

PESD5V0L6UAS; PESD5V0L6US

Low capacitance 6-fold ESD protection diode arrays

Rev. 02 — 9 November 2004

Product data sheet

1. Product profile

1.1 General description

Low capacitance 6-fold ESD protection diode arrays in small plastic packages designed to protect up to six transmission or data lines from the damage caused by ElectroStatic Discharge (ESD) and other transients.

Table 1: Product overview

| Type number | Package | |
|--------------|---------|----------|
| | Name | Philips |
| PESD5V0L6UAS | TSSOP8 | SOT505-1 |
| PESD5V0L6US | SO8 | SOT96-1 |

1.2 Features

- ESD protection of up to six lines
- Low diode capacitance
- Max. peak pulse power: $P_{PP} = 35 \text{ W}$
- Low clamping voltage: $V_{(CL)R} = 15 \text{ V}$
- Ultra low leakage current: $I_{RM} = 8 \text{ nA}$
- ESD protection of up to 20 kV
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 2.5 \text{ A}$.

1.3 Applications

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

1.4 Quick reference data

Table 2: Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|---------------------------|---|-----|-----|-----|------|
| V_{RWM} | reverse stand-off voltage | | - | - | 5 | V |
| C_d | diode capacitance | $V_R = 0 \text{ V};$ $f = 1 \text{ MHz}$ | - | 16 | 19 | pF |

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2. Pinning information

Table 3: Discrete pinning

| Pin | Description | Simplified outline | Symbol |
|---------------|--------------|--------------------|------------|
| TSSOP8 | | | |
| 1 | cathode 1 | | sym004 |
| 2 | cathode 2 | | |
| 3 | cathode 3 | | |
| 4 | cathode 4 | | |
| 5 | cathode 5 | | |
| 6 | common anode | | |
| 7 | common anode | | |
| 8 | cathode 6 | | |
| SO8 | | | |
| 1 | cathode 1 | | sym004 |
| 2 | cathode 2 | | |
| 3 | cathode 3 | | |
| 4 | cathode 4 | | |
| 5 | cathode 5 | | |
| 6 | common anode | | |
| 7 | common anode | | |
| 8 | cathode 6 | | |

3. Ordering information

Table 4: Ordering information

| Type number | Package | | |
|--------------|---------|---|----------|
| | Name | Description | Version |
| PESD5V0L6UAS | TSSOP8 | plastic thin shrink small outline package; 8 leads; body width 3 mm | SOT505-1 |
| PESD5V0L6US | SO8 | plastic small outline package; 8 leads; body width 3.9 mm | SOT96-1 |

4. Marking

Table 5: Marking

| Type number | Marking code |
|--------------|--------------|
| PESD5V0L6UAS | 5V06U |
| PESD5V0L6US | 5V06US |

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 | 8/20 μs pulse | [1] [2] - | 35 | W |
| I _{PP} | peak pulse current | 8/20 μs pulse | [1] [2] - | 2.5 | A |
| 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 exponentially decay waveform according to IEC 61000-4-5; see [Figure 1](#).

[2] Measured from pin 1, 2, 3, 4, 5 or 8 to pin 6 or 7.

Table 7: ESD maximum ratings

| Symbol | Parameter | Conditions | Min | Max | Unit |
|--------|------------------------------------|-----------------------------------|-----------|-----|------|
| ESD | electrostatic discharge capability | IEC 61000-4-2 (contact discharge) | [1] [2] - | 20 | kV |
| | | HBM MIL-STD883 | - | 10 | kV |

[1] Device stressed with ten non-repetitive ElectroStatic Discharge (ESD) pulses; see [Figure 2](#).

[2] Measured from pin 1, 2, 3, 4, 5 or 8 to pin 6 or 7.

