



THE DATASHEET OF PESD3V3V4UG,115



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Team Nexperia

PESDxV4UF; PESDxV4UG; PESDxV4UW

Very low capacitance unidirectional quadruple ESD protection diode arrays

Rev. 03 — 28 January 2008

Product data sheet

1. Product profile

1.1 General description

Very low capacitance unidirectional quadruple ElectroStatic Discharge (ESD) protection diode arrays in small Surface-Mounted Device (SMD) plastic packages designed to protect up to four signal lines from the damage caused by ESD and other transients.

Table 1. Product overview

| Type number | Package | | | Package configuration |
|-------------|---------|--------|--------|---------------------------|
| | NXP | JEITA | JEDEC | |
| PESD3V3V4UF | SOT886 | - | MO-252 | leadless ultra small |
| PESD5V0V4UF | SOT886 | - | MO-252 | leadless ultra small |
| PESD3V3V4UG | SOT353 | SC-88A | - | very small |
| PESD5V0V4UG | SOT353 | SC-88A | - | very small |
| PESD3V3V4UW | SOT665 | - | - | ultra small and flat lead |
| PESD5V0V4UW | SOT665 | - | - | ultra small and flat lead |

1.2 Features

- ESD protection of up to four lines
- Very low diode capacitance
- Max. peak pulse power: $P_{PP} = 16 \text{ W}$
- Low clamping voltage: $V_{CL} = 11 \text{ V}$
- Ultra low leakage current: $I_{RM} = 25 \text{ nA}$
- ESD protection up to 12 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 1.5 \text{ A}$

1.3 Applications

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

1.4 Quick reference data

Table 2. Quick reference data
T_{amb} = 25 °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---|---------------------------------|-----|-----|-----|------|
| Per diode | | | | | | |
| V _{RWM} | reverse standoff voltage | | | | | |
| | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | | - | - | 3.3 | V |
| | PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | | - | - | 5.0 | V |
| C _d | diode capacitance | f = 1 MHz; V _R = 0 V | | | | |
| | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | | - | 15 | 18 | pF |
| | PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | | - | 12 | 15 | pF |

2. Pinning information

Table 3. Pinning

| Pin | Description | Simplified outline | Symbol |
|---------------------------------|-------------------|--------------------|------------------|
| PESD3V3V4UF; PESD5V0V4UF | | | |
| 1 | cathode (diode 1) | <p>bottom view</p> | <p>006aaa156</p> |
| 2 | common anode | | |
| 3 | cathode (diode 2) | | |
| 4 | cathode (diode 3) | | |
| 5 | common anode | | |
| 6 | cathode (diode 4) | | |
| PESD3V3V4UG; PESD5V0V4UG | | | |
| 1 | cathode (diode 1) | | <p>006aaa157</p> |
| 2 | common anode | | |
| 3 | cathode (diode 2) | | |
| 4 | cathode (diode 3) | | |
| 5 | cathode (diode 4) | | |
| PESD3V3V4UW; PESD5V0V4UW | | | |
| 1 | cathode (diode 1) | | <p>006aaa157</p> |
| 2 | common anode | | |
| 3 | cathode (diode 2) | | |
| 4 | cathode (diode 3) | | |
| 5 | cathode (diode 4) | | |

3. Ordering information

Table 4. Ordering information

| Type number | Package | | Version |
|----------------------------|---------|--|---------|
| | Name | Description | |
| PESD3V3V4UF PESD5V0V4UF | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |
| PESD3V3V4UG PESD5V0V4UG | SC-88A | plastic surface-mounted package; 5 leads | SOT353 |
| PESD3V3V4UW PESD5V0V4UW | - | plastic surface-mounted package; 5 leads | SOT665 |

4. Marking

Table 5. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PESD3V3V4UF | A7 |
| PESD5V0V4UF | A8 |
| PESD3V3V4UG | V1* |
| PESD5V0V4UG | V2* |
| PESD3V3V4UW | W1 |
| PESD5V0V4UW | W2 |

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

5. Limiting values

Table 6. 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][3] - | 16 | W |
| I_{PP} | peak pulse current | $t_p = 8/20 \mu s$ | [1][2][3] - | 1.5 | A |
| Per device | | | | | |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -65 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

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

[2] For PESDxV4UF measured from pin 1, 3, 4 or 6 to pin 2 or 5.

[3] For PESDxV4UG and PESDxV4UW measured from pin 1, 3, 4 or 5 to pin 2.

