



# PESD3V3S2UT

## Double ESD protection diode

11 April 2023

Product data sheet

## 1. General description

Uni-directional 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

- Uni-directional ESD protection of up to two lines
- Max. peak pulse power:  $P_{pp} = 330 \text{ W}$  at  $t_p = 8/20 \text{ us}$
- Low clamping voltage:  $V_{(CL)R} = 20 \text{ V}$  at  $I_{pp} = 18 \text{ A}$
- Ultra-low reverse leakage current:  $I_{RM} < 700 \text{ nA}$
- ESD protection  $> 30 \text{ kV}$
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge);  $I_{pp} = 18 \text{ A}$  at  $t_p = 8/20 \text{ us}$ .

## 3. Applications

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

## 4. Quick reference data

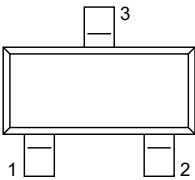
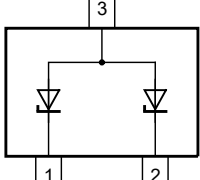
Table 1. Quick reference data

| Symbol    | Parameter                | Conditions                                                                          |     | Min | Typ | Max | Unit |
|-----------|--------------------------|-------------------------------------------------------------------------------------|-----|-----|-----|-----|------|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25 \text{ }^{\circ}\text{C}$                                             | [1] | -   | -   | 3.3 | V    |
| $C_d$     | diode capacitance        | $f = 1 \text{ MHz}$ ; $V_R = 0 \text{ V}$ ; $T_{amb} = 25 \text{ }^{\circ}\text{C}$ | [1] | -   | 207 | 300 | 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 |
| PESD3V3S2UT | 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] |
|-------------|-----------------|
| PESD3V3S2UT | %U9             |

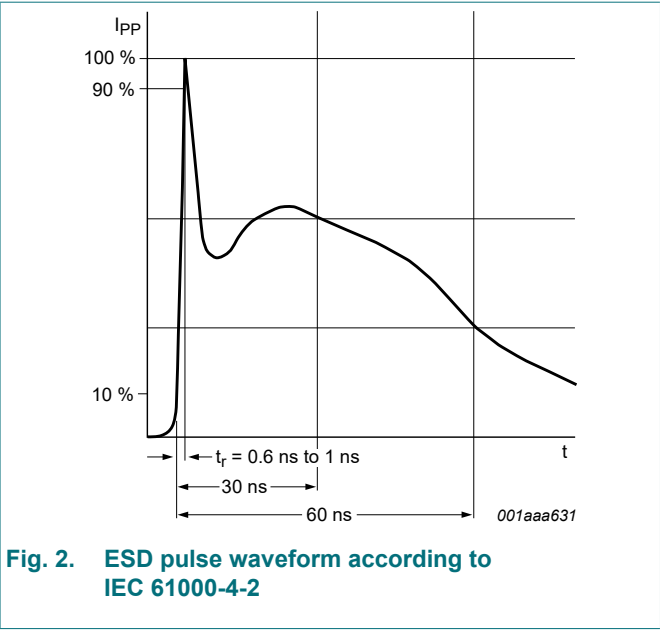
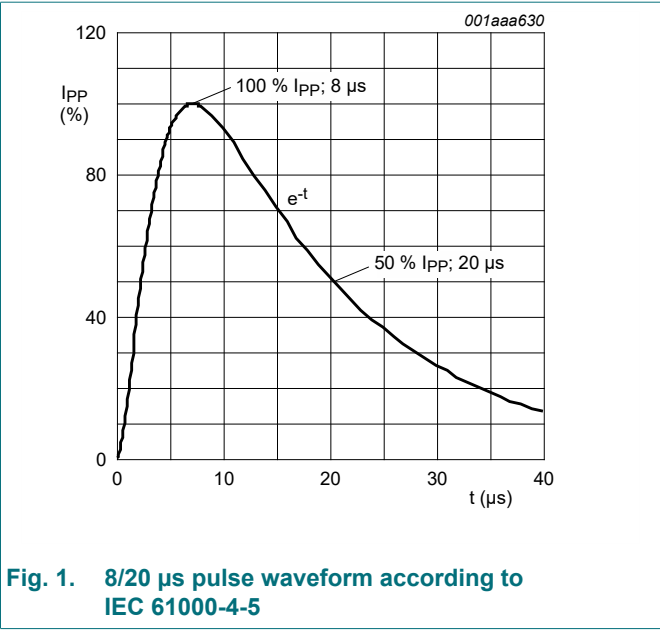
[1] % = placeholder for manufacturing site code