Table 8: ESD standards compliance

| ESD Standard | Conditions |
|--|---------------------------------|
| IEC 61000-4-2, level 4 (ESD); see Figure 2 | > 15 kV (air); > 8 kV (contact) |
| HBM MIL-STD883, class 3 | > 4 kV |

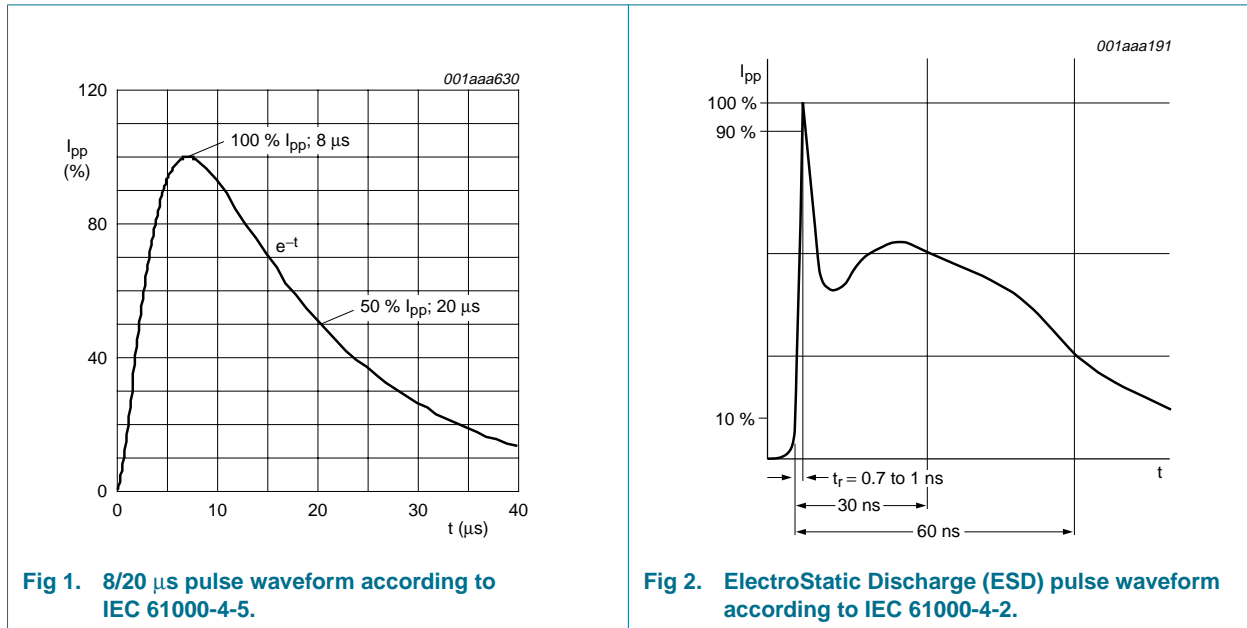


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5.

Fig 2. ElectroStatic Discharge (ESD) pulse waveform according to IEC 61000-4-2.

6. Characteristics

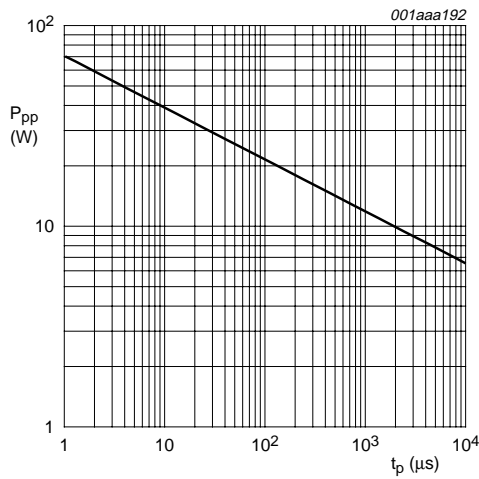
Table 9: Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---------------------------|---|-----------|-----|-----|----------|
| Per diode | | | | | | |
| V_{RWM} | reverse stand-off voltage | | - | - | 5 | V |
| I_{RM} | reverse leakage current | $V_{RWM} = 5\text{ V}$ | - | 8 | 25 | nA |
| $V_{(CL)R}$ | clamping voltage | $I_{PP} = 1\text{ A}$ | [1] [2] - | - | 10 | V |
| | | $I_{PP} = 2.5\text{ A}$ | [1] [2] - | - | 15 | V |
| $V_{(BR)}$ | breakdown voltage | $I_R = 1\text{ mA}$ | 6.4 | 6.8 | 7.2 | V |
| r_{dif} | differential resistance | $I_R = 1\text{ mA}$ | - | - | 100 | Ω |
| C_d | diode capacitance | $V_R = 0\text{ V}$; $f = 1\text{ MHz}$; see Figure 5 | - | 16 | 19 | pF |

