



PESD24VS5UD-Q

Fivefold ESD protection diode array

3 July 2023

Product data sheet

1. General description

Fivefold ElectroStatic Discharge (ESD) protection diode array in a SOT457 (SC-74) small Surface-Mounted Device (SMD) plastic package, designed to protect up to five signal lines from the damage caused by ESD and other transients.

2. Features and benefits

- ESD protection of up to five lines
- Max peak pulse power: $P_{PPM} = 200 \text{ W}$
- Ultra low leakage current: $I_{RM} = 0.05 \text{ nA}$
- Low clamping voltage: $V_{CL} = 52 \text{ V}$ at $I_{PPM} = 4 \text{ A}$
- ESD protection up to 23 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PPM} = 4 \text{ A}$
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Portable electronics
- SIM card protection

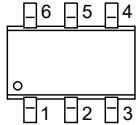
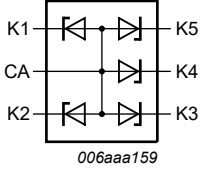
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|---|-----|-----|-----|------|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25 \text{ }^\circ\text{C}$ | - | - | 24 | V |
| C_d | diode capacitance | $f = 1 \text{ MHz}; V_R = 0 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$ | - | 45 | 70 | pF |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------|--|--|
| 1 | K1 | cathode 1 |  <p>SC-74; TSOP6 (SOT457)</p> |  <p>006aaa159</p> |
| 2 | CA | common anode | | |
| 3 | K2 | cathode 2 | | |
| 4 | K3 | cathode 3 | | |
| 5 | K4 | cathode 4 | | |
| 6 | K5 | cathode 5 | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------|--------------|--|---------|
| | Name | Description | Version |
| PESD24VS5UD-Q | SC-74; TSOP6 | plastic, surface-mounted package (SC-74; TSOP6); 6 leads | SOT457 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|---------------|--------------|
| PESD24VS5UD-Q | E5 |

8. Limiting values

Table 5. Limiting values

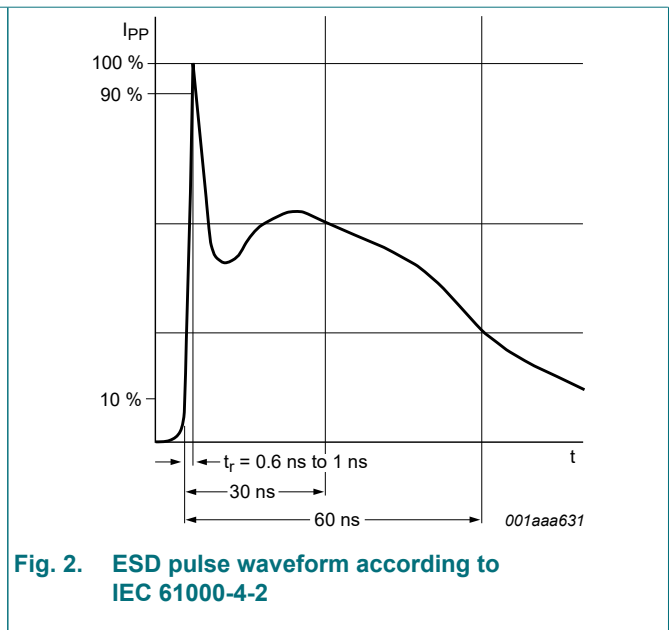
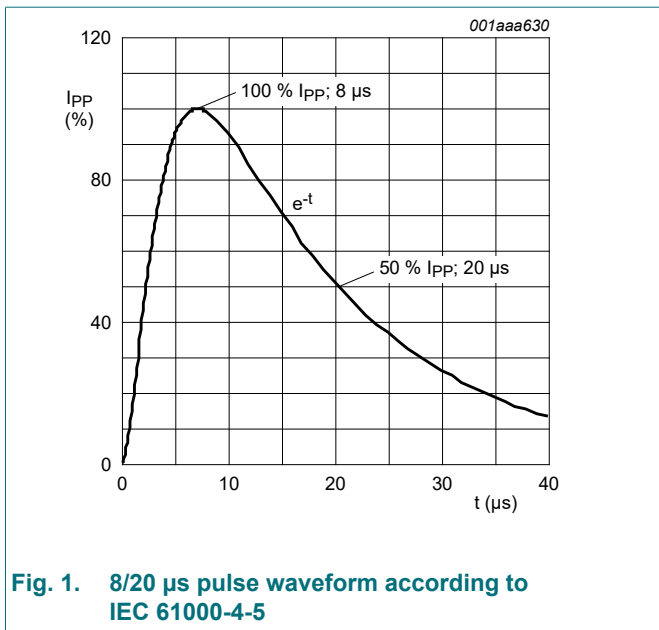
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|----------------------------|---------------------------------|-------------------------------------|---------|-----|-----|------|
| P_{PPM} | rated peak pulse power | $t_p = 8/20 \mu s$ | [1] [2] | - | 200 | W |
| I_{PPM} | rated peak pulse current | | [1] [2] | - | 4 | A |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -65 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |
| ESD maximum ratings | | | | | | |
| V_{ESD} | electrostatic discharge voltage | IEC 61000-4-2; contact discharge | [3] [2] | - | 23 | kV |
| | | IEC 61000-4-2; air discharge | | - | 15 | kV |
| | | MIL-STD-883; human body model (HBM) | | - | 10 | kV |

