



# PESD12VS2UT

Double ESD protection diode

24 July 2023

Product data sheet

## 1. General description

Unidirectional double ESD protection diode in a SOT23 plastic package. Designed to protect up to two transmission or data lines from ElectroStatic Discharge (ESD) damage.

## 2. Features and benefits

- Unidirectional ESD protection of up to two lines
- Max. peak pulse power:  $P_{PPM} = 180 \text{ W}$  at  $t_p = 8/20 \text{ }\mu\text{s}$
- Low clamping voltage:  $V_{CL} = 35 \text{ V}$  at  $I_{PPM} = 5 \text{ A}$
- Ultra-low reverse leakage current:  $I_{RM} < 20 \text{ nA}$
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge);  $I_{PPM} = 5 \text{ A}$  at  $t_p = 8/20 \text{ }\mu\text{s}$
- AEC-Q101 qualified

## 3. Applications

- Computers and peripherals
- Communication systems
- Audio and video equipment
- High speed data lines
- Parallel ports

## 4. Quick reference data

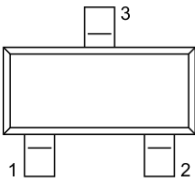
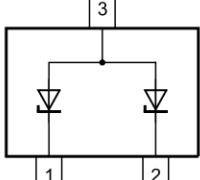
Table 1. Quick reference data

| Symbol    | Parameter                | Conditions                                                                          |     | Min | Typ | Max | Unit |
|-----------|--------------------------|-------------------------------------------------------------------------------------|-----|-----|-----|-----|------|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                             | [1] | -   | -   | 12  | V    |
| $C_d$     | diode capacitance        | $f = 1 \text{ MHz}$ ; $V_R = 0 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$ | [1] | -   | 38  | 75  | pF   |

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

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description       | Simplified outline                                                                         | Graphic symbol                                                                                   |
|-----|--------|-------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1   | K1     | cathode (diode 1) | <br>SOT23 | <br>006aaa154 |
| 2   | K2     | cathode (diode 2) |                                                                                            |                                                                                                  |
| 3   | A      | common anode      |                                                                                            |                                                                                                  |

6. Ordering information

Table 3. Ordering information

| Type number | Package |                                                                                          |         |
|-------------|---------|------------------------------------------------------------------------------------------|---------|
|             | Name    | Description                                                                              | Version |
| PESD12VS2UT | SOT23   | plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body | SOT23   |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| PESD12VS2UT |                 |

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values

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

| Symbol              | Parameter                       | Conditions                        |         | Min | Max | Unit |
|---------------------|---------------------------------|-----------------------------------|---------|-----|-----|------|
| P <sub>PPM</sub>    | rated peak pulse power          | t <sub>p</sub> = 8/20 μs          | [1] [2] | -   | 180 | W    |
| I <sub>PPM</sub>    | rated peak pulse current        |                                   | [1] [2] | -   | 5   | A    |
| T <sub>j</sub>      | junction temperature            |                                   |         | -   | 150 | °C   |
| T <sub>amb</sub>    | ambient temperature             |                                   |         | -65 | 150 | °C   |
| T <sub>stg</sub>    | storage temperature             |                                   |         | -65 | 150 | °C   |
| ESD maximum ratings |                                 |                                   |         |     |     |      |
| V <sub>ESD</sub>    | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | [3] [2] | -   | 30  | kV   |
|                     |                                 | IEC 61000-4-2 (air discharge)     | [3] [2] | -   | 15  | kV   |
|                     |                                 | MIL-STD-883 (human body model)    |         | -   | 10  | kV   |

- [1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.  
[2] Measured from pin 1 or 2 to pin 3.  
[3] Device stressed with ten non-repetitive ESD pulses.

