



# PESD30VF1BL

Bidirectional ESD protection diode

8 April 2019

Product data sheet

## 1. General description

Ultra low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in a DFN1006-2 (SOD882) leadless ultra small 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

- Bidirectional ESD protection of one line
- High reverse standoff voltage  $V_{RWM} = 30\text{ V}$
- Ultra-low diode capacitance  $C_d = 0.27\text{ pF}$
- Ultra small plastic package  $1.0 \times 0.6 \times 0.48\text{ mm}$
- ESD protection up to  $12\text{ kV}$ ; IEC 61000-4-2
- AEC-Q101 qualified

## 3. Applications

- NFC antenna protection
- Protection of high-speed data lines

## 4. Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter                | Conditions  |     | Min | Typ | Max | Unit |
|-----------|--------------------------|---|-----|-----|-----|-----|------|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25\text{ °C}$                          |     | -   | -   | 30  | V    |
| $I_{PPM}$ | rated peak pulse current | $t_p = 8/20\text{ }\mu\text{s}$                   | [1] | -   | -   | 1   | A    |
| $V_{CL}$  | clamping voltage         | $I_{PPM} = 1\text{ A}$ ; $T_{amb} = 25\text{ °C}$ | [1] | -   | 6.5 | -   | V    |

[1] Device stressed with  $8/20\text{ }\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description       | Simplified outline                                 | Graphic symbol |
|-----|--------|-------------------|--|----------------|
| 1   | K1     | cathode (diode 1) | <p>Transparent top view<br/>DFN1006-2 (SOD882)</p> | <p>sym045</p>  |
| 2   | K2     | cathode (diode 2) |  |                |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package   |  |         |
|-------------|-----------|--|---------|
|             | Name      | Description  | Version |
| PESD30VF1BL | DFN1006-2 | DFN1006-2: leadless ultra small plastic package; 2 terminals | SOD882  |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PESD30VF1BL | L7           |

## 8. Limiting values

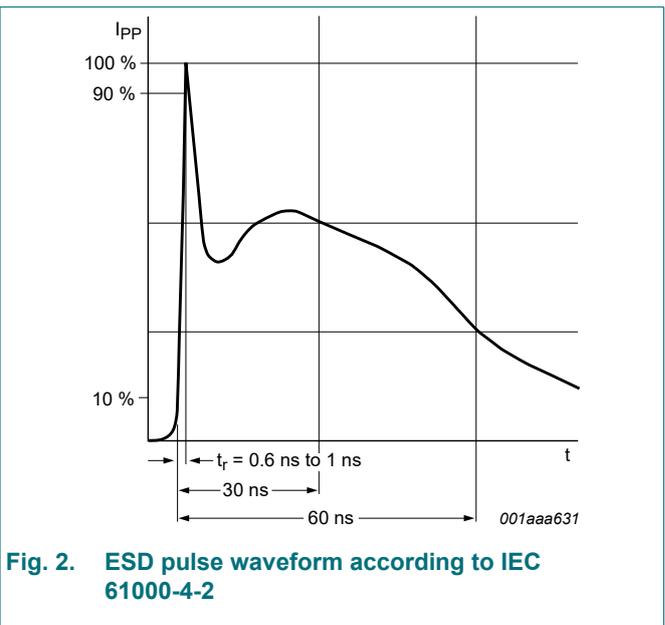
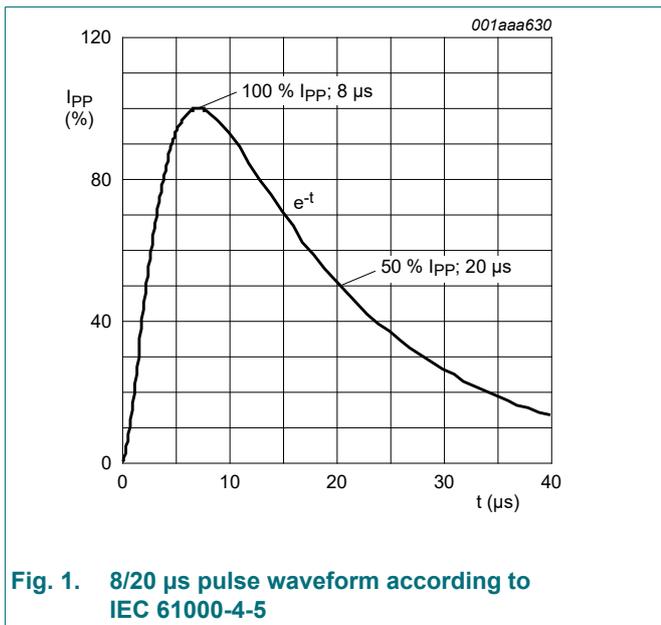
Table 5. Limiting values