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

[2] Measured from pin 1,3,4,5 or 6 to pin 2.

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



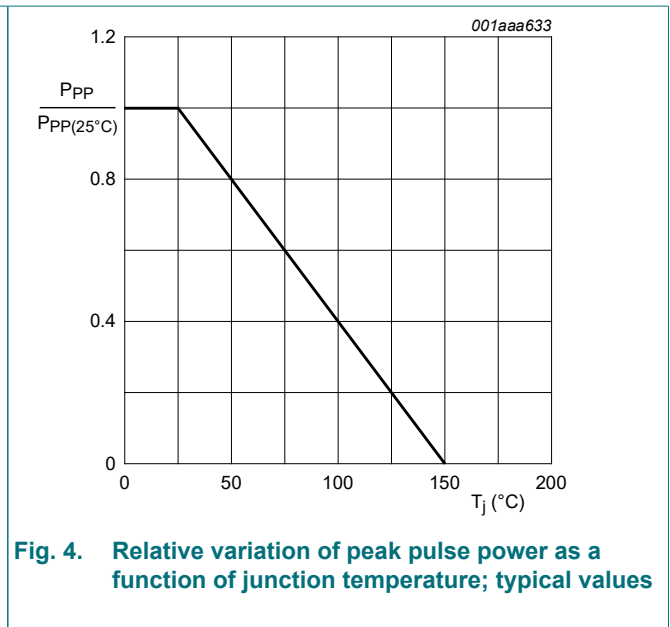
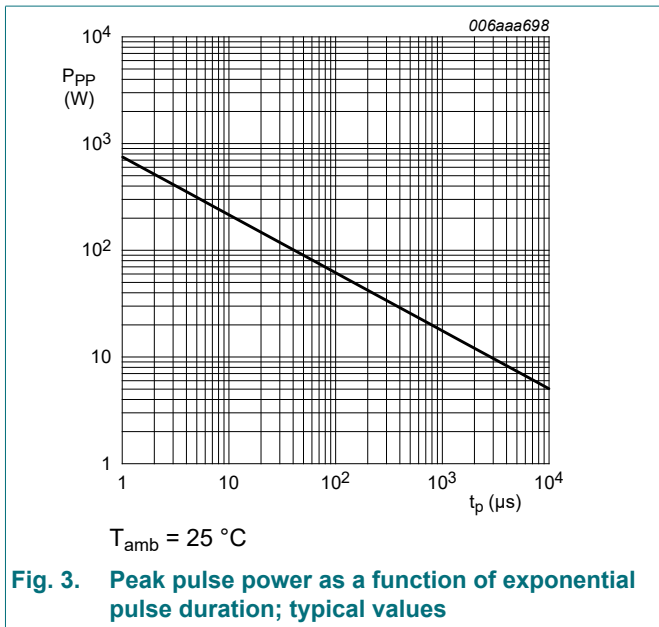
9. Characteristics