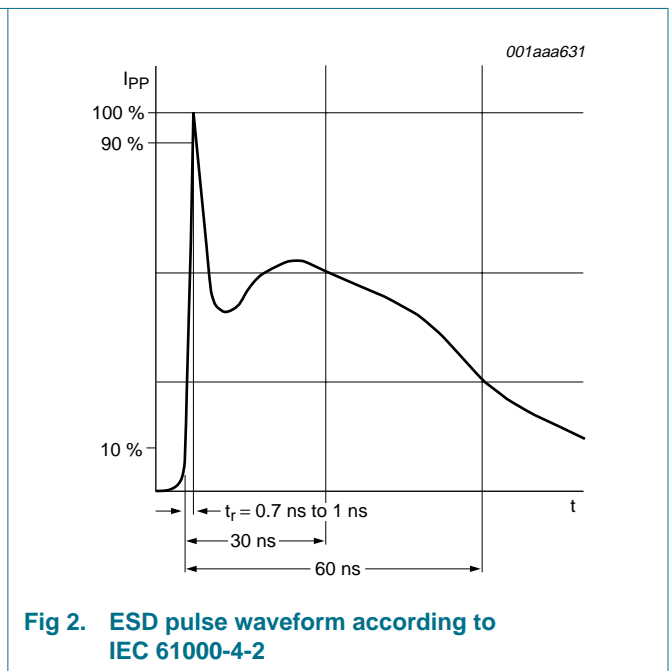
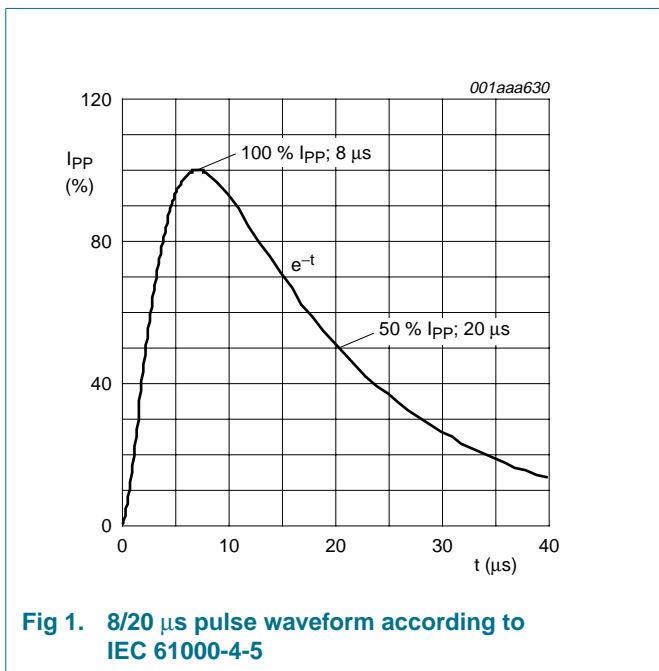
Table 7. ESD maximum ratings
T_{amb} = 25 °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|---------------------------------|-----------------------------------|-----------|-----|-------|
| Per diode | | | | | |
| V _{ESD} | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | [1][2][3] | - | 12 kV |
| | | MIL-STD-883 (human body model) | - | 10 | kV |

- [1] Device stressed with ten non-repetitive ESD pulses.
- [2] For PESDxV4UF measured from pin 1, 3, 4 or 6 to pin 2 or 5.
- [3] For PESDxV4UG and PESDxV4UW measured from pin 1, 3, 4 or 5 to pin 2.

