



# PESD36VS1UL

## Unidirectional ESD protection diode

17 October 2016

Product data sheet

## 1. General description

Unidirectional ElectroStatic Discharge (ESD) protection diode in a leadless ultra small SOD882 Surface-Mounted Device (SMD) plastic package designed to protect one signal line from the damage caused by ESD and other transients.

## 2. Features and benefits

- ESD protection of one line
- Ultra small SMD plastic package
- AEC-Q101 qualified
- ESD protection up to 30 kV
- IEC 61000-4-5; (surge);  $I_{PPM} = 2.5 \text{ A}$
- Rated peak pulse power:  $P_{PPM} = 150 \text{ W}$
- Ultra low leakage current:  $I_{RM} < 1 \text{ nA}$

## 3. Applications

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

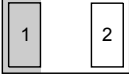


## 4. Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter                | Conditions  | Min | Typ | Max | Unit |
|-----------|--------------------------|---|-----|-----|-----|------|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25 \text{ }^\circ\text{C}$                                       | -   | -   | 36  | V    |
| $C_d$     | diode capacitance        | $f = 1 \text{ MHz}; V_R = 0 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$ | -   | 18  | 30  | pF   |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline   | Graphic symbol   |
|-----|--------|-------------|--|--|
| 1   | K      | cathode     |  <p>Transparent<br/>top view</p> <p><b>DFN1006-2 (SOD882)</b></p> |  <p>1  2</p> <p>sym035</p> |
| 2   | A      | anode       |  |  |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package   |  |         |
|-------------|-----------|--|---------|
|             | Name      | Description  | Version |
| PESD36VS1UL | DFN1006-2 | DFN1006-2: leadless ultra small plastic package; 2 terminals | SOD882  |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PESD36VS1UL | TC           |

## 8. Limiting values

Table 5. Limiting values

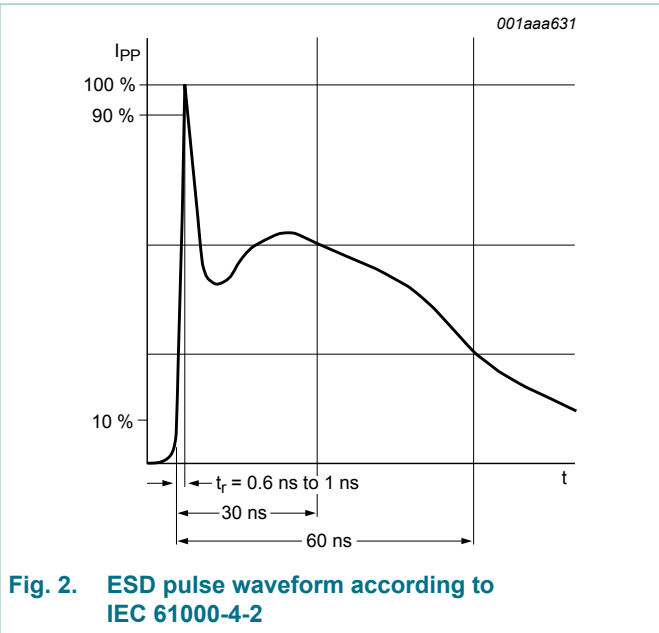
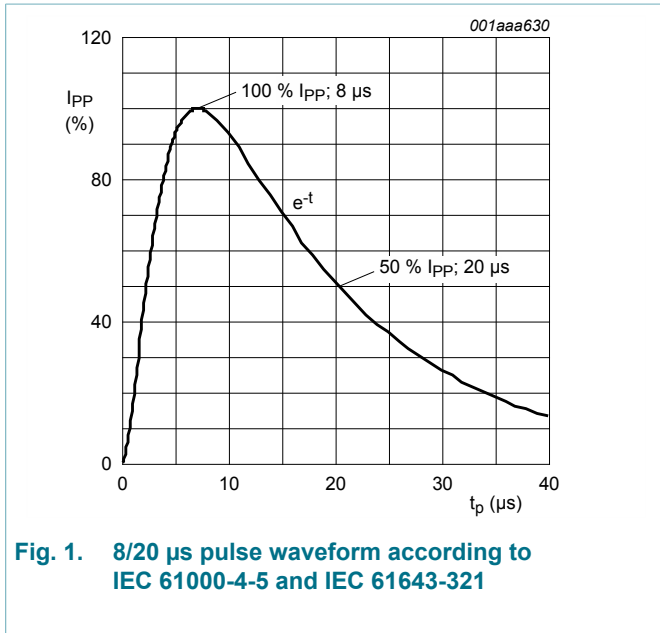
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol                     | Parameter                       | Conditions                       |        | Min | Max | Unit |
|----------------------------|---------------------------------|----------------------------------|--------|-----|-----|------|
| $P_{PPM}$                  | rated peak pulse power          | $t_p = 8/20 \mu s$               | [1][2] | -   | 150 | W    |
| $I_{PPM}$                  | rated peak pulse current        |                                  | [1][2] | -   | 2.5 | A    |
| $T_j$                      | junction temperature            |                                  |        | -   | 150 | °C   |
| $T_{amb}$                  | ambient temperature             |                                  |        | -55 | 150 | °C   |
| $T_{stg}$                  | storage temperature             |                                  |        | -65 | 150 | °C   |
| <b>ESD maximum ratings</b> |                                 |                                  |        |     |     |      |
| $V_{ESD}$                  | electrostatic discharge voltage | IEC 61000-4-2; contact discharge | [3][2] | -   | 30  | kV   |
|                            |                                 | machine model                    | [2]    | -   | 400 | V    |
|                            |                                 | human body model (MIL-STD-883)   |        | -   | 10  | kV   |