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

| Symbol                     | Parameter                       | Conditions                       |     | Min | Max | Unit |
|----------------------------|---------------------------------|----------------------------------|-----|-----|-----|------|
| $I_{PPM}$                  | rated peak pulse current        | $t_p = 8/20 \mu s$               | [1] | -   | 1   | 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 | [2] | -   | 12  | kV   |

[1] Device stressed with 8/20  $\mu s$  exponential decay waveform according to IEC 61000-4-5.

[2] 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 | $T_{amb} = 25\text{ °C}$                                     | -   | -    | 30  | V        |
| $V_{BR}$  | breakdown voltage        | $I_R = 10\text{ mA}; T_{amb} = 25\text{ °C}$                 | 31  | 34   | 39  | V        |
| $I_{RM}$  | reverse leakage current  | $V_R = 30\text{ V}; T_{amb} = 25\text{ °C}$                  | -   | 0.1  | 50  | nA       |
| $C_d$     | diode capacitance        | $f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ °C}$ | -   | 0.27 | 0.4 | pF       |
| $V_{CL}$  | clamping voltage         | $I_{PPM} = 1\text{ A}; T_{amb} = 25\text{ °C}$               | [1] | 6.5  | -   | V        |
|           |                          | $I_{PP} = 16\text{ A}; T_{amb} = 25\text{ °C}$               | [2] | 23   | -   | V        |
| $R_{dyn}$ | dynamic resistance       | $I_R = 7.5\text{ A}; T_{amb} = 25\text{ °C}$                 | [2] | 0.7  | -   | $\Omega$ |

[1] Device stressed with 8/20  $\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.

[2] Non-repetitive current pulse, Transmission Line Pulse (TLP)  $t_p = 100\text{ ns}$ ; square pulse; ANSI / ESD STM5.5.1-2008.

