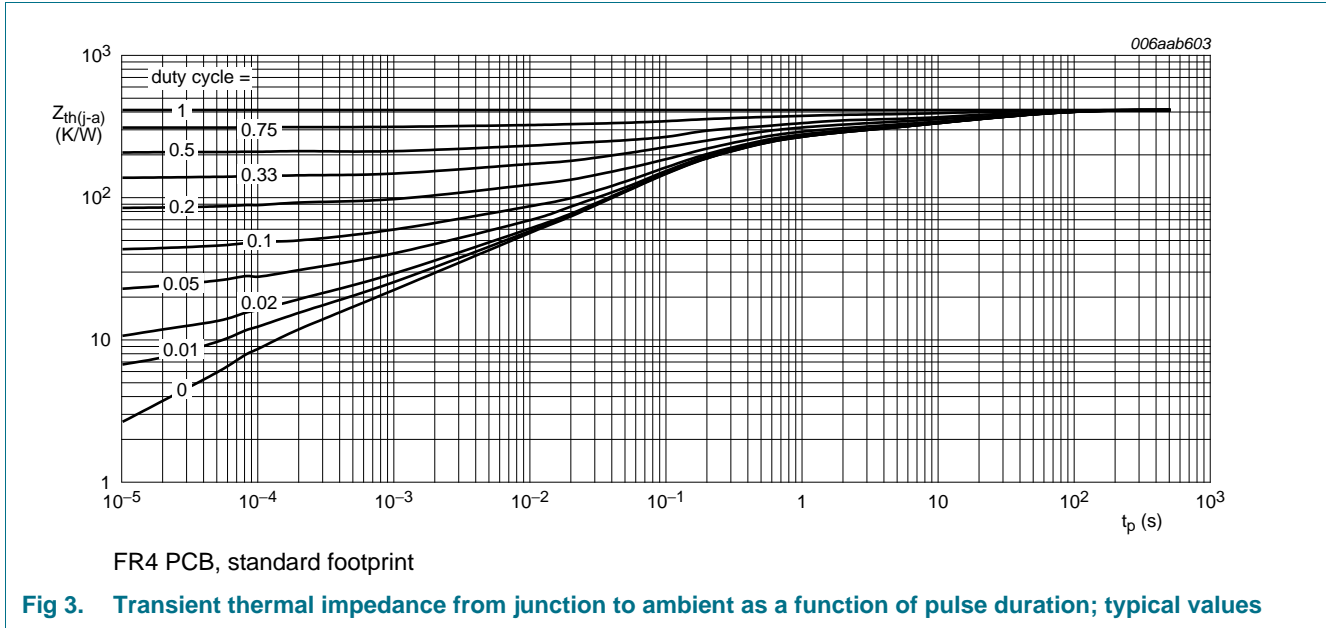
**Fig. 2. Power derating curve for DFN1006B-3 (SOT883B)**

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol               | Parameter                                   | Conditions  | Min | Typ | Max | Unit |
|----------------------|---|-------------|-----|-----|-----|------|
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] | -   | 500 | K/W  |