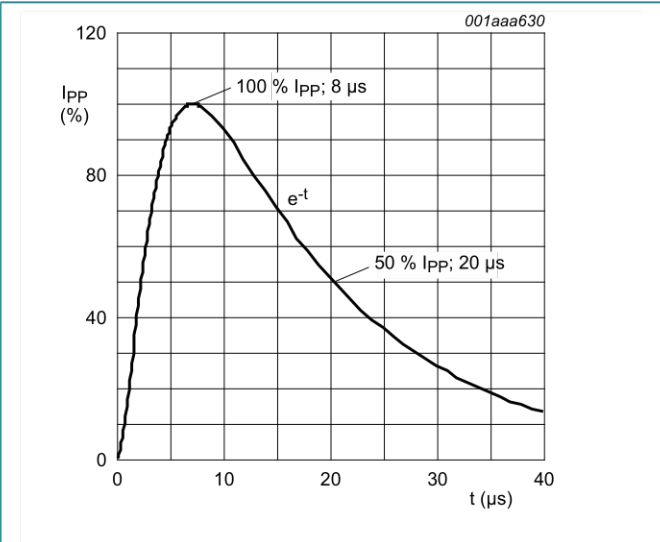


Fig. 1. 8/20 μs pulse waveform according to IEC 61000-4-5

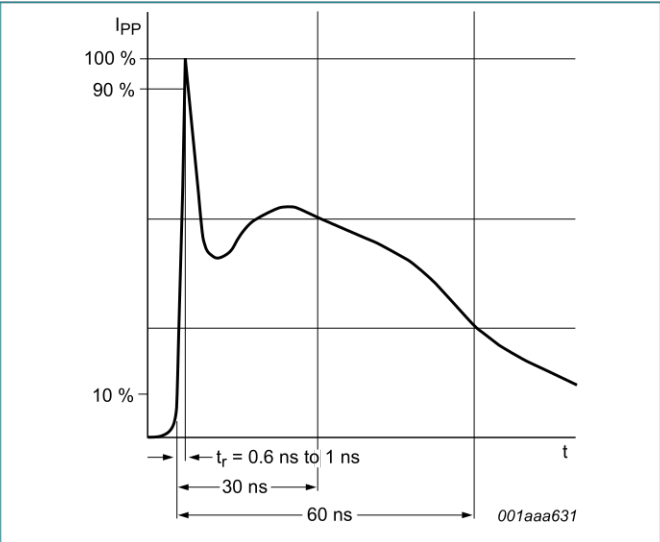


