



PESD5V0L1UB-Q

Low capacitance unidirectional ESD protection diodes

10 June 2022

Product data sheet

1. General description

Low capacitance unidirectional ElectroStatic Discharge (ESD) protection diodes in small Surface-Mounted Device (SMD) plastic packages designed to protect one signal line from the damage caused by ESD and other transients.

2. Features and benefits

- Unidirectional ESD protection of one line
- Low diode capacitance: $C_d = 25$ pF
- Low clamping voltage: $V_{CL} = 12$ V
- Very low leakage current: $I_{RM} = 10$ nA
- ESD protection up to 26 kV
- IEC 61000-4-2; level 4 (ESD)
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Application information

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Subscriber Identity Module (SIM) card protection
- Portable electronics
- FireWire
- High-speed data lines


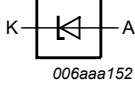
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|---|-----|-----|-----|------|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25$ °C | - | - | 5 | V |
| C_d | diode capacitance | $f = 1$ MHz; $V_R = 0$ V; $T_{amb} = 25$ °C | - | 25 | 30 | pF |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------------|---|---|
| 1 | K1 | cathode 1 ^[1] |  <p>SC-79 (SOD523)</p> |  |
| 2 | A | anode | | |

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------|---------|--|---------|
| | Name | Description | Version |
| PESD5V0L1UB-Q | SC-79 | plastic, surface-mounted package; 2 leads; 1.2 mm x 0.8 mm x 0.6 mm body | SOD523 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|---------------|--------------|
| PESD5V0L1UB-Q | Z8 |

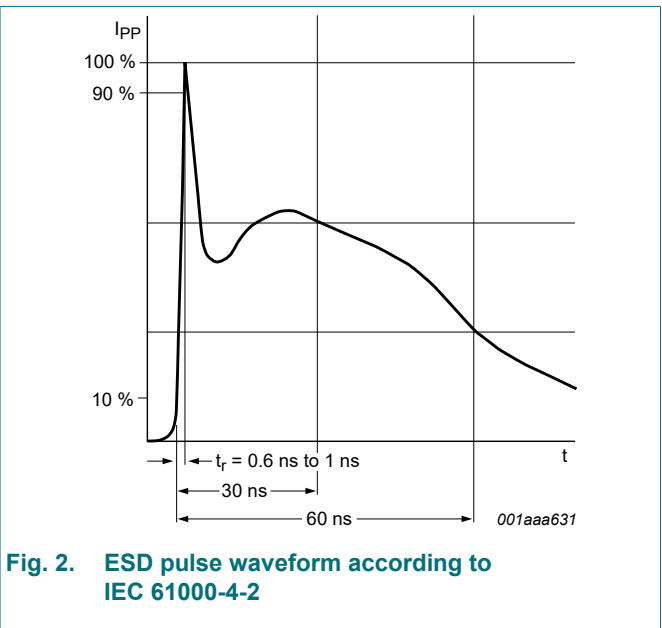
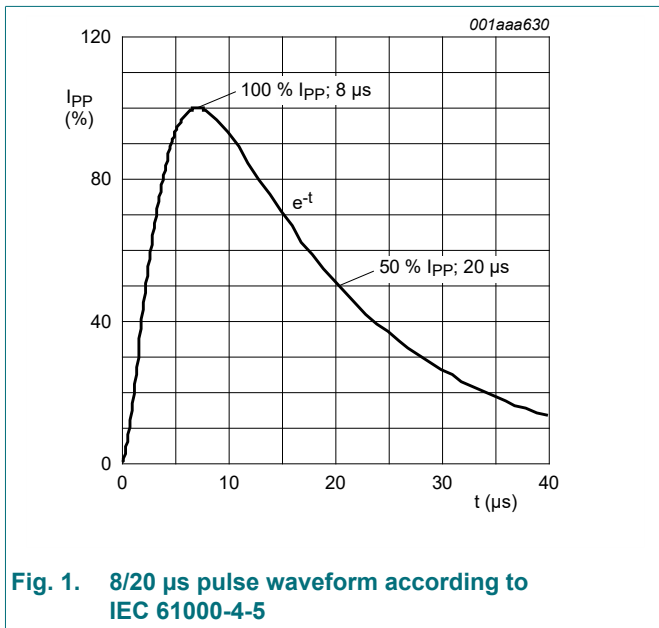
8. Limiting values

