



PESD3V3S4UF; PESD5V0S4UF

Unidirectional quadruple ESD protection diode arrays

Rev. 01 — 17 January 2008

Product data sheet

1. Product profile

1.1 General description

Unidirectional quadruple ElectroStatic Discharge (ESD) protection diode arrays in a small SOT886 Surface-Mounted Device (SMD) plastic package designed to protect up to four signal lines from the damage caused by ESD and other transients.

1.2 Features

- ESD protection of up to four lines
- Max. peak pulse power: $P_{PP} = 110 \text{ W}$
- Low clamping voltage: $V_{CL} = 11 \text{ V}$
- Ultra low leakage current: $I_{RM} = 4 \text{ nA}$
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 10 \text{ A}$
- AEC-Q101 qualified

1.3 Applications

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

1.4 Quick reference data

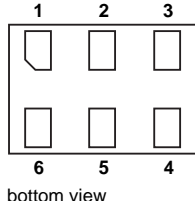
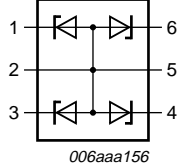
Table 1. Quick reference data

$T_{amb} = 25^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|--------------------------|--|-----|-----|-----|------|
| Per diode | | | | | | |
| V_{RWM} | reverse standoff voltage | | | | | |
| | PESD3V3S4UF | | - | - | 3.3 | V |
| | PESD5V0S4UF | | - | - | 5.0 | V |
| C_d | diode capacitance | $f = 1 \text{ MHz}; V_R = 0 \text{ V}$ | | | | |
| | PESD3V3S4UF | | - | 110 | 300 | pF |
| | PESD5V0S4UF | | - | 85 | 220 | pF |

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Symbol |
|-----|-------------------|--|---|
| 1 | cathode (diode 1) |  |  |
| 2 | common anode | | |
| 3 | cathode (diode 2) | | |
| 4 | cathode (diode 3) | | |
| 5 | common anode | | |
| 6 | cathode (diode 4) | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PESD3V3S4UF | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |
| PESD5V0S4UF | | | |

4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PESD3V3S4UF | A3 |
| PESD5V0S4UF | A4 |

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

5. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|--------------------|--------------------|----------|-----|------|
| Per diode | | | | | |
| P_{PP} | peak pulse power | $t_p = 8/20 \mu s$ | [1][2] - | 110 | W |
| I_{PP} | peak pulse current | $t_p = 8/20 \mu s$ | [1][2] - | 10 | A |

Table 5. Limiting values ...continued

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-------------------|----------------------|------------|-----|------|------|
| Per device | | | | | |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -55 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[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 or 6 to pin 2 or 5.

Table 6. ESD maximum ratings

$T_{amb} = 25^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|---------------------------------|-----------------------------------|--------|-----|-------|
| Per diode | | | | | |
| V_{ESD} | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | [1][2] | - | 30 kV |
| | | MIL-STD-883 (human body model) | - | 10 | kV |

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

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

Table 7. ESD standards compliance

| Standard | Conditions |
|---|---------------------------------|
| Per diode | |
| IEC 61000-4-2; level 4 (ESD) | > 15 kV (air); > 8 kV (contact) |
| MIL-STD-883; class 3 (human body model) | > 4 kV |