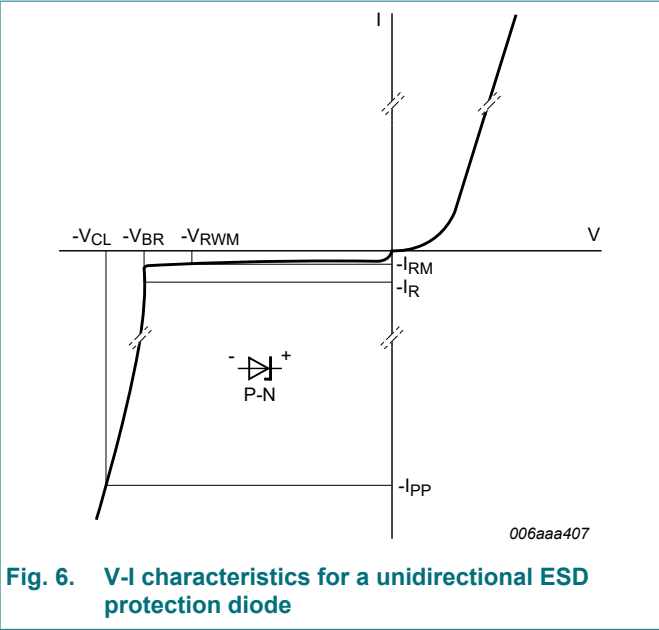
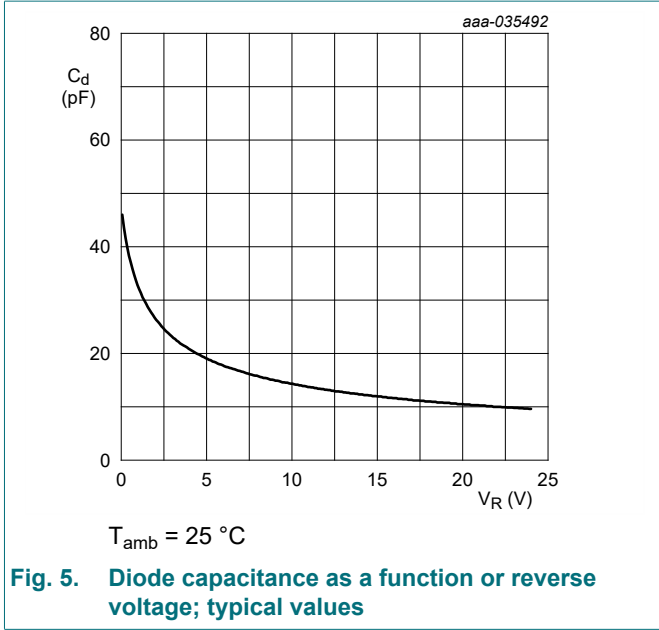
Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------|--------------------------|--|---------|------|-----|----------|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25\text{ °C}$ | - | - | 24 | V |
| V_{BR} | breakdown voltage | $I_R = 1\text{ mA}; T_{amb} = 25\text{ °C}$ | 25.5 | 27 | 29 | V |
| I_{RM} | reverse leakage current | $V_{RWM} = 24\text{ V}; T_{amb} = 25\text{ °C}$ | - | 0.05 | 15 | nA |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ °C}$ | - | 45 | 70 | pF |
| V_{CL} | clamping voltage | $I_{PP} = 1\text{ A}; T_{amb} = 25\text{ °C}$ | [1] [2] | - | 33 | V |
| | | $I_{PPM} = 4\text{ A}; T_{amb} = 25\text{ °C}$ | [1] [2] | - | 52 | V |
| R_{diff} | differential resistance | $I_R = 5\text{ mA}; T_{amb} = 25\text{ °C}$ | - | - | 25 | Ω |

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

[2] Measured from pin 1,3,4,5 or 6 to pin 2.





