



PBSS2515MB

15 V, 0.5 A NPN low V_{CEsat} (BISS) transistor

Rev. 1 — 26 January 2012

Product data sheet

1. Product profile

1.1 General description

NPN low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a leadless ultra small SOT883B Surface-Mounted Device (SMD) plastic package.

PNP complement: PBSS3515MB.

1.2 Features and benefits

- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High efficiency due to less heat generation
- AEC-Q101 qualified
- Reduced Printed-Circuit Board (PCB) requirements

1.3 Applications

- DC-to-DC conversion
- Supply line switching
- Battery charger
- LCD backlighting
- Driver in low supply voltage applications (e.g. lamps and LEDs)

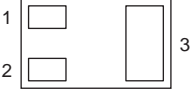
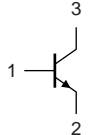
1.4 Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|---|---|-----|-----|-----|------------|
| V_{CEO} | collector-emitter voltage | open base | - | - | 15 | V |
| I_C | collector current | | - | - | 500 | mA |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | - | - | 1 | A |
| R_{CEsat} | collector-emitter saturation resistance | $I_C = 500$ mA; $I_B = 50$ mA; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_{amb} = 25$ °C | - | 360 | 500 | m Ω |

2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|---|
| 1 | B | base |  <p>Transparent top view</p> <p>SOT883B</p> |  <p>sym021</p> |
| 2 | E | emitter | | |
| 3 | C | collector | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PBSS2515MB | - | Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm | SOT883B |

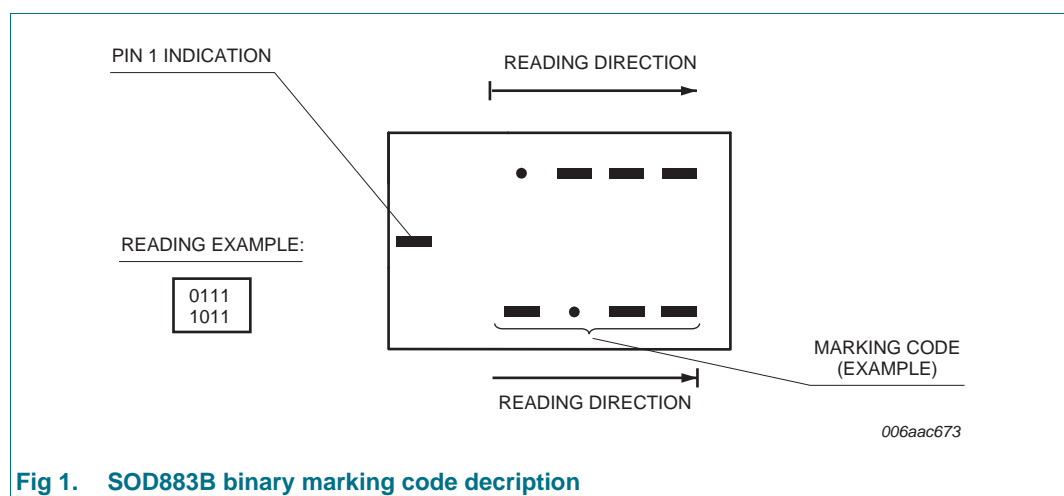
4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PBSS2515MB | 0001 0001 |

[1] For SOT883B binary marking code description, see [Figure 1](#).

4.1 Binary marking code description



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 | - | 15 | V |
| V_{CEO} | collector-emitter voltage | open base | - | 15 | V |
| V_{EBO} | emitter-base voltage | open collector | - | 6 | V |
| I_C | collector current | | - | 500 | mA |
| I_{CM} | peak collector current | single pulse; $t_p \leq 1$ ms | - | 1 | A |
| I_{BM} | peak base current | single pulse; $t_p \leq 1$ ms | - | 100 | mA |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [1] [2] | 250 | mW |
| | | | [3] [2] | 590 | mW |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -55 | 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.

