# PESD1IVN24-LS

## ESD protection for In-vehicle networks

**9 April 2021** **Product data sheet**

## 1. General description

ESD protection device in a leadless ultra small DFN1006BD-2 (SOD882BD) Surface-Mounted Device (SMD) plastic package with side-wettable flanks, designed to protect automotive In-vehicle network bus lines from the damage caused by ElectroStatic discharge (ESD) and other transients.

## 2. Features and benefits

- Reverse stand-off voltage: $V_{RWM}$ = 24 V
- Low clamping voltage: $V_{CL}$= 33 V at $I_{PP}$ = 3.5 A
- ESD protection up to 30 kV (IEC 61000-4-2)
- ESD protection up to 30 kV (ISO 10605: C = 330 pF, R = 330 Ω)
- Ultra low leakage current: $I_{RM}$ < 1 nA
- Qualified according to AEC-Q101 / Automotive grade

## 3. Applications

ESD protection for In-vehicle network lines in automotive enviroments

- CAN
- LIN
- FlexRay
- SENT

## 4. Quick reference data

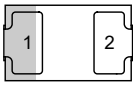
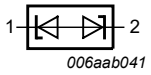
**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb}$ = 25 °C | | - | - | 24 | V |
| $I_{PPM}$ | rated peak pulse current | $t_p$ = 8/20 µs | [1] | - | - | 3.5 | A |
| $V_{CL}$ | clamping voltage | $I_{PPM}$ = 3.5 A; $t_p$ = 8/20 µs; $T_{amb}$ = 25 °C | [1] | - | 33 | 42 | V |

[1] Device stressed with 8/20 µs 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) |  Transparent top view **DFN1006BD-2 (SOD882BD)** |  |
| 2 | K2 | cathode (diode 2) | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PESD1IVN24-LS | DFN1006BD-2 | Leadless ultra small plastic package with side-wettable flanks (SWF); 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.47 mm body | SOD882BD |

## 7. Marking

**Table 4. Marking codes**

| Type number | Marking code |
|---|---|
| PESD1IVN24-LS | 8H |

# 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] | - | 3.5 | 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 | [2] | - | 30 | kV |
| | | ISO 10605: contact discharge; C = 330 pF, R = 330 Ω | [2] | - | 30 | kV |
| | | ISO 10605: contact discharge; C = 150 pF, R = 330 Ω | [2] | - | 30 | kV |

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5.
[2] Device stressed with ten non-repetitive ESD pulses.

