



THE DATASHEET OF PESD24VS1ULSYL





PESD24VS1ULS

Unidirectional ESD protection diode

28 January 2021

Product data sheet

1. General description

Unidirectional ElectroStatic Discharge (ESD) protection diode designed to protect one signal line from the damage caused by ESD and other transients. The device is housed in a leadless ultra small DFN1006BD-2 (SOD882BD) Surface-Mounted Device (SMD) plastic package with side-wettable flanks (SWF).

2. Features and benefits

- ESD protection of one line
- ESD protection up to 23 kV
- Ultra small SMD plastic package
- IEC 61000-4-2; level 4 (ESD)
- Side wettable flanks
- IEC 61000-4-5 (surge); $I_{PP} = 4.5$ A
- Low clamping voltage: $V_{CL} = 60$ V
- Ultra low leakage current: $I_{RM} < 1$ nA
- AEC-Q101 qualified

3. Applications

- Computers and peripherals
- Audio and video equipment
- Communication systems
- Portable electronics

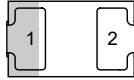
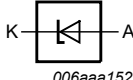
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|---|-----|-----|-----|------|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25$ °C | - | - | 24 | V |
| C_d | diode capacitance | $f = 1$ MHz; $V_R = 0$ V; $T_{amb} = 25$ °C | - | 23 | 50 | pF |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|------------------------|--|--|
| 1 | K | cathode ^[1] |  <p>Transparent top view</p> <p>DFN1006BD-2 (SOD882BD)</p> |  <p>006aaa152</p> |
| 2 | A | anode | | |

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|--------------|-------------|--|----------|
| | Name | Description | Version |
| PESD24VS1ULS | 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 |
|--------------|--------------|
| PESD24VS1ULS | 3W |

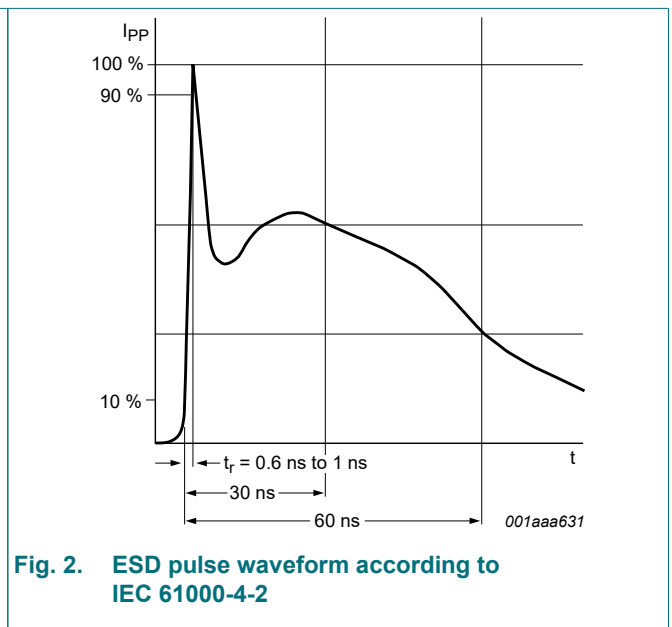
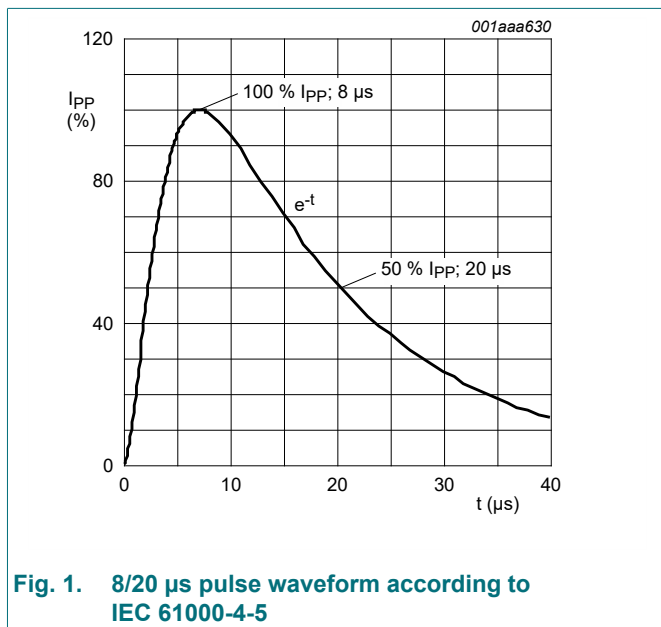
8. Limiting values

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] | - | 4.5 | 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] [3] | - | 23 | kV |

- [1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC61000-4-5.
- [2] Device stressed with ten non-repetitive ESD pulses.
- [3] Measured from pin 1 to 2.