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

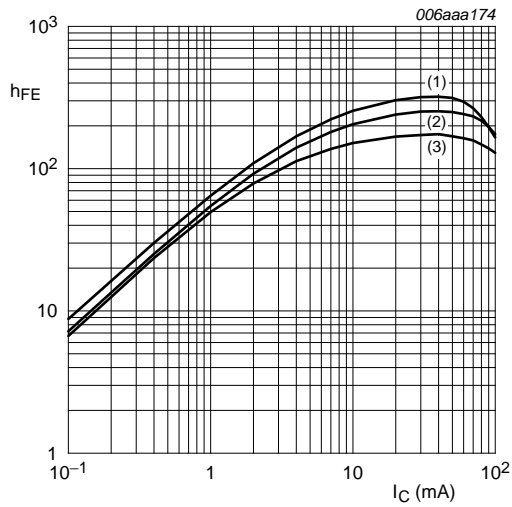


## 7. Characteristics

**Table 7. Characteristics**

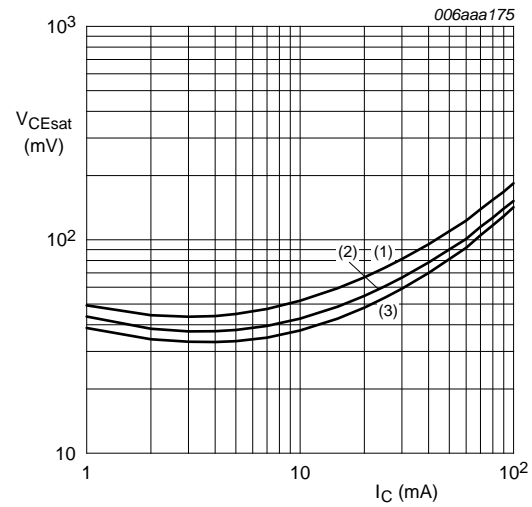
| Symbol              | Parameter                            | Conditions  | Min  | Typ | Max  | Unit |
|---------------------|--------------------------------------|---|------|-----|------|------|
| I <sub>CBO</sub>    | collector-base cut-off current       | V <sub>CB</sub> = 50 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C                                  | -    | -   | 100  | nA   |
| I <sub>CEO</sub>    | collector-emitter cut-off current    | V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0 A; T <sub>amb</sub> = 25 °C                                  | -    | -   | 1    | μA   |
|                     |                                      | V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0 A; T <sub>j</sub> = 150 °C                                   | -    | -   | 5    | μA   |
| I <sub>EBO</sub>    | emitter-base cut-off current         | V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C                                   | -    | -   | 120  | μA   |
| h <sub>FE</sub>     | DC current gain                      | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 5 mA; T <sub>amb</sub> = 25 °C                                  | 80   | -   | -    |      |
| V <sub>CEsat</sub>  | collector-emitter saturation voltage | I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA; T <sub>amb</sub> = 25 °C                               | -    | -   | 150  | mV   |
| V <sub>I(off)</sub> | off-state input voltage              | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 100 μA; T <sub>amb</sub> = 25 °C                                | -    | 0.8 | 0.5  | V    |
| V <sub>I(on)</sub>  | on-state input voltage               | V <sub>CE</sub> = 0.3 V; I <sub>C</sub> = 2 mA; T <sub>amb</sub> = 25 °C                                | 2    | 1.1 | -    | V    |
| R1                  | bias resistor 1 (input)              | T <sub>amb</sub> = 25 °C  | 15.4 | 22  | 28.6 | kΩ   |
| R2/R1               | bias resistor ratio                  |   | 1.7  | 2.1 | 2.6  |      |
| C <sub>C</sub>      | collector capacitance                | V <sub>CB</sub> = 10 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C | -    | -   | 2.5  | pF   |
| f <sub>T</sub>      | transition frequency                 | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 10 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C                    | [1]  | 230 | -    | MHz  |

[1] Characteristics of built-in transistor.



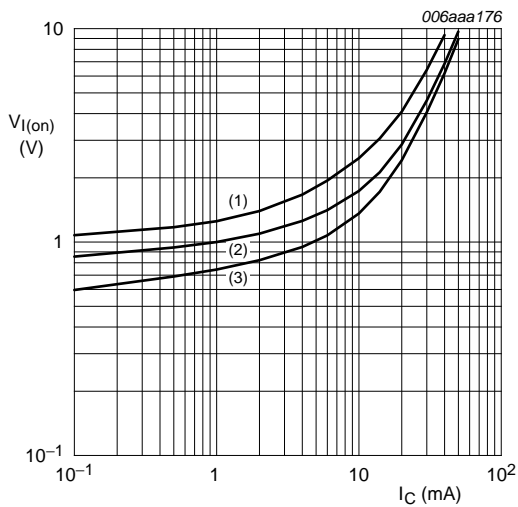
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



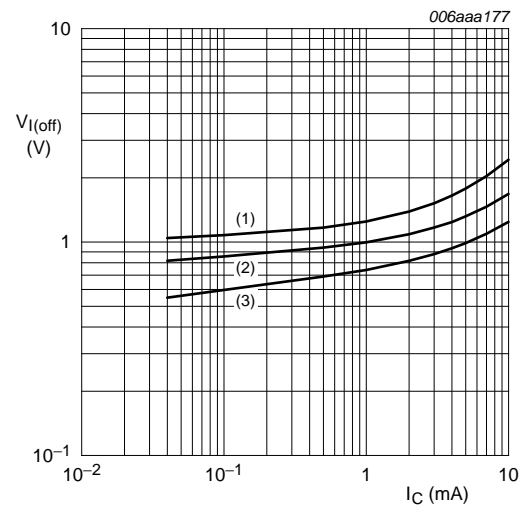
$I_C/I_B = 20$   
 (1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

