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Kind regards,

Team Nexperia



PDTC144WMB

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

Rev. 1 — 2 July 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: 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

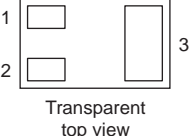
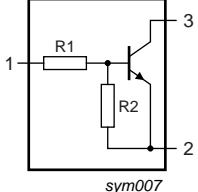
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---------------------------|--------------------------|------|------|------|------------|
| V _{CEO} | collector-emitter voltage | open base | - | - | 50 | V |
| I _O | output current | | - | - | 100 | mA |
| R1 | bias resistor 1 (input) | T _{amb} = 25 °C | 33 | 47 | 61 | k Ω |
| R2/R1 | bias resistor ratio | | 0.37 | 0.47 | 0.57 | |



2. Pinning information

Table 2. Pinning information

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

3. Ordering information

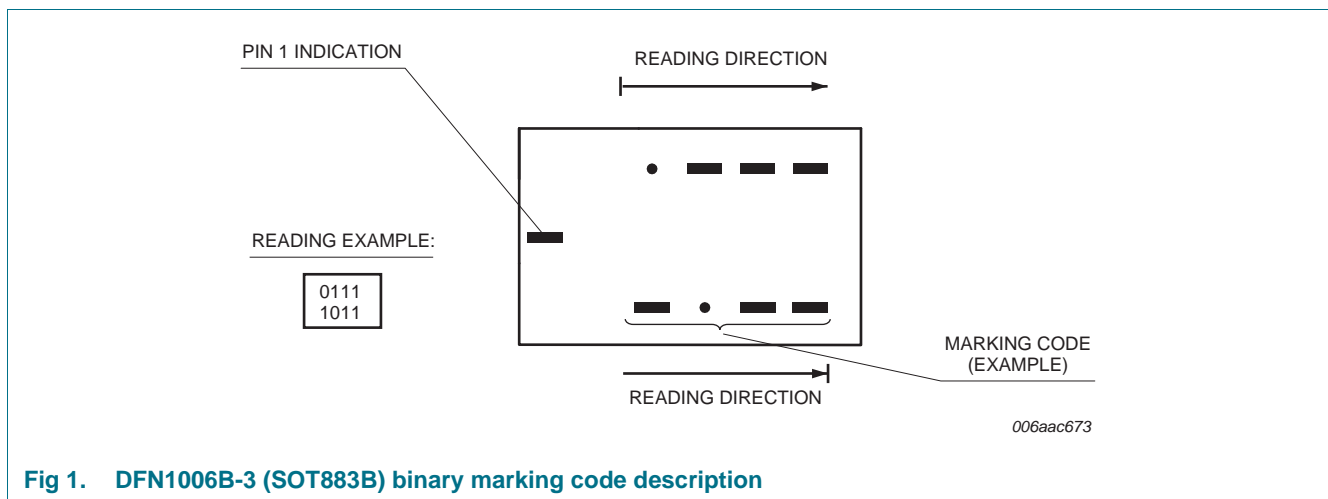
Table 3. Ordering information

| Type number | Package | | |
|-------------|------------|--|---------|
| | Name | Description | Version |
| PDTC144WMB | 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 |
|-------------|--------------|
| PDTC144WMB | 0011 1111 |



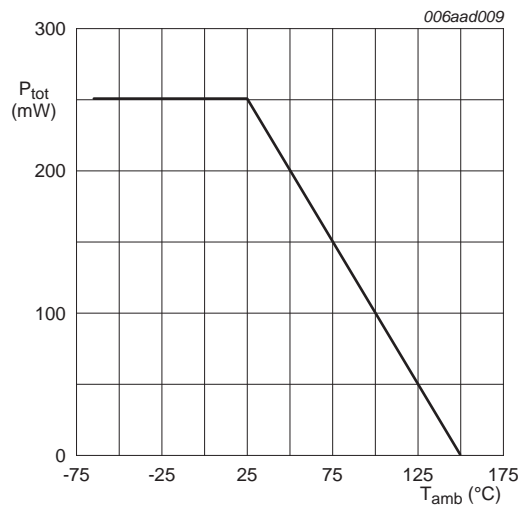
5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|---------------------------|-------------------------------|-----|-----|------|
| V _{CBO} | collector-base voltage | open emitter | - | 50 | V |
| V _{CEO} | collector-emitter voltage | open base | - | 50 | V |
| V _{EBO} | emitter-base voltage | open collector | - | 10 | V |
| V _I | input voltage | positive | - | 40 | V |
| | | negative | - | -10 | V |
| I _O | output current | | - | 100 | mA |
| I _{CM} | peak collector current | pulsed; t _p ≤ 1 ms | - | 100 | mA |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | [1] | 250 | mW |
| T _j | junction temperature | | - | 150 | °C |
| T _{amb} | ambient temperature | | -65 | 150 | °C |
| T _{stg} | 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 | [1] | - | 500 | K/W |