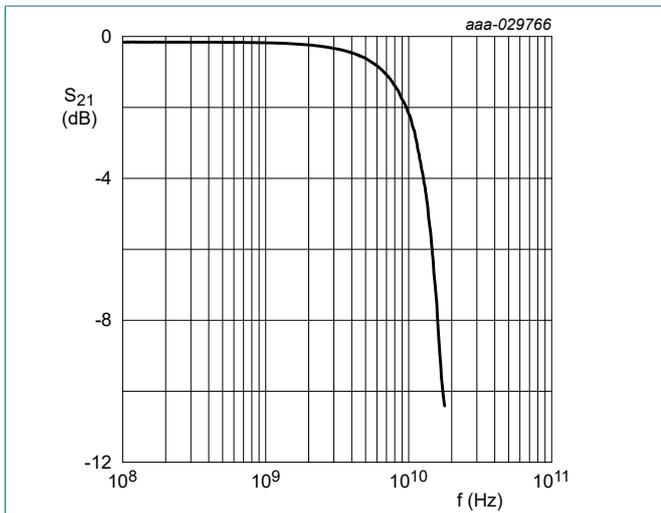


Fig. 3. Insertion loss; typical values

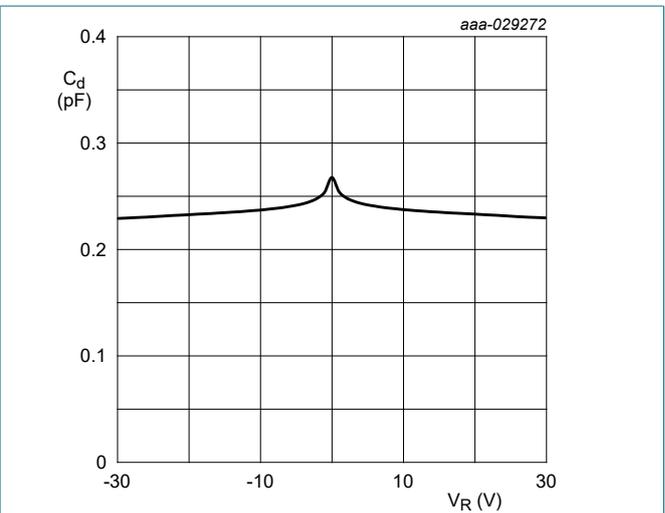
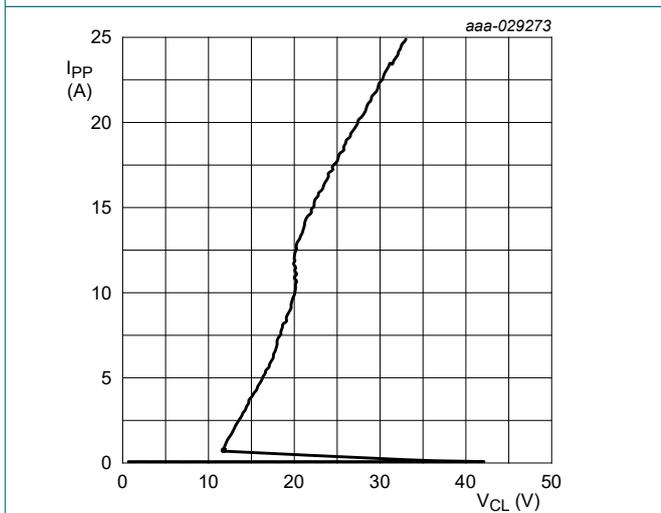
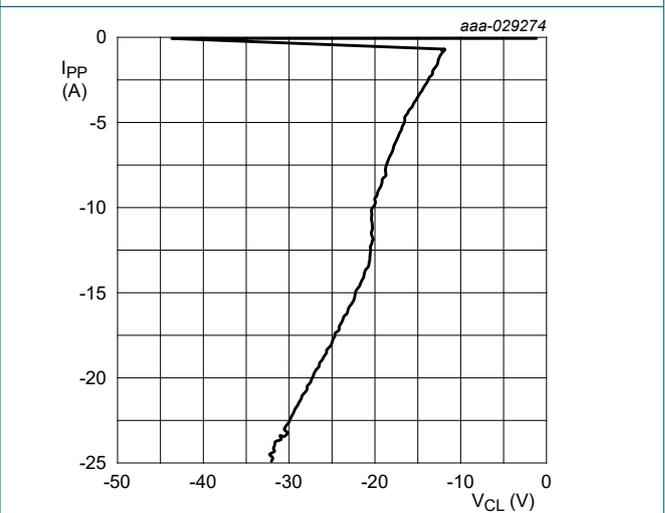


Fig. 4. Diode capacitance as a function of reverse voltage; typical values



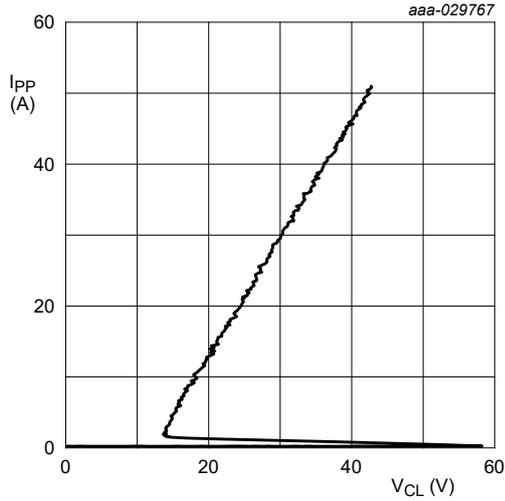
$t_p = 100\text{ ns}$ ; Transmission Line Pulse (TLP)