[1] Device stressed with non-repetitive current pulses (8/20  $\mu s$  exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321).

[2] Measured from pin 1 to pin 2.

[3] Device stressed with ten non-repetitive ESD pulses.



## 9. Characteristics

Table 6. Characteristics

| Symbol    | Parameter                | Conditions   | Min    | Typ | Max  | Unit     |
|-----------|--------------------------|--|--------|-----|------|----------|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25\text{ °C}$                                     | -      | -   | 36   | V        |
| $V_{BR}$  | breakdown voltage        | $I_R = 2\text{ mA}; T_{amb} = 25\text{ °C}$                  | 38.2   | 39  | 39.8 | V        |
| $I_{RM}$  | reverse leakage current  | $V_{RWM} = 36\text{ V}; T_{amb} = 25\text{ °C}$              | -      | 1   | 10   | nA       |
| $C_d$     | diode capacitance        | $f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ °C}$ | -      | 18  | 30   | pF       |
| $V_{CL}$  | clamping voltage         | $I_{PP} = 1\text{ A}; T_{amb} = 25\text{ °C}$                | [1][2] | -   | 58   | V        |
|           |                          | $I_{PPM} = 2.5\text{ A}; T_{amb} = 25\text{ °C}$             | [1][2] | -   | 80   | V        |
| $R_{dyn}$ | dynamic resistance       | $I_R = 10\text{ A}; T_{amb} = 25\text{ °C}$                  | [3]    | 9.5 | -    | $\Omega$ |

- [1] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321.
- [2] Measured from pin 1 to pin 2.
- [3] Non-repetitive current pulse, Transmission Line Pulse (TLP)  $t_p = 100\text{ ns}$ ; square pulse; ANSI / ESD STM5.5.1-2008.

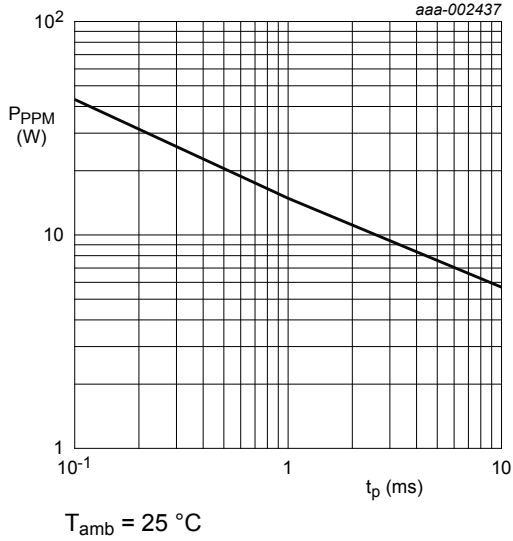


Fig. 3. Rated peak pulse power as a function of square pulse duration; maximum values

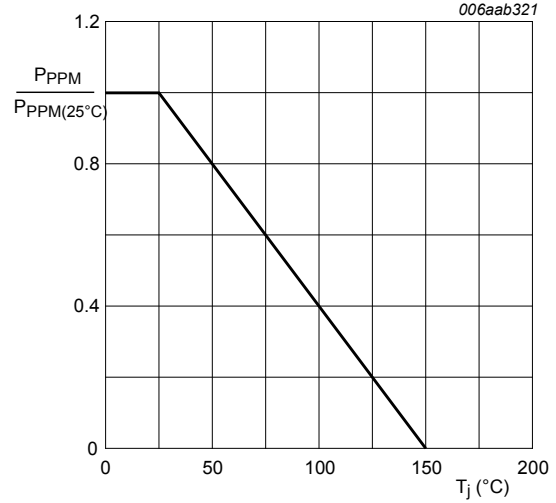


Fig. 4. Relative variation of rated peak pulse power as a function of junction temperature; typical values