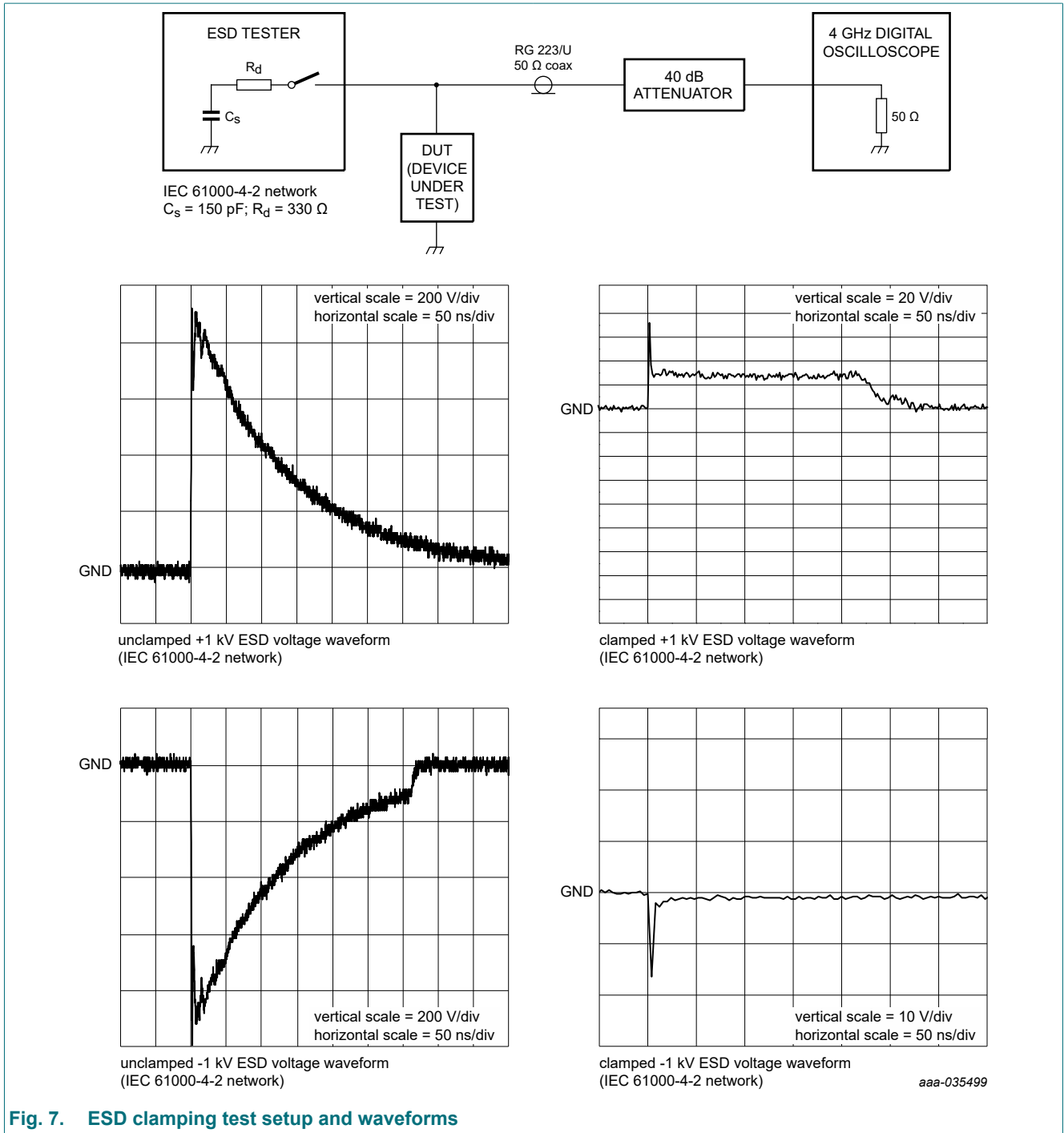


Fig. 7. ESD clamping test setup and waveforms

10. Application information

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