9. Characteristics

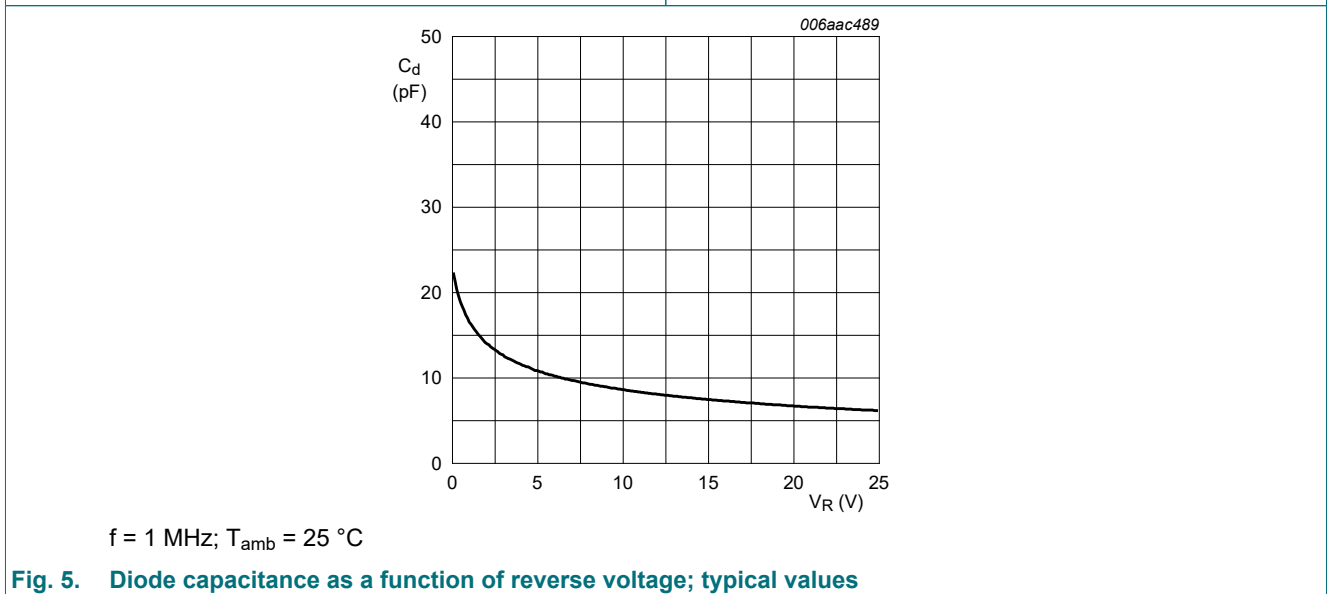
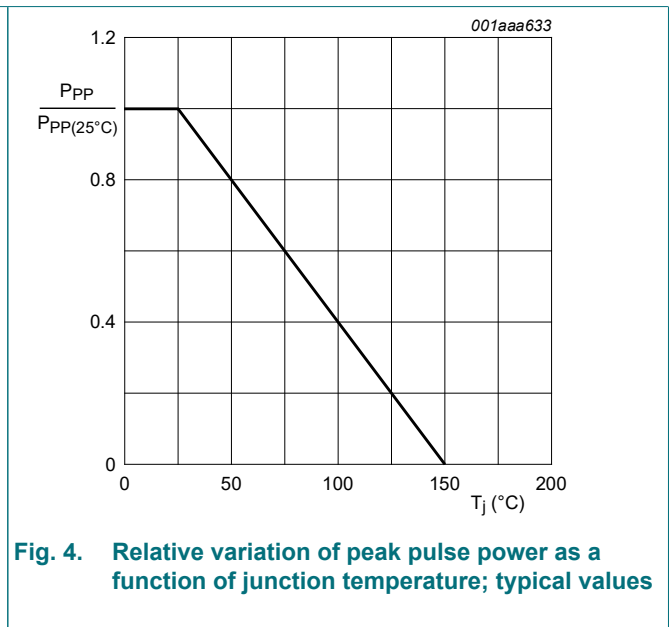
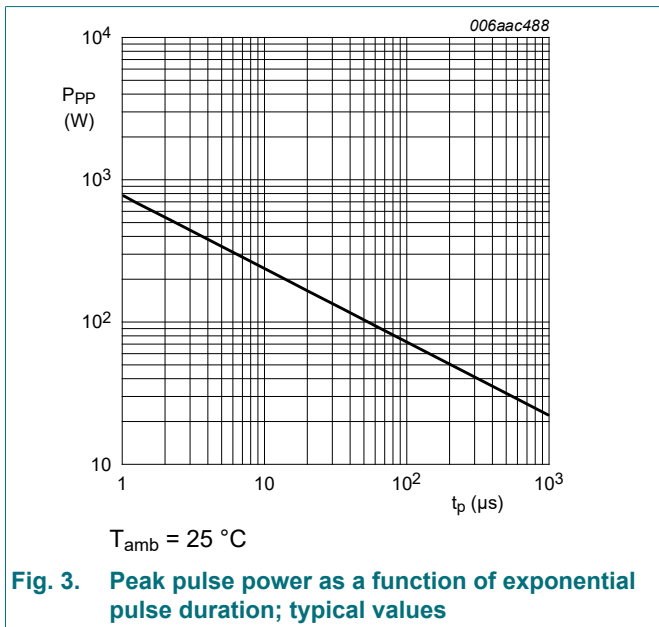
Table 6. Characteristics

