

# PESD5V0V2BMB

## Very low capacitance bidirectional ESD protection diodes

17 August 2015 Product data sheet

## 1. General description

Two bidirectional ElectroStatic Discharge (ESD) protection diodes designed to protect two signal lines from damage caused by ESD and other transients. The device is housed in a DFN1006B-3 (SOT883B) leadless ultra small Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Bidirectional ESD protection of two lines
- Ultra small SMD plastic package
- ESD protection up to 30 kV; IEC 61000-4-2
- $I_{PPM}$ = 9 A; IEC 61000-4-5 (surge)
- Ultra low leakage current: $I_{RM}$ = 1 nA
- AEC-Q101 qualified

## 3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Portable electronics

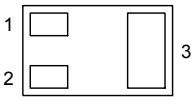
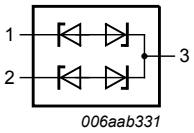
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb}$ = 25 °C | | - | - | 5 | V |
| $C_d$ | diode capacitance | f = 1 MHz; $V_R$ = 0 V; $T_{amb}$ = 25 °C | | - | 18 | 20 | pF |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | K1 | cathode |  Transparent top view **DFN1006B-3 (SOT883B)** |  |
| 2 | K2 | cathode | | |
| 3 | K3 | common cathode | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PESD5V0V2BMB | DFN1006B-3 | DFN1006B-3: leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm | SOT883B |

## 7. Marking

**Table 4. Marking codes**

| Type number | Marking code |
|---|---|
| PESD5V0V2BMB | 00 11 01 00 |

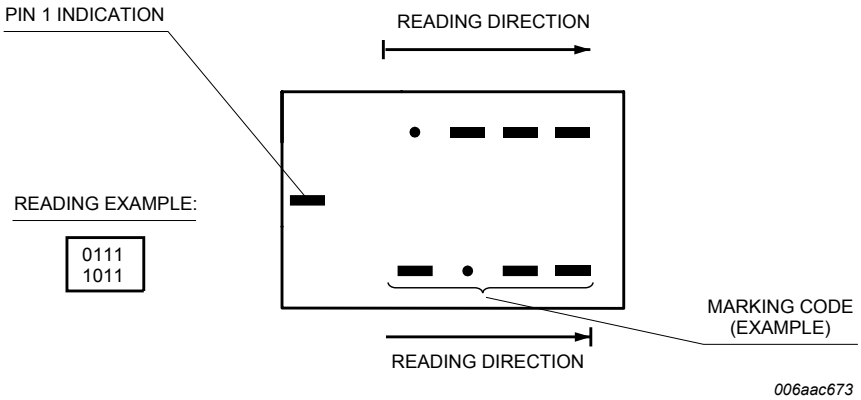



**Fig. 1. DFN1006B-3 (SOT883B) binary marking code description**


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# 8. Limiting values

**Table 5. Limiting values**

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{PPM}$ | rated peak pulse current | $t_p$ = 8/20 µs | [1][2] | - | 9 | A |
| $T_j$ | junction temperature | | | - | 150 | °C |
| $T_{amb}$ | ambient temperature | | | -55 | 150 | °C |
| $T_{stg}$ | storage temperature | | | -65 | 150 | °C |
| **ESD maximum ratings** | | | | | | |
| $V_{ESD}$ | electrostatic discharge voltage | IEC 61000-4-2; contact discharge | [1][3] | - | 30 | kV |
| | | IEC 61000-4-2; air discharge | [1][3] | - | 30 | kV |
| | | MIL-STD-883; human body model | [1] | - | 10 | kV |

[1] Measured from pin 1 or 2 to pin 3.
[2] According to IEC 61000-4-5 and IEC 61643-321.
[3] Device stressed with ten non-repetitive ESD pulses.