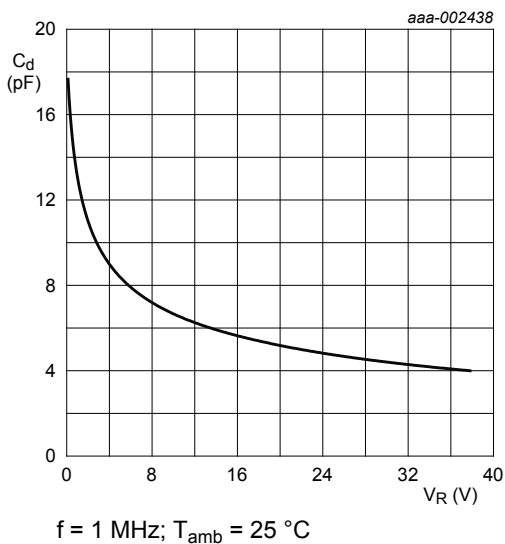


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

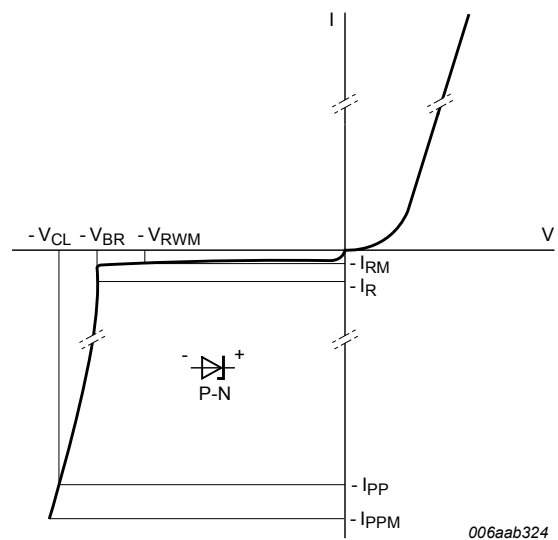


Fig. 6. V-I characteristics for a bidirectional ESD protection diode

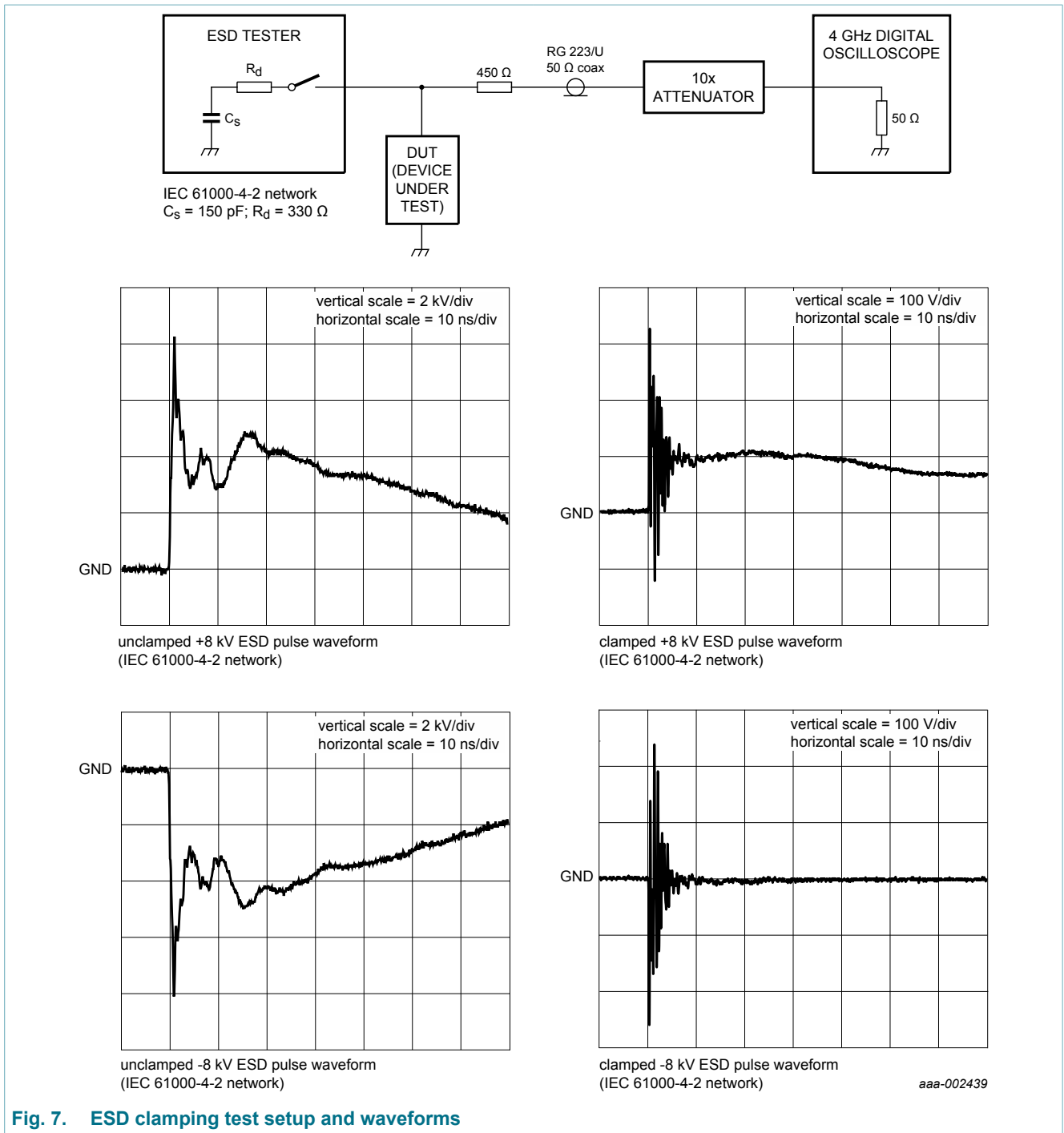


Fig. 7. ESD clamping test setup and waveforms

## 10. Application information

The device is designed for the protection of one unidirectional data line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are either positive or negative with respect to ground. The device provides a surge capability of 150 W for an 8/20  $\mu\text{s}$  waveform.

