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Kind regards,

Team Nexperia



PNTC115EMB

NPN resistor-equipped transistor; R1 = 100 k Ω , R2 = 100 k Ω

Rev. 1 — 1 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: PDTA115EMB.

1.2 Features and benefits

- 20 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

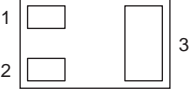
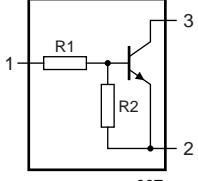
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---------------------------|--------------------------|-----|-----|-----|------------|
| V _{CEO} | collector-emitter voltage | open base | - | - | 50 | V |
| I _O | output current | | - | - | 20 | mA |
| R1 | bias resistor 1 (input) | T _{amb} = 25 °C | 70 | 100 | 130 | k Ω |
| 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>SOT883B (DFN1006B-3)</p> |  <p><i>sym007</i></p> |
| 2 | G | GND (emitter) | | |
| 3 | O | output (collector) | | |

3. Ordering information

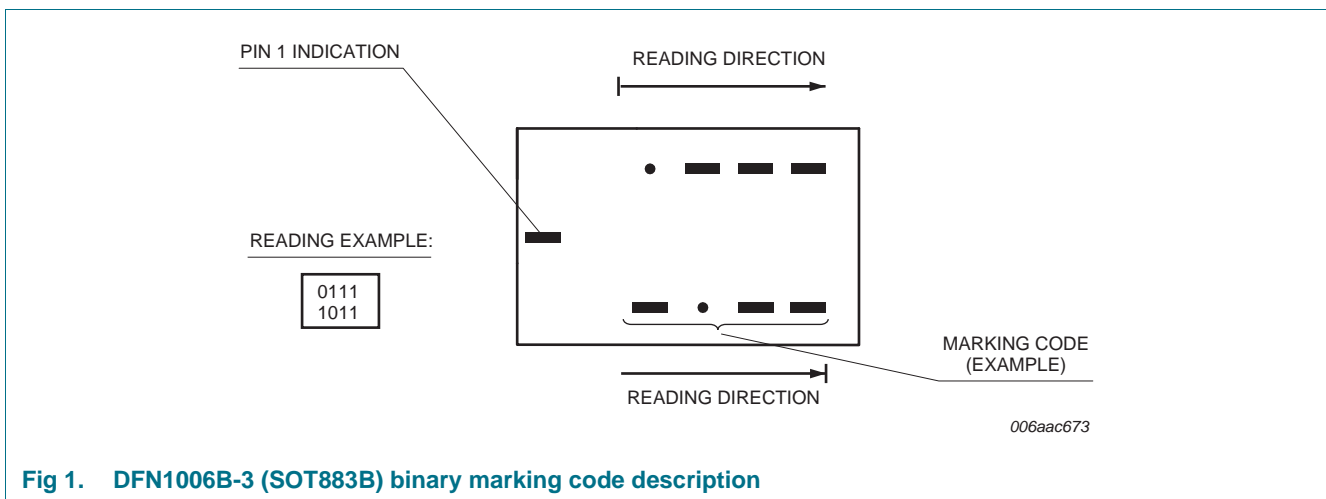
Table 3. Ordering information

| Type number | Package | | |
|-------------|------------|--|---------|
| | Name | Description | Version |
| PDTC115EMB | 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 |
|-------------|--------------|
| PDTC115EMB | 0011 0001 |



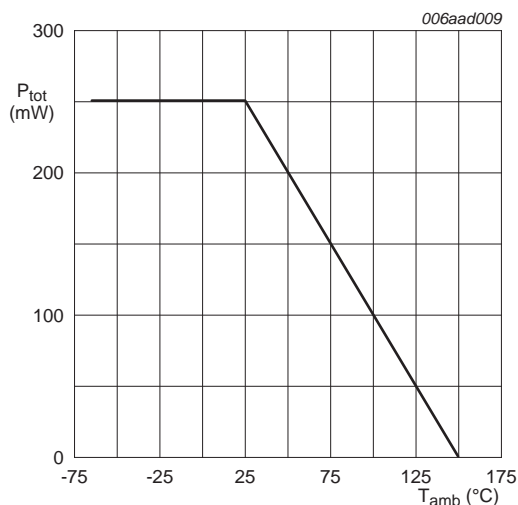
5. Limiting values

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 | | - | 20 | 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.