Table 8. ESD standards compliance

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



6. Characteristics

Table 9. Characteristics

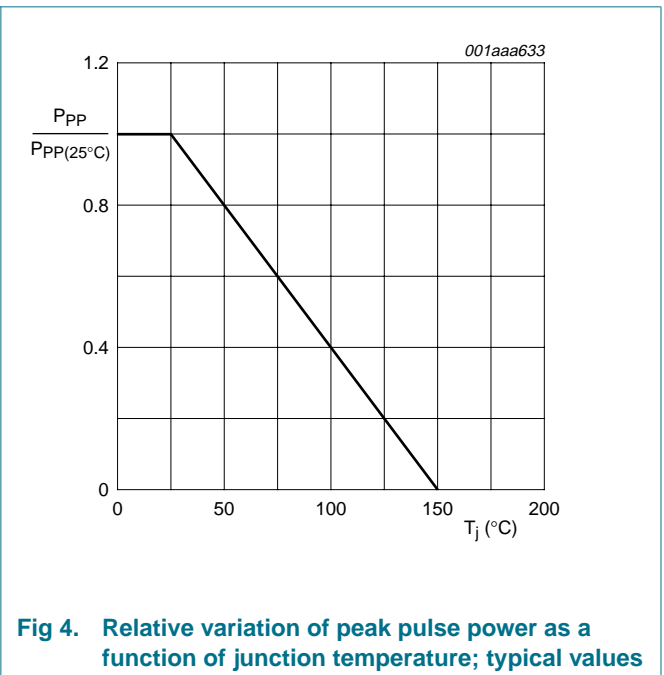
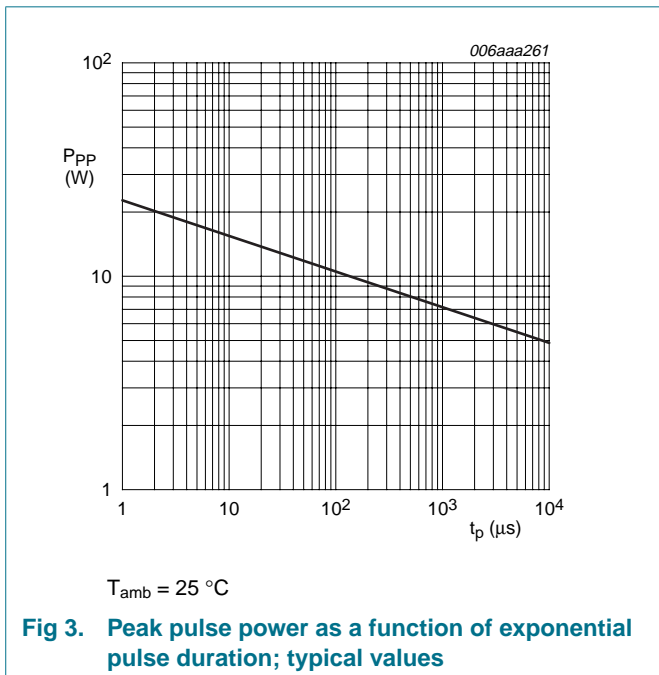
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

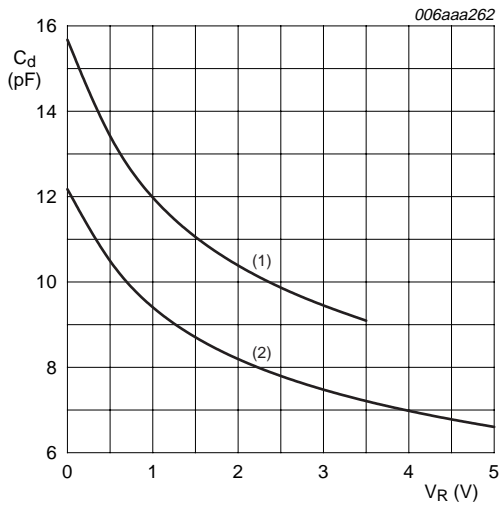
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|---|---|---|--------------------------|-----|-----|------|----|
| Per diode | | | | | | | |
| V_{RWM} | reverse standoff voltage | | | | | | |
| | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | | - | - | 3.3 | V | |
| | PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | | - | - | 5.0 | V | |
| | I_{RM} | reverse leakage current | | | | | |
| | | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | $V_{RWM} = 3.3\text{ V}$ | - | 40 | 300 | nA |
| | | PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | $V_{RWM} = 5.0\text{ V}$ | - | 3 | 25 | nA |
| V_{BR} | breakdown voltage | $I_R = 1\text{ mA}$ | | | | | |
| | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | | 5.3 | 5.6 | 5.9 | V | |
| | PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | | 6.4 | 6.8 | 7.2 | V | |
| | C_d | diode capacitance | $f = 1\text{ MHz}$ | | | | |
| | | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | $V_R = 0\text{ V}$ | - | 15 | 18 | pF |
| | | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | $V_R = 3.3\text{ V}$ | - | 9 | 12 | pF |
| PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | | $V_R = 0\text{ V}$ | - | 12 | 15 | pF | |
| PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | | $V_R = 5\text{ V}$ | - | 6 | 9 | pF | |

Table 9. Characteristics ...continued
 $T_{amb} = 25\text{ }^\circ\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|-------------------------|---|-----|-----|----------|
| V_{CL} | clamping voltage | | [1] [2] [3] | | | |
| | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | $I_{PP} = 1\text{ A}$ | - | - | 9 | V |
| | PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | $I_{PP} = 2\text{ A}$ | - | - | 11 | V |
| | PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | $I_{PP} = 1\text{ A}$ | - | - | 11 | V |
| | PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | $I_{PP} = 1.7\text{ A}$ | - | - | 13 | V |
| | r_{dif} | differential resistance | $I_R = 1\text{ mA}$ | | | |
| PESD3V3V4UF PESD3V3V4UG PESD3V3V4UW | | | - | - | 200 | Ω |
| PESD5V0V4UF PESD5V0V4UG PESD5V0V4UW | | | - | - | 100 | Ω |

