



# PESD5V0X2UM

Ultra low capacitance unidirectional double ESD protection diode

3 February 2014

Product data sheet

## 1. General description

Ultra low capacitance unidirectional double ElectroStatic Discharge (ESD) protection diode in a DFN1006-3 (SOT883) leadless ultra small Surface-Mounted Device (SMD) plastic package designed to protect up to two signal lines from the damage caused by ESD and other transients.

## 2. Features and benefits

- Ultra low diode capacitance:  $C_d = 0.50$  pF
- ESD protection up to 10 kV; IEC61000-4-2
- $I_{PPM} = 1.5$  A; IEC 61643-321 (surge)
- AEC-Q101 qualified

## 3. Applications

- High-speed data lines
- Portable electronics
- Communication systems
- Computers and peripherals

## 4. Quick reference data

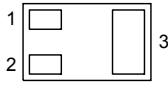
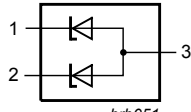
Table 1. Quick reference data

| Symbol           | Parameter                | Conditions               |     | Min | Typ | Max  | Unit |
|------------------|--------------------------|--------------------------|-----|-----|-----|------|------|
| <b>Per diode</b> |                          |                          |     |     |     |      |      |
| $C_d$            | diode capacitance        | $f = 1$ MHz; $V_R = 0$ V | [1] | -   | 0.5 | 0.65 | pF   |
| $V_{RWM}$        | reverse standoff voltage |                          |     | -   | -   | 5    | V    |

[1] Measured from pin 1 or 2 to 3.

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description       | Simplified outline   | Graphic symbol   |
|-----|--------|-------------------|--|--|
| 1   | K1     | cathode (diode 1) |  <p>Transparent<br/>top view</p> <p><b>DFN1006-3 (SOT883)</b></p> |  <p><i>brb051</i></p> |
| 2   | K2     | cathode (diode 2) |  |  |
| 3   | A      | common anode      |  |  |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package   |   |         |
|-------------|-----------|---|---------|
|             | Name      | Description   | Version |
| PESD5V0X2UM | DFN1006-3 | DFN1006-3: leadless ultra small plastic package; 3 solder lands | SOT883  |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PESD5V0X2UM | ZH           |

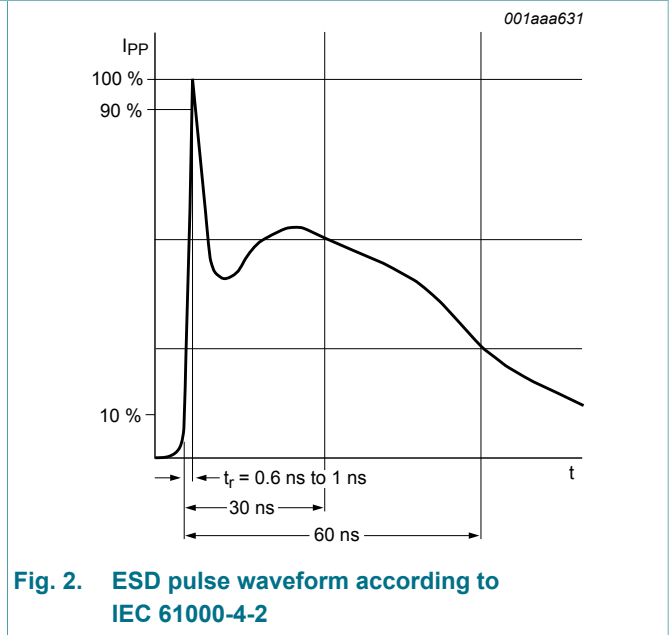
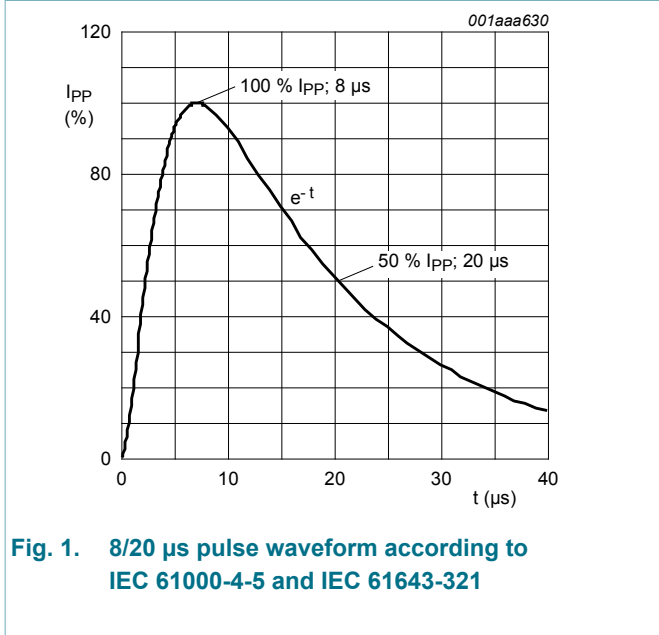
## 8. Limiting values