[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

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][2] | - | - | 500 | K/W |
| | | | [3][2] | - | - | 212 | K/W |

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

[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

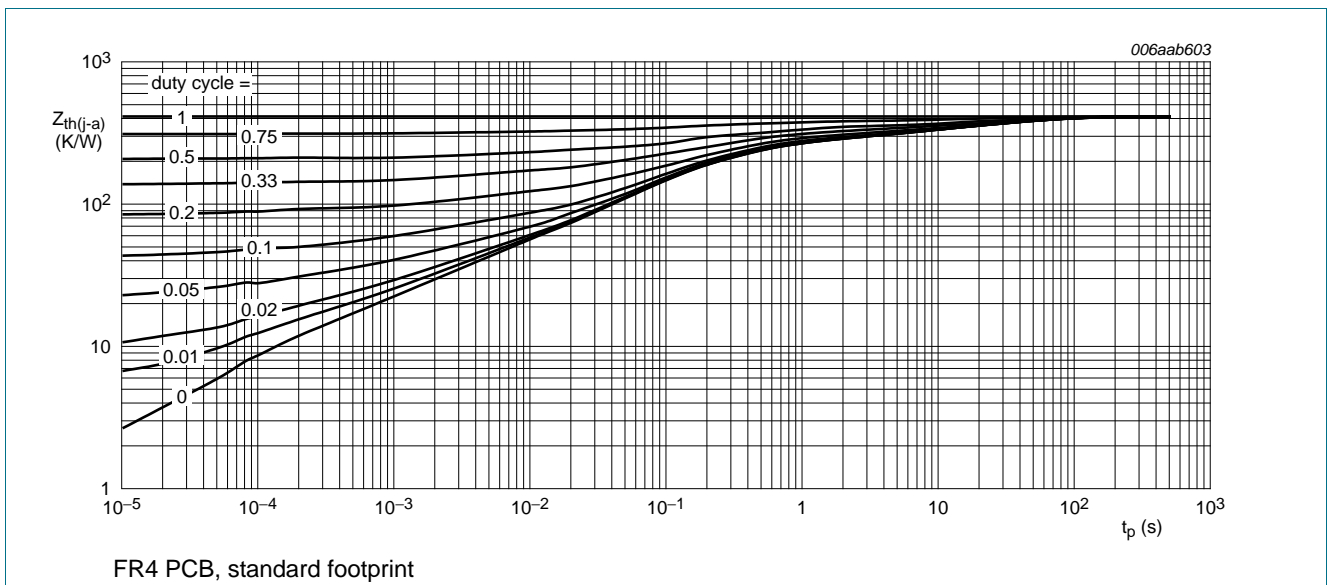


Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

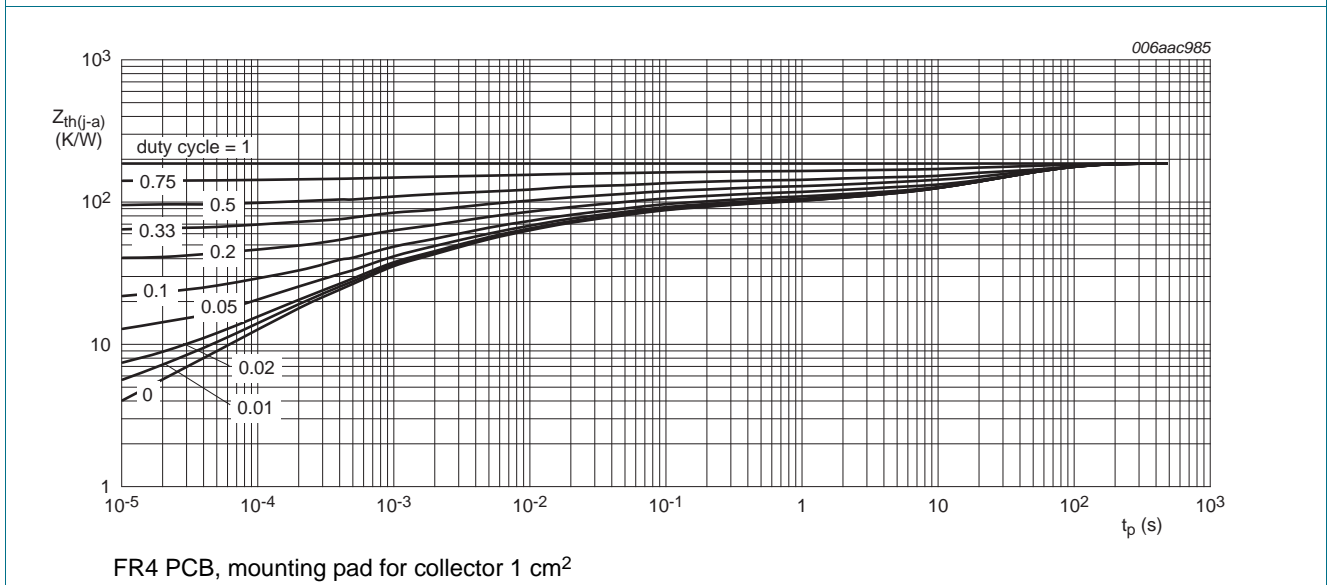
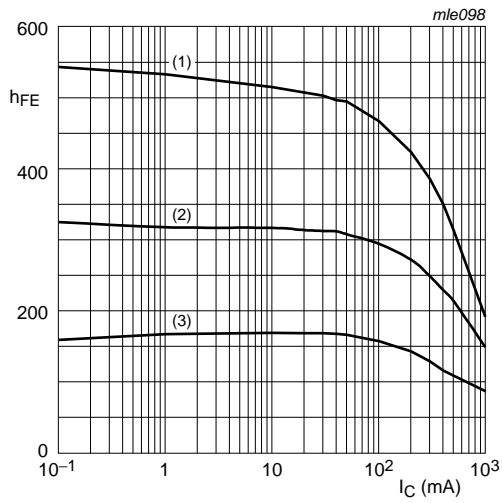


Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

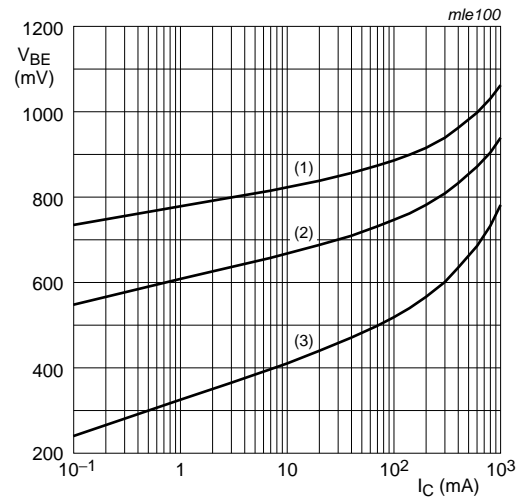
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|---|--|-----|-----|-----|------------------|
| I_{CBO} | collector-base cut-off current | $V_{CB} = 15\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 100 | nA |
| | | $V_{CB} = 15\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^\circ\text{C}$ | - | - | 50 | μA |
| I_{EBO} | emitter-base cut-off current | $V_{EB} = 5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 100 | nA |
| h_{FE} | DC current gain | $V_{CE} = 2\text{ V}; I_C = 10\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | 200 | - | - | |
| | | $V_{CE} = 2\text{ V}; I_C = 100\text{ mA};$ pulsed; $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$ | 150 | - | - | |
| | | $V_{CE} = 2\text{ V}; I_C = 500\text{ mA};$ pulsed; $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$ | 90 | - | - | |
| V_{CEsat} | collector-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 25 | mV |
| | | $I_C = 200\text{ mA}; I_B = 10\text{ mA};$ pulsed; $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 150 | mV |
| | | $I_C = 500\text{ mA}; I_B = 50\text{ mA};$ pulsed; $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 250 | mV |
| R_{CEsat} | collector-emitter saturation resistance | $I_C = 500\text{ mA}; I_B = 50\text{ mA};$ pulsed; $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$ | - | 360 | 500 | $\text{m}\Omega$ |
| V_{BEsat} | base-emitter saturation voltage | $I_C = 500\text{ mA}; I_B = 50\text{ mA};$ pulsed; $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 1.1 | V |
| V_{BEon} | base-emitter turn-on voltage | $V_{CE} = 2\text{ V}; I_C = 100\text{ mA};$ pulsed; $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$ | - | - | 0.9 | V |
| f_T | transition frequency | $V_{CE} = 5\text{ V}; I_C = 100\text{ mA}; f = 100\text{ MHz};$ $T_{amb} = 25\text{ }^\circ\text{C}$ | 250 | 420 | - | MHz |
| C_C | collector capacitance | $V_{CB} = 10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A};$ $f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$ | - | 4.4 | 6 | pF |



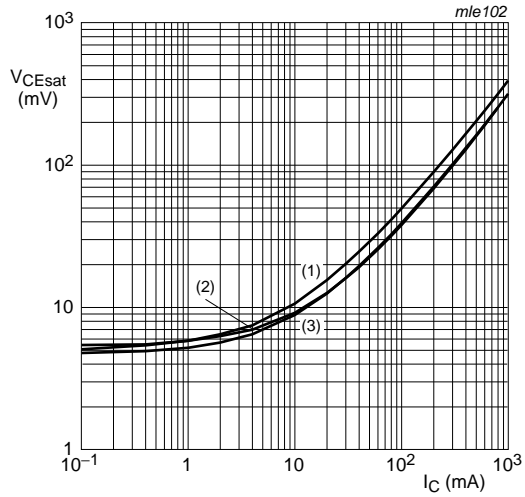
$V_{CE} = 2\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