- [1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.
- [2] For PESDxV4UF measured from pin 1, 3, 4 or 6 to pin 2 or 5.
- [3] For PESDxV4UG and PESDxV4UW measured from pin 1, 3, 4 or 5 to pin 2.





f = 1 MHz; T_{amb} = 25 °C

- (1) PESD3V3V4UF; PESD3V3V4UG; PESD3V3V4UW
- (2) PESD5V0V4UF; PESD5V0V4UG; PESD5V0V4UW

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

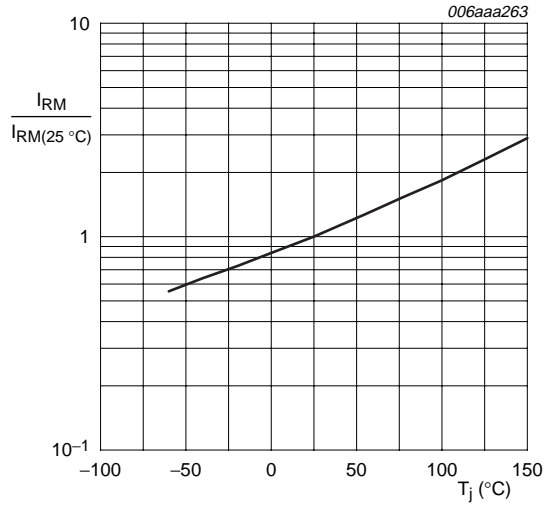


Fig 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

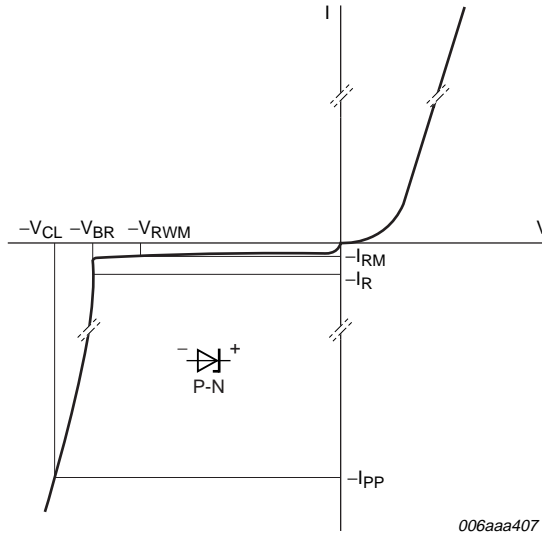


Fig 7. V-I characteristics for a unidirectional ESD protection diode

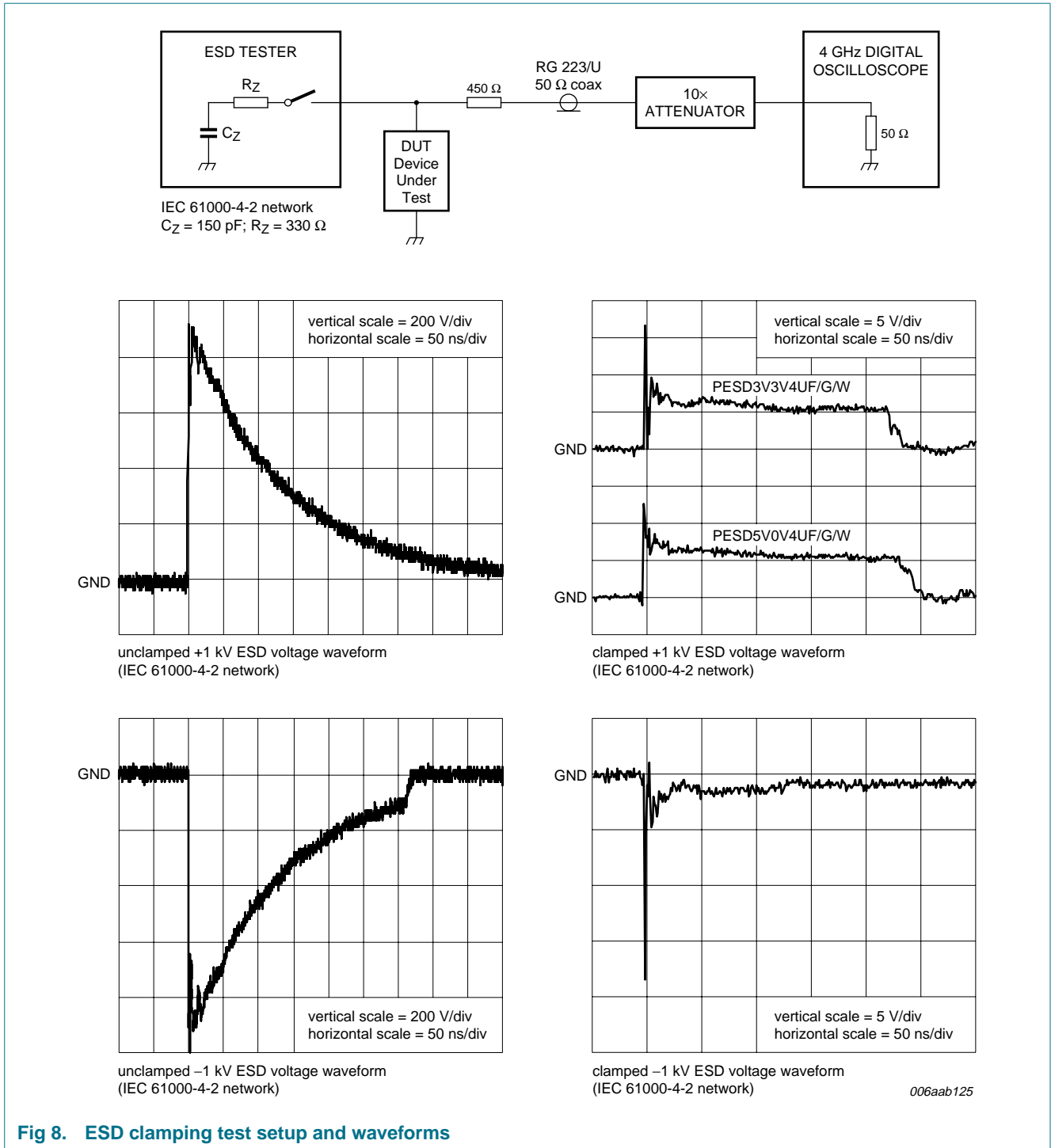


Fig 8. ESD clamping test setup and waveforms

7. Application information

The devices are designed for the protection of up to four 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 both, positive and negative with respect to ground. The devices provide a surge capability of 16 W per line for an 8/20 μ s waveform each.