**Table 5. Limiting values**

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

| Symbol                     | Parameter                       | Conditions                        |        | Min | Max | Unit |
|----------------------------|---------------------------------|-----------------------------------|--------|-----|-----|------|
| <b>Per diode</b>           |                                 |                                   |        |     |     |      |
| $I_{PPM}$                  | rated peak pulse current        | $t_p = 8/20 \mu s$                | [1][2] | -   | 1.5 | A    |
| $T_j$                      | junction temperature            |                                   |        | -   | 150 | °C   |
| $T_{stg}$                  | storage temperature             |                                   |        | -55 | 150 | °C   |
| $T_{amb}$                  | ambient temperature             |                                   |        | -65 | 150 | °C   |
| <b>ESD maximum ratings</b> |                                 |                                   |        |     |     |      |
| $V_{ESD}$                  | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | [3][2] | -   | 10  | kV   |
|                            |                                 | IEC 61000-4-2 (air discharge)     | [3][2] | -   | 15  | kV   |
|                            |                                 | machine model                     | [2]    | -   | 400 | V    |
|                            |                                 | MIL-STD-883 (human body model)    |        | -   | 10  | kV   |

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



## 9. Characteristics

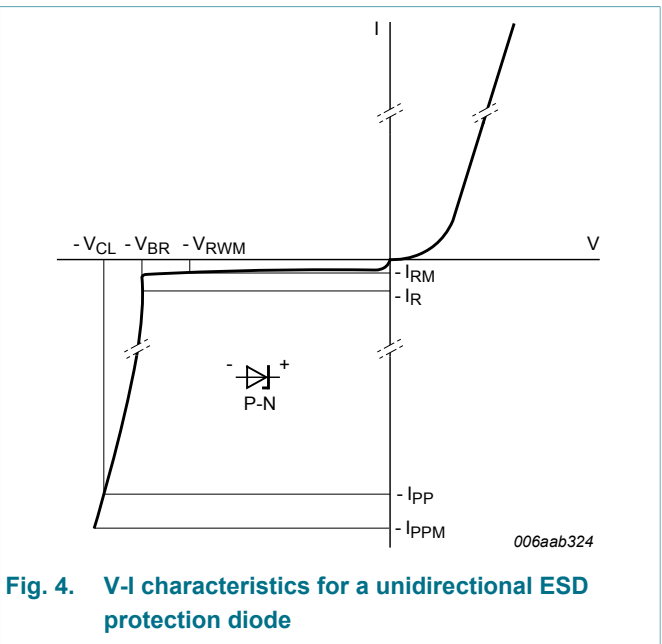
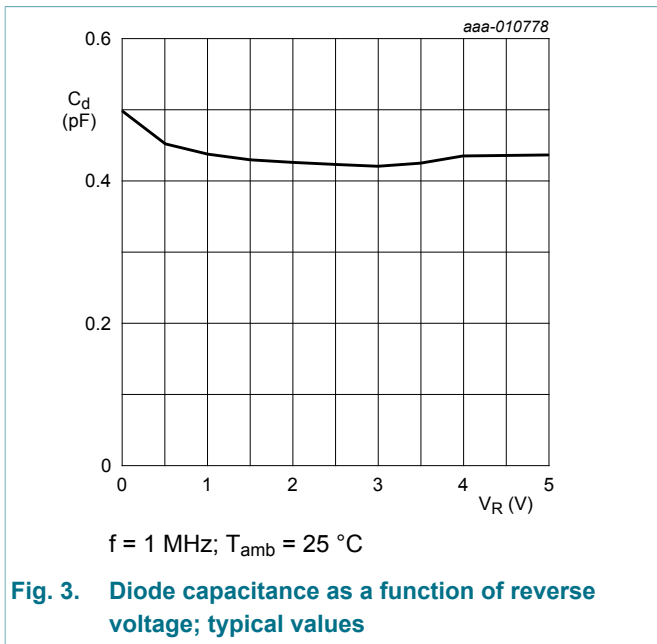
Table 6. Characteristics

