



# PESD15VS2UT-Q

## Double ESD protection diode

10 June 2022

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:  $P_{pp} = 160 \text{ W}$  at  $t_p = 8/20 \text{ us}$
- Low clamping voltage:  $V_{(CL)R} = 40 \text{ V}$  at  $I_{pp} = 5 \text{ A}$
- Ultra-low reverse leakage current:  $I_{RM} < 20 \text{ nA}$
- ESD protection  $> 30 \text{ kV}$
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge);  $I_{pp} = 5 \text{ A}$  at  $t_p = 8/20 \text{ us}$ .
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

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

## 4. Quick reference data

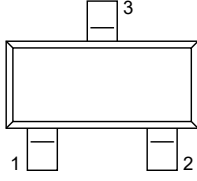
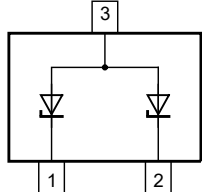
Table 1. Quick reference data

| Symbol    | Parameter                | Conditions  |     | Min | Typ | Max | Unit |
|-----------|--------------------------|---|-----|-----|-----|-----|------|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25 \text{ }^\circ\text{C}$                                       | [1] | -   | -   | 15  | V    |
| $C_d$     | diode capacitance        | $f = 1 \text{ MHz}; V_R = 0 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$ | [1] | -   | 32  | 70  | 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) |  <p style="text-align: center;"><b>SOT23</b></p> |  <p style="text-align: right;"><small>006aaa154</small></p> |
| 2   | K2     | cathode (diode 2) |   |  |
| 3   | A      | common anode      |   |  |

## 6. Ordering information

Table 3. Ordering information

| Type number   | Package |  |         |
|---------------|---------|--|---------|
|               | Name    | Description  | Version |
| PESD15VS2UT-Q | 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 <sup>[1]</sup> |
|---------------|-----------------------------|
| PESD15VS2UT-Q | %U3                         |

[1] % = placeholder for manufacturing site code

## 8. Limiting values

**Table 5. Limiting values**

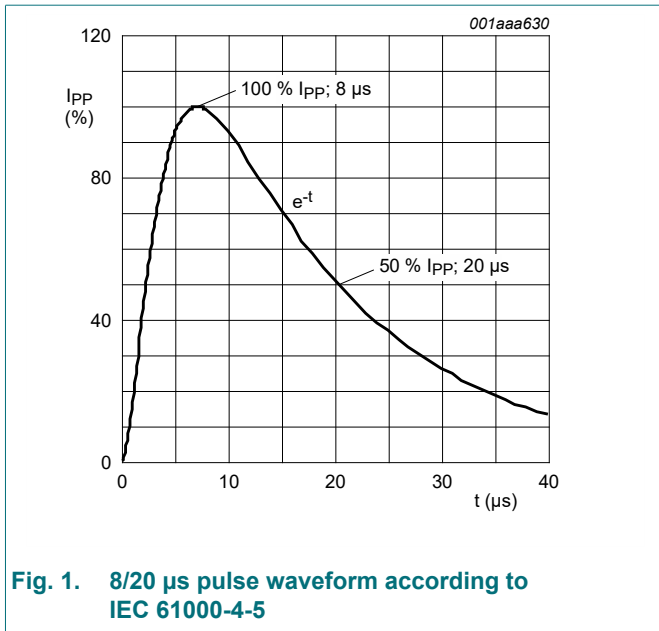
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol                     | Parameter                       | Conditions                        |         | Min | Max | Unit |
|----------------------------|---------------------------------|-----------------------------------|---------|-----|-----|------|
| $P_{PPM}$                  | rated peak pulse power          | $t_p = 8/20 \mu s$                | [1] [2] | -   | 160 | W    |
| $I_{PPM}$                  | rated peak pulse current        |                                   | [1] [2] | -   | 5   | A    |
| $T_j$                      | junction temperature            |                                   |         | -   | 150 | °C   |
| $T_{amb}$                  | ambient temperature             |                                   |         | -65 | 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) | [3] [2] | -   | 30  | kV   |
|                            |                                 | IEC 61000-4-2 (air discharge)     | [3] [2] | -   | 15  | kV   |
|                            |                                 | MIL-STD-883 (human body model)    |         | -   | 10  | kV   |