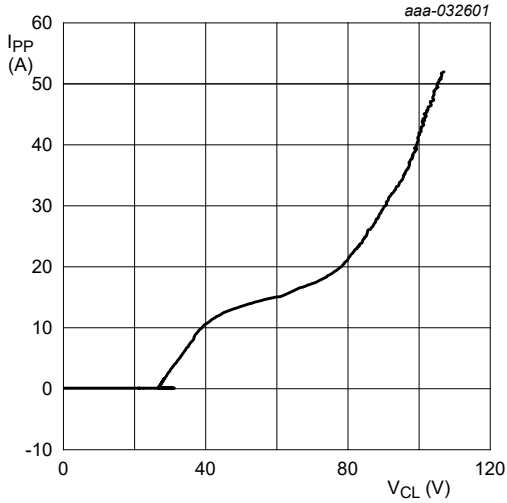
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|--|---------|-----|------|----------|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25\text{ }^{\circ}\text{C}$ | - | - | 24 | V |
| V_{BR} | breakdown voltage | $I_R = 5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | 26.5 | 27 | 27.5 | V |
| I_{RM} | reverse leakage current | $V_{RWM} = 24\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | - | 1 | 50 | nA |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | - | 23 | 50 | pF |
| V_{CL} | clamping voltage | $I_{PP} = 1\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | [1] [2] | - | 36 | V |
| | | $I_{PP} = 4.5\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | [1] [2] | - | 60 | V |
| R_{dyn} | dynamic resistance | $I_R = 10\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | [3] [2] | 1.6 | - | Ω |

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC61000-4-5.

[2] Measured from pin 1 to pin 2.

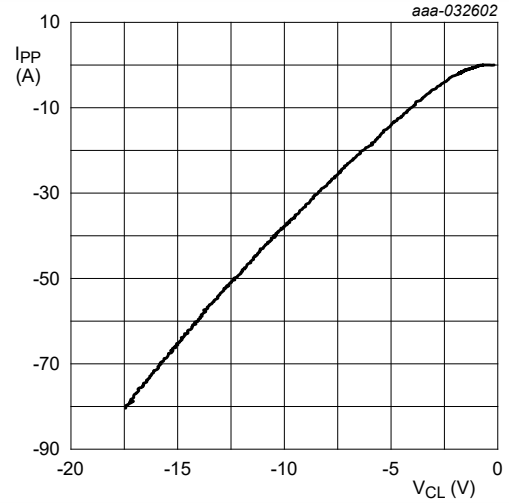
[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) $t_p = 100\text{ ns}$; square pulse; ANSI / ESD STM5.5.1-2008.