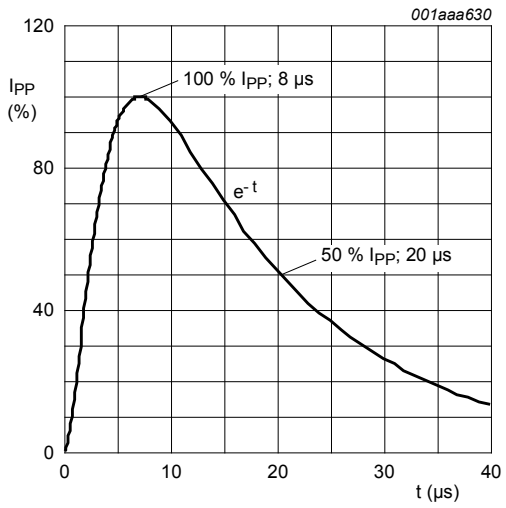



**Fig. 2. 8/20 µs pulse waveform according to IEC 61000-4-5 and IEC 61643-321**

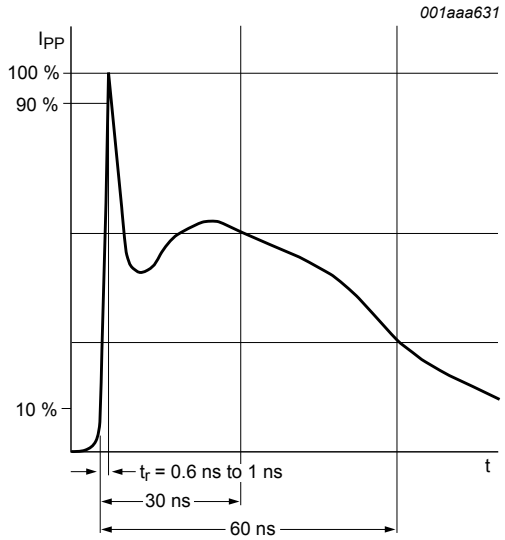



**Fig. 3. ESD pulse waveform according to IEC 61000-4-2**

# 9. Characteristics

**Table 6. Characteristics**

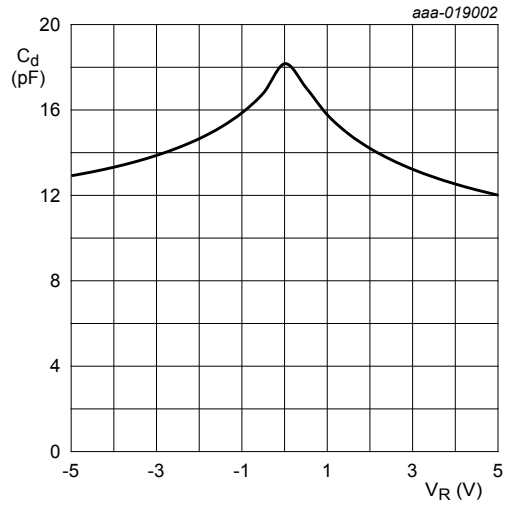
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb}$ = 25 °C | | - | - | 5 | V |
| $I_{RM}$ | reverse leakage current | $V_{RWM}$ = 5 V; $T_{amb}$ = 25 °C | [1] | - | 1 | 10 | nA |


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| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{BR}$ | breakdown voltage | $I_R$ = 5 mA; $T_{amb}$ = 25 °C | [1] | 5.5 | 6.8 | 7.8 | V |
| $C_d$ | diode capacitance | f = 1 MHz; $V_R$ = 0 V; $T_{amb}$ = 25 °C | | - | 18 | 20 | pF |
| $V_{CL}$ | clamping voltage | $I_{PP}$ = 1 A; $T_{amb}$ = 25 °C; $t_p$ = 8/20 µs | [1][2] | - | 8 | 9.5 | V |
| | | $I_{PPM}$ = 9 A; $T_{amb}$ = 25 °C; $t_p$ = 8/20 µs | [1][2] | - | 11 | 12.5 | V |
| $R_{dyn}$ | dynamic resistance | $I_R$ = 10 A; $T_{amb}$ = 25 °C | [1][3] | - | 0.15 | - | Ω |

[1] Measured from pin 1 or 2 to pin 3.
[2] According to IEC 61000-4-5 and IEC 61643-321.
[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) $t_p$ = 100 ns; square pulse; ANSI / ESD STM5.5.1-2008.