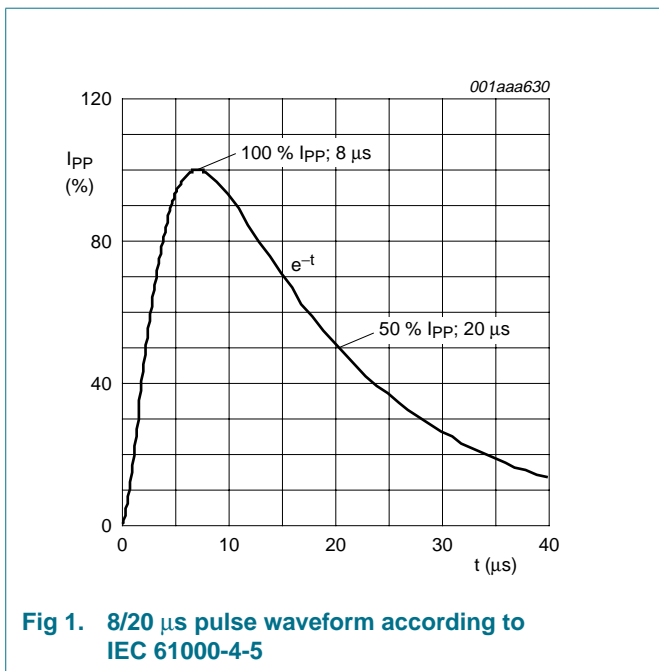


Fig 1. 8/20 μ s pulse waveform according to IEC 61000-4-5

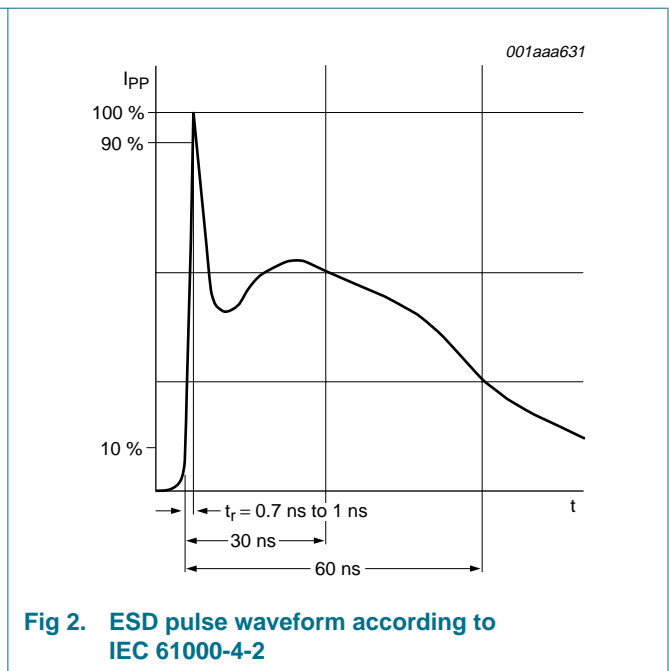


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

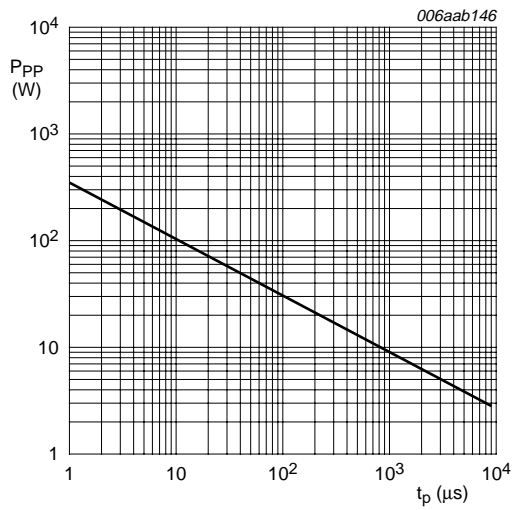
Table 8. Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|--------------------------|--------------------------------------|------|-----|------|------------------------|
| Per diode | | | | | | |
| V_{RWM} | reverse standoff voltage | | | | | |
| | PESD3V3S4UF | | - | - | 3.3 | V |
| | PESD5V0S4UF | | - | - | 5.0 | V |
| I_R | reverse current | | | | | |
| | PESD3V3S4UF | $V_R = 3.0\text{ V}$ | - | 100 | 1000 | nA |
| | PESD5V0S4UF | $V_R = 4.3\text{ V}$ | - | 4 | 100 | nA |
| V_{BR} | breakdown voltage | $I_R = 1\text{ mA}$ | | | | |
| | PESD3V3S4UF | | 5.32 | 5.6 | 5.88 | V |
| | PESD5V0S4UF | | 6.46 | 6.8 | 7.14 | V |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 0\text{ V}$ | | | | |
| | PESD3V3S4UF | | - | 110 | 300 | pF |
| | PESD5V0S4UF | | - | 85 | 220 | pF |
| V_{CL} | clamping voltage | | | | | [1][2] |
| | PESD3V3S4UF | $I_{PP} = 1\text{ A}$ | - | - | 8 | V |
| | | $I_{PP} = 10\text{ A}$ | - | - | 11 | V |
| | PESD5V0S4UF | $I_{PP} = 1\text{ A}$ | - | - | 8 | V |
| | | $I_{PP} = 10\text{ A}$ | - | - | 12 | V |
| r_{dif} | differential resistance | $I_R = 1\text{ mA}$ | | | | |
| | PESD3V3S4UF | | - | - | 400 | Ω |
| | PESD5V0S4UF | | - | - | 200 | Ω |