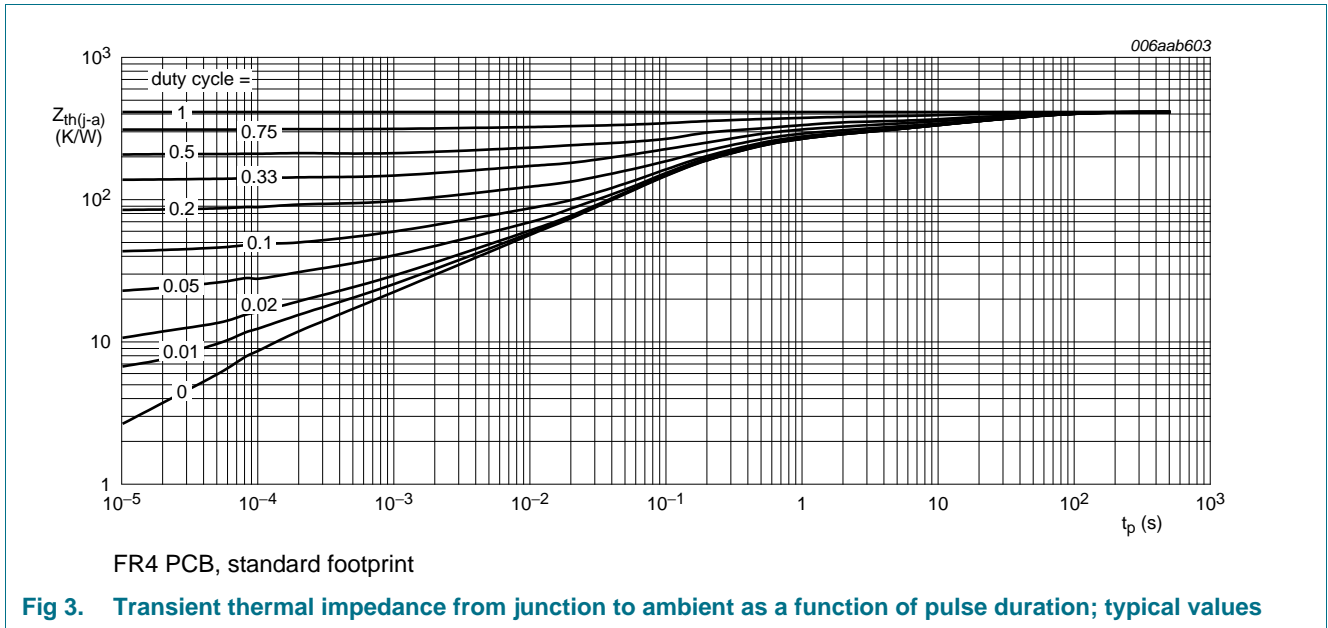


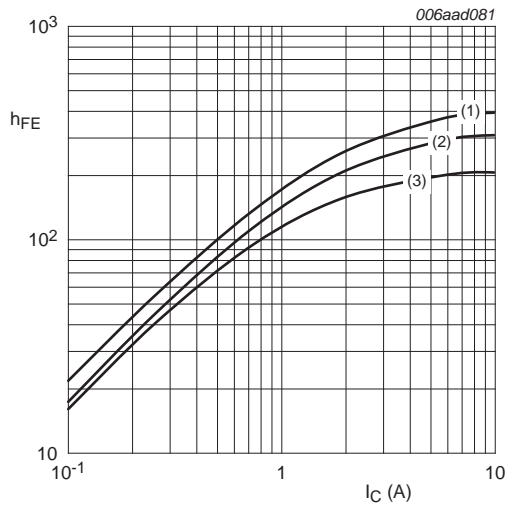
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