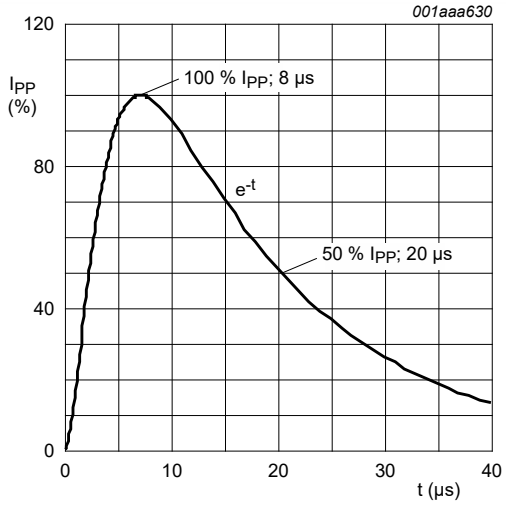



**Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5**

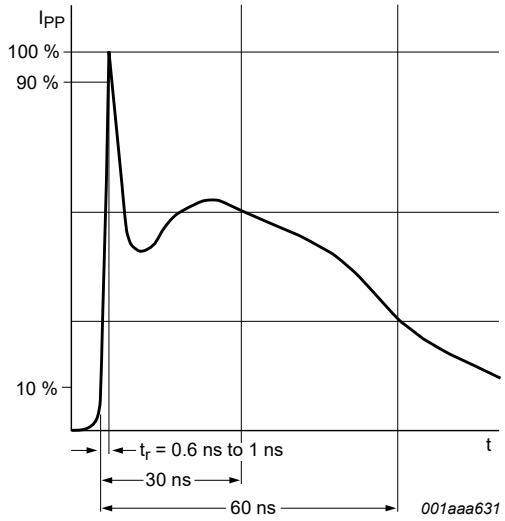



**Fig. 2. ESD pulse waveform according to IEC 61000-4-2**

# 9. Characteristics

**Table 6. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb}$ = 25 °C | | - | - | 24 | V |
| $V_{BR}$ | breakdown voltage | $I_R$ = 10 mA; $T_{amb}$ = 25 °C | | 25.5 | 30.5 | 35.5 | V |
| $I_{RM}$ | reverse leakage current | $V_R$ = 24 V; $T_{amb}$ = 25 °C | | - | 1 | 50 | nA |
| $C_d$ | diode capacitance | f = 1 MHz; $V_R$ = 0 V; $T_{amb}$ = 25 °C | | - | 14 | 17 | pF |
| $V_{CL}$ | clamping voltage | $I_{PPM}$ = 1 A; $t_p$ = 8/20 µs; $T_{amb}$ = 25 °C | [1] | - | 31 | 40 | V |
| | | $I_{PPM}$ = 3.5 A; $t_p$ = 8/20 µs; $T_{amb}$ = 25 °C | [1] | - | 33 | 42 | V |
| | | $I_{PP}$ = 16 A; $t_p$ = TLP; $T_{amb}$ = 25 °C | [2] | - | 32 | - | V |
| $R_{dyn}$ | dynamic resistance | $I_R$ = 10 A; $T_{amb}$ = 25 °C | [2] | - | 0.2 | - | Ω |

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5.
[2] Non-repetitive current pulse, Transmission Line Pulse (TLP); square pulse; ANSI / ESD STM5.5.1-2008

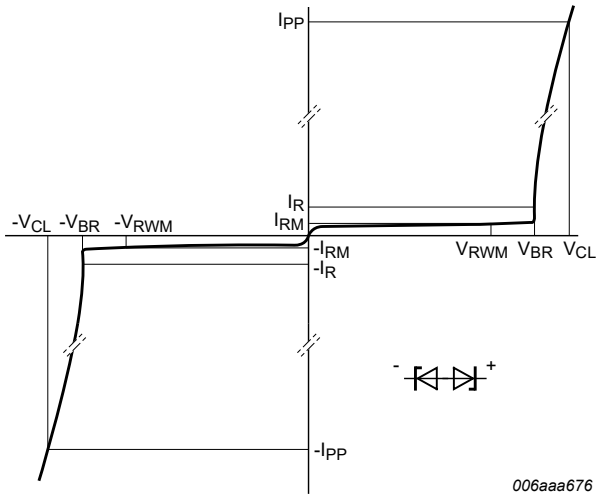



**Fig. 3. V-I characteristics for a bidirectional ESD protection diode**

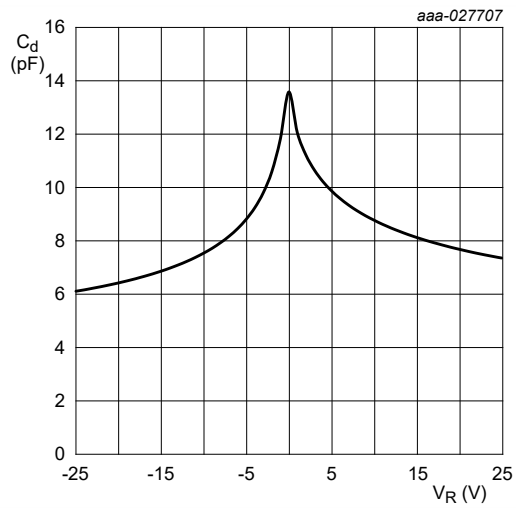
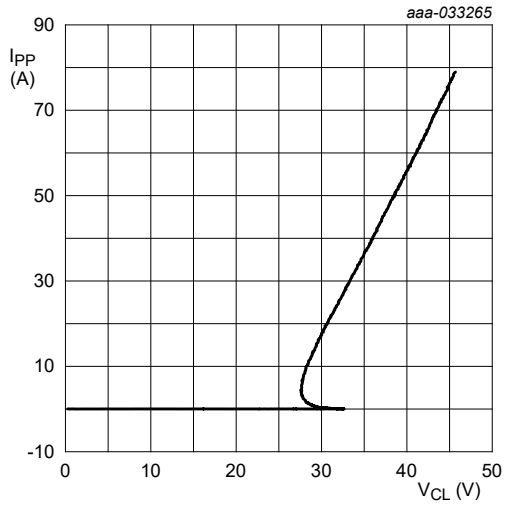
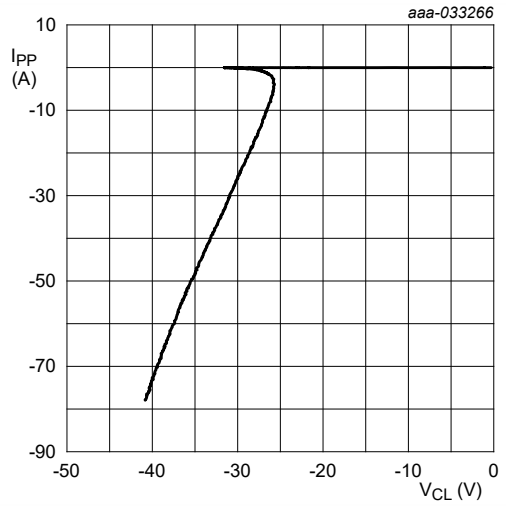