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

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



$T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig 3. Peak pulse power as a function of exponential pulse duration; typical values

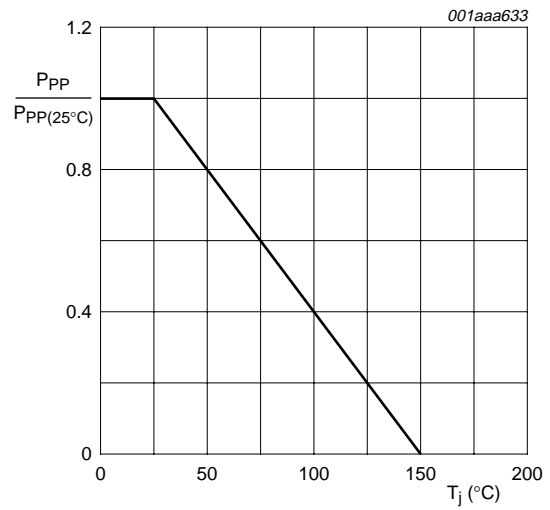
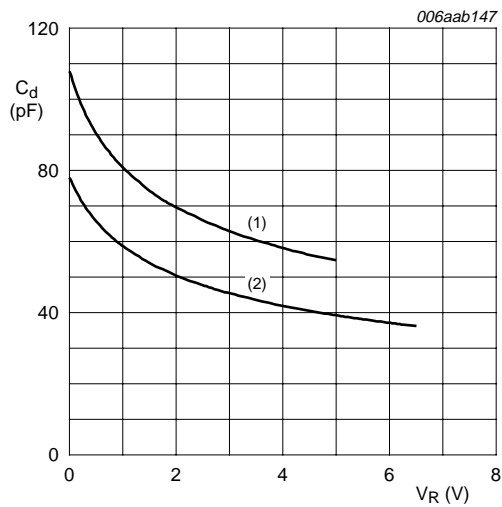


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values



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

- (1) PESD3V3S4UF
- (2) PESD5V0S4UF

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

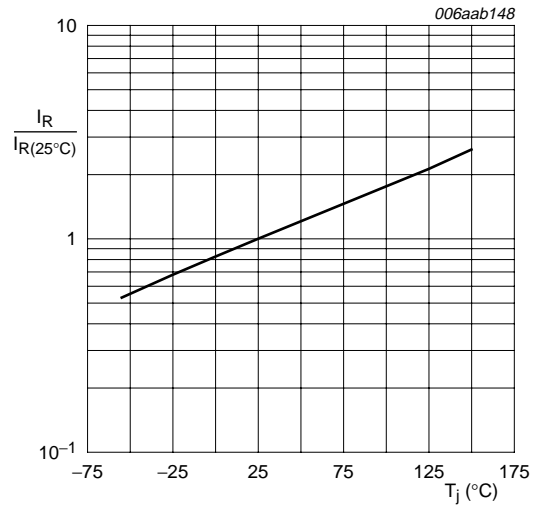


Fig 6. Relative variation of reverse current as a function of junction temperature; typical values