Fig. 5. Positive clamping voltage (TLP); typical values



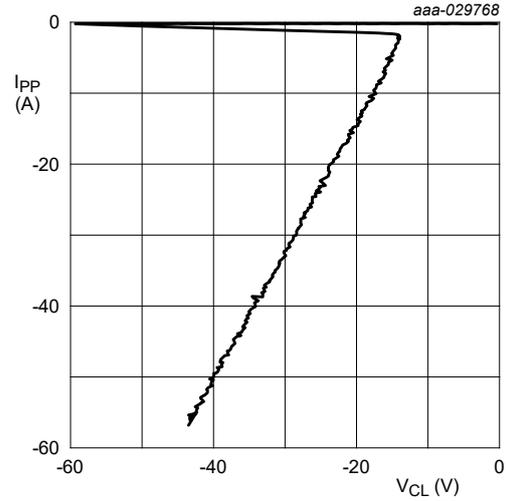
$t_p = 100\text{ ns}$ ; Transmission Line Pulse (TLP)

Fig. 6. Negative clamping voltage (TLP); typical values



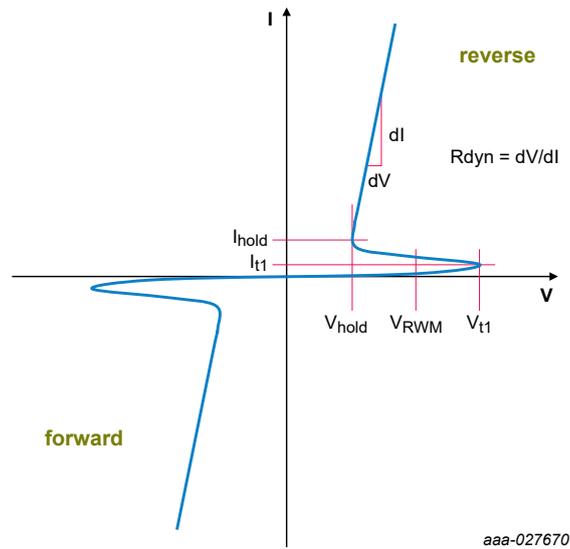
Very Fast Transmission Line Pulse (VF-TLP)  
 $t_p = 5 \text{ ns}$   
 $t_r = 600 \text{ ps}$

**Fig. 7. Positive clamping voltage (VF-TLP); typical values**



Very Fast Transmission Line Pulse (VF-TLP)  
 $t_p = 5 \text{ ns}$   
 $t_r = 600 \text{ ps}$

**Fig. 8. Negative clamping voltage (VF-TLP); typical values**



**Fig. 9. V-I characteristics for a bidirectional ESD protection diode**

## 10. Application information

The device is designed for the protection of one bidirectional data line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are both positive and negative with respect to ground.