[1] Non-repetitive current pulse 8/20 μs exponentially decay waveform according to IEC 61000-4-5; see [Figure 1](#).

[2] Measured between each cathode on pins 1, 2, 3, 4, 5 or 8 and anode on pin 6 or 7.



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

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

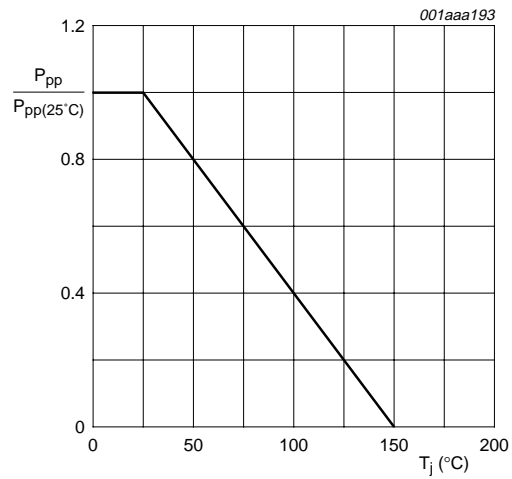
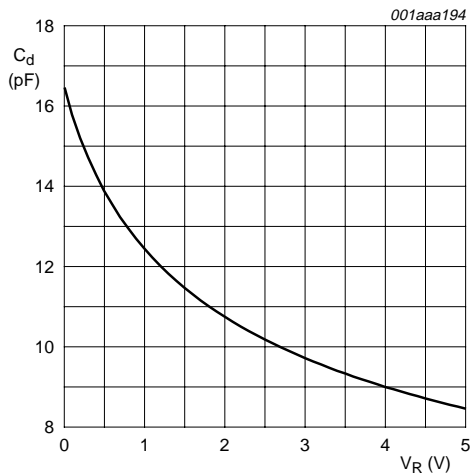


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values.



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

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

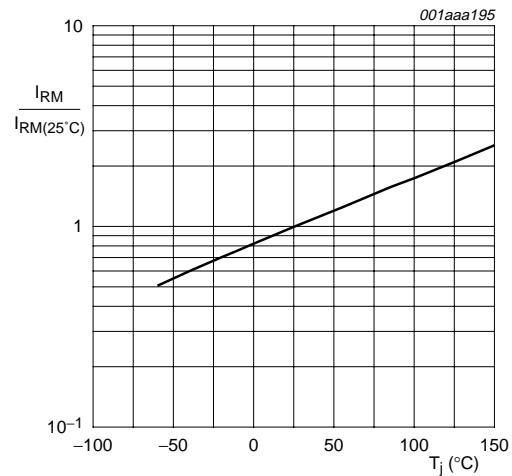


Fig 6. Relative variation of reverse leakage current as a function of junction temperature; typical values.