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] | - | 42 | W |
| I_{PPM} | rated peak pulse current | | [1] [2] | - | 3.5 | A |
| Per device | | | | | | |
| 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), $T_{amb} = 25 \text{ }^\circ\text{C}$ | [3] | - | 26 | kV |
| | | machine model, $T_{amb} = 25 \text{ }^\circ\text{C}$ | | - | 400 | V |
| | | MIL-STD-883 (human body model), $T_{amb} = 25 \text{ }^\circ\text{C}$ | | - | 10 | kV |

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

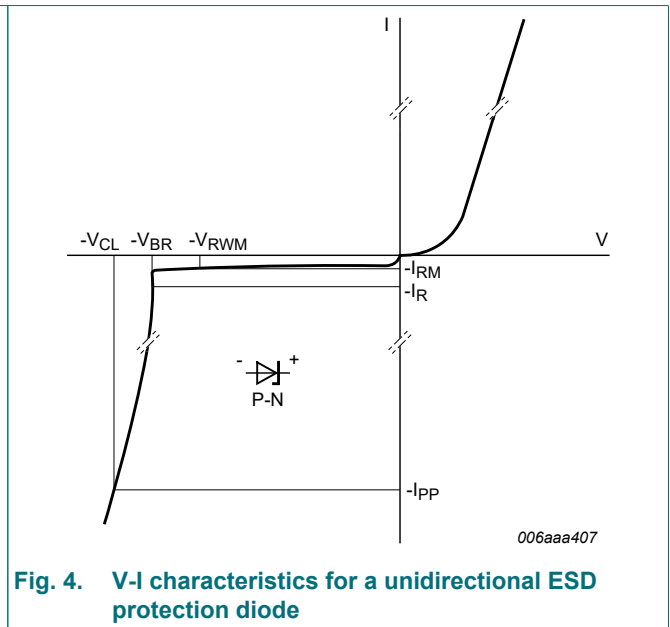
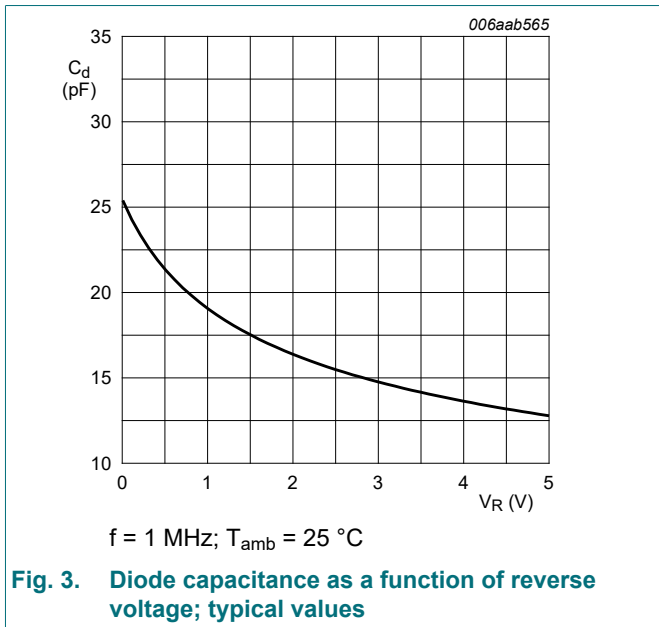


9. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------|--------------------------|--|---------|-----|-----|----------|
| V_F | forward voltage | $I_F = 200 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 1.2 | V |
| V_{RWM} | reverse standoff voltage | $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 5 | V |
| V_{BR} | breakdown voltage | $I_R = 5 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | 6.4 | 6.8 | 7.2 | V |
| I_{RM} | reverse leakage current | $V_{RWM} = 5 \text{ V}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | 10 | 100 | nA |
| C_d | diode capacitance | $f = 1 \text{ MHz}$; $V_R = 0 \text{ V}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | 25 | 30 | pF |
| V_{CL} | clamping voltage | $I_{PPM} = 1 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [1] [2] | - | 9 | V |
| | | $I_{PPM} = 3.5 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | [1] [2] | - | 12 | V |
| R_{diff} | differential resistance | $I_R = 5 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 30 | Ω |