f = 1 MHz; $T_{amb}$ = 25 °C

**Fig. 4. Diode capacitance as a function of reverse voltage; typical values**

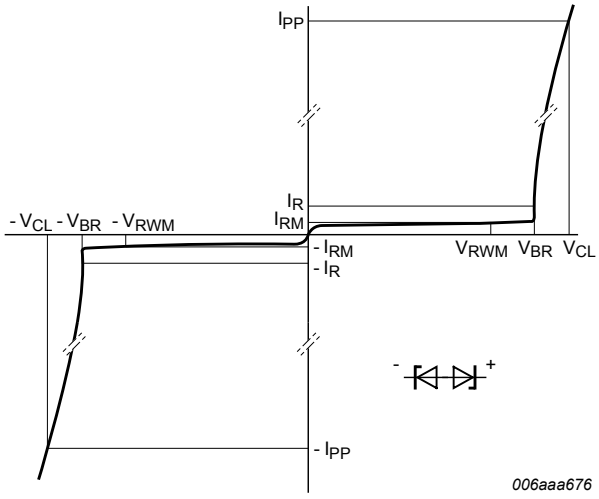
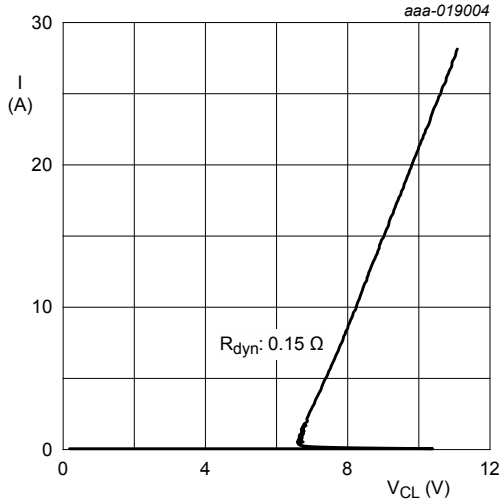
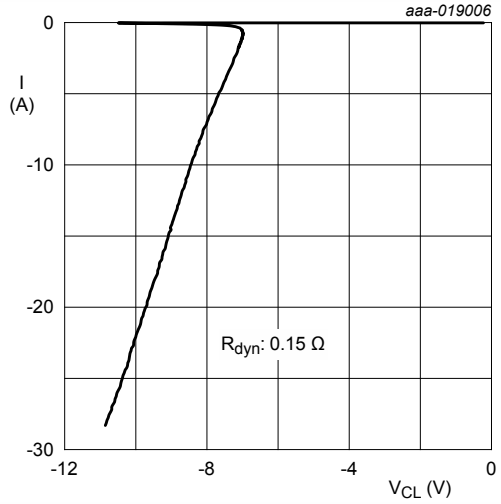



**Fig. 5. V-I characteristics for a bidirectional ESD protection diode**




$t_p$ = 100 ns; Transmission Line Pulse (TLP)

**Fig. 6. Dynamic resistance**




$t_p$ = 100 ns; Transmission Line Pulse (TLP)