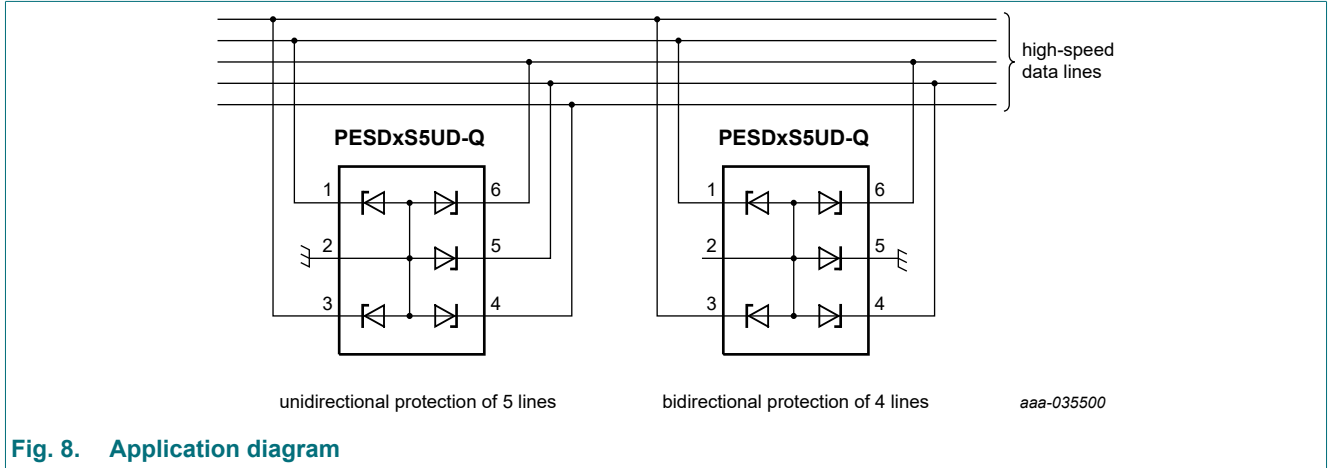


Fig. 8. Application diagram

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. 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