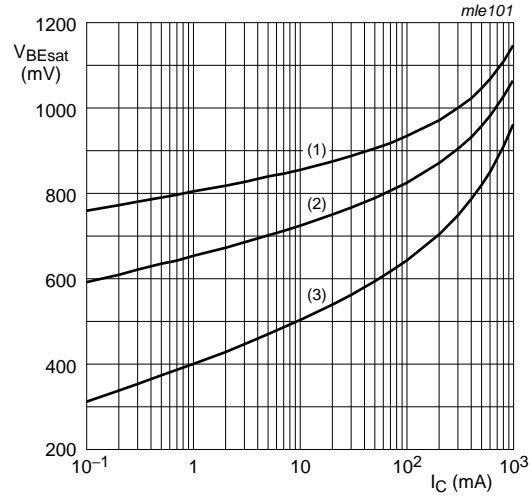
$V_{CE} = 2\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 6. Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 7. Base-emitter saturation voltage as a function of collector current; typical values

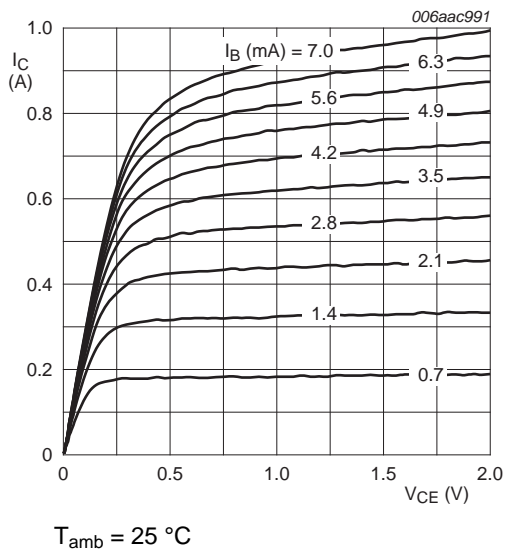
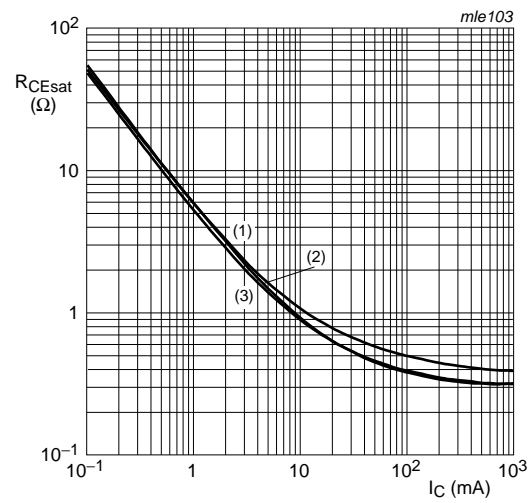


Fig 8. Collector current as a function of collector-emitter voltage; typical values



$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = -55\text{ }^\circ\text{C}$

Fig 9. Collector-emitter equivalent on-resistance as a function of collector current; typical values