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] | -   | 330 | W    |
| I <sub>PPM</sub>    | rated peak pulse current        |                                   | [1] [2] | -   | 18  | 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.

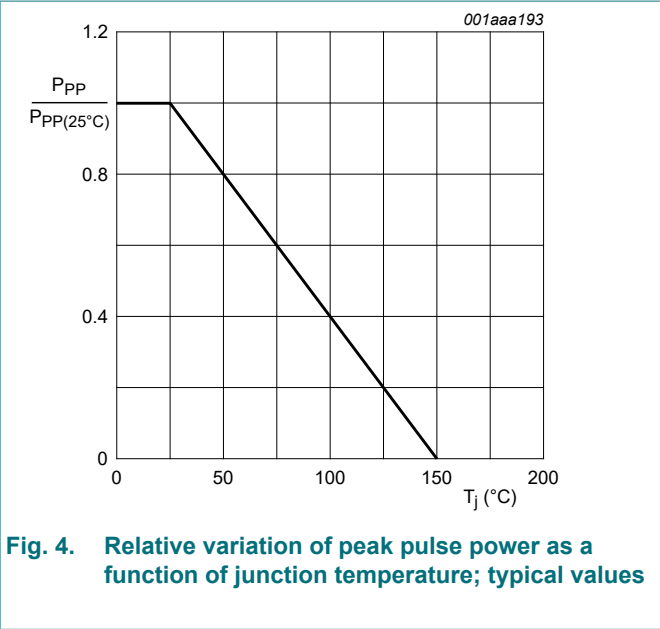
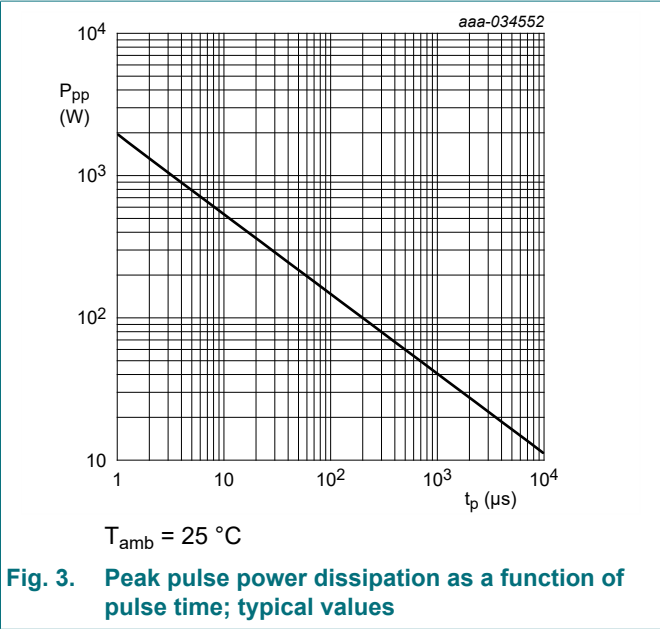