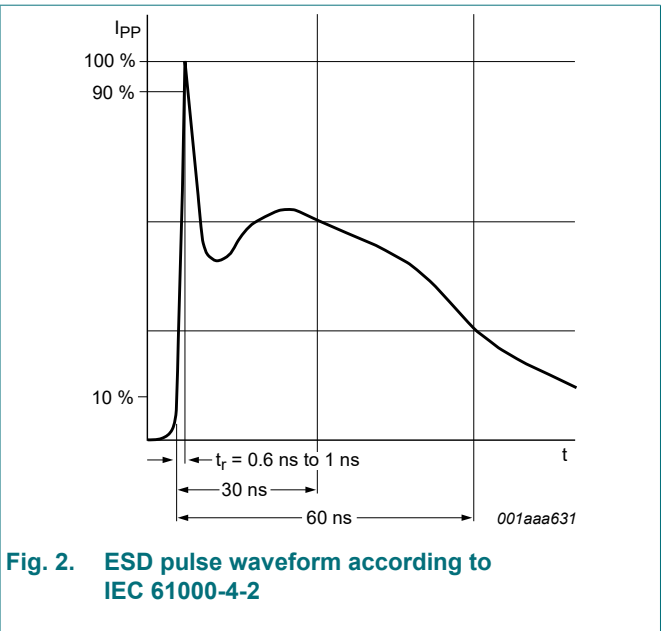
[1] Non-repetitive current pulse 8/20  $\mu s$  exponential decay waveform according to IEC 61000-4-5.

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

[3] Device stressed with ten non-repetitive ESD pulses.



**Fig. 1. 8/20  $\mu s$  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 | $T_{amb} = 25\text{ °C}$                                     | [1]     | -    | -    | 15   | V             |
| $V_{BR}$   | breakdown voltage        | $I_R = 5\text{ mA}; T_{amb} = 25\text{ °C}$                  | [1]     | 17.6 | 18   | 18.4 | V             |
| $I_{RM}$   | reverse leakage current  | $V_{RWM} = 15\text{ V}; T_{amb} = 25\text{ °C}$              | [1]     | -    | 0.02 | 1    | $\mu\text{A}$ |
| $C_d$      | diode capacitance        | $f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ °C}$ | [1]     | -    | 32   | 70   | pF            |
| $V_{CL}$   | clamping voltage         | $I_{PP} = 1\text{ A}; T_{amb} = 25\text{ °C}$                | [1] [2] | -    | -    | 23   | V             |
|            |                          | $I_{PP} = 5\text{ A}; T_{amb} = 25\text{ °C}$                | [1] [2] | -    | -    | 40   | V             |
| $R_{diff}$ | differential resistance  | $I_R = 1\text{ mA}; T_{amb} = 25\text{ °C}$                  | [1]     | -    | -    | 225  | $\Omega$      |

[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.