**Fig. 7. Dynamic resistance**


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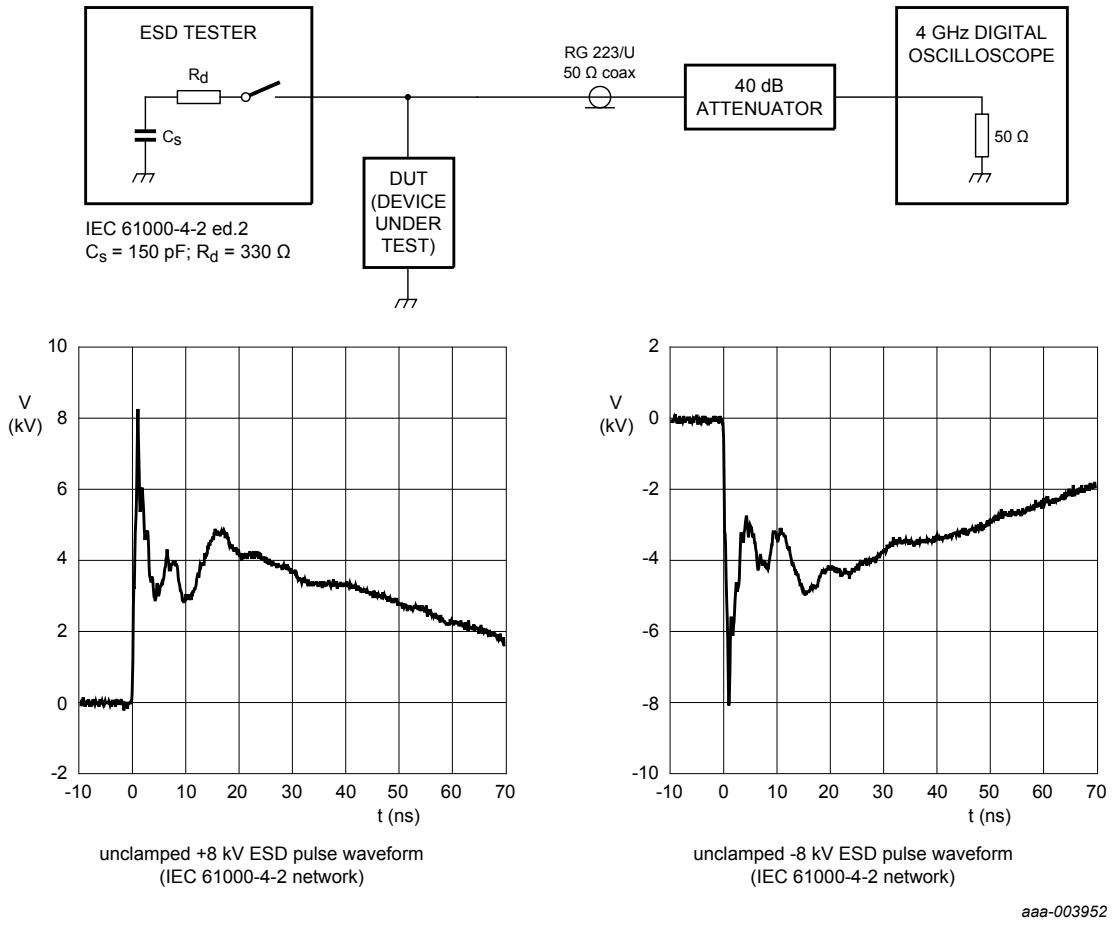