**Fig 5. Collector-emitter saturation voltage as a function of collector current; typical values**



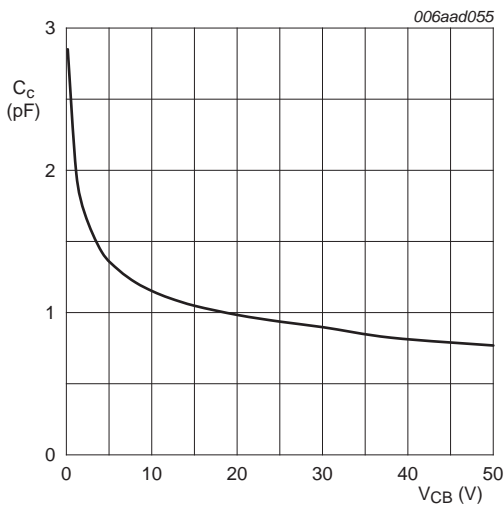
$V_{CE} = 0.3\text{ V}$   
 (1)  $T_{amb} = -40\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



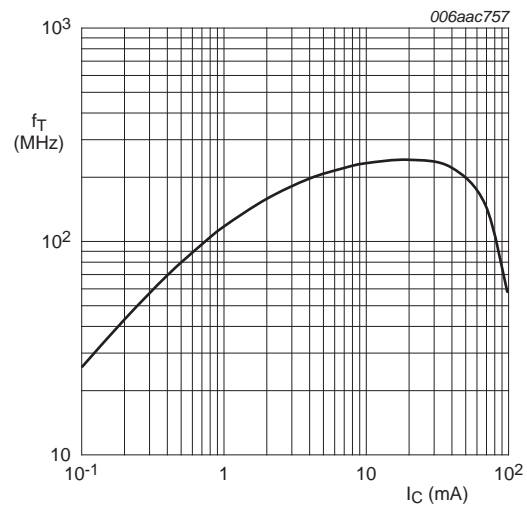
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = -40\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 100\text{ }^{\circ}\text{C}$

**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

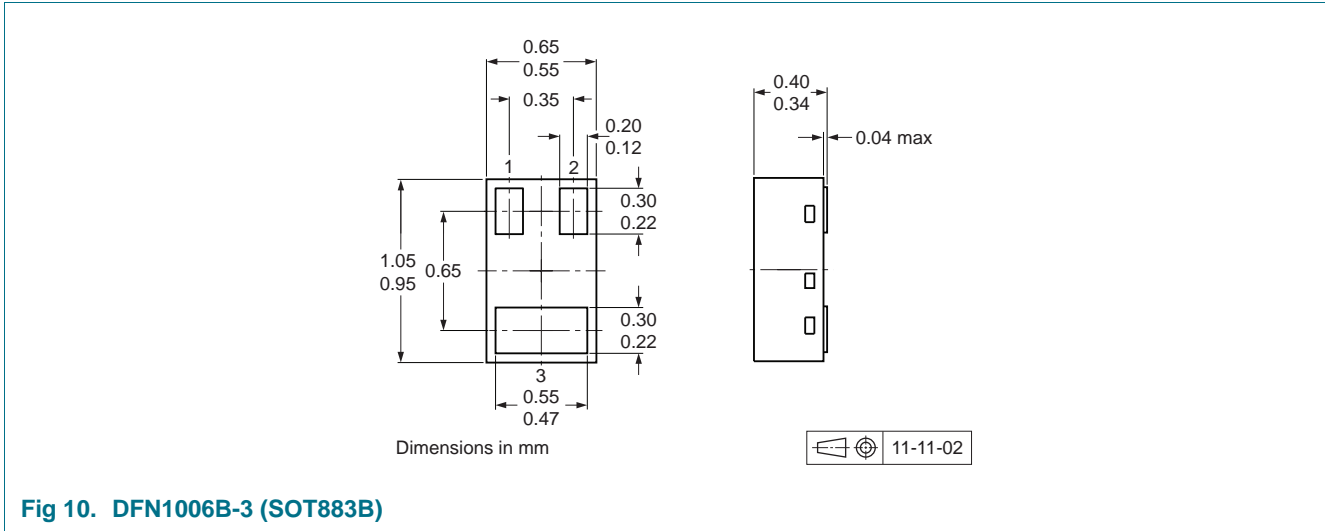


Fig 10. DFN1006B-3 (SOT883B)