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



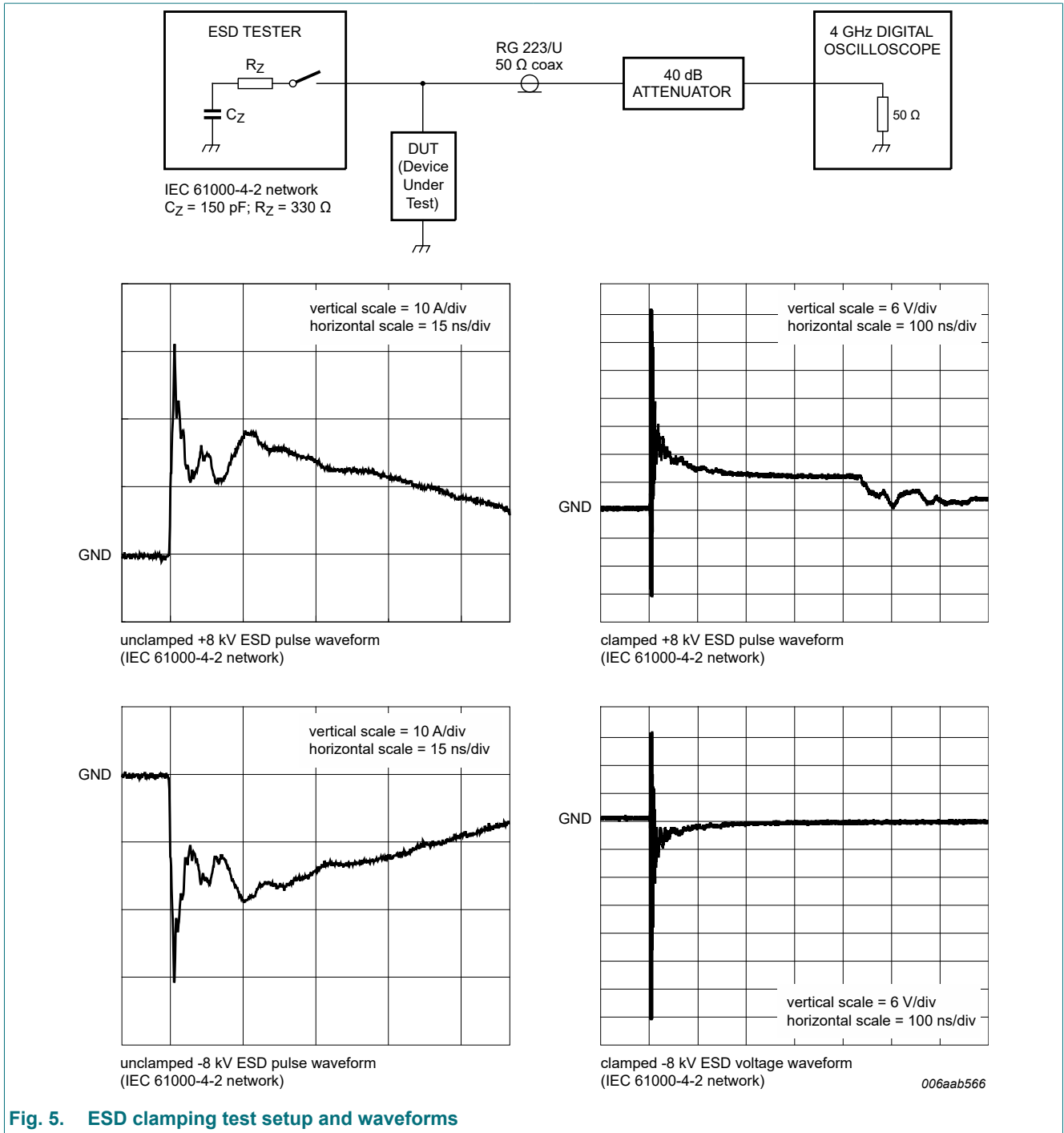


Fig. 5. ESD clamping test setup and waveforms

10. Application information

The device is designed for the protection of one unidirectional data or signal line from the damage caused by ESD and surge pulses. The device may be used on lines where the signal polarities are either positive or negative with respect to ground. The device provides a surge capability up to 42 W per line for an 8/20 μ s waveform.