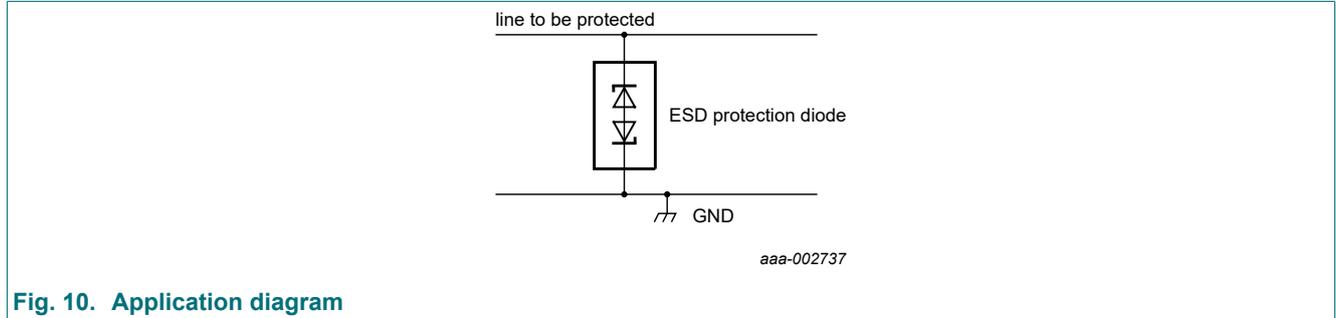


Fig. 10. Application diagram

### 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:

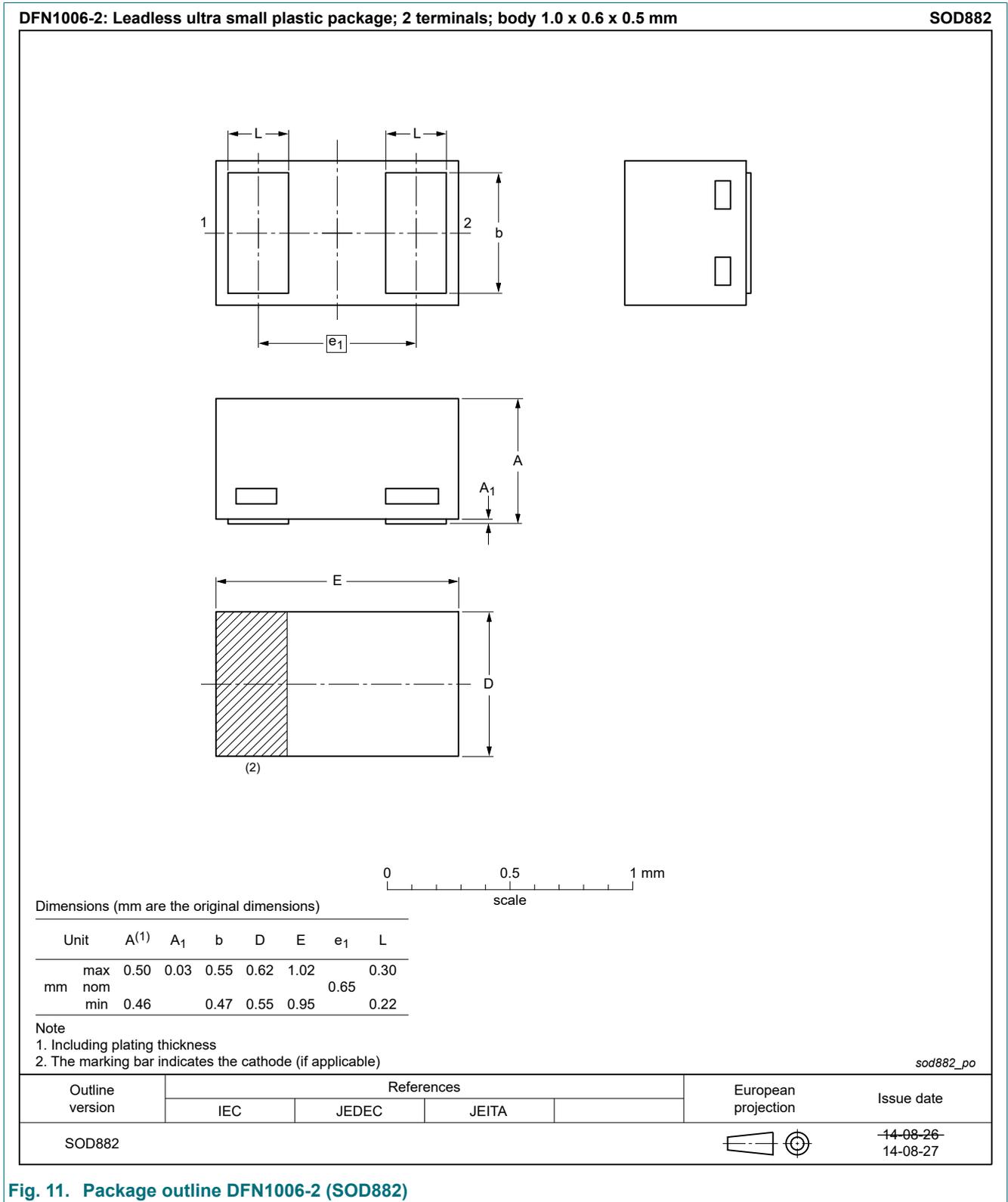
1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit 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. 11. Package outline DFN1006-2 (SOD882)**