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

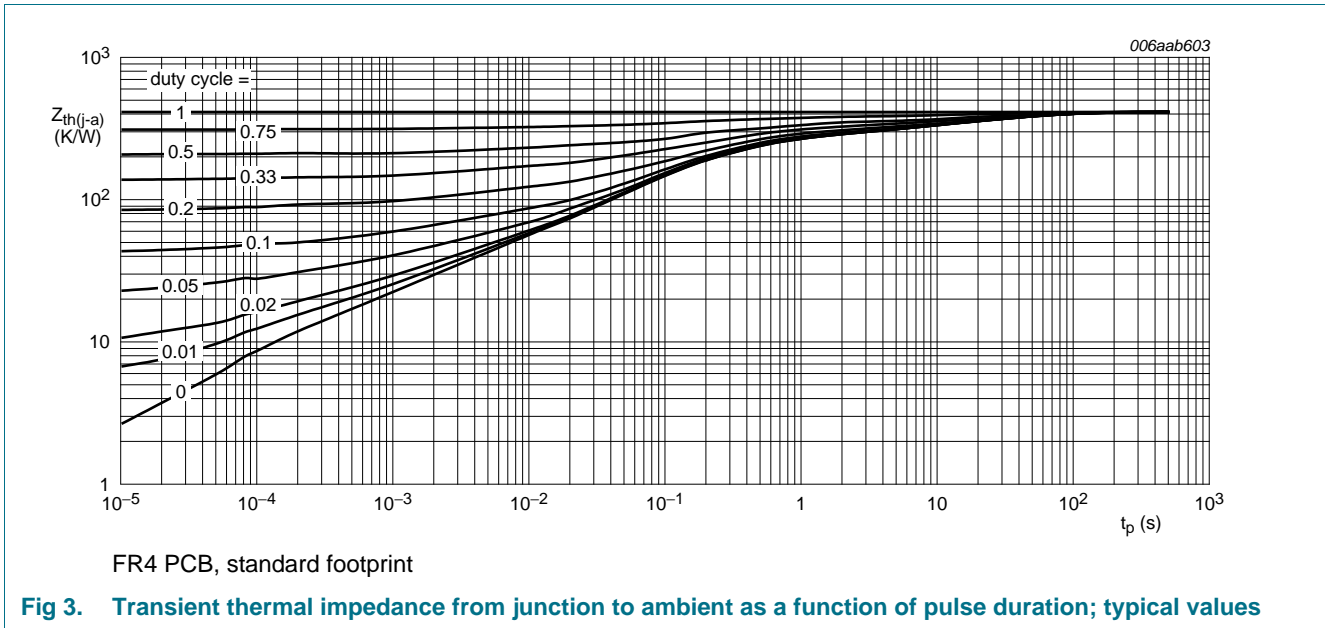


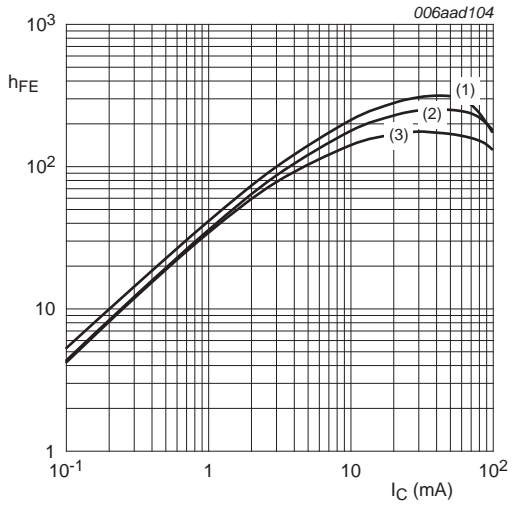
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