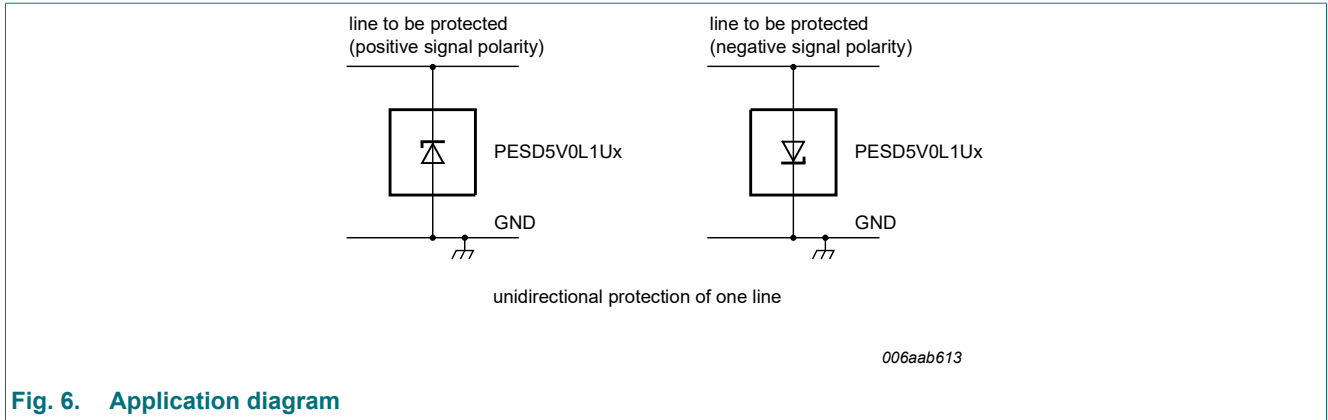


Fig. 6. Application diagram

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. The path length between the device and the protected line should be minimized.
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