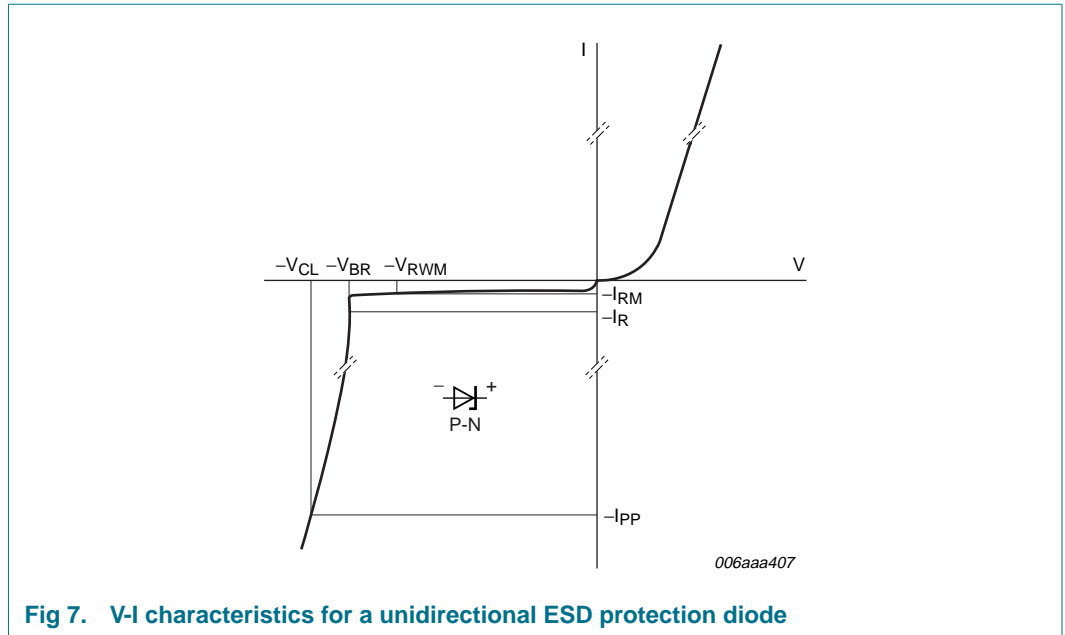
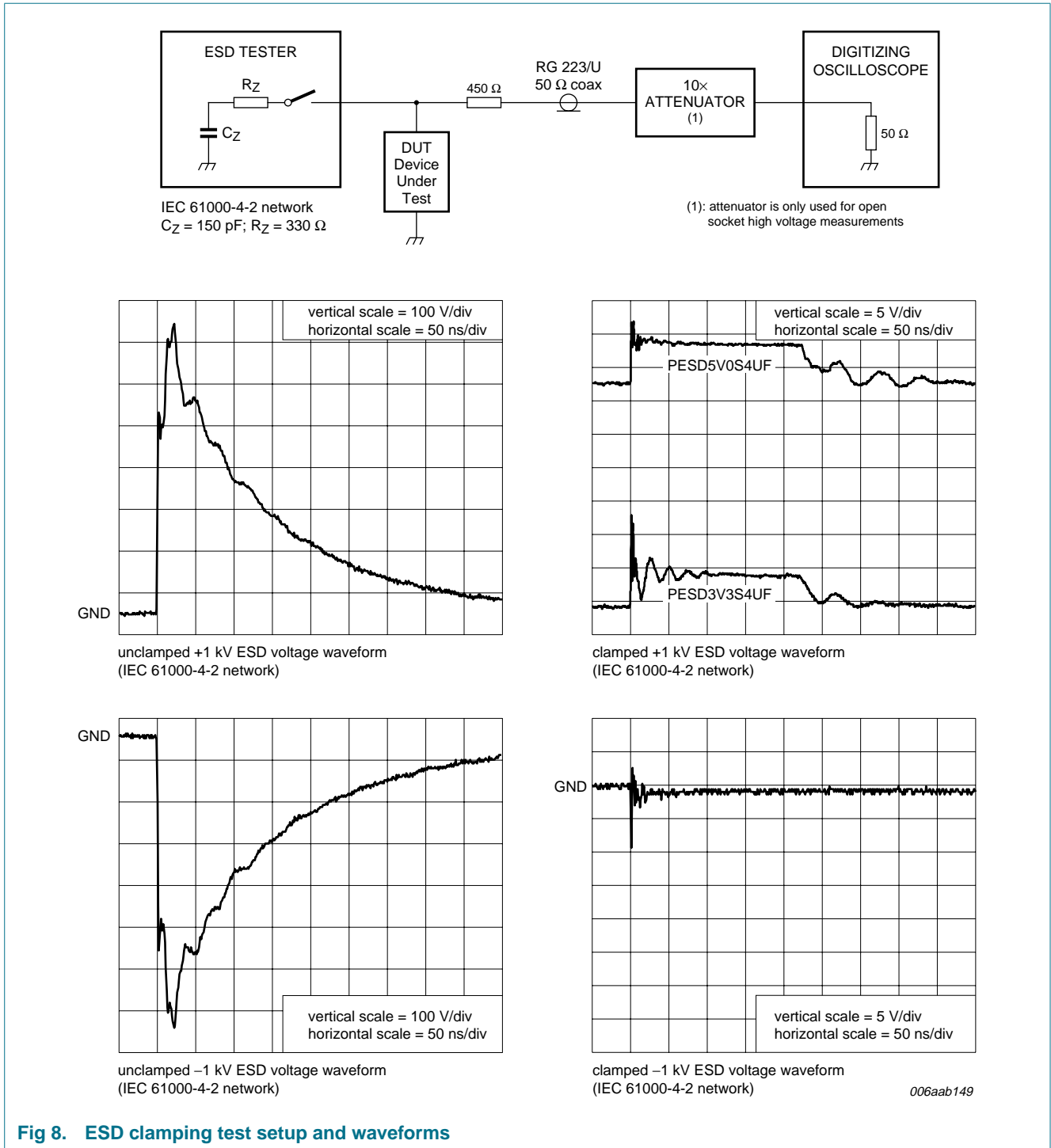