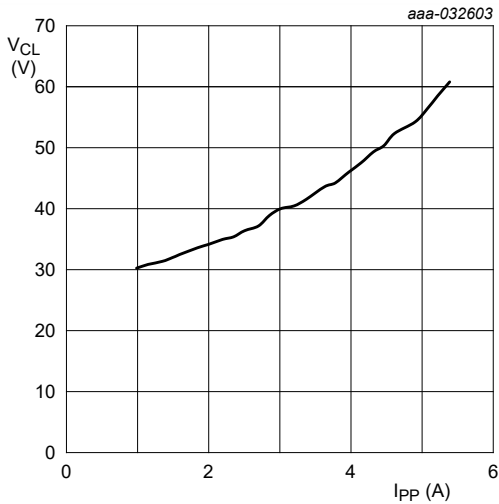
Transmission Line Pulse (TLP);
 $t_p = 100 \text{ ns}$; $t_r = 1 \text{ ns}$

Fig. 6. Dynamic resistance with positive clamping; typical values



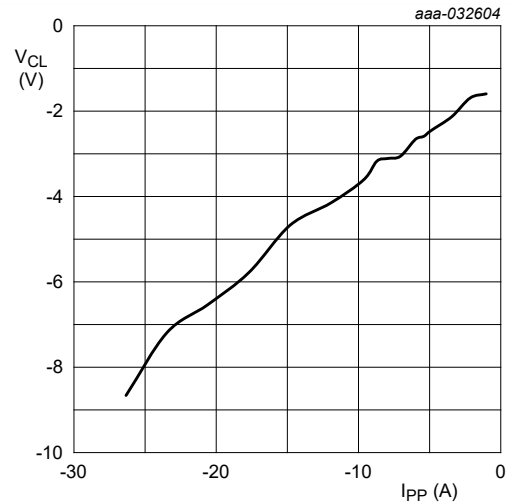
Transmission Line Pulse (TLP);
 $t_p = 100 \text{ ns}$; $t_r = 1 \text{ ns}$

Fig. 7. Dynamic resistance with negative clamping; typical values



IEC 61000-4-5; $t_p = 8/20 \mu\text{s}$; positive pulse

Fig. 8. Dynamic resistance with positive clamping; typical values



IEC 61000-4-5; $t_p = 8/20 \mu\text{s}$; negative pulse

Fig. 9. Dynamic resistance with negative clamping; typical values

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.