## 10. Soldering

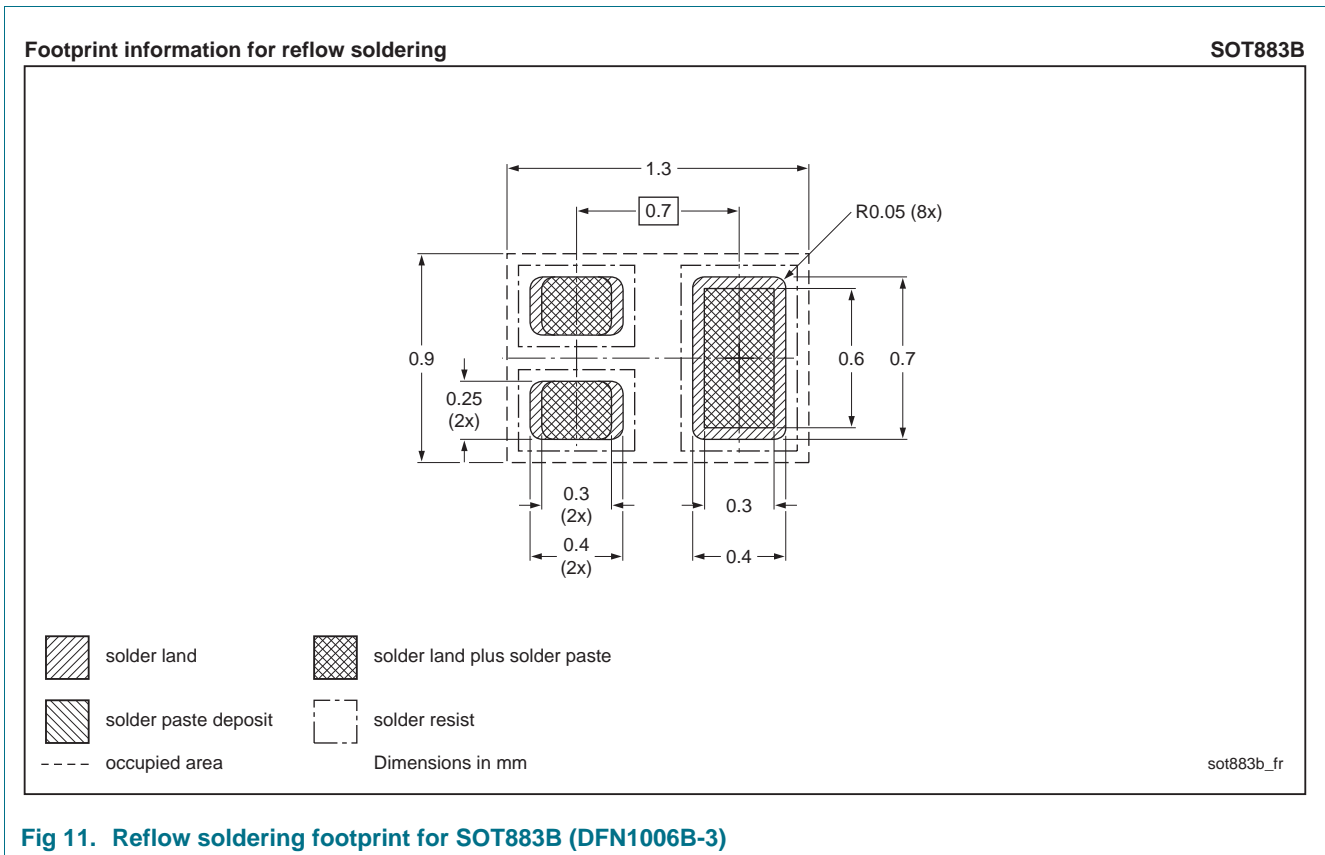


Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)

## 11. Revision history

Table 8. Revision history

| Document ID    | Release date | Data sheet status  | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PDTC124XMB v.1 | 20120626     | 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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**14. Contents**

**1 Product profile . . . . .1**

1.1 General description . . . . .1

1.2 Features and benefits . . . . .1

1.3 Applications . . . . .1

1.4 Quick reference data . . . . .1

**2 Pinning information . . . . .2**

**3 Ordering information . . . . .2**

**4 Marking . . . . .2**

**5 Limiting values . . . . .3**

**6 Thermal characteristics . . . . .3**

**7 Characteristics . . . . .4**

**8 Test information . . . . .6**

8.1 Quality information . . . . .6

**9 Package outline . . . . .7**

**10 Soldering . . . . .7**

**11 Revision history . . . . .8**

**12 Legal information . . . . .9**

12.1 Data sheet status . . . . .9

12.2 Definitions . . . . .9

12.3 Disclaimers . . . . .9

12.4 Trademarks . . . . .10

**13 Contact information . . . . .10**

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