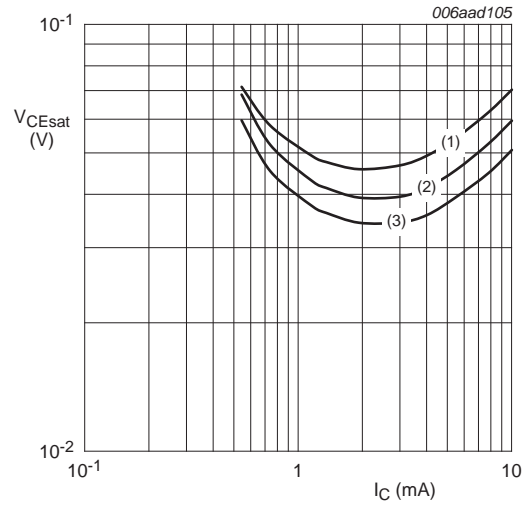
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------|--------------------------------------|---|------|------|------|------|
| I _{CBO} | collector-base cut-off current | V _{CB} = 50 V; I _E = 0 A; T _{amb} = 25 °C | - | - | 100 | nA |
| I _{CEO} | collector-emitter cut-off current | V _{CE} = 30 V; I _B = 0 A; T _{amb} = 25 °C | - | - | 1 | μA |
| | | V _{CE} = 30 V; I _B = 0 A; T _j = 150 °C | - | - | 5 | μA |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 5 V; I _C = 0 A; T _{amb} = 25 °C | - | - | 110 | μA |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 5 mA; T _{amb} = 25 °C | 60 | - | - | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 10 mA; I _B = 0.5 mA; T _{amb} = 25 °C | - | - | 150 | mV |
| V _{I(off)} | off-state input voltage | V _{CE} = 5 V; I _C = 100 μA; T _{amb} = 25 °C | - | 1.7 | 1.2 | V |
| V _{I(on)} | on-state input voltage | V _{CE} = 0.3 V; I _C = 2 mA; T _{amb} = 25 °C | 4 | 2.7 | - | V |
| R1 | bias resistor 1 (input) | T _{amb} = 25 °C | 33 | 47 | 61 | kΩ |
| R2/R1 | bias resistor ratio | | 0.37 | 0.47 | 0.57 | |
| C _C | collector capacitance | V _{CB} = 10 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C | - | - | 2.5 | pF |
| f _T | transition frequency | V _{CE} = 5 V; I _C = 10 mA; f = 100 MHz; T _{amb} = 25 °C | [1] | 230 | - | MHz |

[1] Characteristics of built-in transistor.



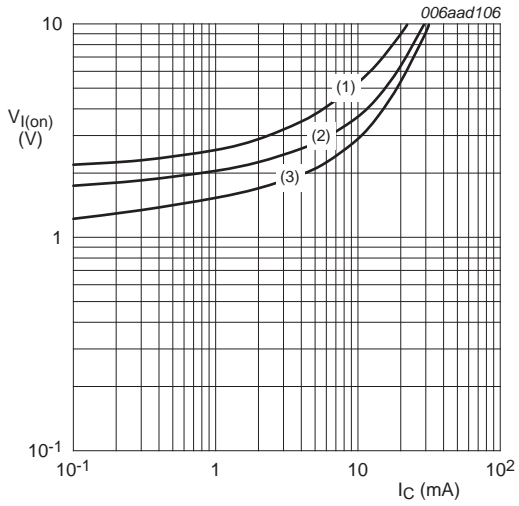
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



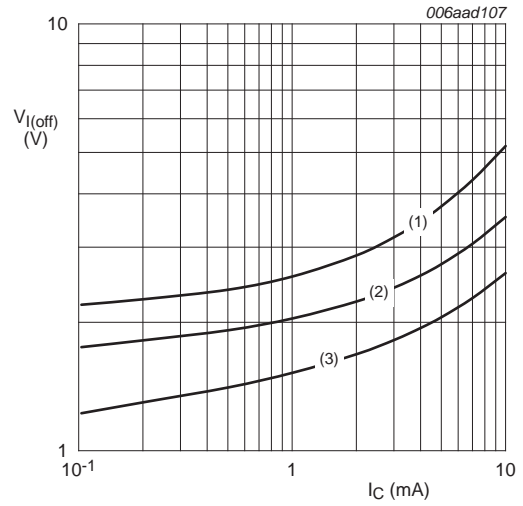
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