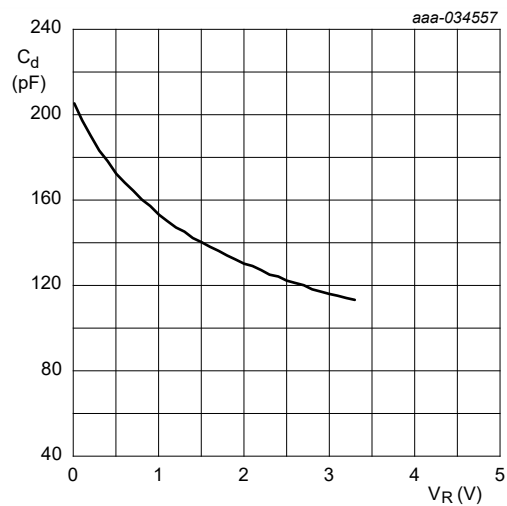
9. Characteristics

Table 6. Characteristics

| Symbol            | Parameter                | Conditions                                                |         | Min | Typ | Max | Unit |
|-------------------|--------------------------|-----------------------------------------------------------|---------|-----|-----|-----|------|
| V <sub>RWM</sub>  | reverse standoff voltage | T <sub>amb</sub> = 25 °C                                  | [1]     | -   | -   | 3.3 | V    |
| V <sub>BR</sub>   | breakdown voltage        | I <sub>R</sub> = 5 mA; T <sub>amb</sub> = 25 °C           | [1]     | 5.2 | 5.6 | 6   | V    |
| I <sub>RM</sub>   | reverse leakage current  | V <sub>RWM</sub> = 3.3 V; T <sub>amb</sub> = 25 °C        | [1]     | -   | 0.7 | 2   | μA   |
| C <sub>d</sub>    | diode capacitance        | f = 1 MHz; V <sub>R</sub> = 0 V; T <sub>amb</sub> = 25 °C | [1]     | -   | 207 | 300 | pF   |
| V <sub>CL</sub>   | clamping voltage         | I <sub>PP</sub> = 1 A; T <sub>amb</sub> = 25 °C           | [1] [2] | -   | -   | 7   | V    |
|                   |                          | I <sub>PP</sub> = 18 A; T <sub>amb</sub> = 25 °C          | [1] [2] | -   | -   | 20  | V    |
| R <sub>diff</sub> | differential resistance  | I <sub>R</sub> = 1 mA; T <sub>amb</sub> = 25 °C           | [1]     | -   | -   | 400 | Ω    |