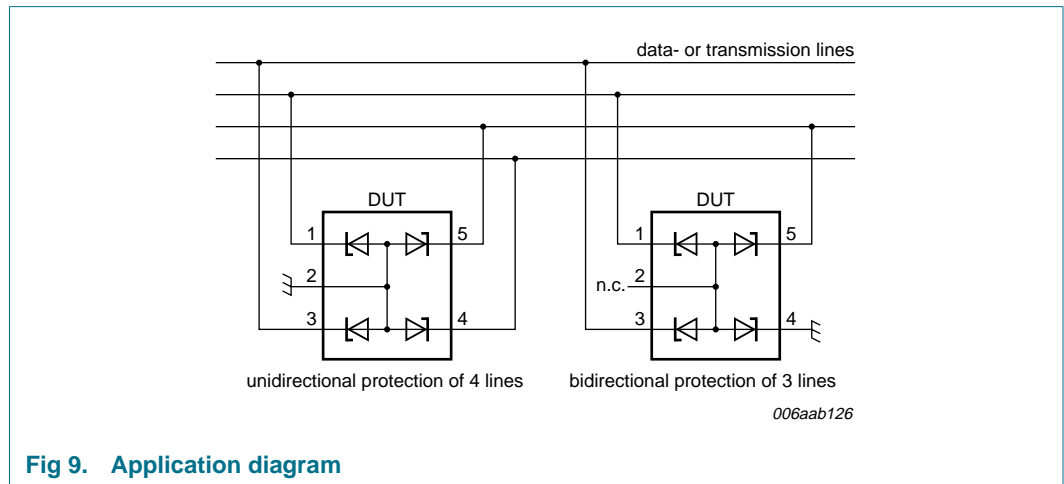


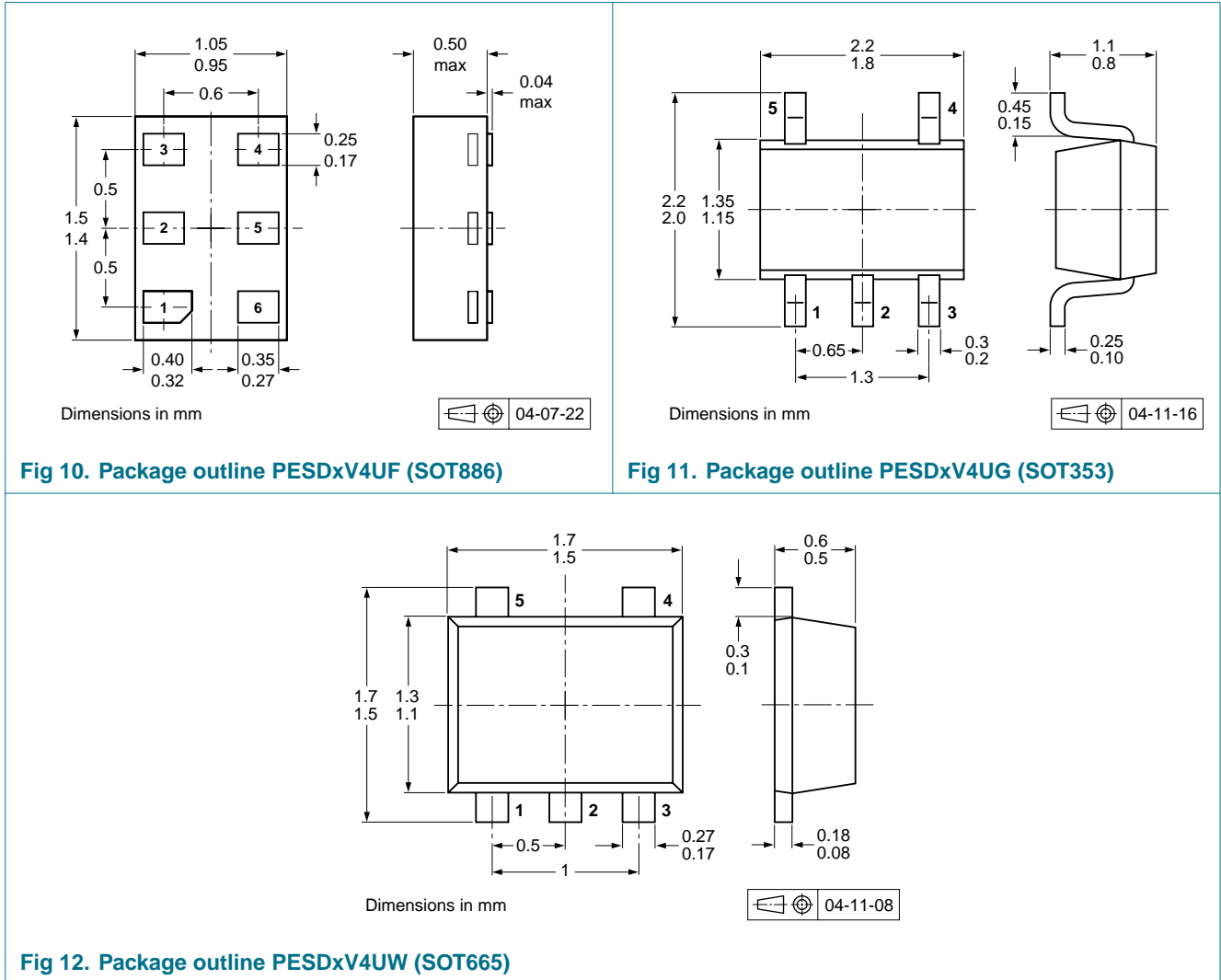
Fig 9. Application diagram

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

8. Package outline



9. Packing information

Table 10. Packing methods

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

| Type number | Package | Description | Packing quantity | | | | | |
|-------------|---------|------------------------------------|------------------|------|------|------|-------|------|
| | | | 3000 | 4000 | 5000 | 8000 | 10000 | |
| PESD3V3V4UF | SOT886 | 4 mm pitch, 8 mm tape and reel; T1 | [2] | - | - | -115 | - | - |
| | | 4 mm pitch, 8 mm tape and reel; T4 | [3] | - | - | -132 | - | - |
| PESD5V0V4UF | SOT886 | 4 mm pitch, 8 mm tape and reel; T1 | [2] | - | - | -115 | - | - |
| | | 4 mm pitch, 8 mm tape and reel; T4 | [3] | - | - | -132 | - | - |
| PESD3V3V4UG | SOT353 | 4 mm pitch, 8 mm tape and reel; T1 | [2] | -115 | - | - | - | -135 |
| | | 4 mm pitch, 8 mm tape and reel; T2 | [4] | -125 | - | - | - | -165 |
| PESD5V0V4UG | SOT353 | 4 mm pitch, 8 mm tape and reel; T1 | [2] | -115 | - | - | - | -135 |
| | | 4 mm pitch, 8 mm tape and reel; T2 | [4] | -125 | - | - | - | -165 |
| PESD3V3V4UW | SOT665 | 2 mm pitch, 8 mm tape and reel | - | - | - | - | -315 | - |
| | | 4 mm pitch, 8 mm tape and reel | - | -115 | - | - | - | - |
| PESD5V0V4UW | SOT665 | 2 mm pitch, 8 mm tape and reel | - | - | - | - | -315 | - |
| | | 4 mm pitch, 8 mm tape and reel | - | -115 | - | - | - | - |