| Symbol           | Parameter                | Conditions                                       |        | Min | Typ | Max  | Unit     |
|------------------|--------------------------|--|--------|-----|-----|------|----------|
| <b>Per diode</b> |                          |  |        |     |     |      |          |
| $V_{RWM}$        | reverse standoff voltage |  |        | -   | -   | 5    | V        |
| $I_{RM}$         | reverse leakage current  | $V_R = 5\text{ V}$                               | [1]    | -   | 1   | 10   | nA       |
| $V_{CL}$         | clamping voltage         | $I_{PP} = 1\text{ A}; t_p = 8/20\ \mu\text{s}$   | [2][1] | -   | -   | 13   | V        |
|                  |                          | $I_{PP} = 1.5\text{ A}; t_p = 8/20\ \mu\text{s}$ | [2][1] | -   | -   | 14   | V        |
| $V_{BR}$         | breakdown voltage        | $I_R = 10\text{ mA}$                             | [1]    | 7.5 | 8.8 | 10   | V        |
| $C_d$            | diode capacitance        | $f = 1\text{ MHz}; V_R = 0\text{ V}$             | [1]    | -   | 0.5 | 0.65 | pF       |
| $R_{dyn}$        | dynamic resistance       | $I_R = 10\text{ A}$                              | [3][1] | -   | 0.9 | -    | $\Omega$ |

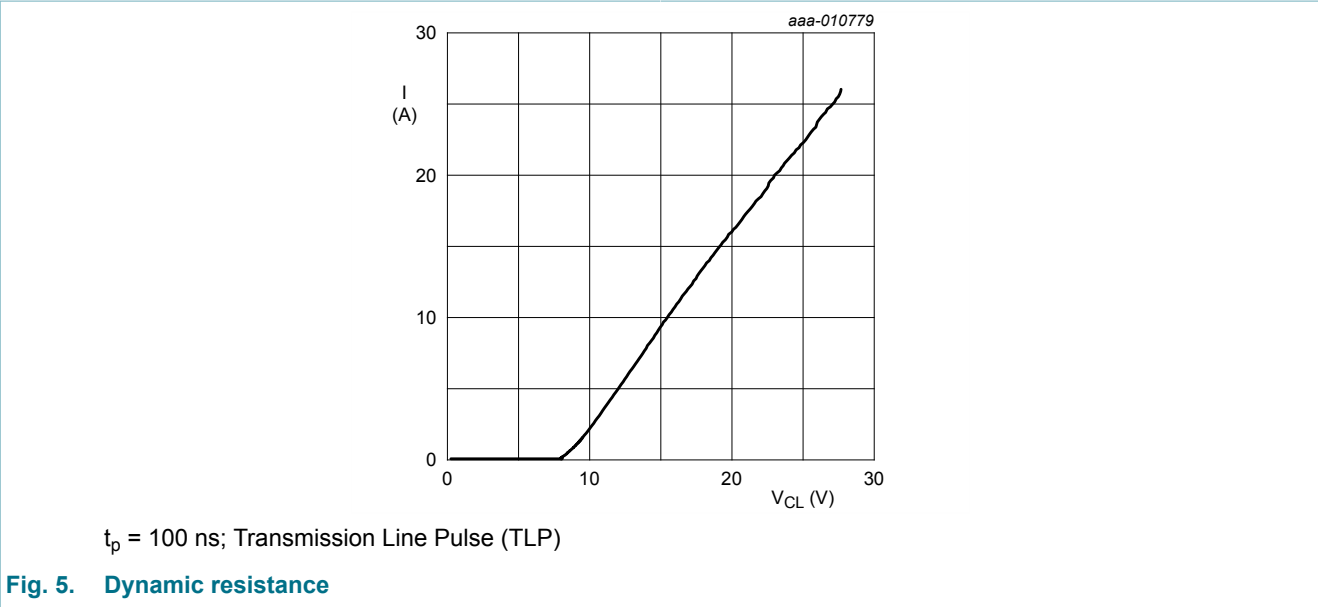
[1] Measured from pin 1 or 2 to 3.