**Fig. 8. ESD clamping test setup and waveforms**

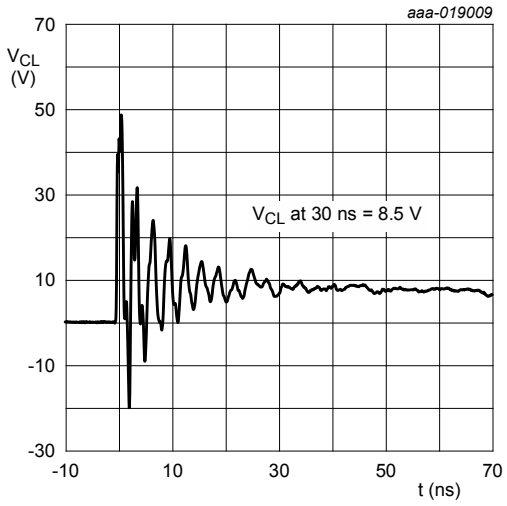



**Fig. 9. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)**

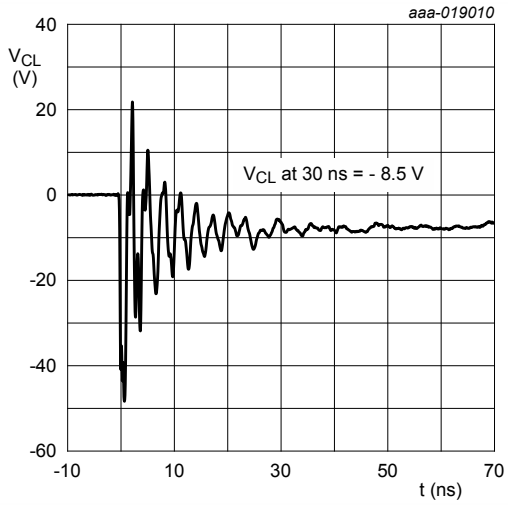



**Fig. 10. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)**

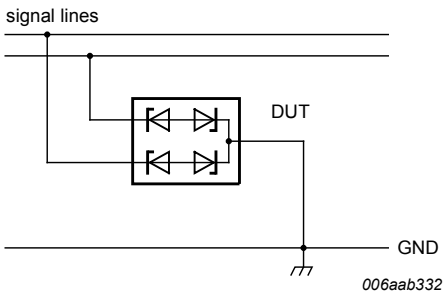

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# 10. Application information

The device is designed for the protection of up to two bidirectional data lines from surge pulses and ESD damage.

**Fig. 11. Application diagram**




**Circuit board layout and protection device placement**

Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

# 11. Test information

## 11.1 Quality information

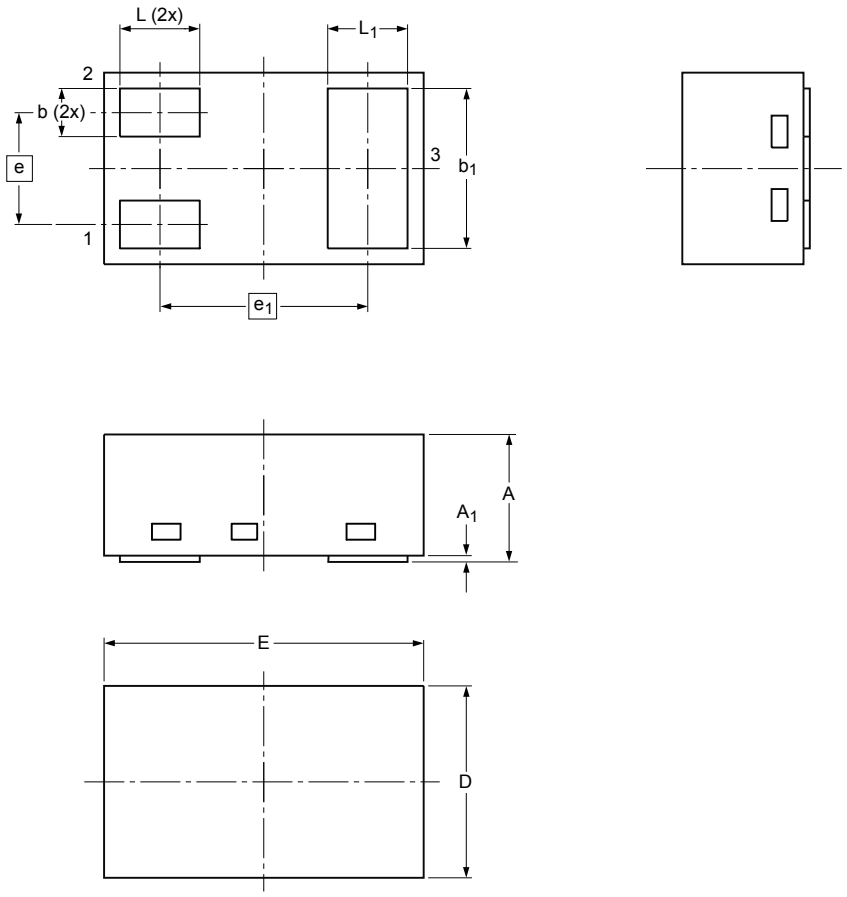
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

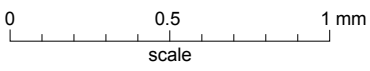

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## 12. Package outline

**Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm** **SOT883B**




Dimensions

| Unit | | $A^{(1)}$ | $A_1$ | b | $b_1$ | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | max | 0.40 | 0.04 | 0.20 | 0.55 | 0.65 | 1.05 | | | 0.30 | 0.30 |
| mm | nom | 0.37 | | 0.15 | 0.50 | 0.60 | 1.00 | 0.35 | 0.65 | 0.25 | 0.25 |
| | min | 0.34 | | 0.12 | 0.47 | 0.55 | 0.95 | | | 0.22 | 0.22 |