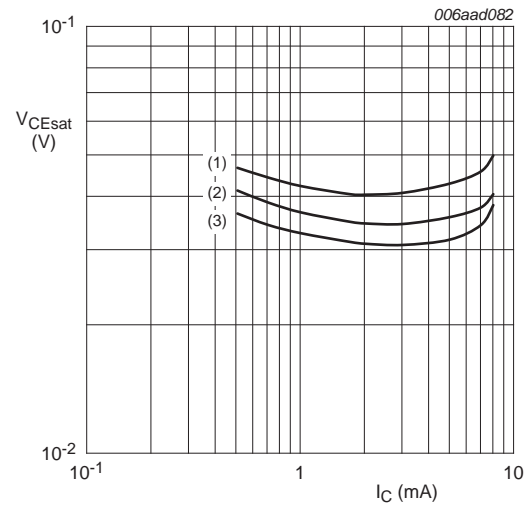
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------|--------------------------------------|---|-----|-----|-----|------|
| I _{CBO} | collector-base cut-off current | V _{CB} = 50 V; I _E = 0 A; T _{amb} = 25 °C | - | - | 100 | nA |
| I _{CEO} | collector-emitter cut-off 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 | - | - | 50 | μA |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 5 mA; T _{amb} = 25 °C | 80 | - | - | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 5 mA; I _B = 0.25 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 | - | 1.1 | 0.5 | V |
| V _{I(on)} | on-state input voltage | V _{CE} = 0.3 V; I _C = 1 mA; T _{amb} = 25 °C | 3 | 1.5 | - | V |
| R1 | bias resistor 1 (input) | T _{amb} = 25 °C | 70 | 100 | 130 | kΩ |
| R2/R1 | bias resistor ratio | | 0.8 | 1 | 1.2 | |
| 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.



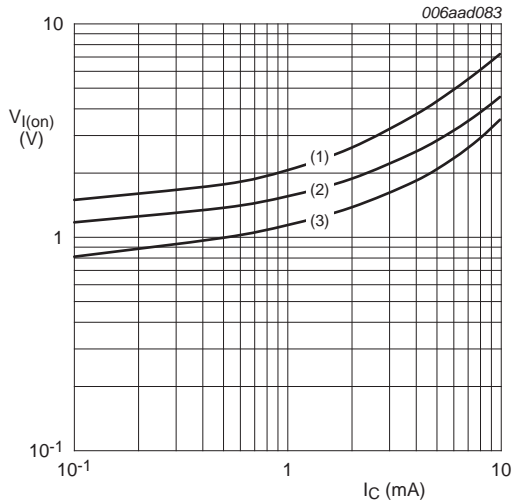
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



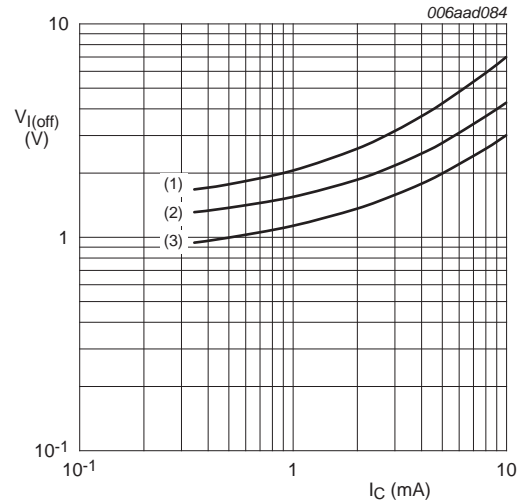
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