[2] According to IEC 61000-4-5 and IEC 61643-321.

[3] Non-repetitive current pulse, Transmission Line Pulse (TLP); square pulse; ANSI / ESD STM5.5.1-2008.



Ultra low capacitance unidirectional double ESD protection diode



Ultra low capacitance unidirectional double ESD protection diode

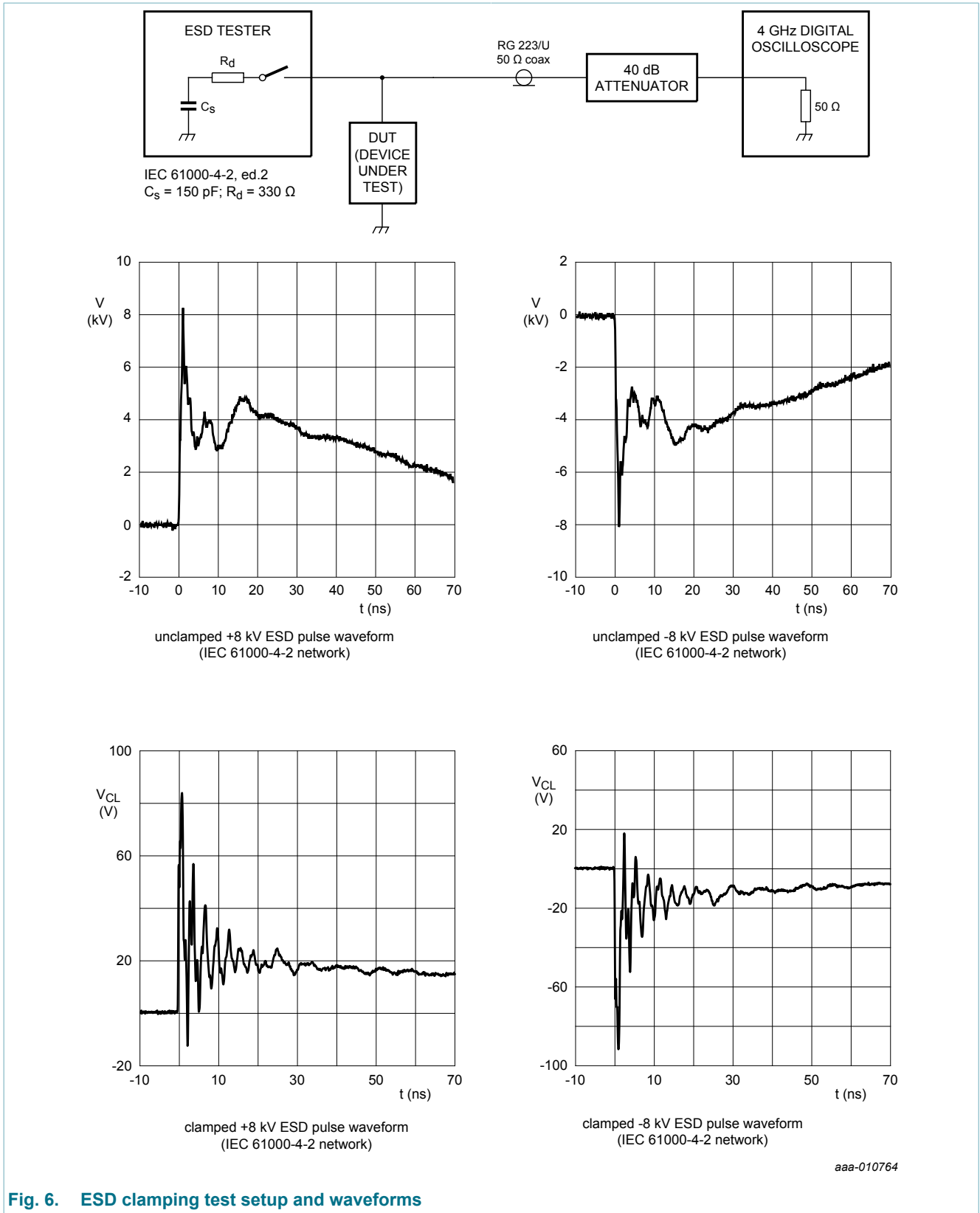


Fig. 6. ESD clamping test setup and waveforms

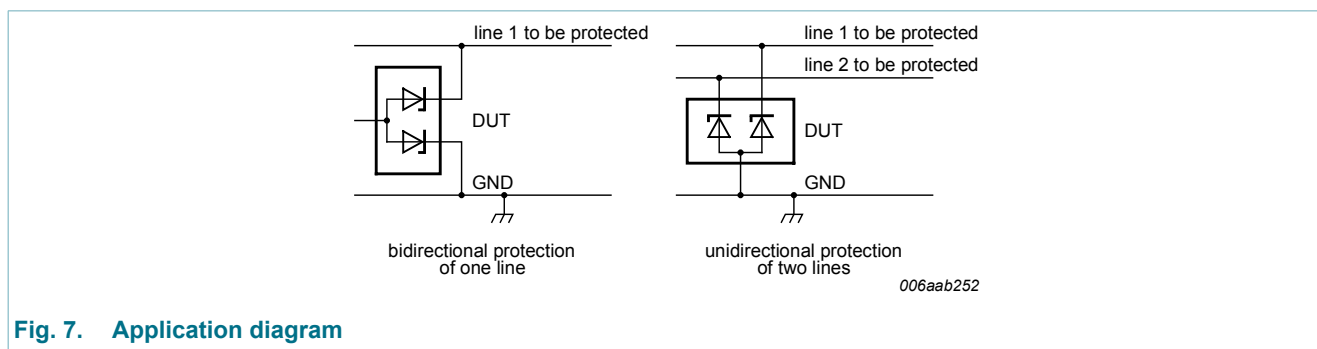