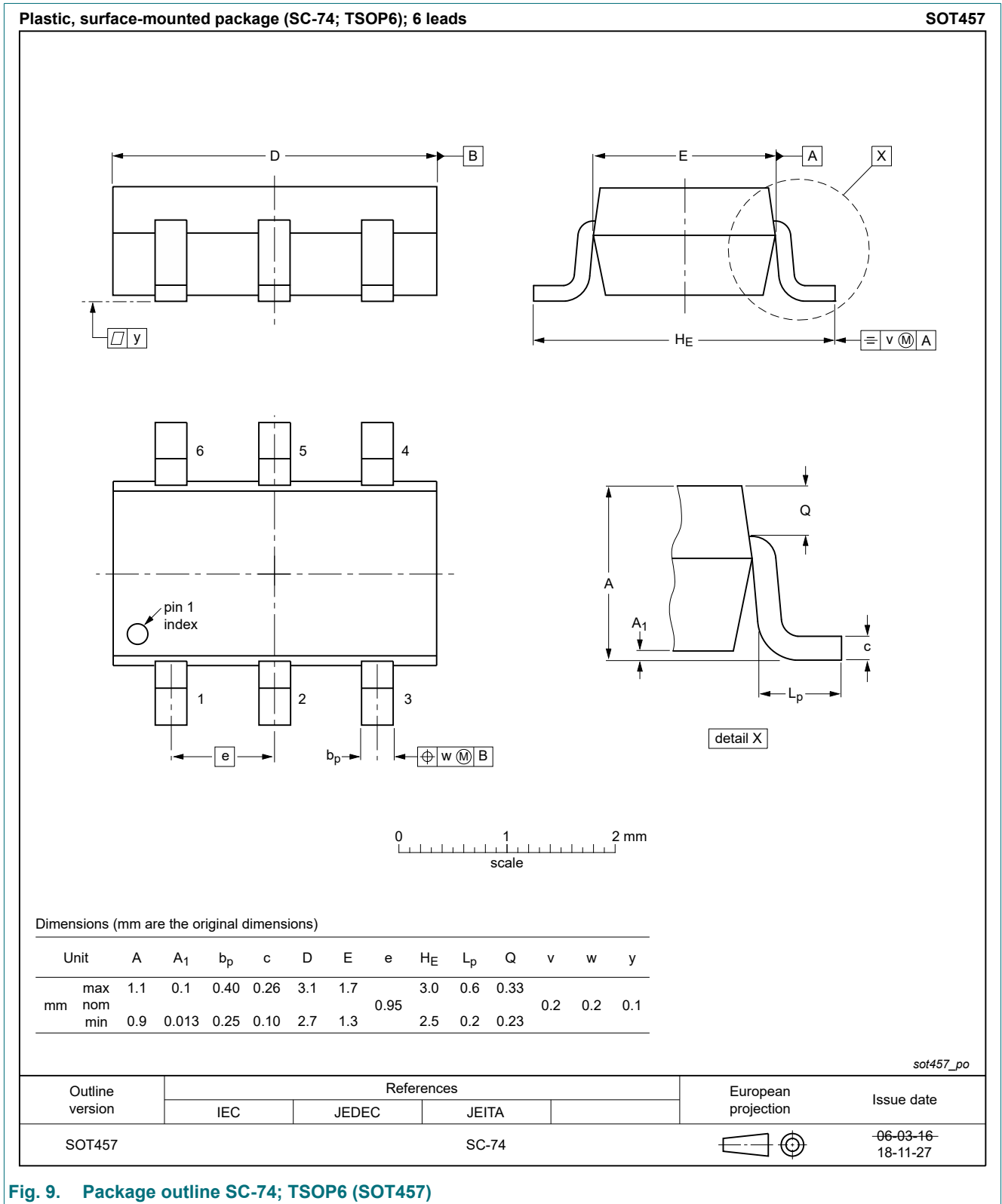


Fig. 9. Package outline SC-74; TSOP6 (SOT457)