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

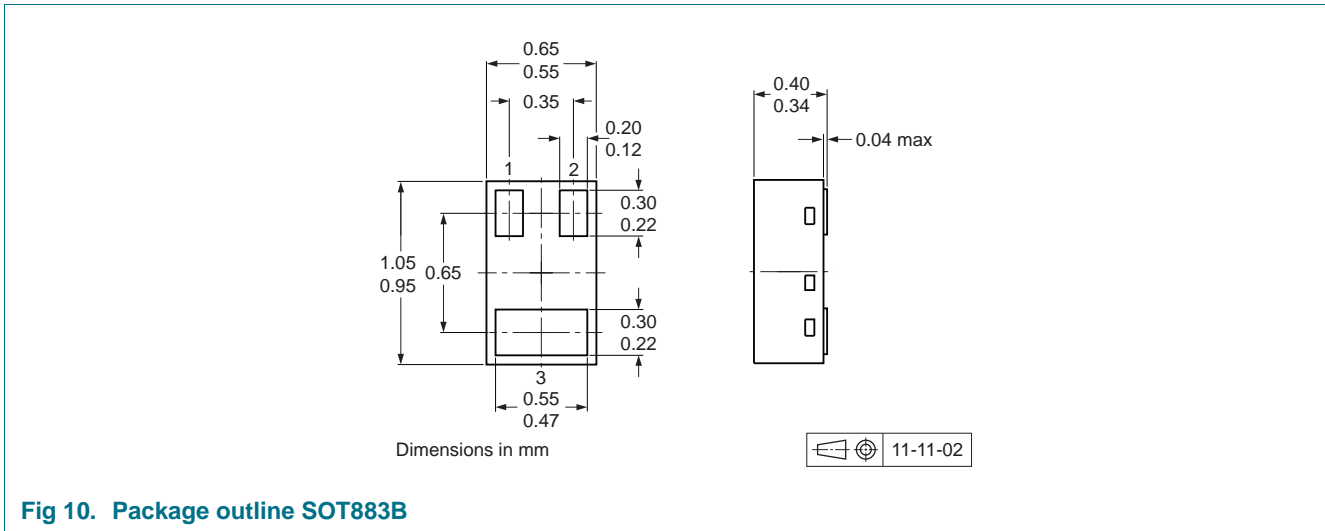


Fig 10. Package outline SOT883B

10. Soldering

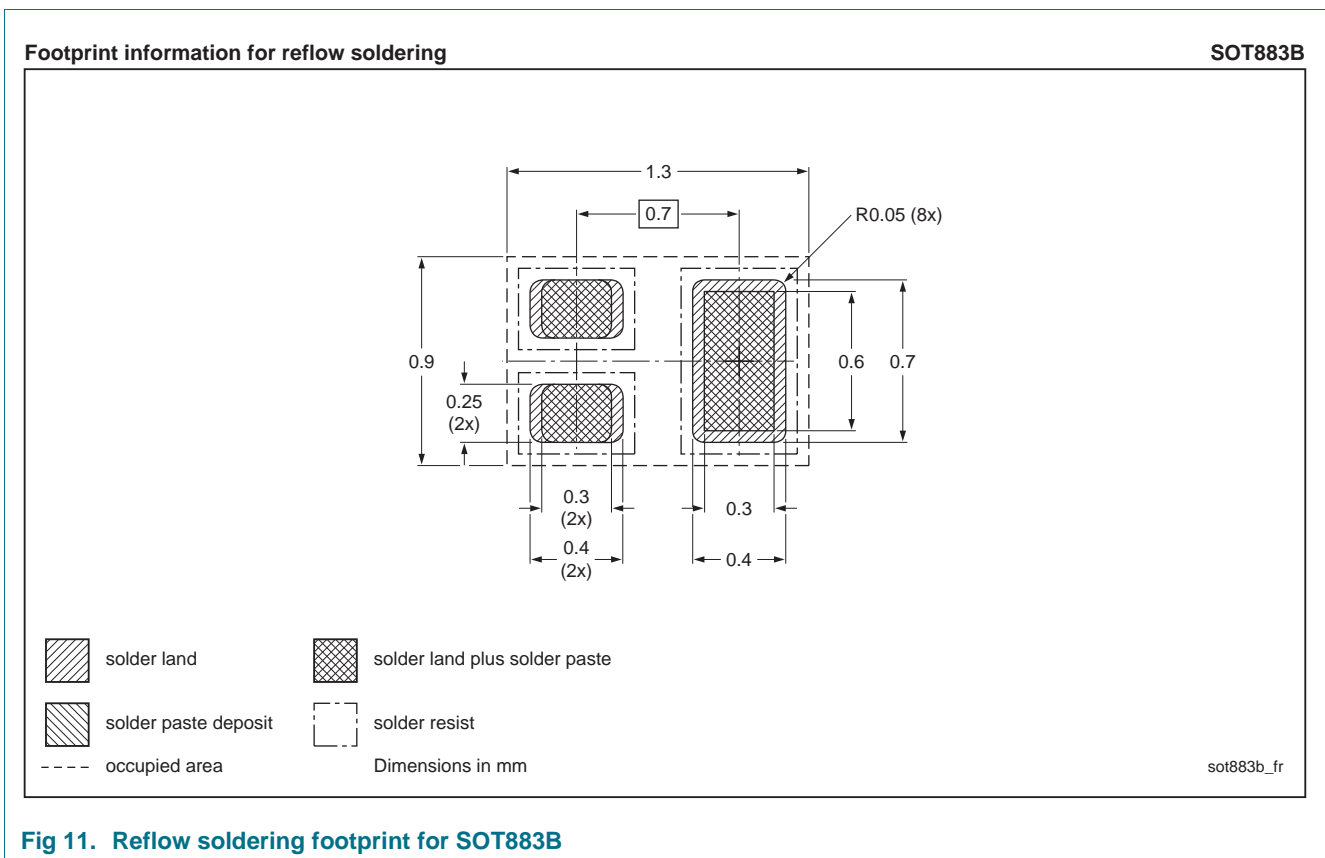


Fig 11. Reflow soldering footprint for SOT883B

11. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PBSS2515MB v.1 | 20120126 | 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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