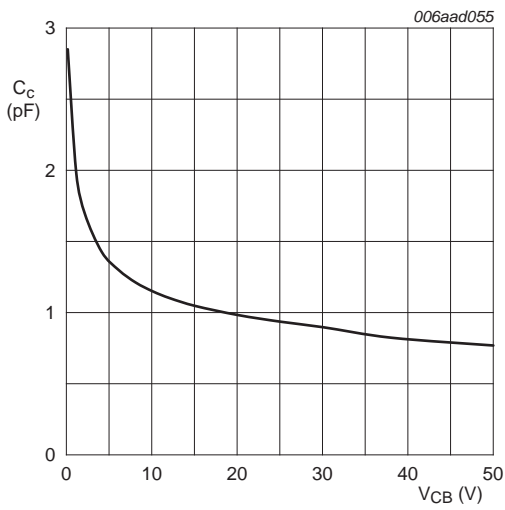
$V_{CE} = 0.3\text{ V}$
 (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



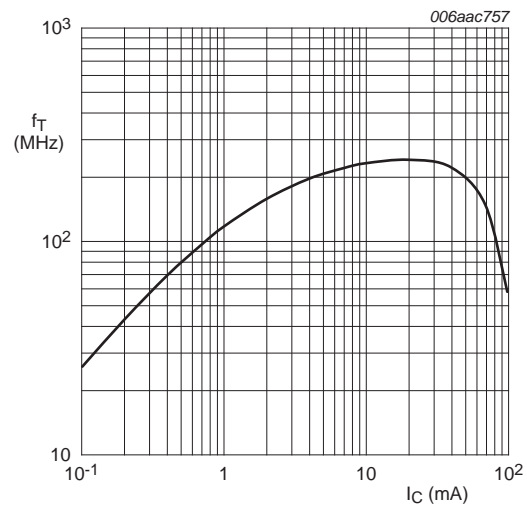
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -40\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



f = 1 MHz; T_{amb} = 25 °C

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



V_{CE} = 5 V; T_{amb} = 25 °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

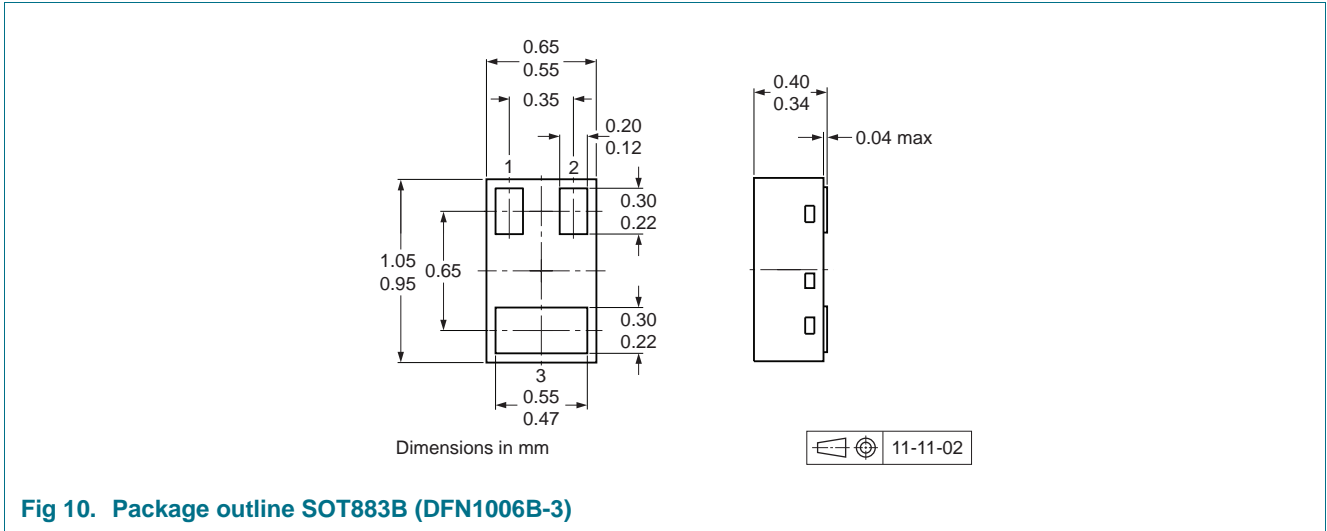


Fig 10. Package outline SOT883B (DFN1006B-3)