## 10. Test information

### 10.1 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.

## 11. Application information

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



**Fig. 7. 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.

## 12. Package outline

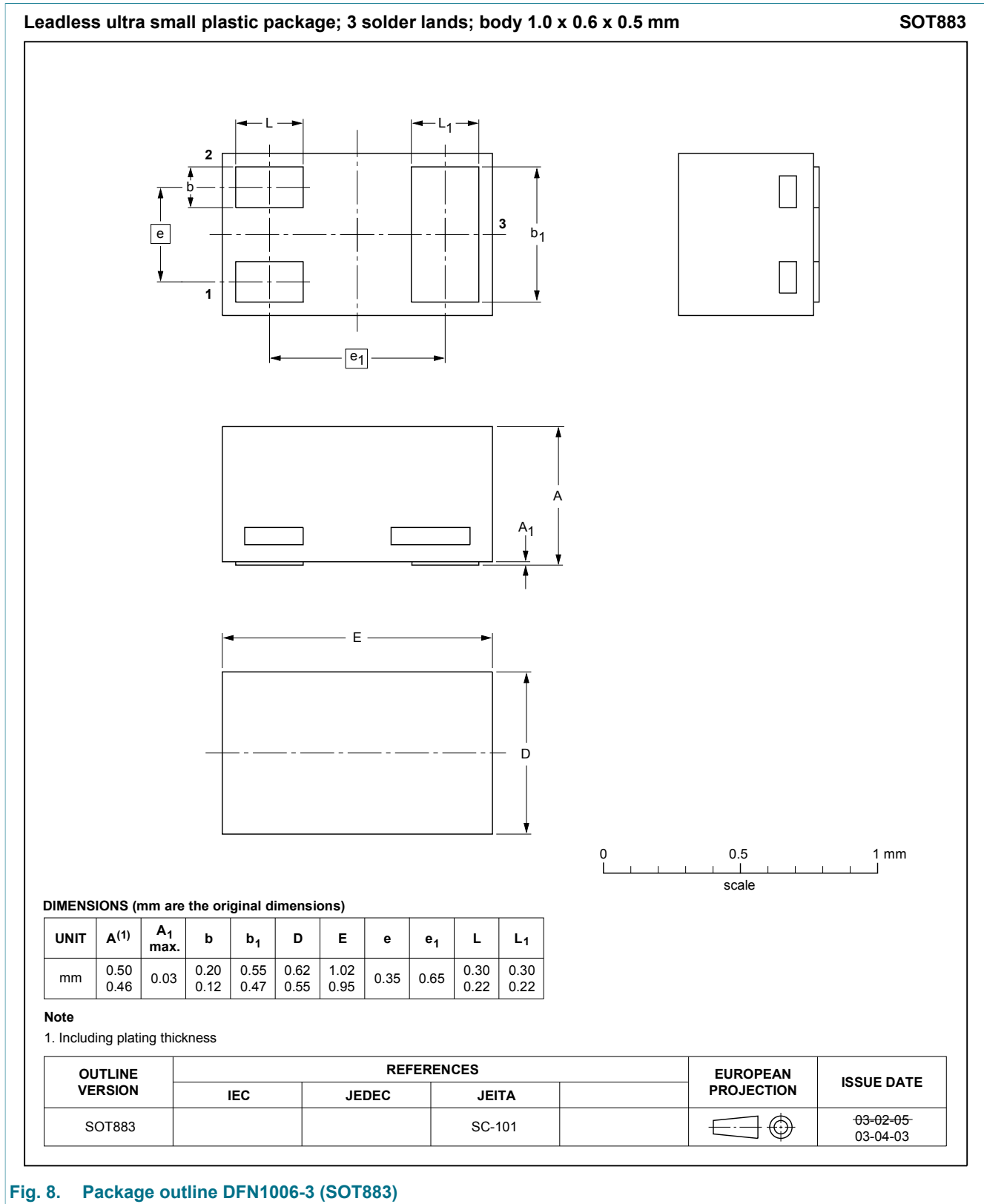


Fig. 8. Package outline DFN1006-3 (SOT883)



### 13. Soldering

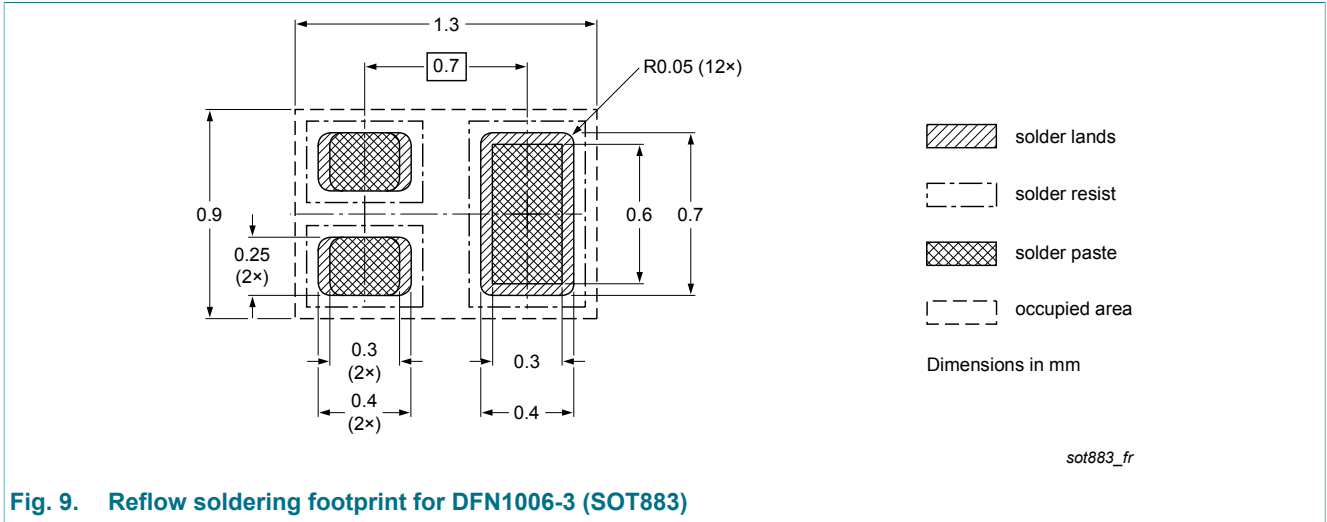


Fig. 9. Reflow soldering footprint for DFN1006-3 (SOT883)

## 14. Revision history

Table 7. Revision history

| Data sheet ID   | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PESD5V0X2UM v.1 | 20140203     | Product data sheet | -             | -          |

## 15. Legal information

### 15.1 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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