Fig 7. V-I characteristics for a unidirectional ESD protection diode



7. Application information

The PESDxS4UF is designed for the protection of up to four unidirectional data or signal lines from the damage caused by ESD and surge pulses. The PESDxS4UF may be used on lines where the signal polarities are either positive or negative with respect to ground. The PESDxS4UF provides a surge capability of 110 W per line for an 8/20 μ s waveform each.

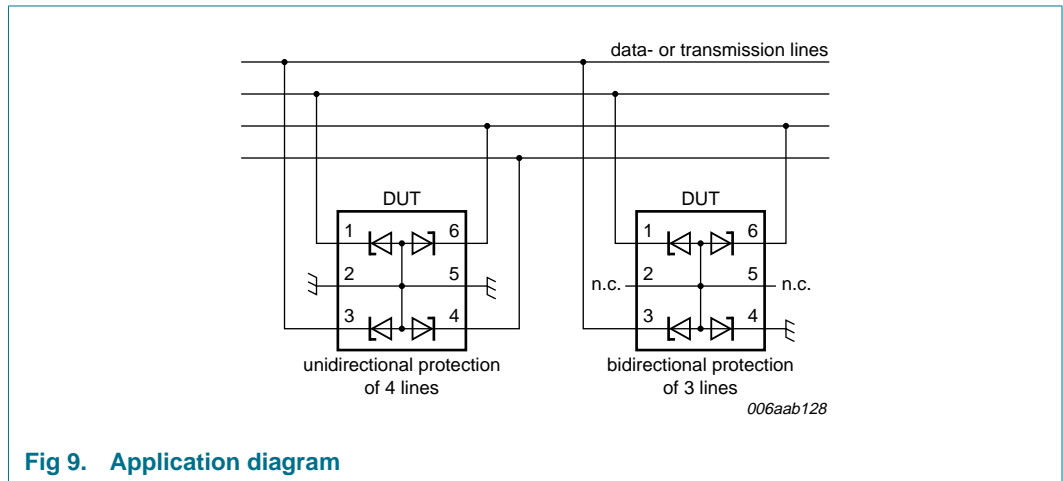


Fig 9. Application diagram

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 PESDxS4UF 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. Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