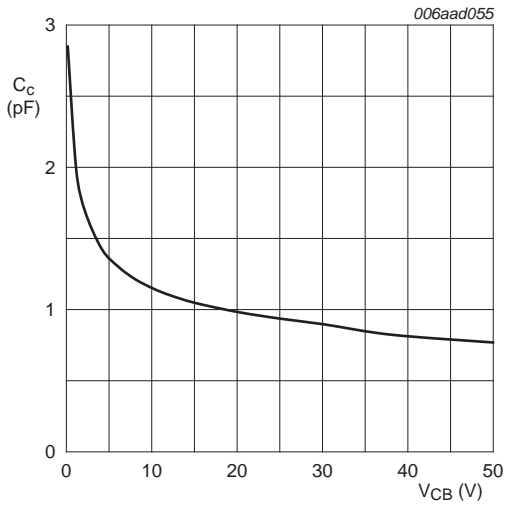
$V_{CE} = 0.3\text{ V}$
 (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



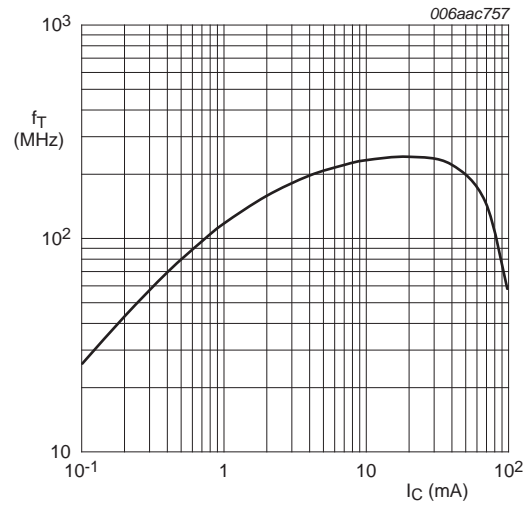
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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

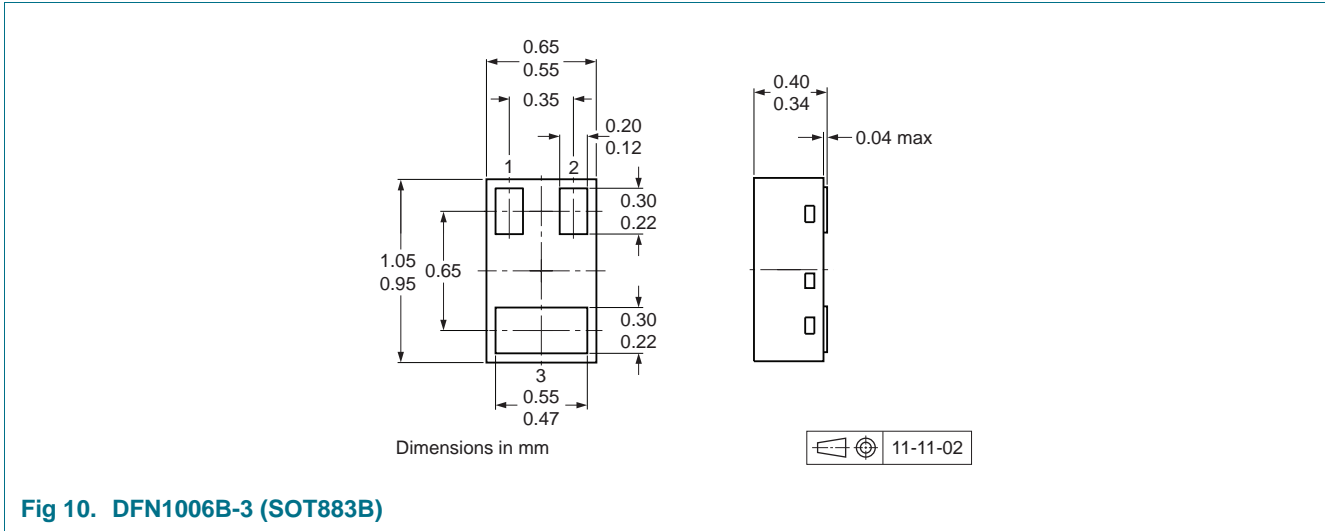


Fig 10. DFN1006B-3 (SOT883B)