**Fig. 4. Diode capacitance as a function of reverse voltage, typical values**




Transmission Line Pulse (TLP);
$t_p$ = 100 ns; $t_r$ = 1 ns

**Fig. 5. Dynamic resistance with positive clamping; typical values**




Transmission Line Pulse (TLP);
$t_p$ = 100 ns; $t_r$ = 1 ns

**Fig. 6. Dynamic resistance with negative clamping; typical values**

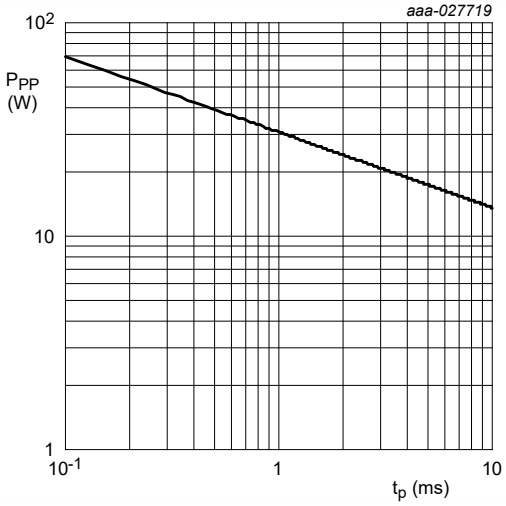



**Fig. 7. Peak pulse power as a function of exponential pulse duration; typical values**

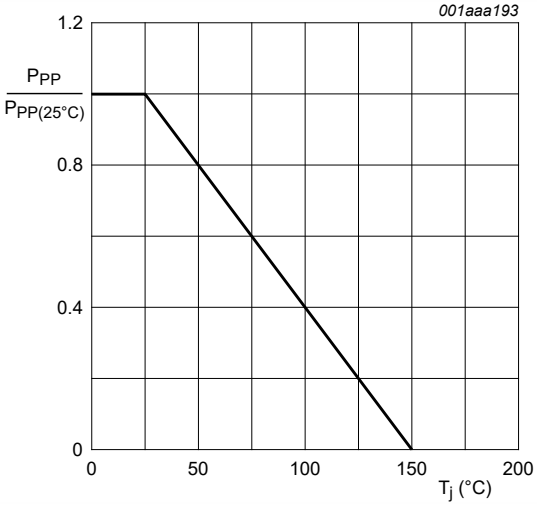



**Fig. 8. Relative variation of peak pulse power as a function of junction temperature; typical values**

# 10. Application information

The device is designed for the protection of one automotive IVN bus line from the damage caused by ESD and surge pulses.