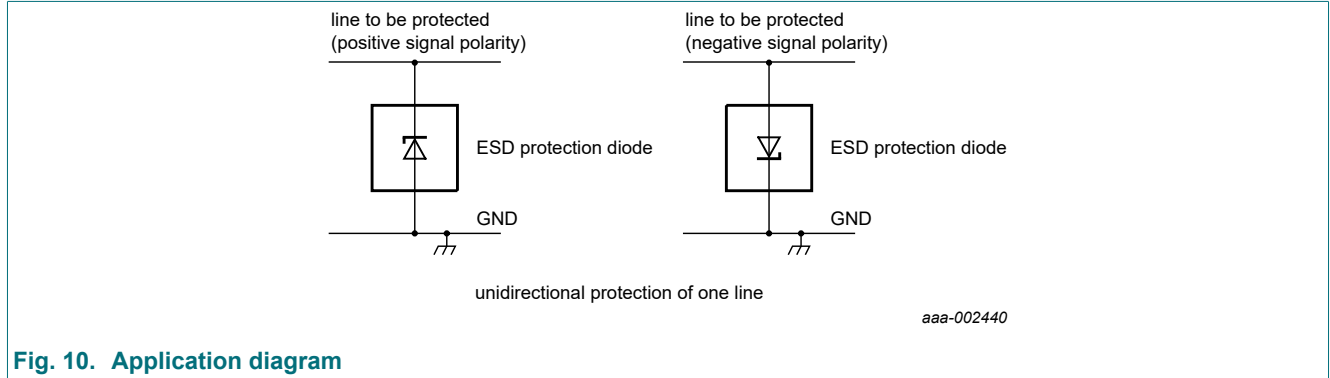


Fig. 10. Application diagram

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

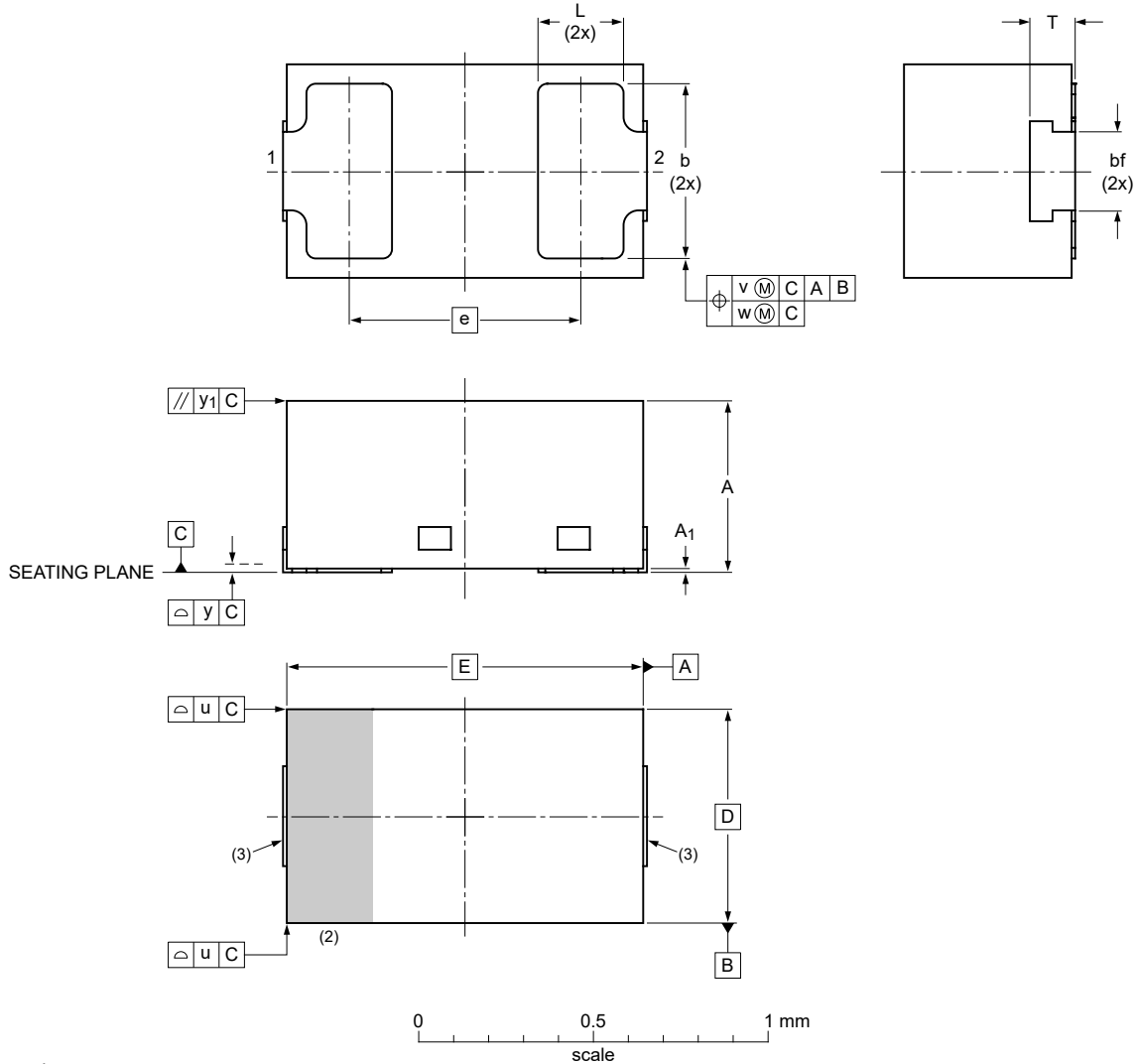
Quality information

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

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 |
|------|------------------|----------------|-------------------|------|------|------|------|------|------------------|------|------|------|------|----------------|
| mm | max 0.50 | 0.04 | | 0.55 | | | | 0.30 | 0.22 | | | | | |
| | 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. 11. Package outline DFN1006BD-2 (SOD882BD)