10. Soldering

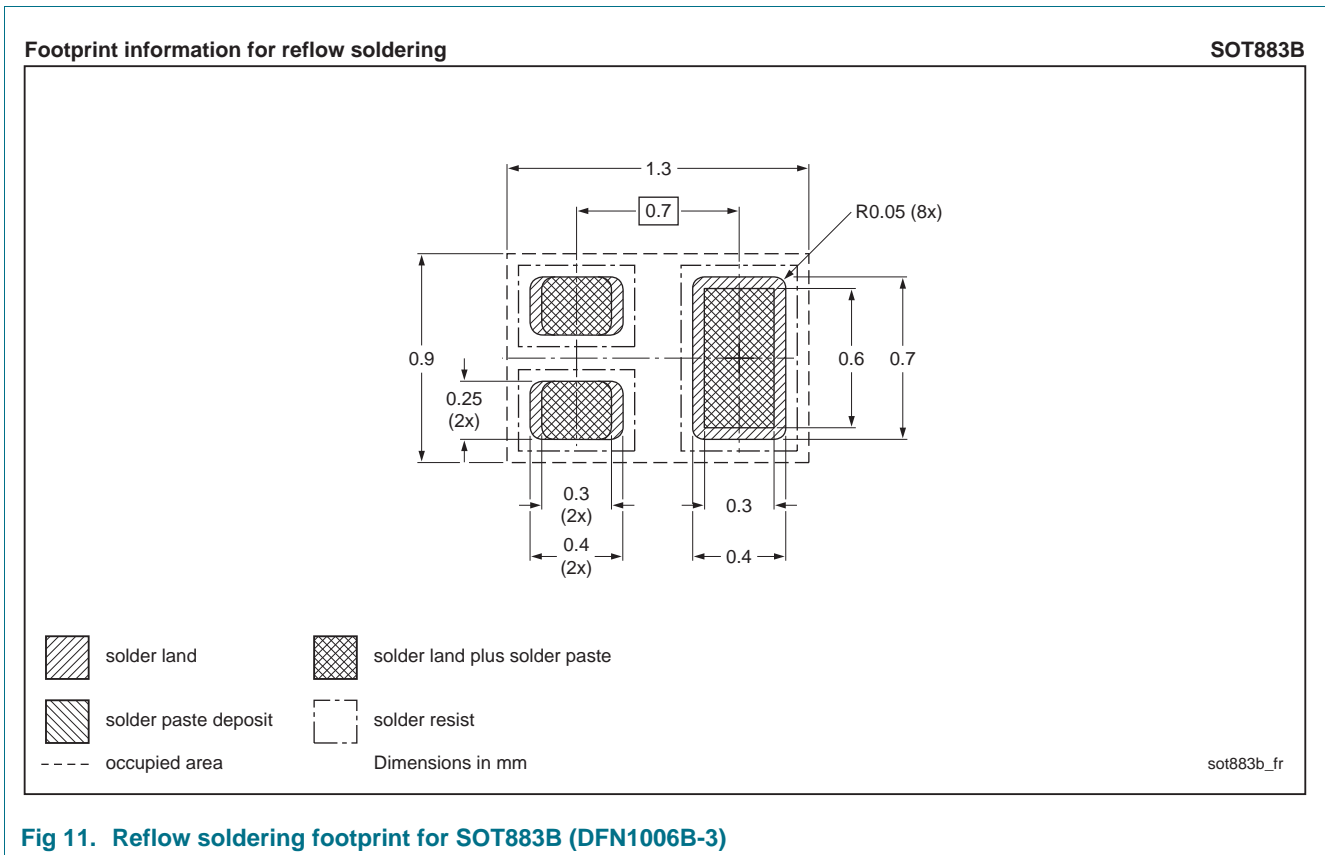


Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)

11. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PDTC144WMB v.1 | 20120702 | Product data sheet | - | - |

12. Legal information

12.1 Data sheet status

| Document status ^[1] [2] | Product status ^[3] | 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 profile1

1.1 General description1

1.2 Features and benefits1

1.3 Applications1

1.4 Quick reference data1

2 Pinning information2

3 Ordering information2

4 Marking2

5 Limiting values3

6 Thermal characteristics3

7 Characteristics4

8 Test information6

8.1 Quality information6

9 Package outline7

10 Soldering7

11 Revision history8

12 Legal information9

12.1 Data sheet status9

12.2 Definitions9

12.3 Disclaimers9

12.4 Trademarks10

13 Contact information10

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

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