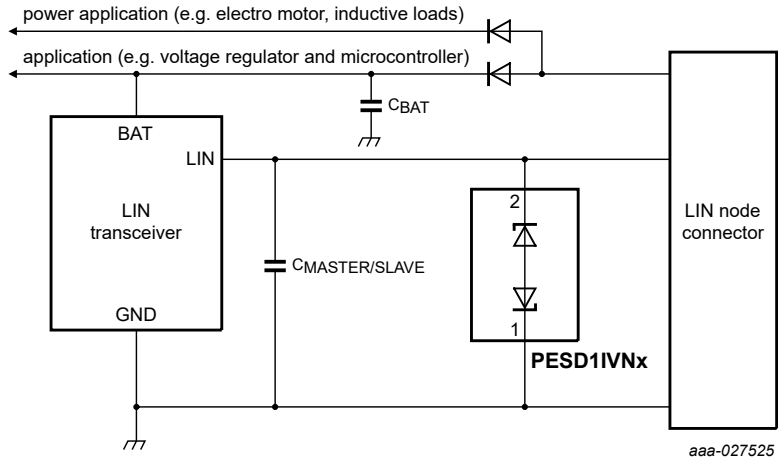



**Fig. 9. Typical application: ESD protection of one automotive LIN bus line**

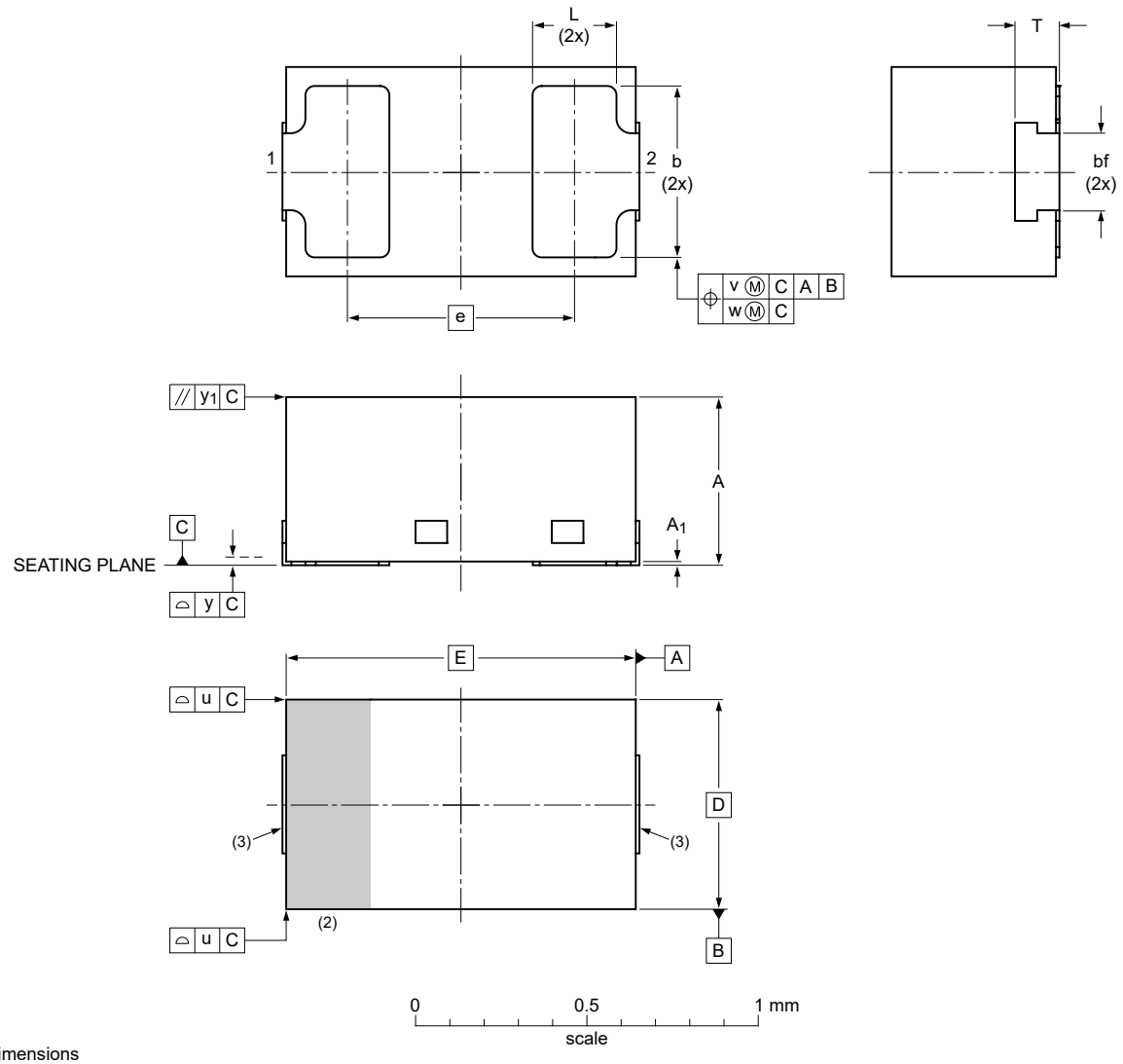
**Circuit board layout and protection device placement**

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. Package outline

**DFN1006BD-2** **Leadless ultra small plastic package with side-wettable flanks (SWF); 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.47 mm body** **SOD882BD**




Dimensions

| Unit | | $A^{(1)}$ | $A_1$ | $bf^{(1)}$ | b | D | E | e | L | $T^{(1)}$ | u | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | max | 0.50 | 0.04 | | 0.55 | | | | 0.30 | 0.22 | | | | | |
| mm | nom | 0.47 | | | 0.50 | 0.60 | 1.00 | 0.65 | 0.25 | 0.16 | 0.05 | 0.10 | 0.05 | 0.05 | 0.05 |
| | min | 0.44 | | 0.20 | 0.45 | | | | 0.22 | 0.10 | | | | | |

Note
1. Dimension including plating thickness.
2. The marking bar indicates the cathode.
3. Solderable lead end, protrusion max. 0.02 mm.