13. Soldering

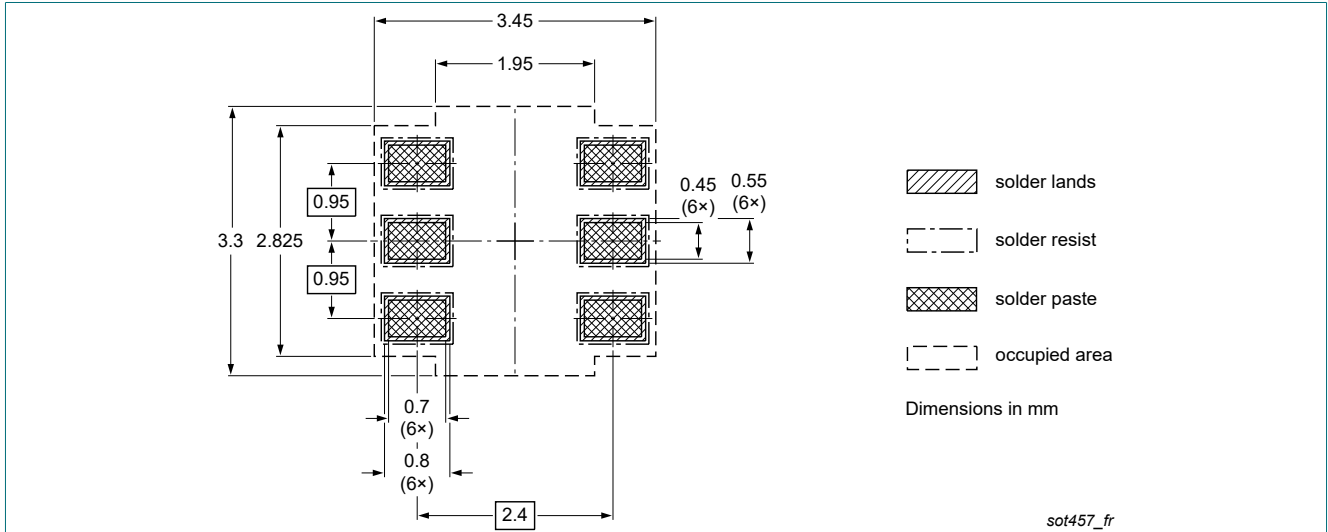


Fig. 10. Reflow soldering footprint for SC-74; TSOP6 (SOT457)

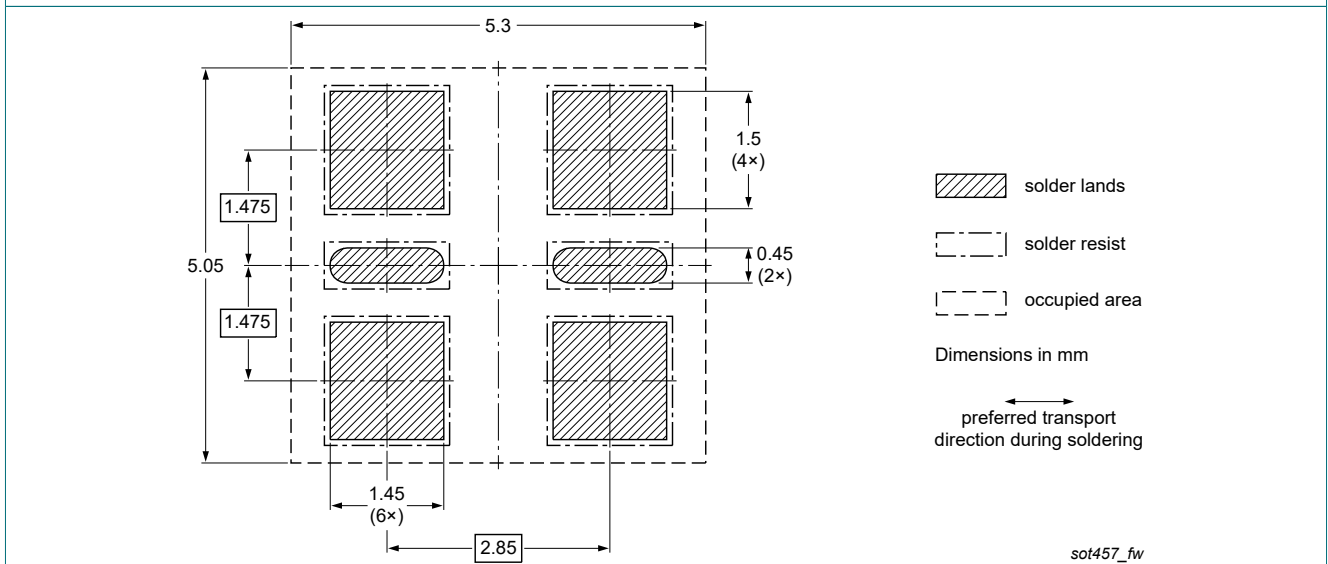


Fig. 11. Wave soldering footprint for SC-74; TSOP6 (SOT457)

14. Revision history

Table 7. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PESD24VS5UD-Q v.1 | 20230703 | 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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