10. Soldering

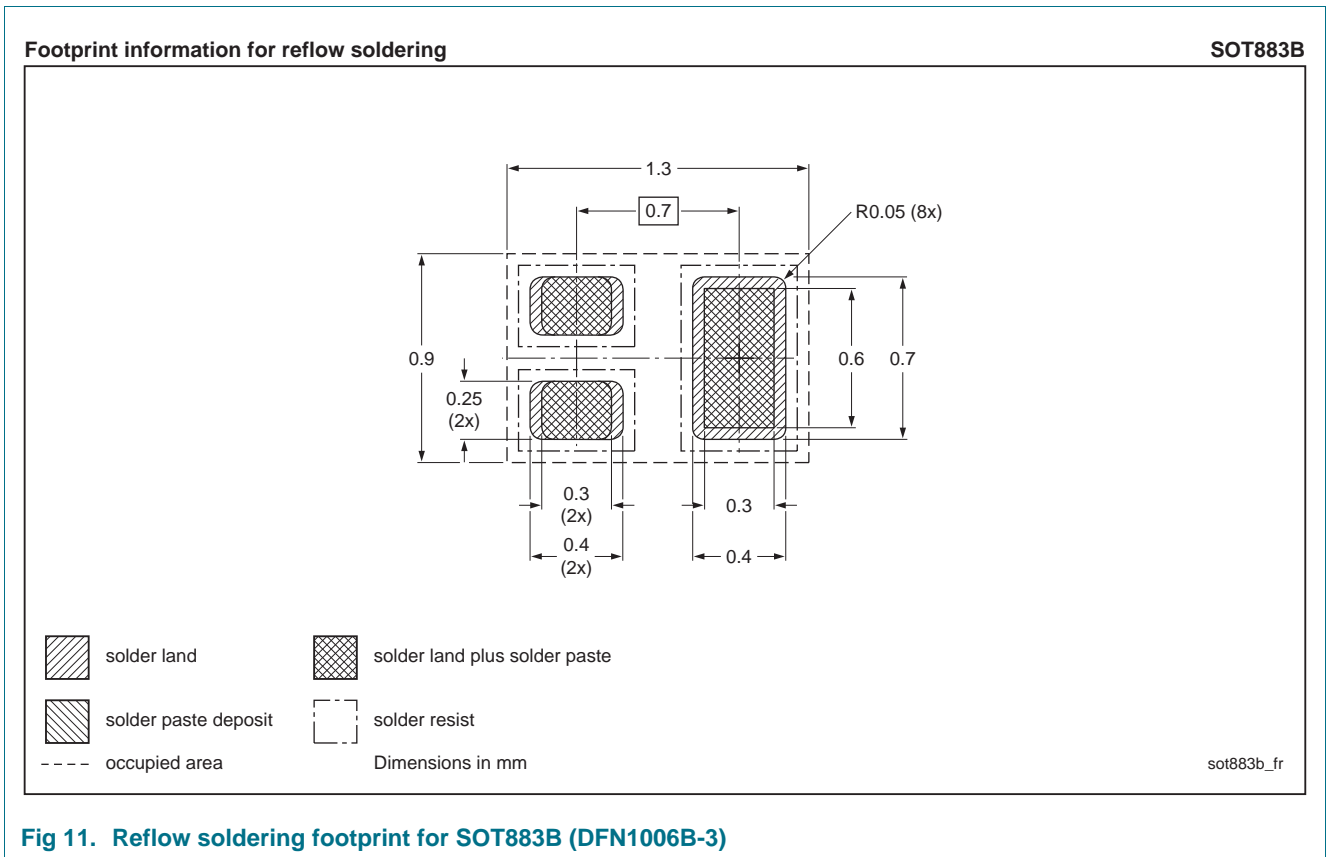


Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)

11. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PDTC115EMB v.1 | 20120601 | 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. |

[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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