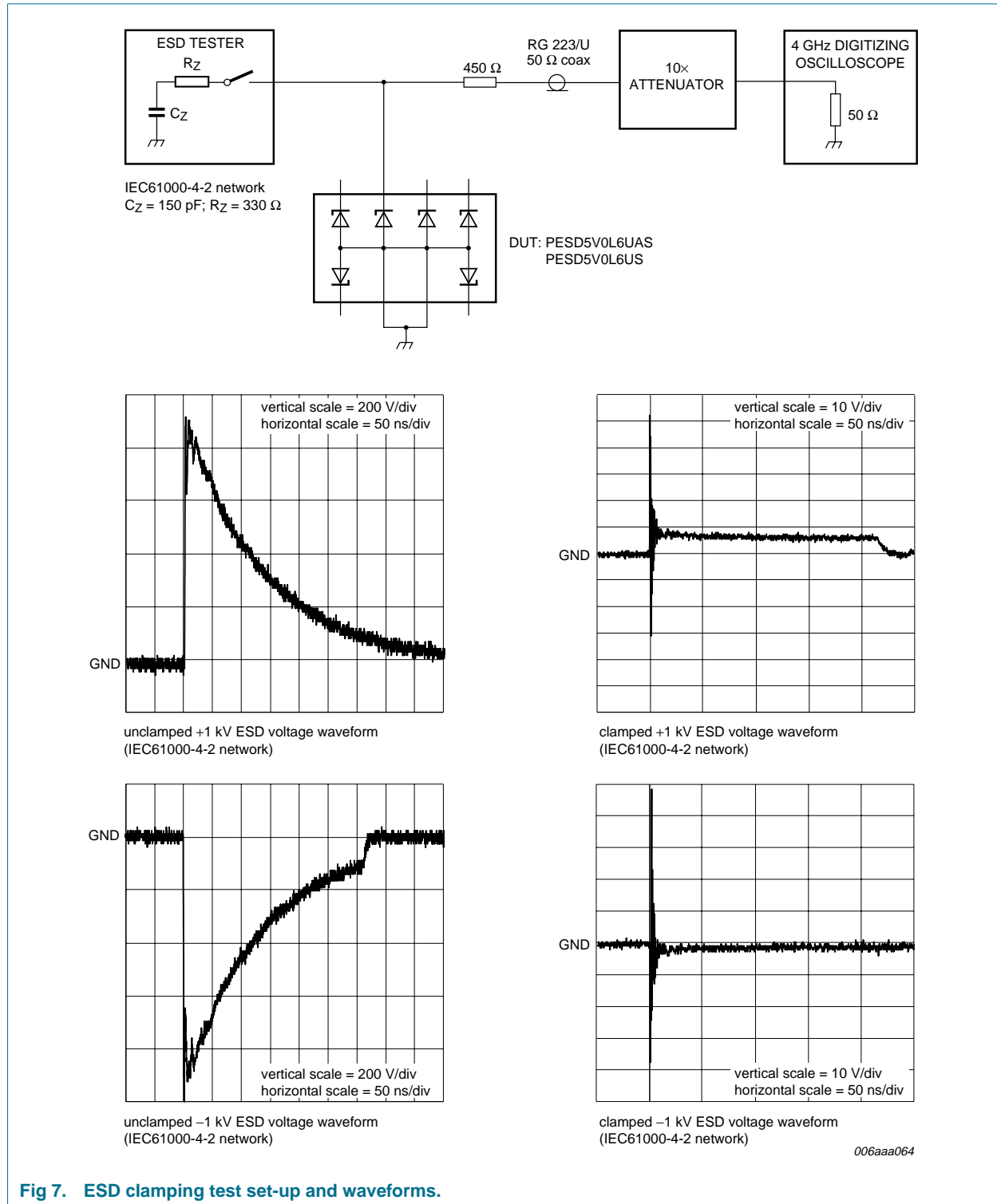


Fig 7. ESD clamping test set-up and waveforms.

7. Application information

The PESD5V0L6UAS and the PESD5V0L6US are designed for protection of up to six unidirectional data lines from the damage caused by ElectroStatic Discharge (ESD) and surge pulses. The PESD5V0L6UAS and the PESD5V0L6US may be used on lines where the signal polarity is above or below ground.