13. Soldering

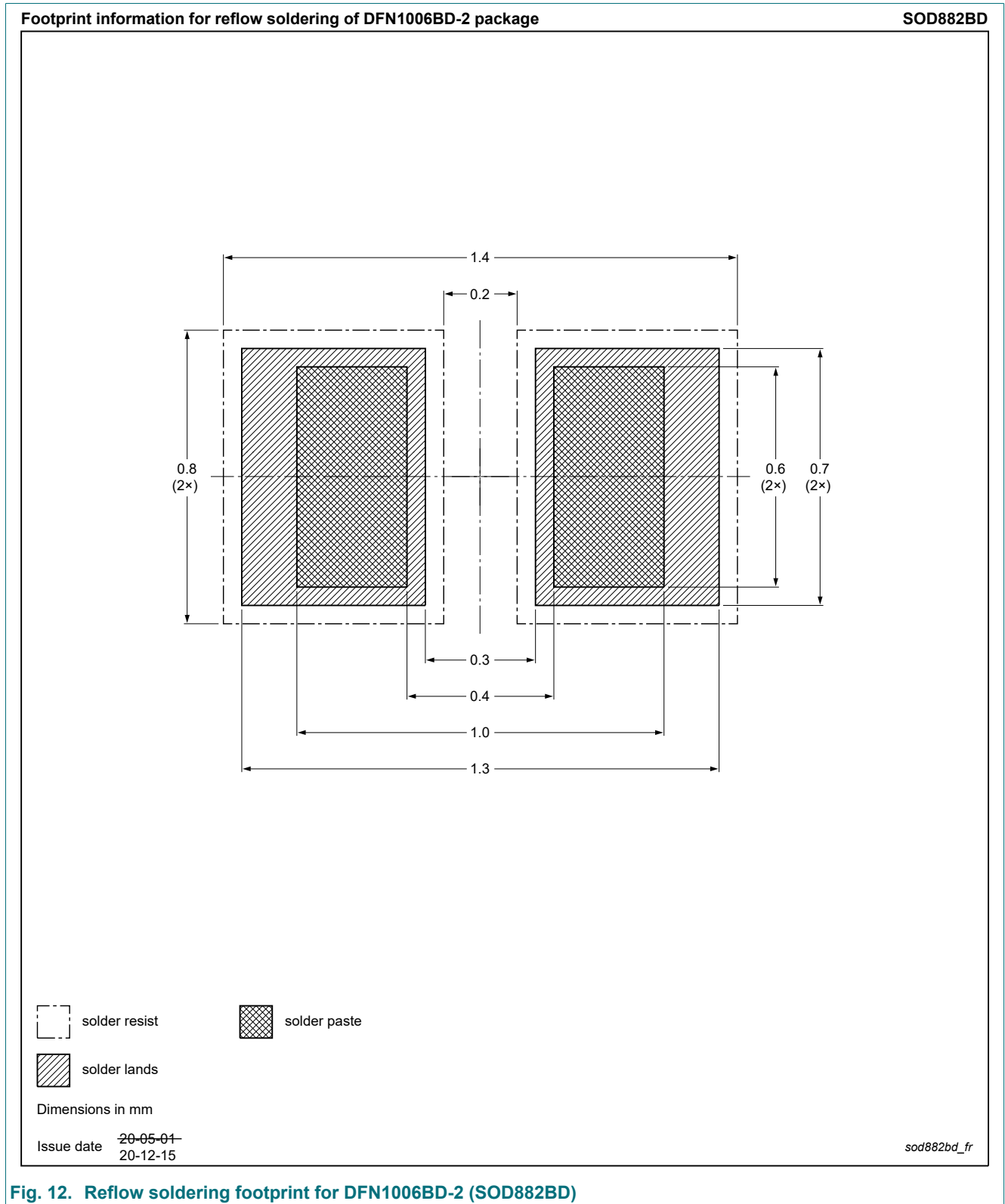


Fig. 12. Reflow soldering footprint for DFN1006BD-2 (SOD882BD)

14. Revision history

Table 7. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|--------------|--------------------|---------------|------------|
| PESD24VS1ULS v.1 | 20210128 | 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. |

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