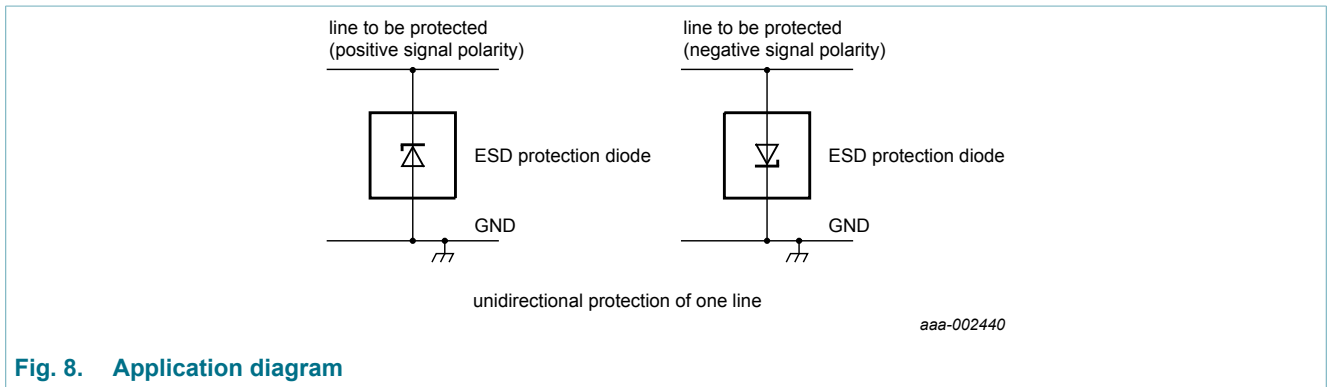


Fig. 8. Application diagram

**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**

**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.

**12. Package outline**

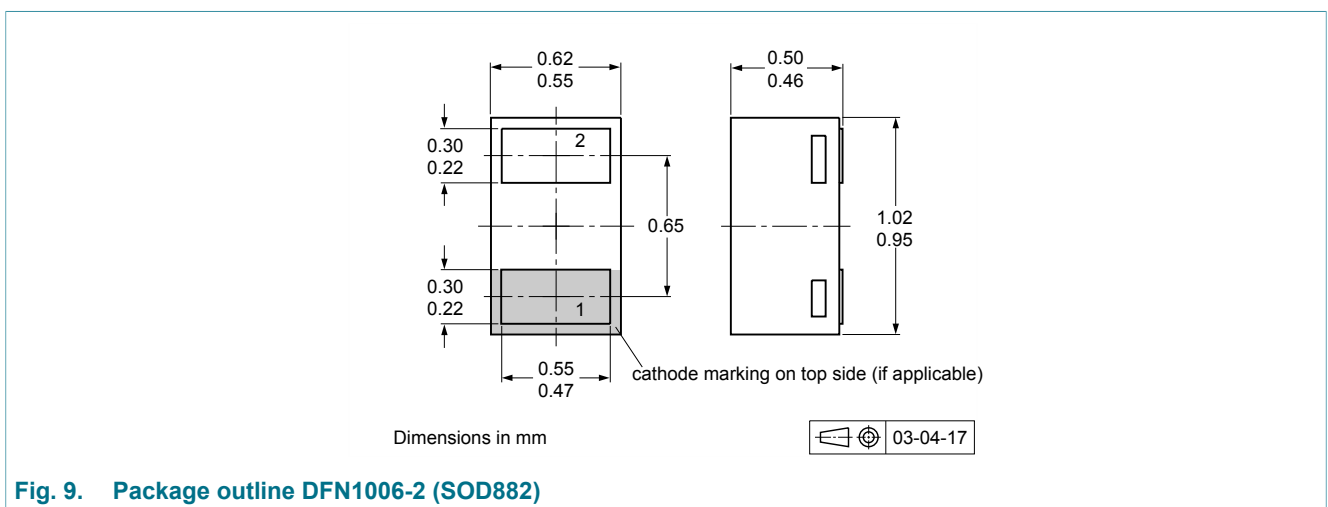


Fig. 9. Package outline DFN1006-2 (SOD882)

### 13. Soldering

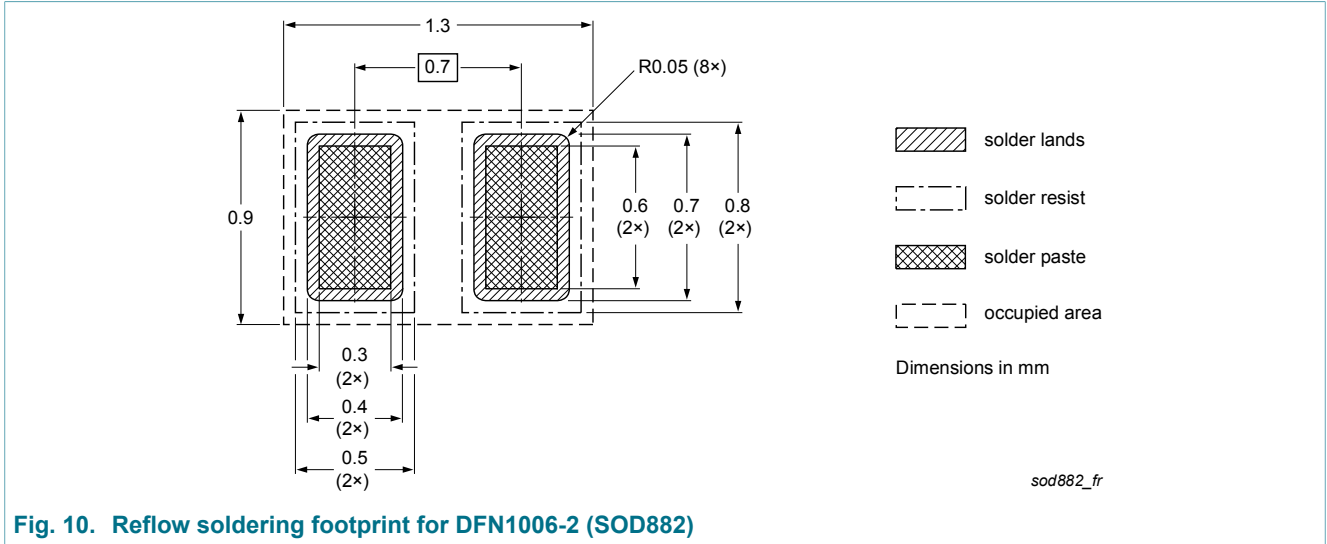


Fig. 10. Reflow soldering footprint for DFN1006-2 (SOD882)

## 14. Revision history

Table 7. Revision history

| Data sheet ID   | Release date  | Data sheet status  | Change notice | Supersedes      |
|-----------------|---|--------------------|---------------|-----------------|
| PESD36VS1UL v.2 | 20161017  | Product data sheet | -             | PESD36VS1UL v.1 |
| Modifications:  | <ul style="list-style-type: none"><li>Deleted section "Packing information"</li></ul> |                    |               |                 |
| PESD36VS1UL v.1 | 20120305  | Product data sheet | -             | -               |



## 15. Legal information

### 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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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