8. Package outline

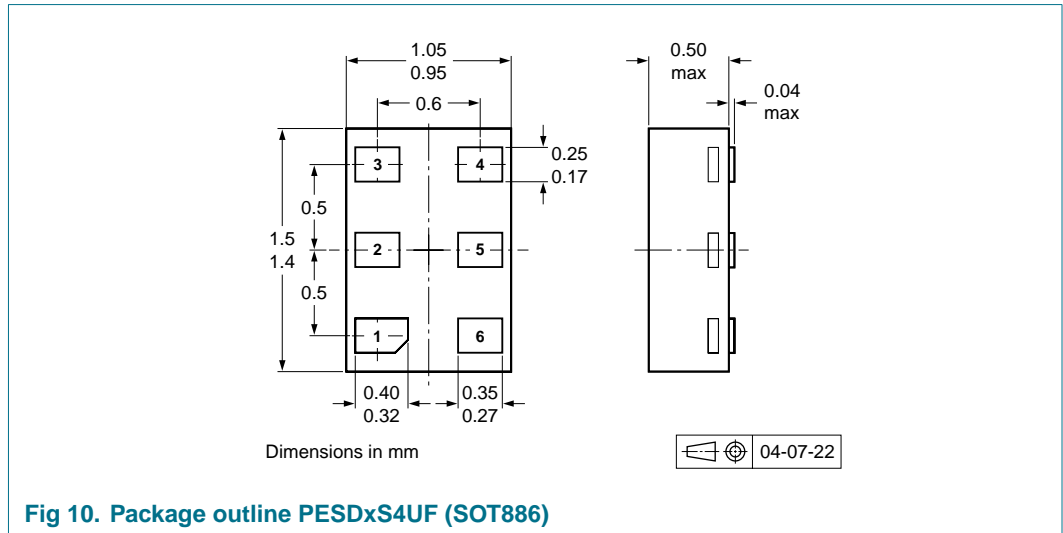


Fig 10. Package outline PESDxS4UF (SOT886)

9. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

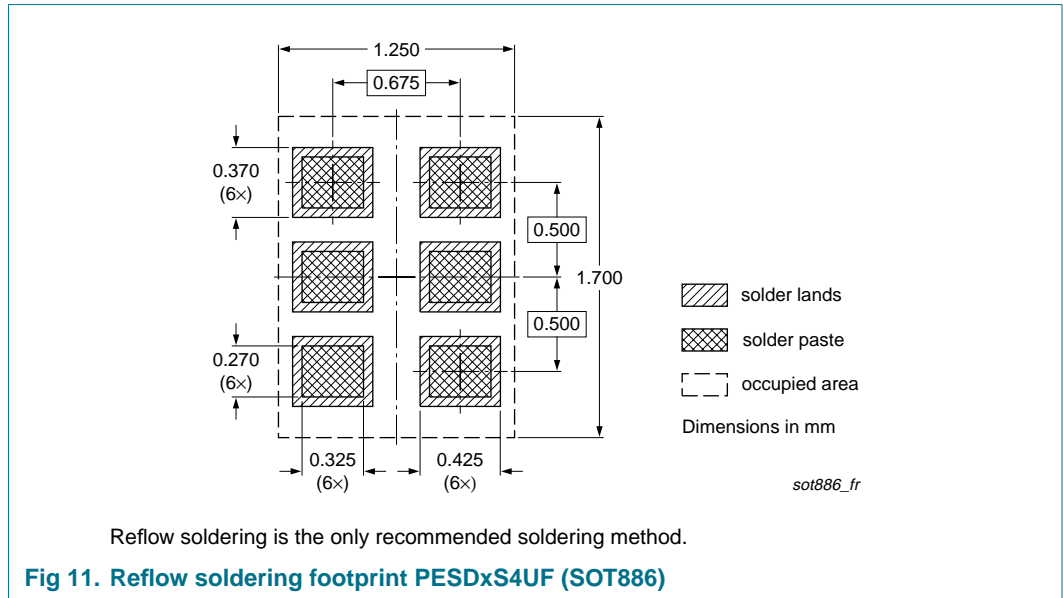
| Type number | Package | Description | Packing quantity | |
|-------------|---------|------------------------------------|------------------|------|
| | | | | 5000 |
| PESD3V3S4UF | SOT886 | 4 mm pitch, 8 mm tape and reel; T1 | [2] | -115 |
| | | 4 mm pitch, 8 mm tape and reel; T4 | [3] | -132 |
| PESD5V0S4UF | SOT886 | 4 mm pitch, 8 mm tape and reel; T1 | [2] | -115 |
| | | 4 mm pitch, 8 mm tape and reel; T4 | [3] | -132 |

[1] For further information and the availability of packing methods, see [Section 13](#).

[2] T1: normal taping

[3] T4: 90° rotated reverse taping

10. Soldering



11. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------------------|--------------|--------------------|---------------|------------|
| PESD3V3S4UF_PESD5V0S4UF_1 | 20080117 | Product data sheet | - | - |

12. Legal information

12.1 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. |
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| 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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