Note
1. Including plating thickness

*sot883b_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT883B | | | | | | ~~11-11-02~~ 12-01-03 |

**Fig. 12. Package outline DFN1006B-3 (SOT883B)**


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# 13. Soldering

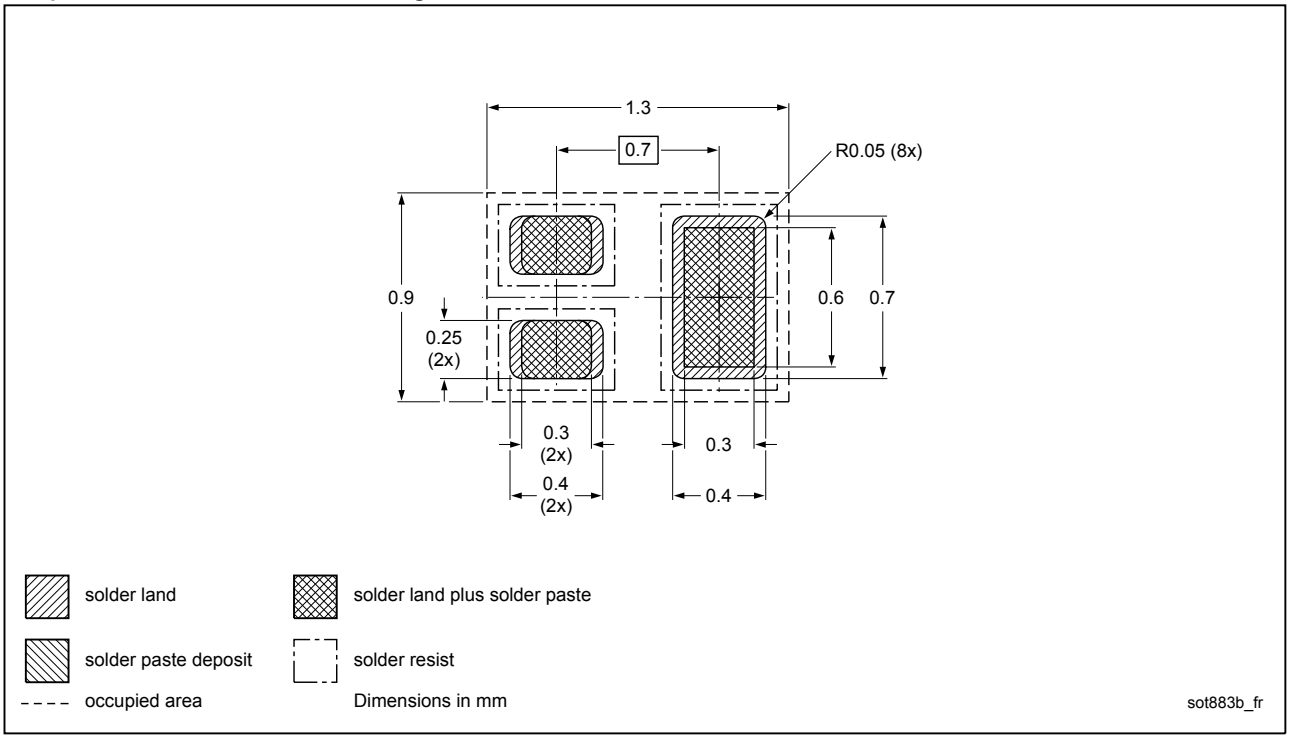



**Fig. 13. Reflow soldering footprint for DFN1006B-3 (SOT883B)**


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# 14. Revision history

**Table 7. Revision history**

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PESD5V0V2BMB v.1 | 20150817 | Product data sheet | - | - |


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| Document status [1][2] | Product status [3] | Definition |
|---|---|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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| Product [short] data sheet | Production | This document contains the product specification. |

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[2] The term 'short data sheet' is explained in section "Definitions".
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