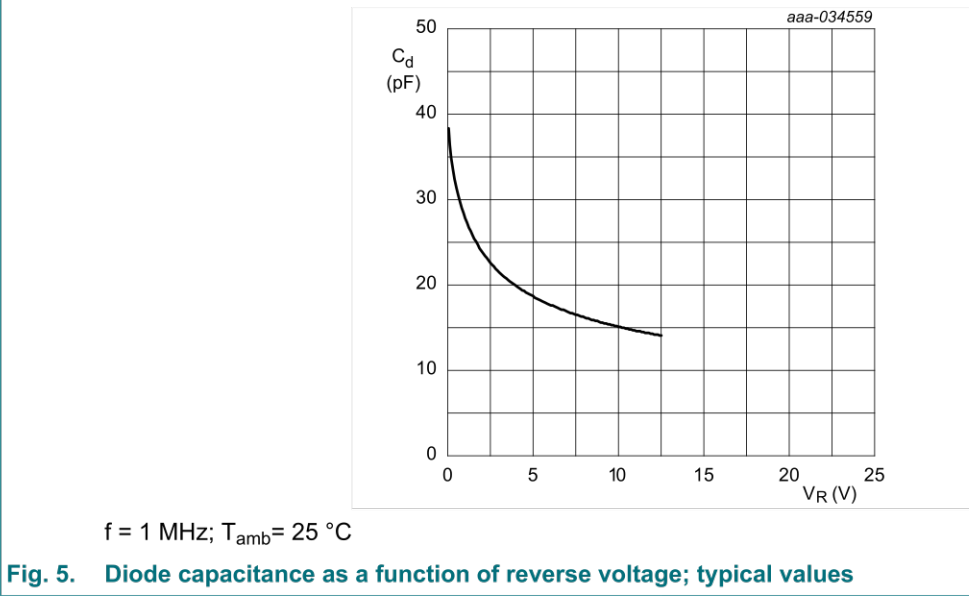
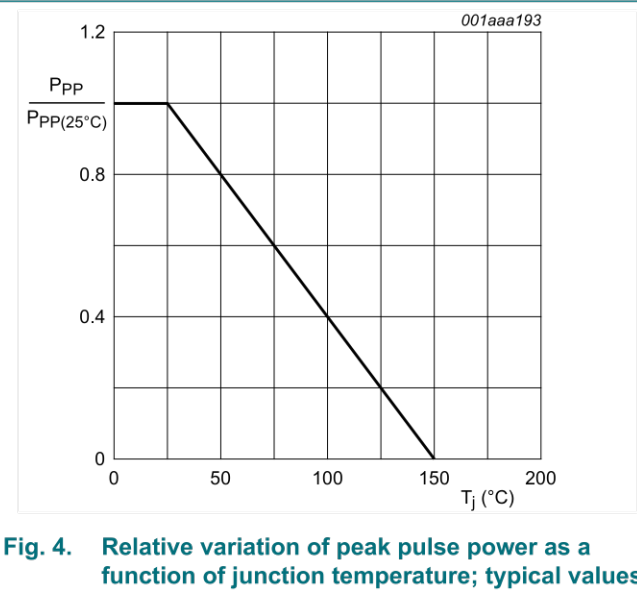
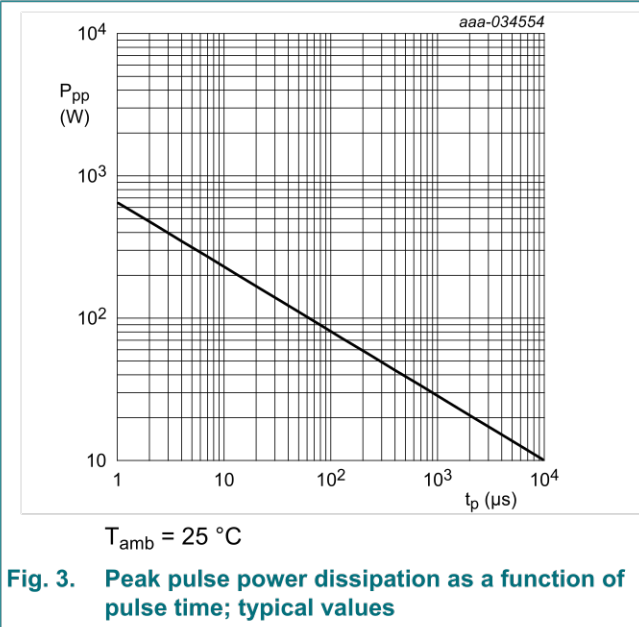
Fig. 2. ESD pulse waveform according to IEC 61000-4-2