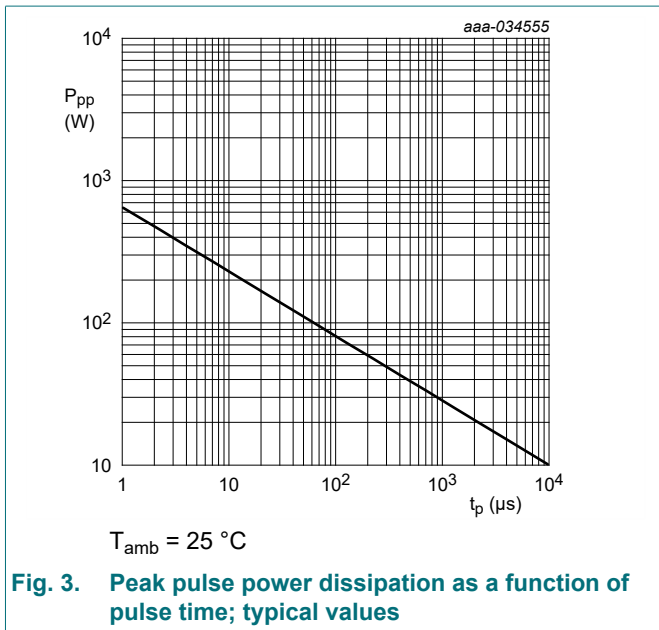


Fig. 3. Peak pulse power dissipation as a function of pulse time; typical values

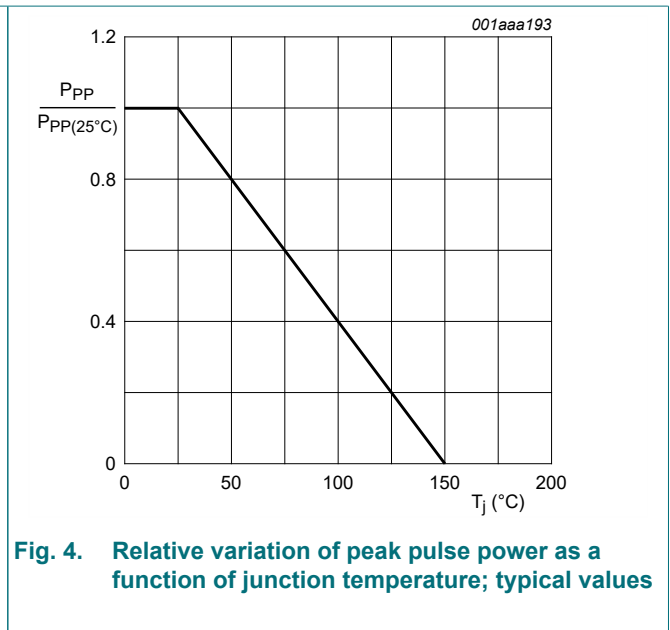


Fig. 4. Relative variation of peak pulse power as a function of junction temperature; typical values