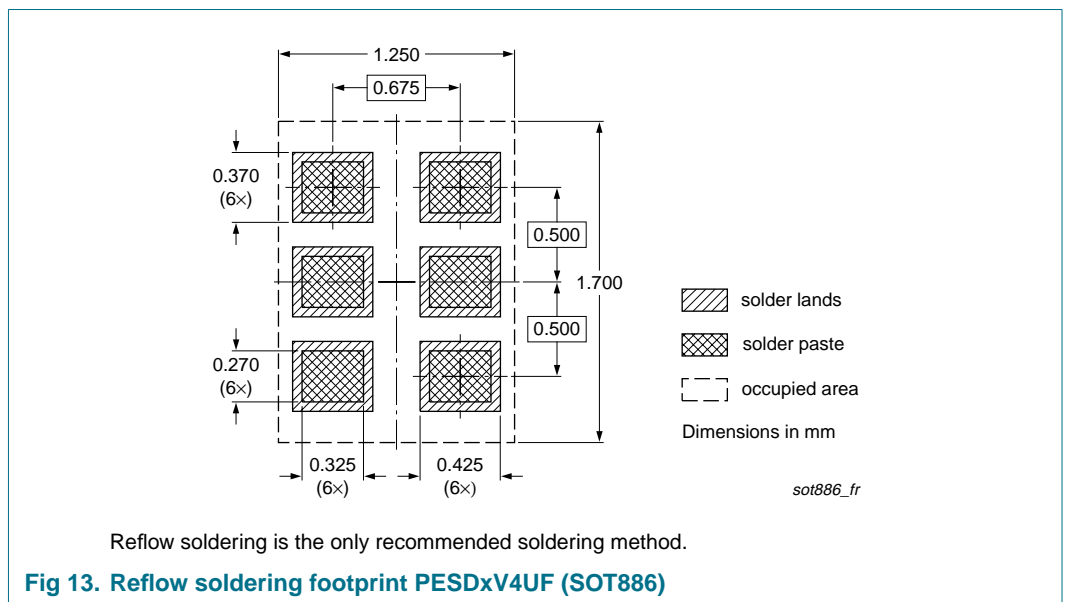
[1] For further information and the availability of packing methods, see [Section 13](#).