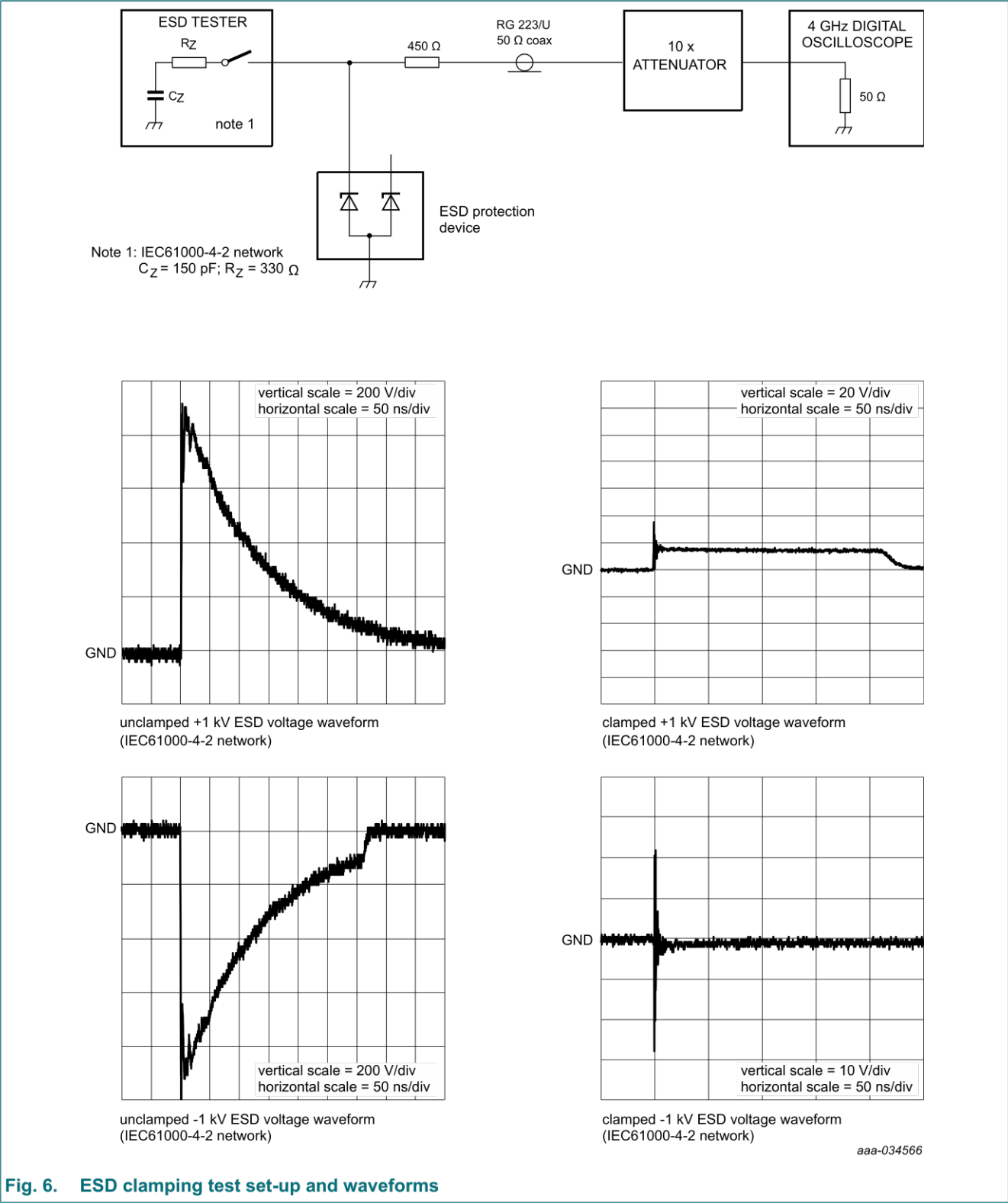
9. Characteristics

Table 6. Characteristics

| Symbol     | Parameter                | Conditions                                                                       |         | Min  | Typ  | Max  | Unit          |
|------------|--------------------------|----------------------------------------------------------------------------------|---------|------|------|------|---------------|
| $V_{RWM}$  | reverse standoff voltage | $T_{amb} = 25\text{ }^{\circ}\text{C}$                                           | [1]     | -    | -    | 12   | V             |
| $V_{BR}$   | breakdown voltage        | $I_R = 5\text{ mA}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                     | [1]     | 14.7 | 15   | 15.3 | V             |
| $I_{RM}$   | reverse leakage current  | $V_{RWM} = 12\text{ V}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                 | [1]     | -    | 0.02 | 1    | $\mu\text{A}$ |
| $C_d$      | diode capacitance        | $f = 1\text{ MHz}$ ; $V_R = 0\text{ V}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$ | [1]     | -    | 38   | 75   | pF            |
| $V_{CL}$   | clamping voltage         | $I_{PP} = 1\text{ A}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                   | [1] [2] | -    | -    | 19   | V             |
|            |                          | $I_{PP} = 5\text{ A}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                   | [1] [2] | -    | -    | 35   | V             |
| $R_{diff}$ | differential resistance  | $I_R = 1\text{ mA}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                     | [1]     | -    | -    | 200  | $\Omega$      |