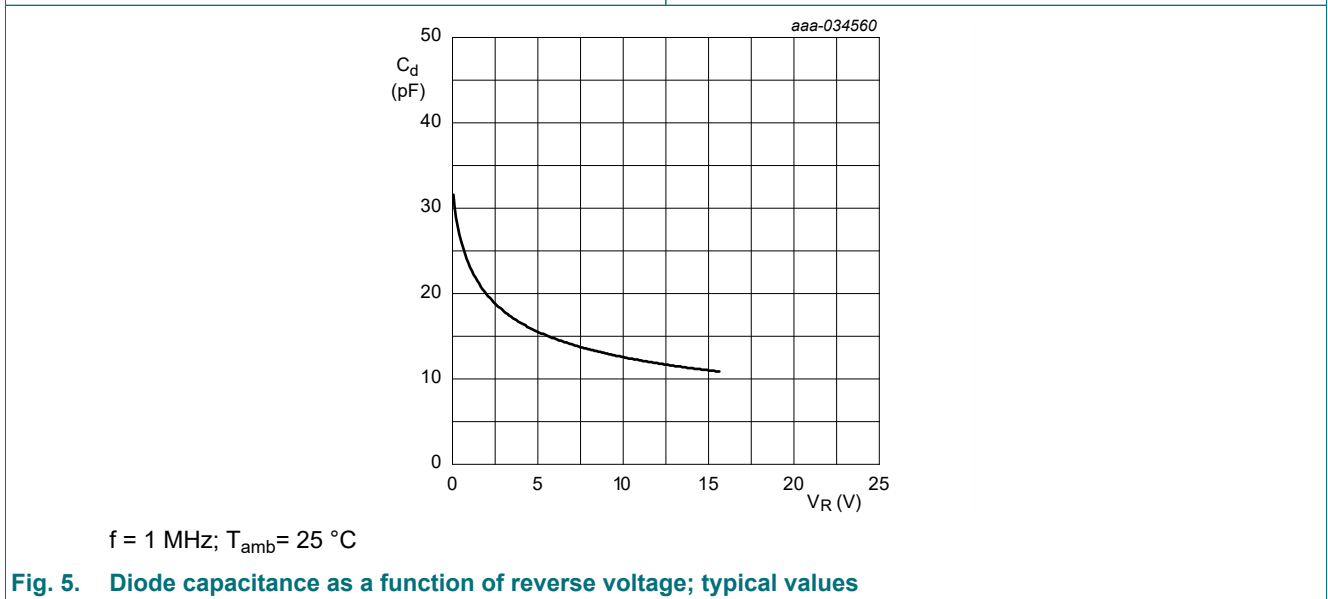


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

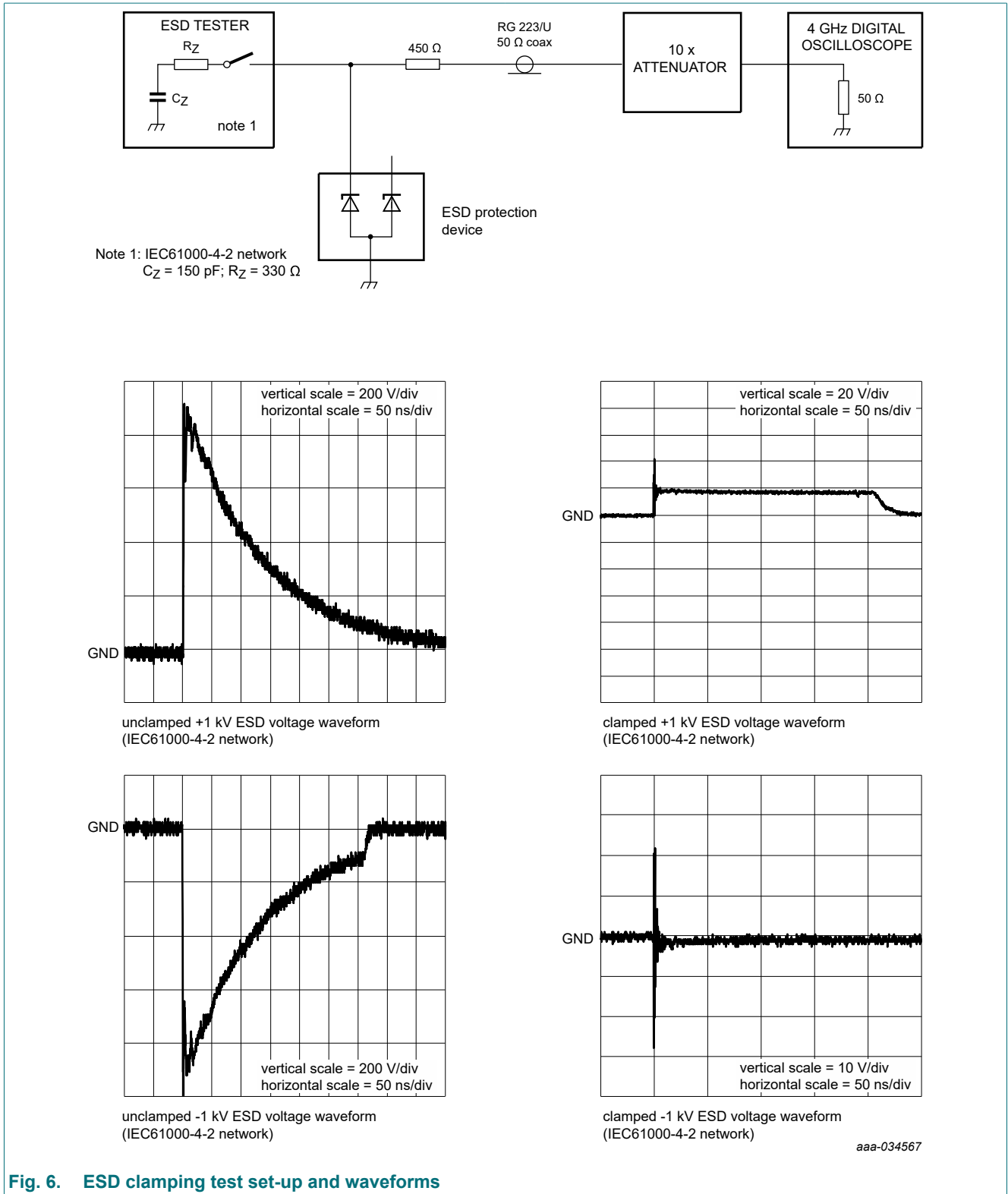


Fig. 6. ESD clamping test set-up and waveforms

## 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.

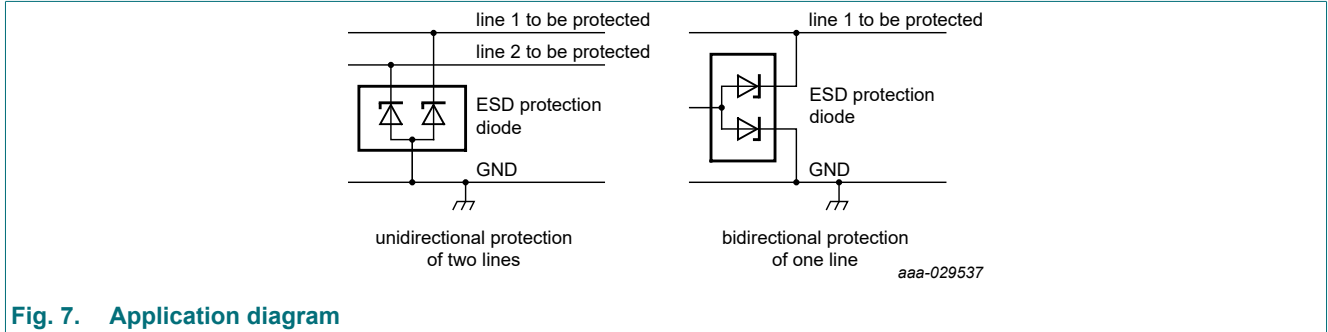


Fig. 7. Application diagram

### 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. 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

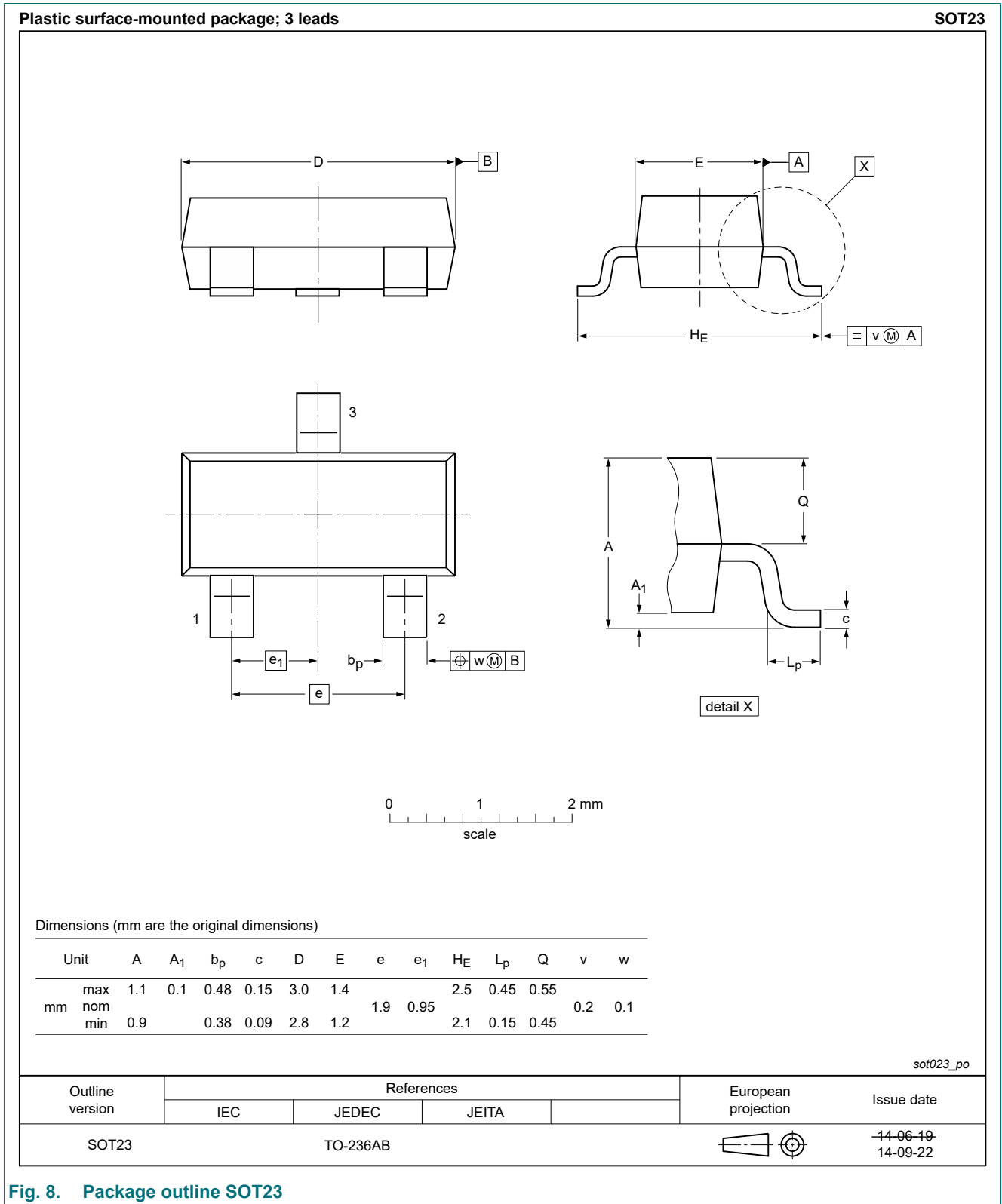