### 13. Soldering

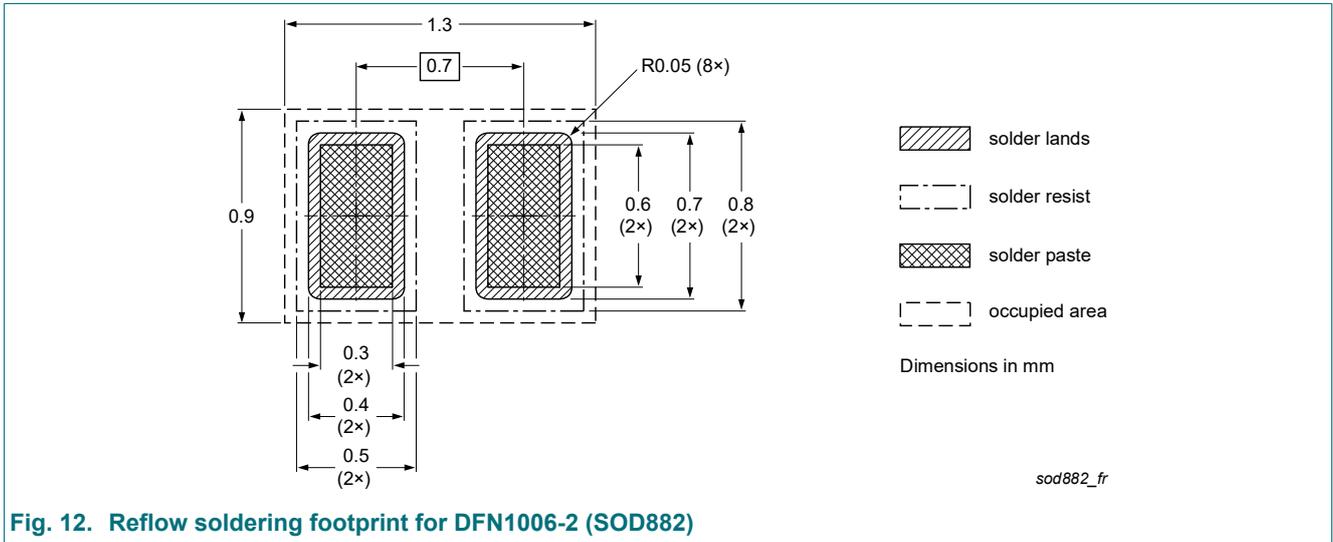


Fig. 12. Reflow soldering footprint for DFN1006-2 (SOD882)

## 14. Revision history

Table 7. Revision history

| Data sheet ID   | Release date  | Data sheet status      | Change notice | Supersedes      |
|-----------------|---|------------------------|---------------|-----------------|
| PESD30VF1BL v.2 | 20190408  | Product data sheet     | -             | PESD30VF1BL v.1 |
| Modifications:  | <ul style="list-style-type: none"><li>• Change document status to "Product data sheet"</li><li>• Added AEC-Q101 qualification status</li><li>• Section Characteristics: updated and enhanced according to latest measurements</li></ul> |                        |               |                 |
| PESD30VF1BL v.1 | 20181211  | Preliminary 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".
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