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





$f = 1\text{ MHz}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$

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

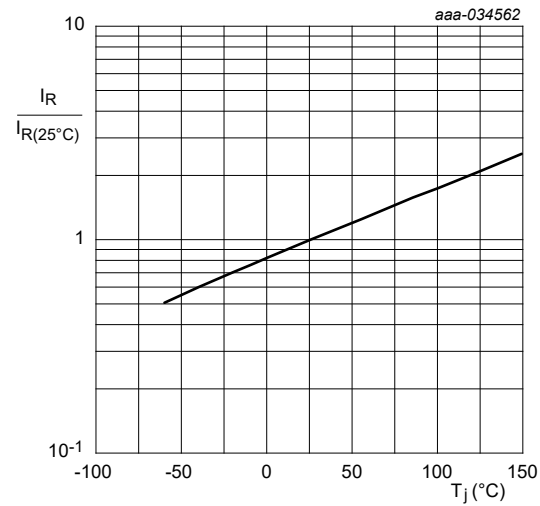


Fig. 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

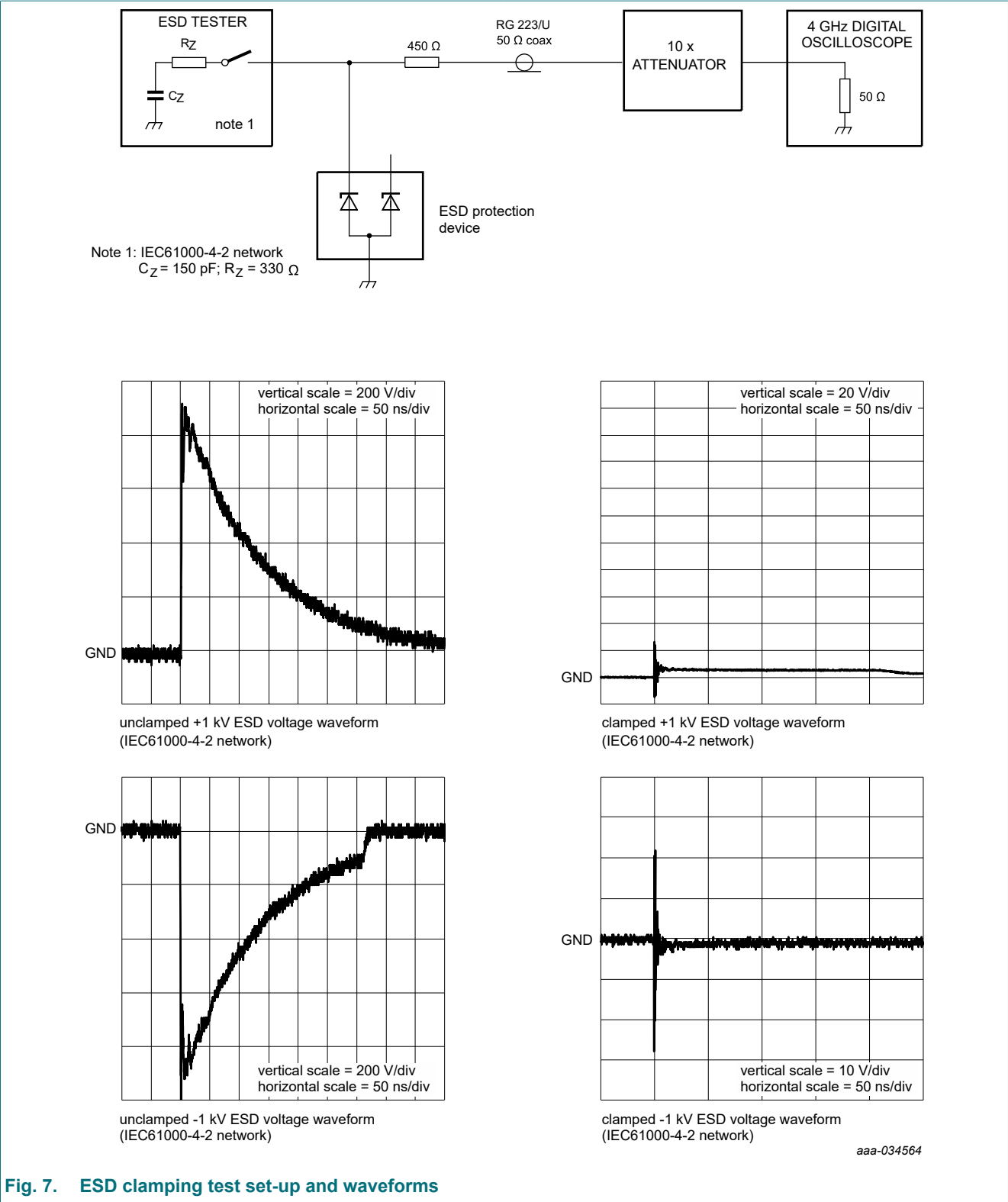


Fig. 7. ESD clamping test set-up and waveforms

## 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.

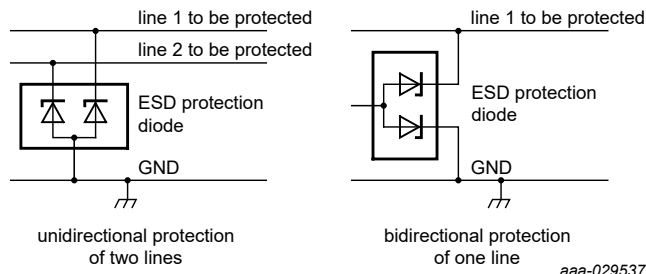


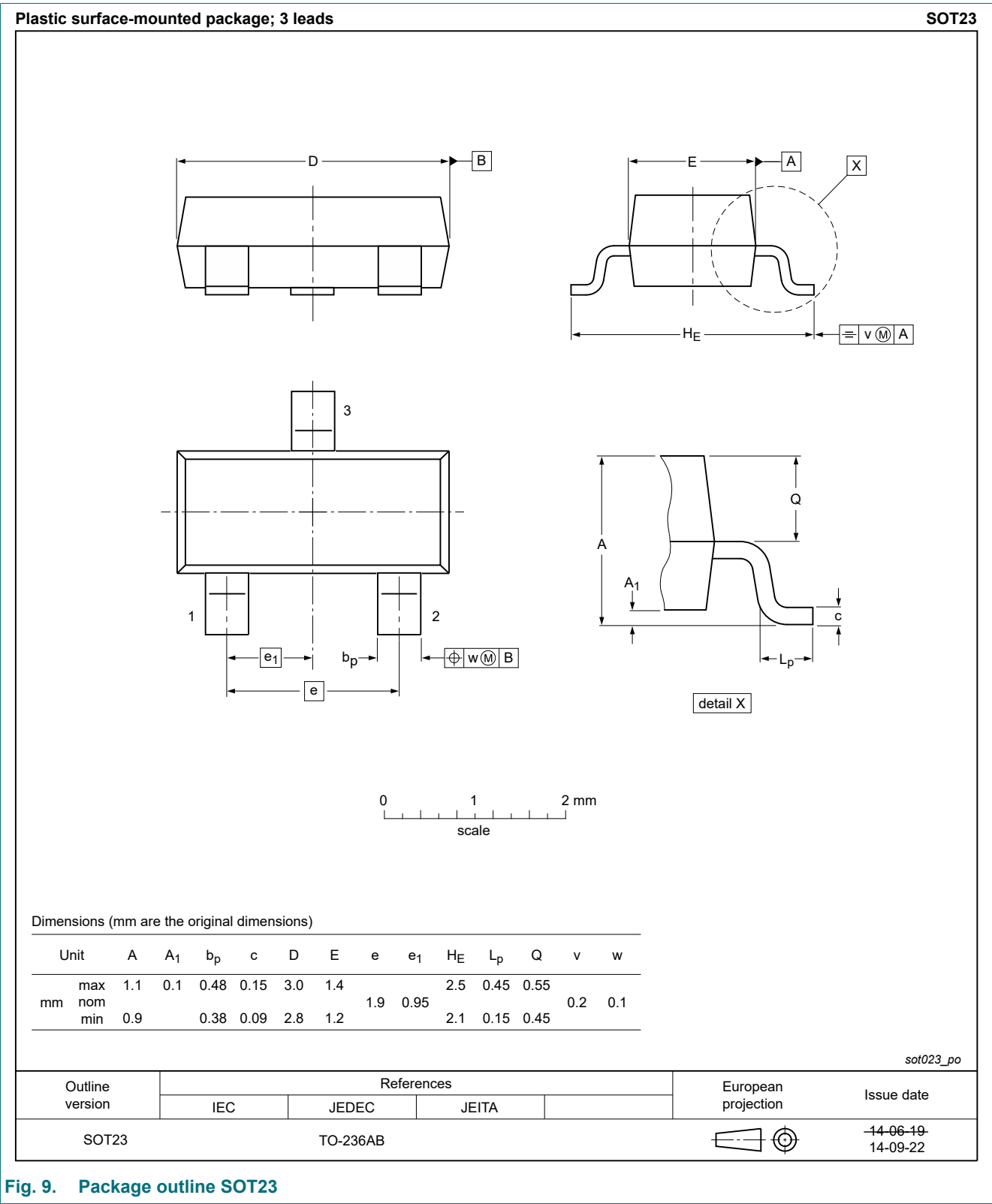
Fig. 8. Application diagram

### Circuit board layout and protection device placement

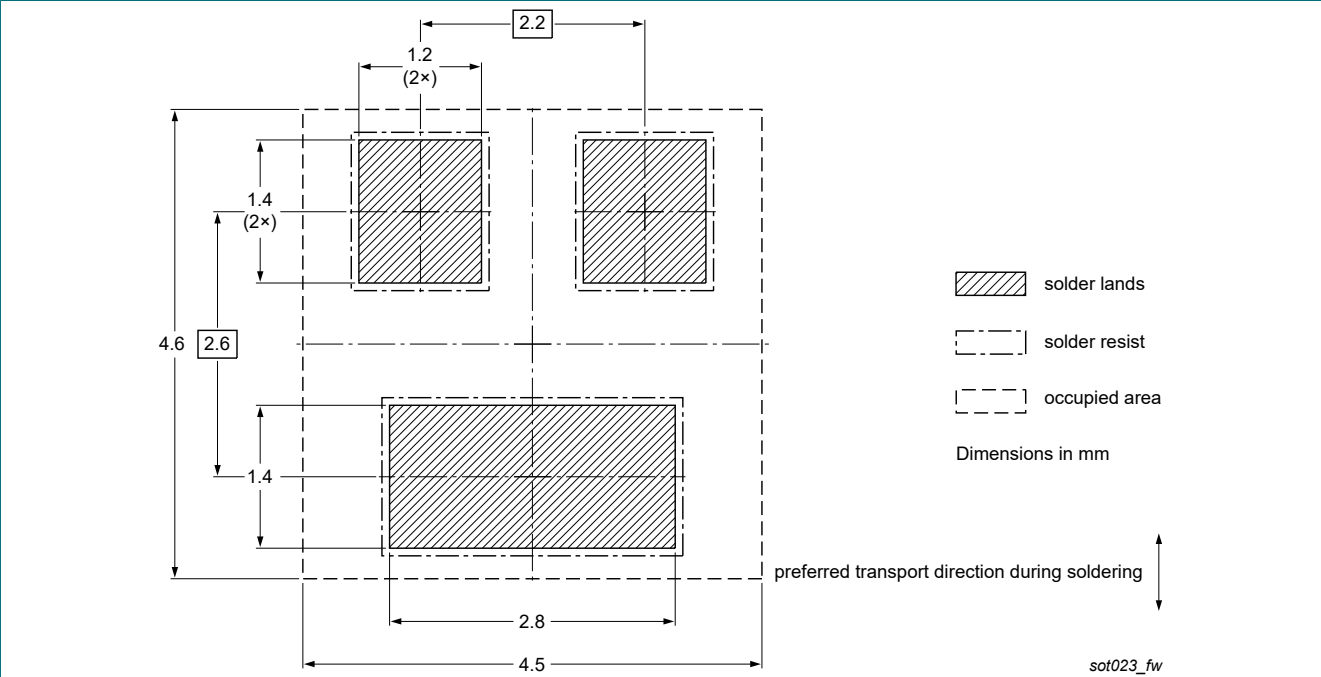
Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

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. Package outline



12. Soldering



13. Revision history

Table 7. Revision history

| Data sheet ID        | Release date                                                                                                                                                                                                                         | Data sheet status  | Change notice | Supersedes           |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|----------------------|
| PESD3V3S2UT v.3      | 20230411                                                                                                                                                                                                                             | Product data sheet | -             | PESDXS2UT_SERIES v.2 |
| Modifications:       | <ul style="list-style-type: none"><li>Product changed to non-automotive qualification. Please refer to nexperia.com for automotive(-Q) product alternative(s).</li><li>Family data sheet reduced to single type data sheet</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".
- [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 <https://www.nexperia.com>.

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