*sod882bd_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOD882BD | | MO-343AA | | | | ~~20-06-22~~ 20-06-23 |

**Fig. 10. Package outline DFN1006BD-2 (SOD882BD)**

## 12. Soldering

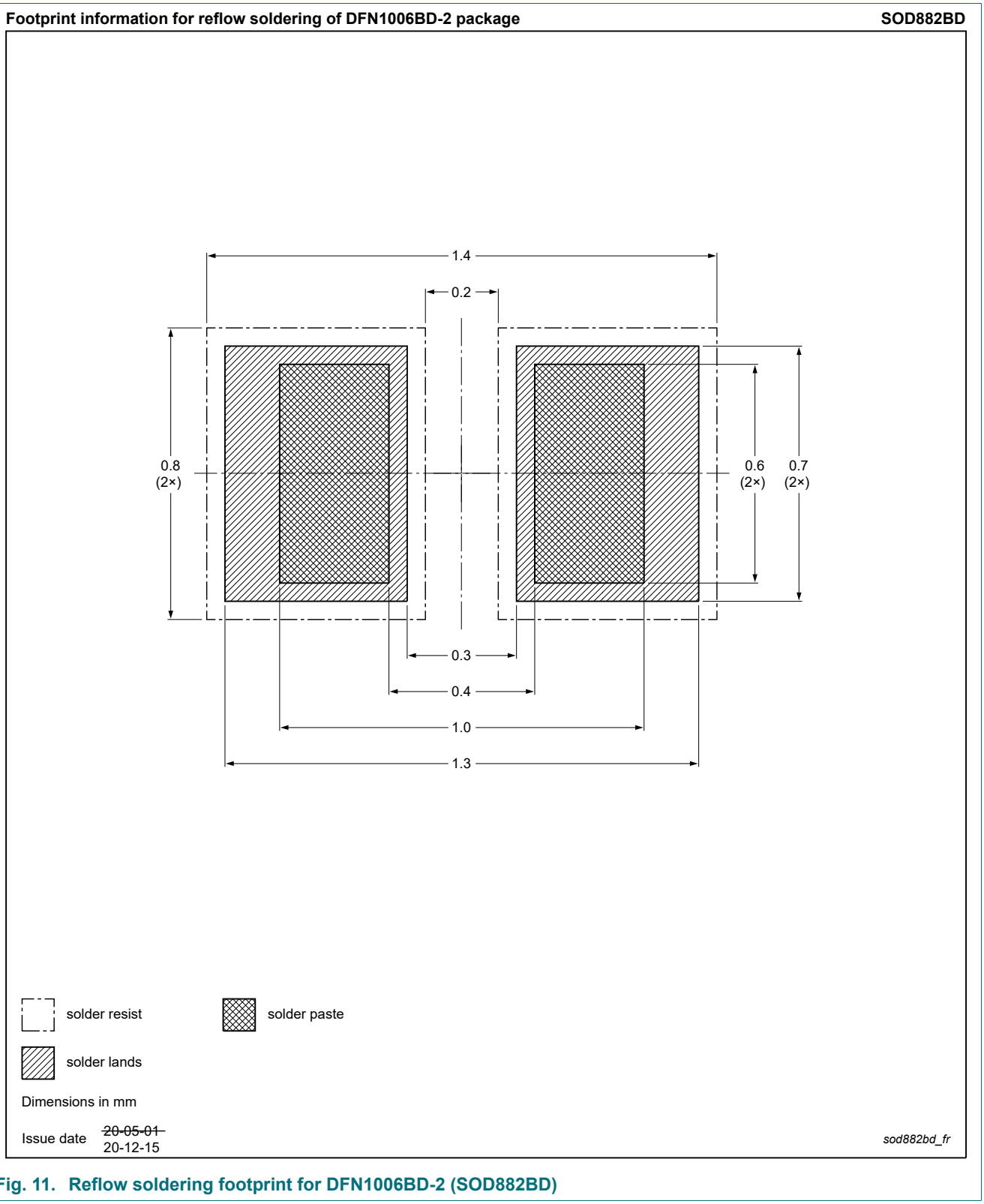



**Fig. 11. Reflow soldering footprint for DFN1006BD-2 (SOD882BD)**

# 13. Revision history

**Table 7. Revision history**

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PESD1IVN24-LS v.1 | 20210409 | Product data sheet | - | - |

# 14. 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. |
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