Fig. 8. Package outline SOT23

### 13. Soldering

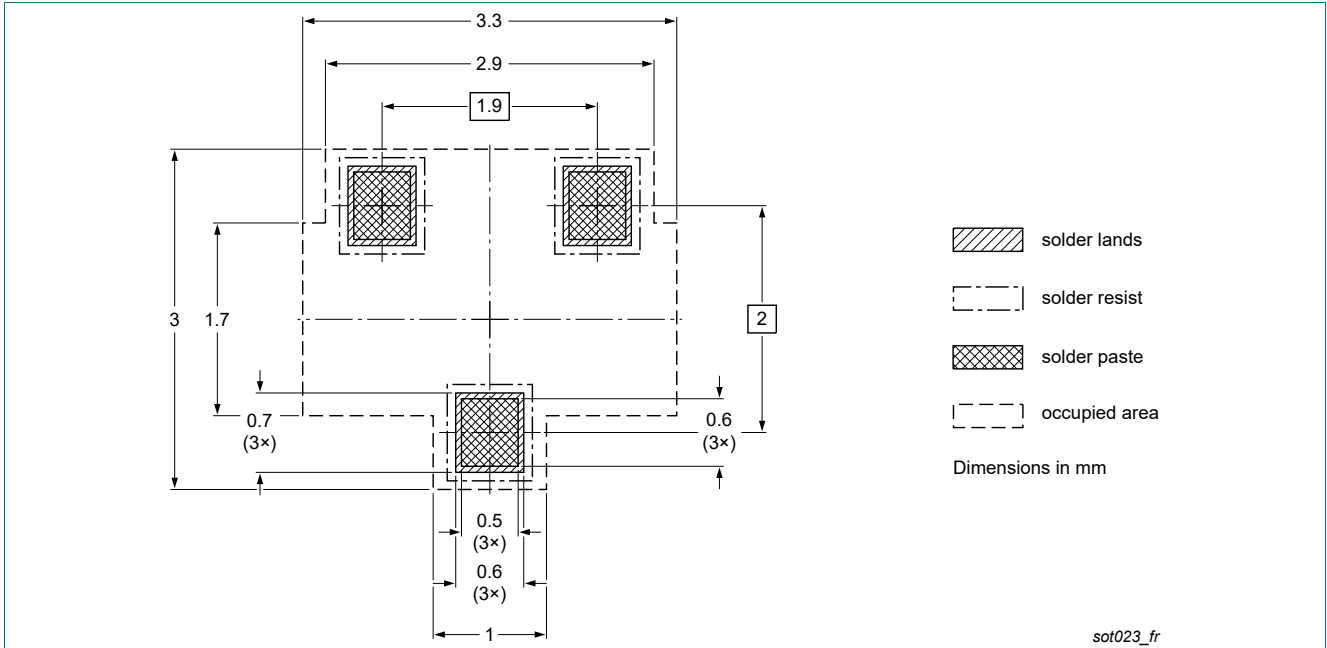


Fig. 9. Reflow soldering footprint for SOT23

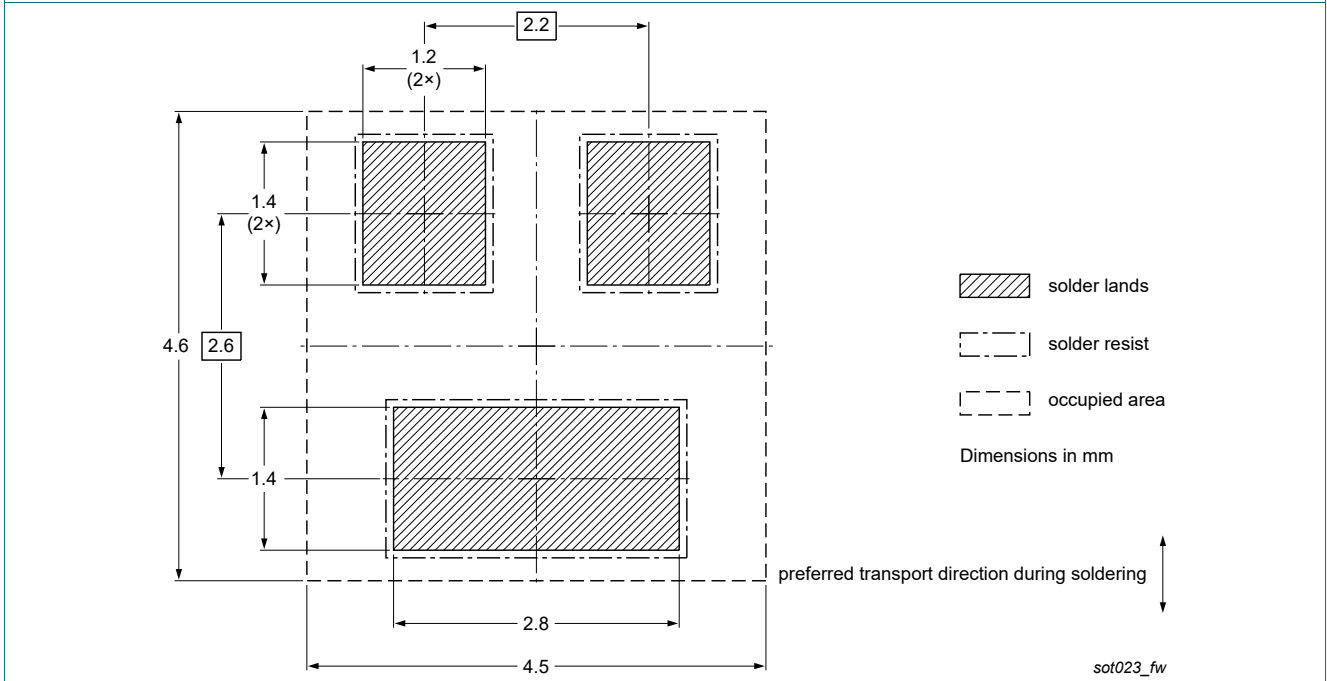


Fig. 10. Wave soldering footprint for SOT23



## 14. Revision history

Table 7. Revision history

| Data sheet ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PESD15VS2UT-Q v.1 | 20220610     | 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.                                     |

- [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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## Contents

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|                                  |    |
|----------------------------------|----|
| 1. General description.....      | 1  |
| 2. Features and benefits.....    | 1  |
| 3. Applications.....             | 1  |
| 4. Quick reference data.....     | 1  |
| 5. Pinning information.....      | 2  |
| 6. Ordering information.....     | 2  |
| 7. Marking.....                  | 2  |
| 8. Limiting values.....          | 3  |
| 9. Characteristics.....          | 4  |
| 10. Application information..... | 6  |
| 11. Test information.....        | 6  |
| 12. Package outline.....         | 7  |
| 13. Soldering.....               | 8  |
| 14. Revision history.....        | 9  |
| 15. Legal information.....       | 10 |

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