The PESD5V0L6UAS and the PESD5V0L6US provide a surge capability of 35 W per line for a 8/20 μ s waveform.

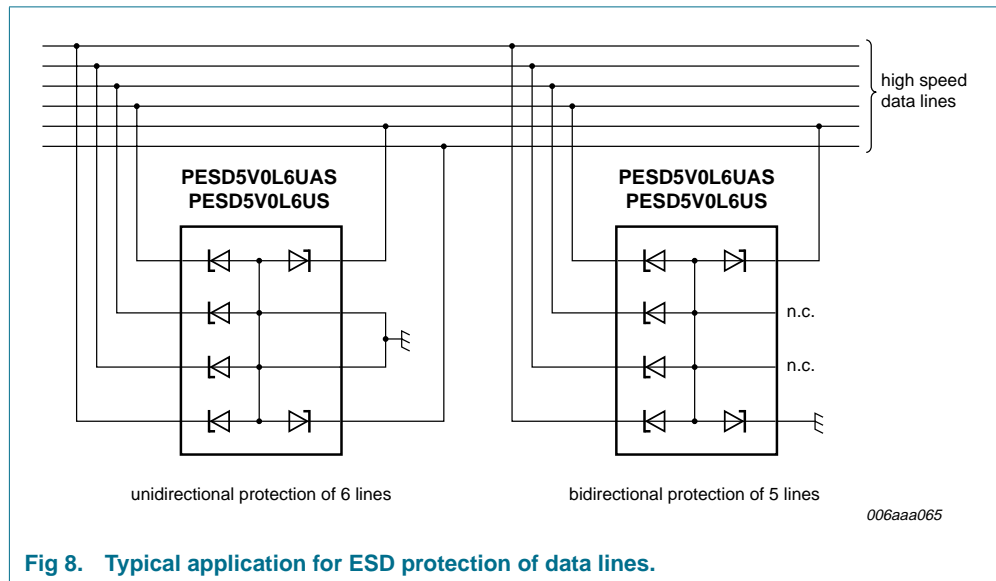


Fig 8. Typical application for ESD protection of data lines.

Circuit board layout and protection device placement:

Circuit board layout is critical for the suppression of ESD, EFT and surge transients. The following guidelines are recommended:

1. Place the protection device as close to the input terminal or connector as possible.
2. The path length between the protection device and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protection conductors in parallel with unprotected conductor.
5. Minimize all printed-circuit board 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 printed-circuit boards, use ground vias.

8. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm

SOT505-1

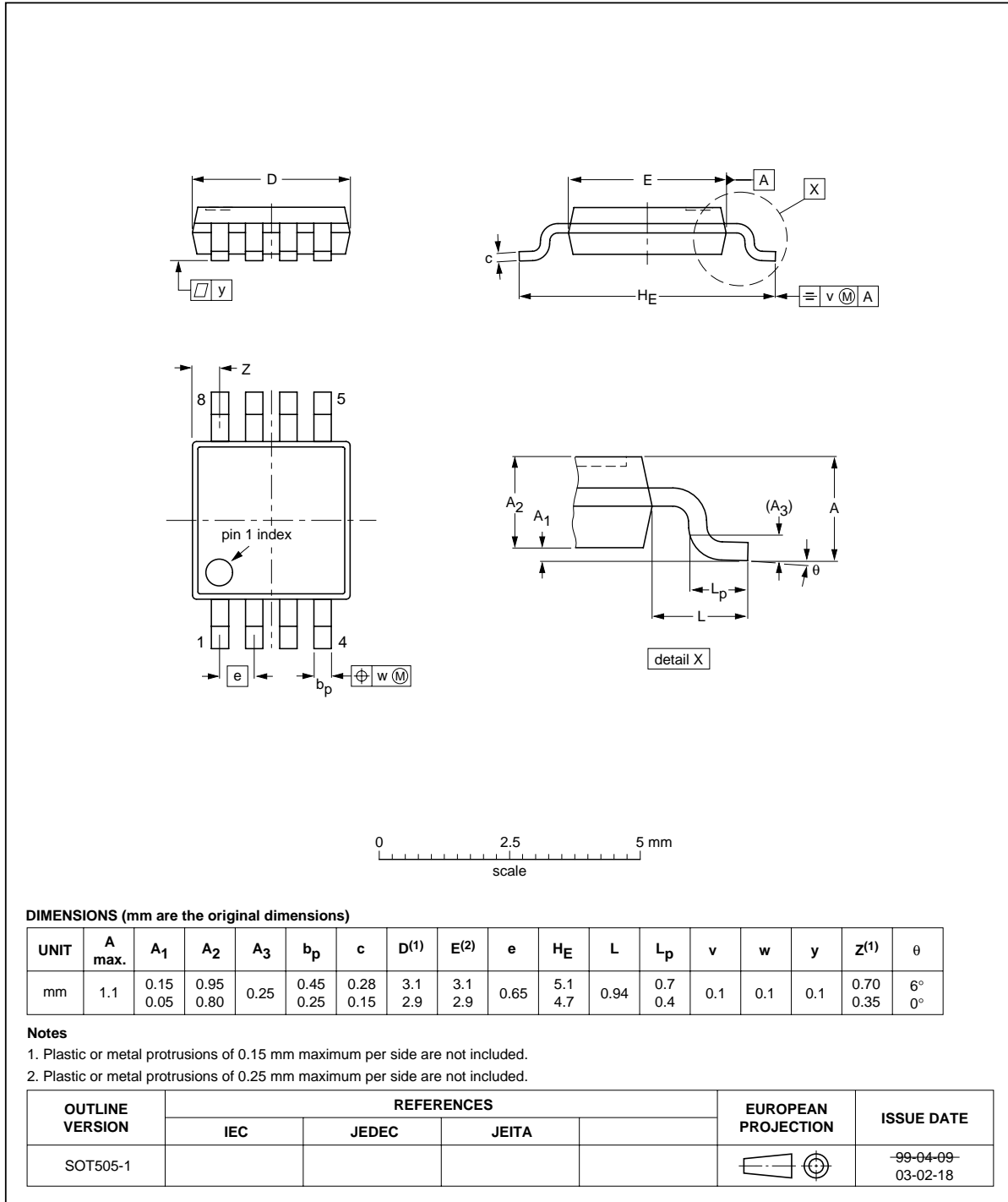


Fig 9. Package outline SOT505-1 (TSSOP8).

SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1

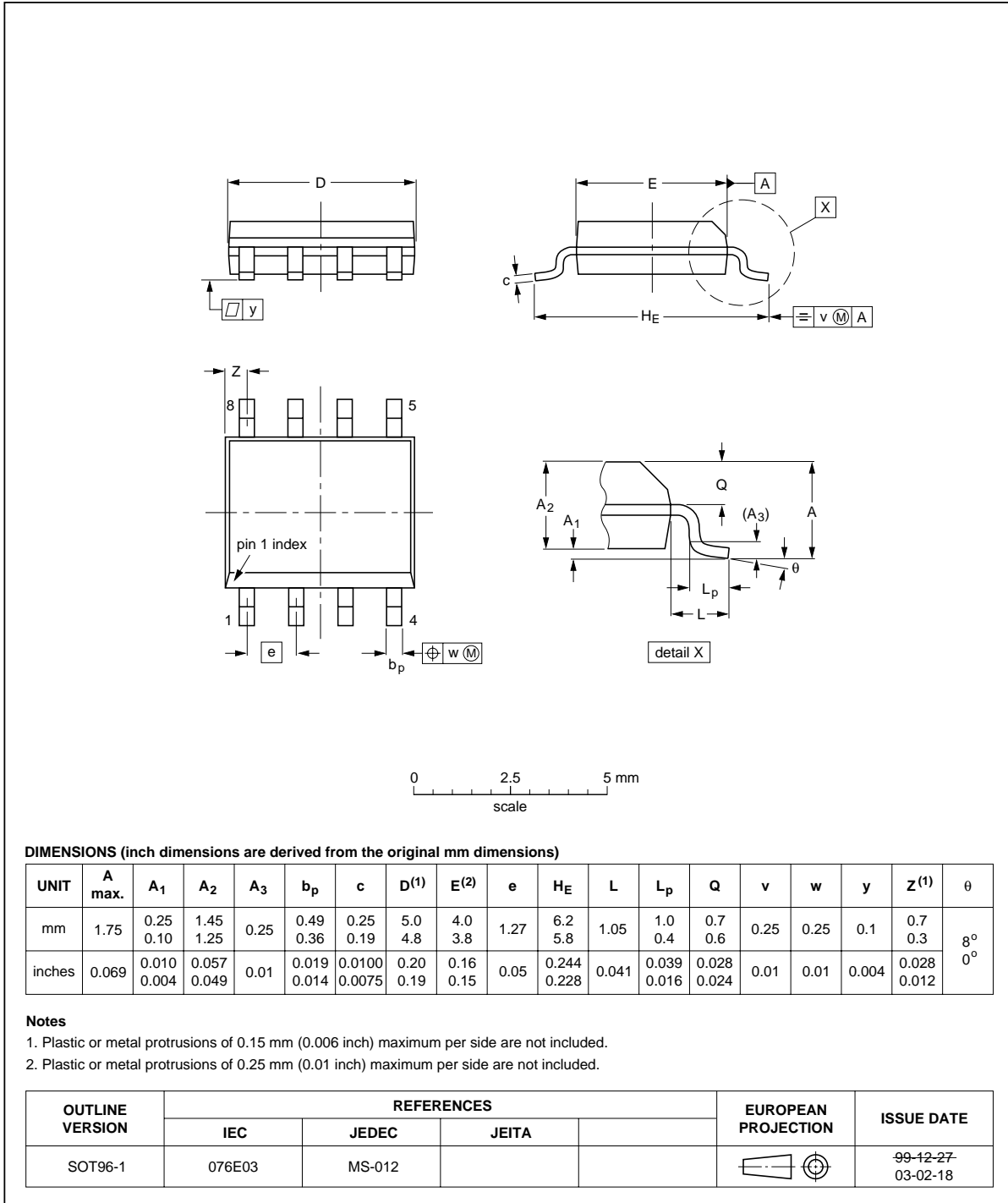


Fig 10. Package outline SOT96-1 (SO8/MS-012).

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 | |
|--------------|----------|---------------------------------|------------------|------|
| | | | 1000 | 2500 |
| PESD5V0L6UAS | SOT505-1 | 8 mm pitch, 12 mm tape and reel | - | -118 |
| PESD5V0L6US | SOT96-1 | 8 mm pitch, 12 mm tape and reel | -115 | -118 |

[1] For further information and the availability of packing methods, see [Section 14](#).

10. Revision history

Table 11: Revision history

| Document ID | Release date | Data sheet status | Change notice | Order number | Supersedes |
|------------------|--------------|-----------------------|---------------|----------------|---|
| PESD5V06UAS_US_2 | 20041109 | Product data sheet | - | 9297 750 13537 | PESD5V0L6US_1 |
| Modifications: | | | | | |
| | | | | | <ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.• PESD5V0L6UAS added• Table 1: product overview added• Section 9: packing information added |
| PESD5V0L6US_1 | 20040315 | Product specification | - | 9397 750 12248 | - |

11. Data sheet status

| Level | Data sheet status [1] | Product status [2] [3] | Definition |
|-------|-----------------------|------------------------|--|
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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