[2] T1: normal taping

[3] T4: 90° rotated reverse taping

[4] T2: reverse taping

10. Soldering



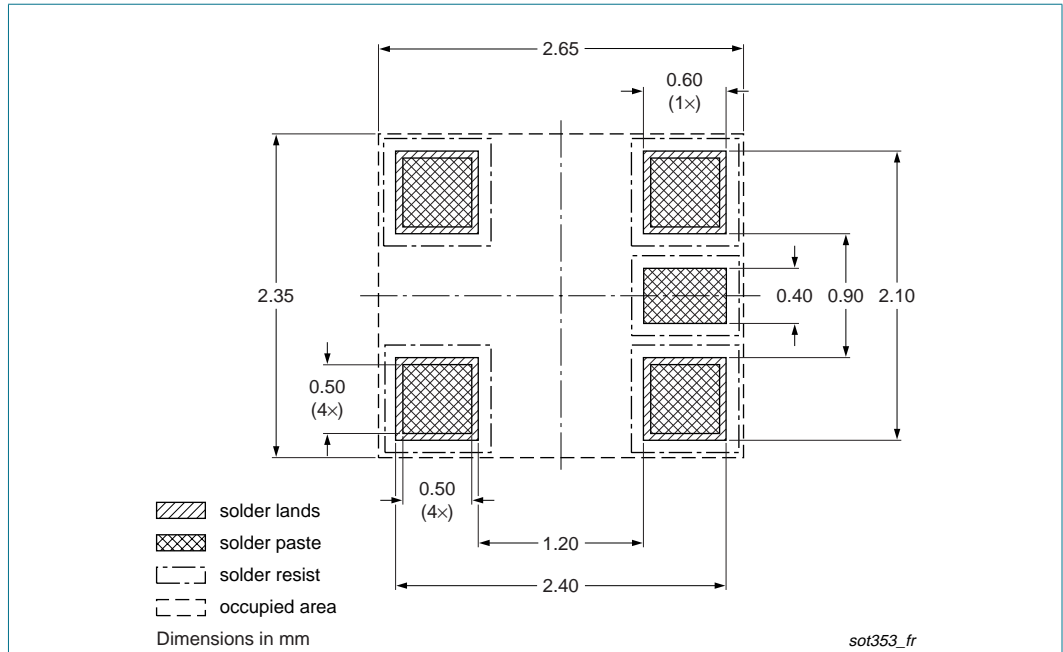


Fig 14. Reflow soldering footprint PESDxV4UG (SOT353/SC-88A)

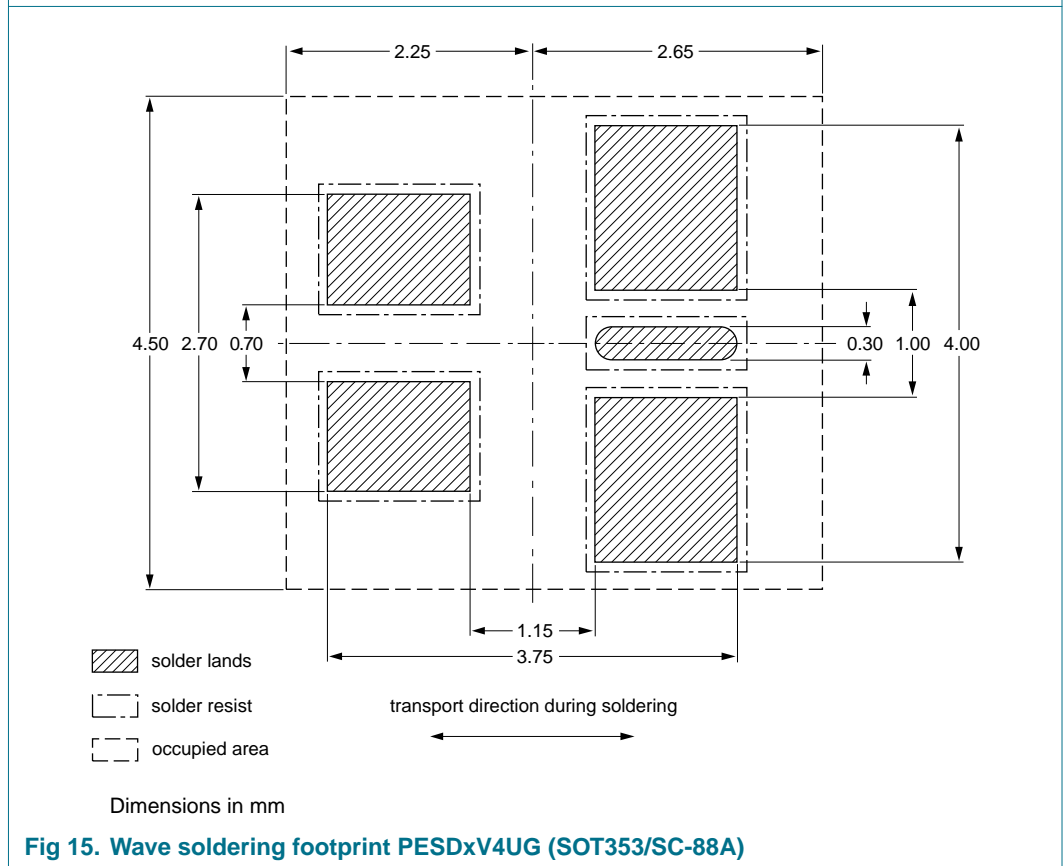


Fig 15. Wave soldering footprint PESDxV4UG (SOT353/SC-88A)

11. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|--------------|--|---------------|------------------------------------|
| PESDXV4UF_G_W_3 | 20080128 | Product data sheet | - | PESDXV4UG_SER_2 PESDXV4UW_SER_1 |
| Modifications: | | <ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.• Legal texts have been adapted to the new company name where appropriate.• Type numbers PESD3V3V4UF and PESD5V0V4UF added• Table 1 “Product overview”: added• Figure 7: added• Section 9 “Packing information”: added• Section 10 “Soldering”: added• Section 12 “Legal information”: updated | | |
| PESDXV4UG_SER_2 | 20050407 | Product data sheet | - | PESDXV4UG_SER_1 |
| PESDXV4UW_SER_1 | 20050422 | Product data sheet | - | - |

12. Legal information

12.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
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| 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 URL <http://www.nxp.com>.

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