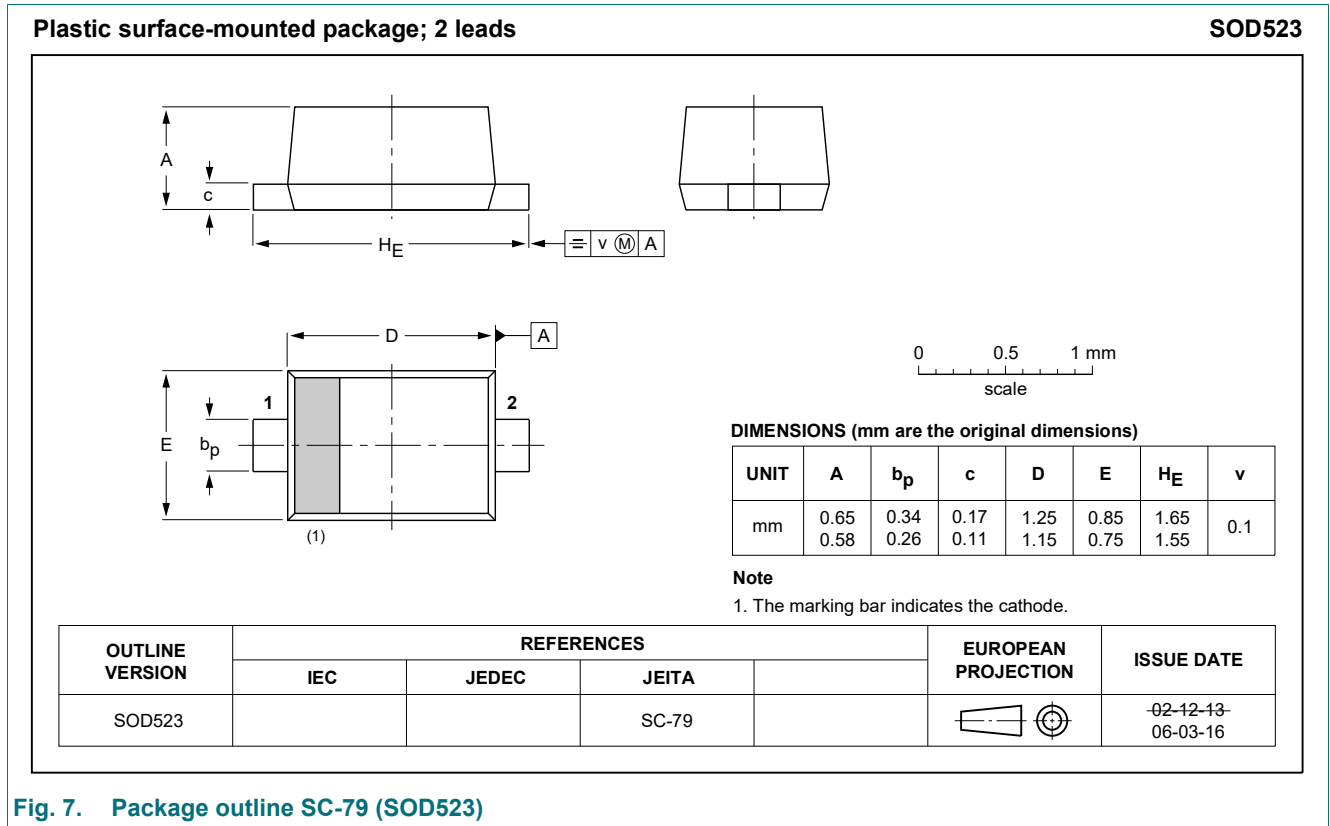


Fig. 7. Package outline SC-79 (SOD523)

13. Soldering

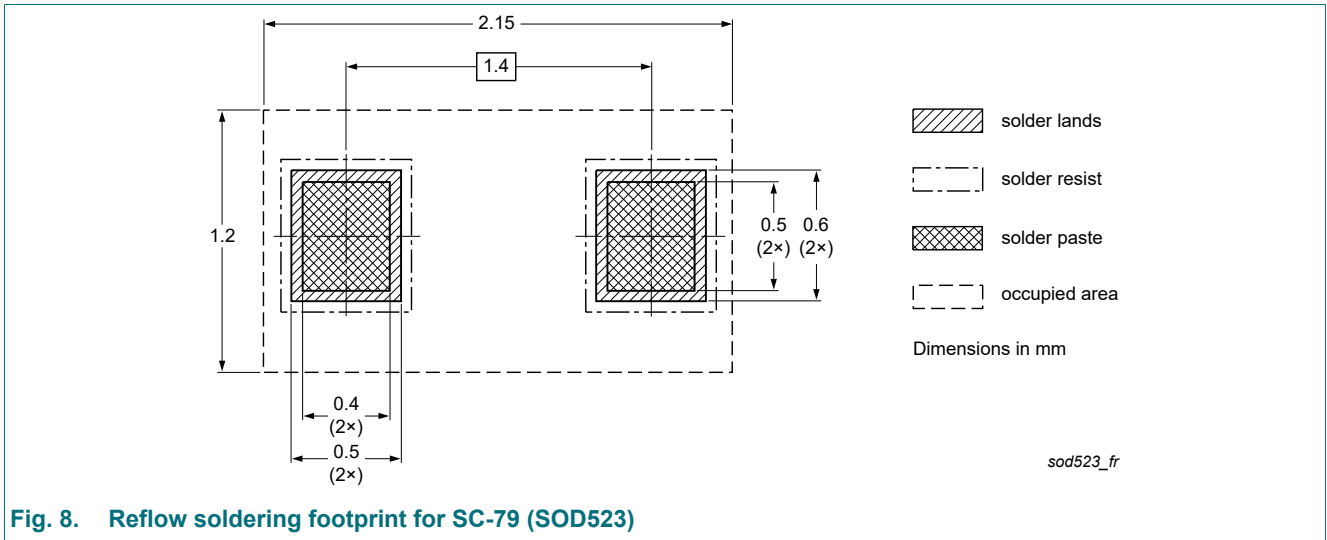


Fig. 8. Reflow soldering footprint for SC-79 (SOD523)

14. Revision history

Table 7. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PESD5V0L1UB-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. |

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

| | |
|----------------------------------|----|
| 1. General description..... | 1 |
| 2. Features and benefits..... | 1 |
| 3. Application information..... | 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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