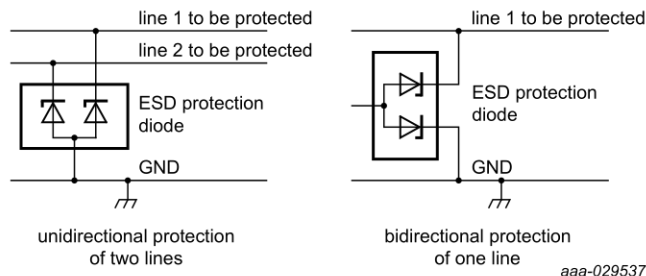
- [1] Measured from pin 1 or 2 to pin 3.  
[2] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.





## 10. Application information

The device is designed for the protection of up to two unidirectional data or signal lines from the damage caused by ESD and surge pulses. The devices may be used on lines where the signal polarities are either positive or negative with respect to ground.



**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.

11. Package outline

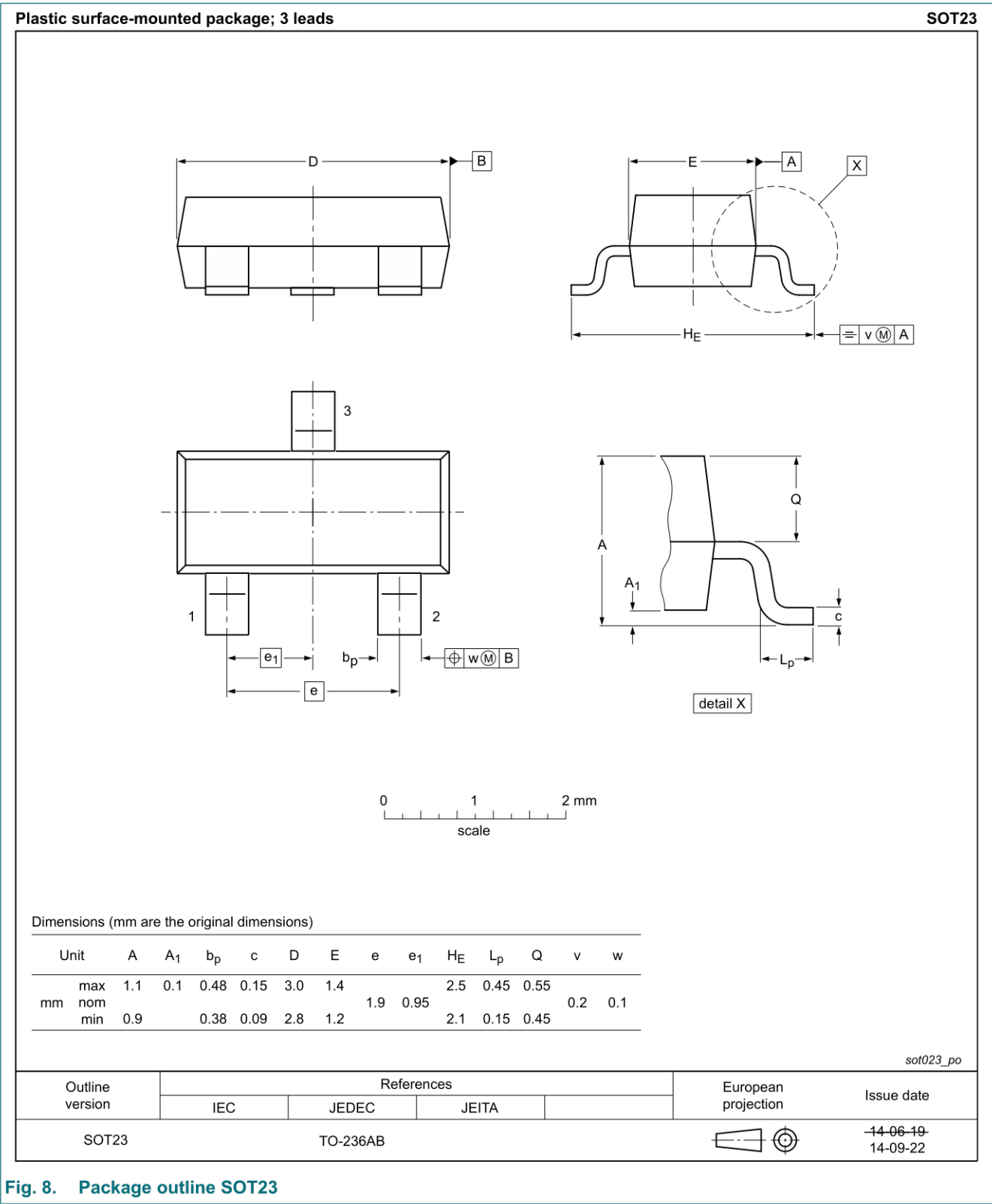


Fig. 8. Package outline SOT23

12. Soldering

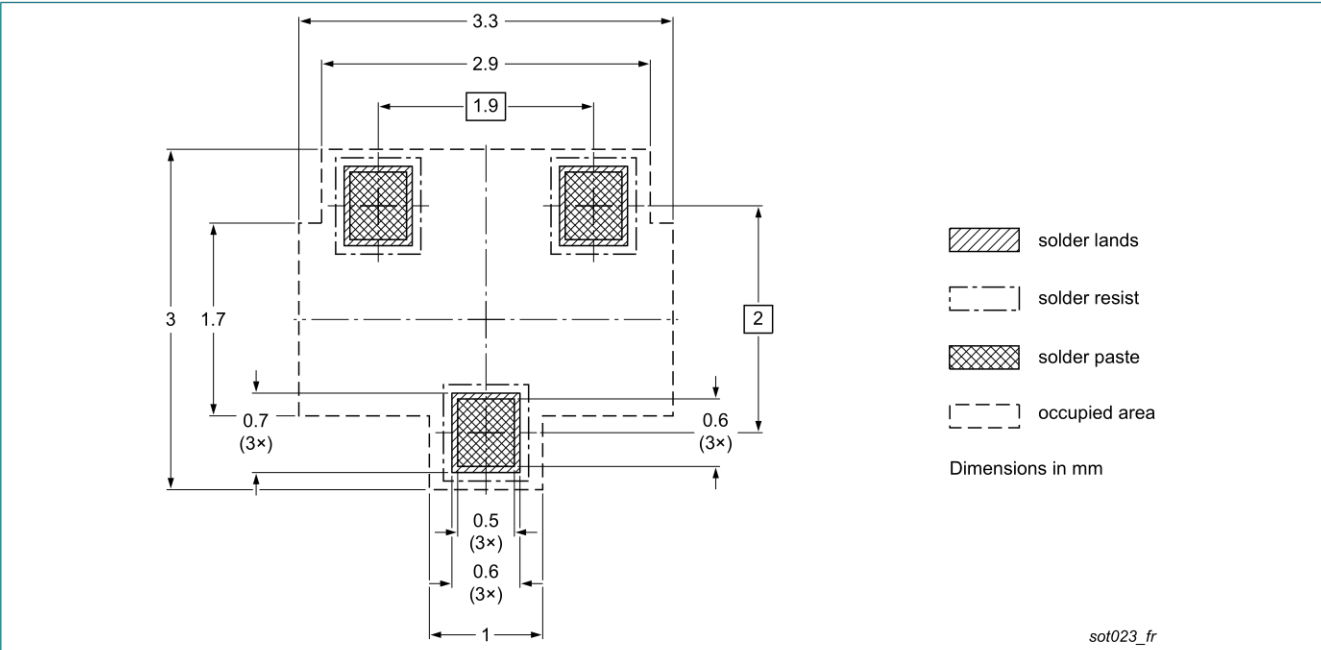


Fig. 9. Reflow soldering footprint for SOT23

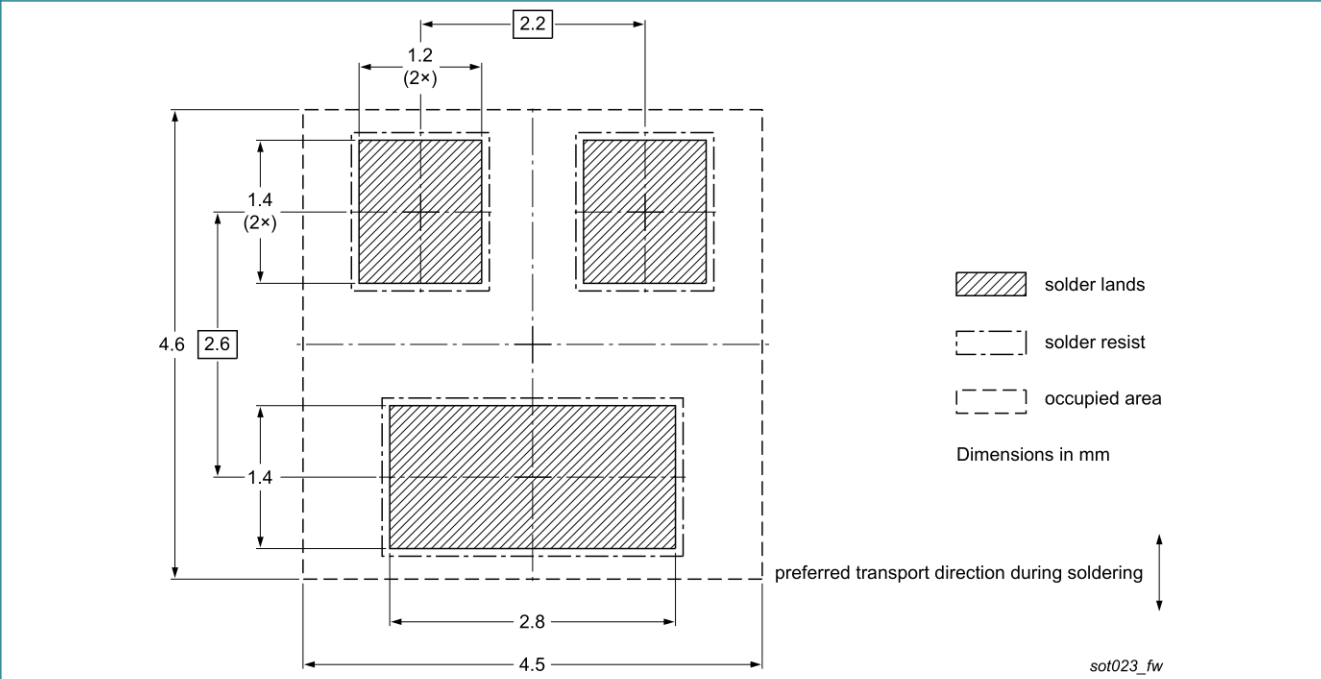


Fig. 10. Wave soldering footprint for SOT23



13. Revision history

Table 7. Revision history

| Data sheet ID        | Release date                                                                                                                                                                                                                                                                                     | Data sheet status  | Change notice | Supersedes           |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|----------------------|
| PESD12VS2UT v.3      | 20230724                                                                                                                                                                                                                                                                                         | Product data sheet | -             | PESDxS2UT series v.2 |
| Modifications:       | <ul style="list-style-type: none"><li>Family data sheet reduced to single type data sheet</li><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia</li><li>Legal texts have been adapted to the new company name where appropriate</li></ul> |                    |               |                      |
| PESDxS2UT series v.2 | 20040415                                                                                                                                                                                                                                                                                         | Product data sheet | -             | PESDxS2UT series v.1 |
| PESDxS2UT series v.1 | 20030820                                                                                                                                                                                                                                                                                         | Product data sheet | -             | -                    |

## 14. Legal information

### Data sheet status

| Document status<br>[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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