

# 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

# PHILIPS

## 2. Pinning information

**Table 3: Discrete pinning**

Pin	Description	Simplified outline	Symbol
<b>TSSOP8</b>			
1	cathode 1		<p style="text-align: center;"><i>sym004</i></p>
2	cathode 2		
3	cathode 3		
4	cathode 4		
5	cathode 5		
6	common anode		
7	common anode		
8	cathode 6		
<b>SO8</b>			
1	cathode 1		<p style="text-align: center;"><i>sym004</i></p>
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
<b>Per diode</b>					
$P_{PP}$	peak pulse power	8/20 $\mu$ s pulse	[1][2] -	35	W
$I_{PP}$	peak pulse current	8/20 $\mu$ s pulse	[1][2] -	2.5	A
$T_j$	junction temperature		-	150	$^{\circ}$ C
$T_{amb}$	ambient temperature		-65	+150	$^{\circ}$ C
$T_{stg}$	storage temperature		-65	+150	$^{\circ}$ C

[1] Non-repetitive current pulse 8/20  $\mu$ s 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**

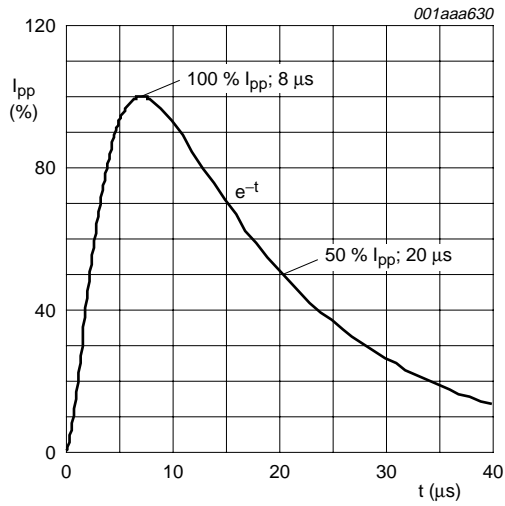
Symbol	Parameter	Conditions	Min	Max	Unit
ESD	electrostatic discharge capability	IEC 61000-4-2 (contact discharge)	[1][2] -	20	kV
		HBM MIL-STD883	-	10	kV

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

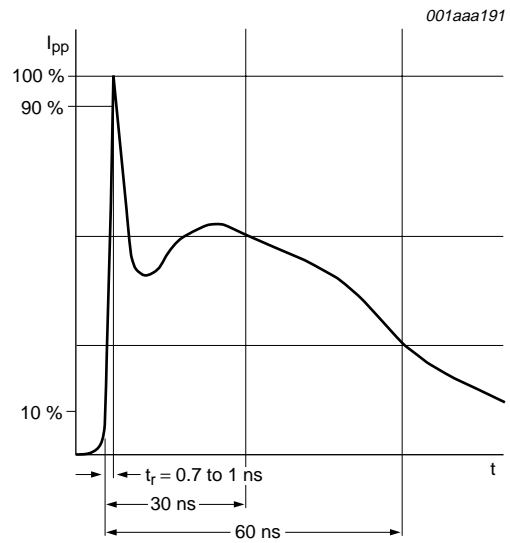
[2] Measured from pin 1, 2, 3, 4, 5 or 8 to pin 6 or 7.

**Table 8: ESD standards compliance**

ESD Standard	Conditions
IEC 61000-4-2, level 4 (ESD); see <a href="#">Figure 2</a>	> 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

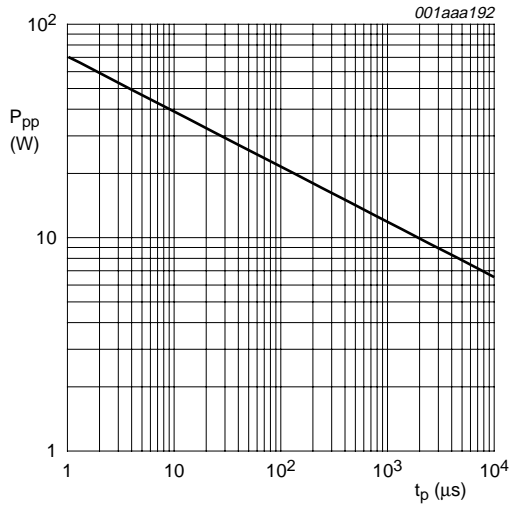
**Table 9: Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_{RWM}$	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	$\Omega$
$C_d$	diode capacitance	$V_R = 0\text{ V}$ ; $f = 1\text{ MHz}$ ; see <a href="#">Figure 5</a>	-	16	19	pF

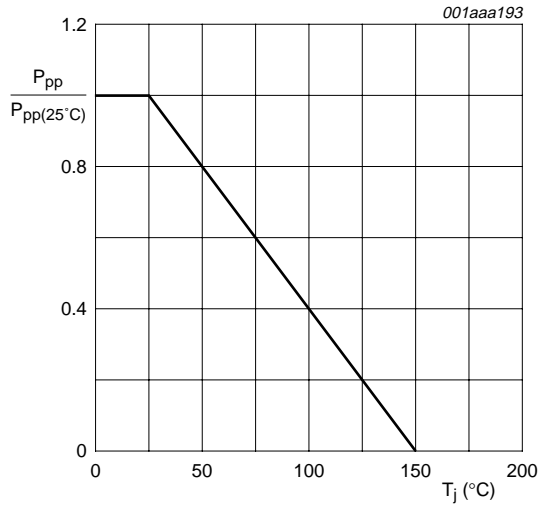
[1] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponentially decay waveform according to IEC 61000-4-5; see [Figure 1](#).

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

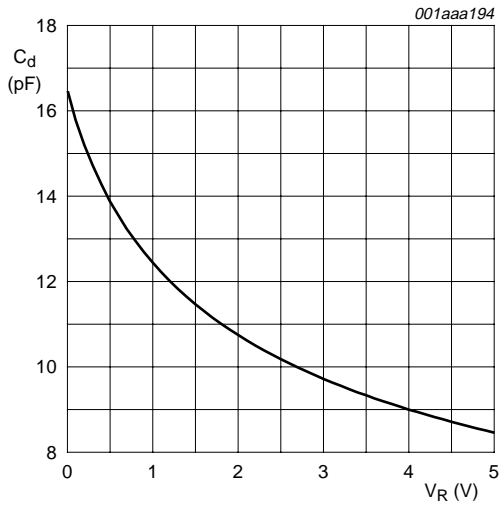


$T_{amb} = 25\text{ }^\circ\text{C}$ .

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

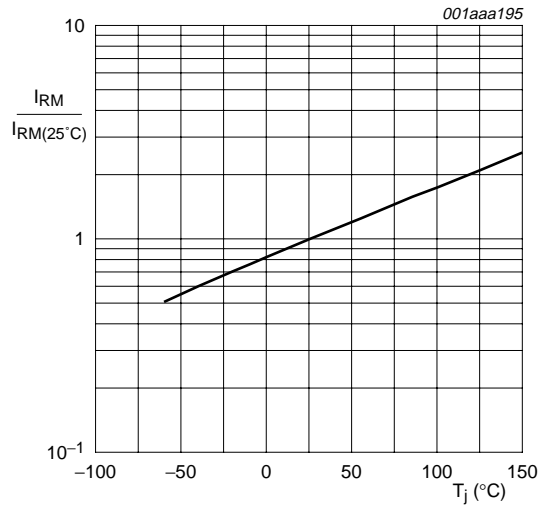


**Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values.**



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

**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.**

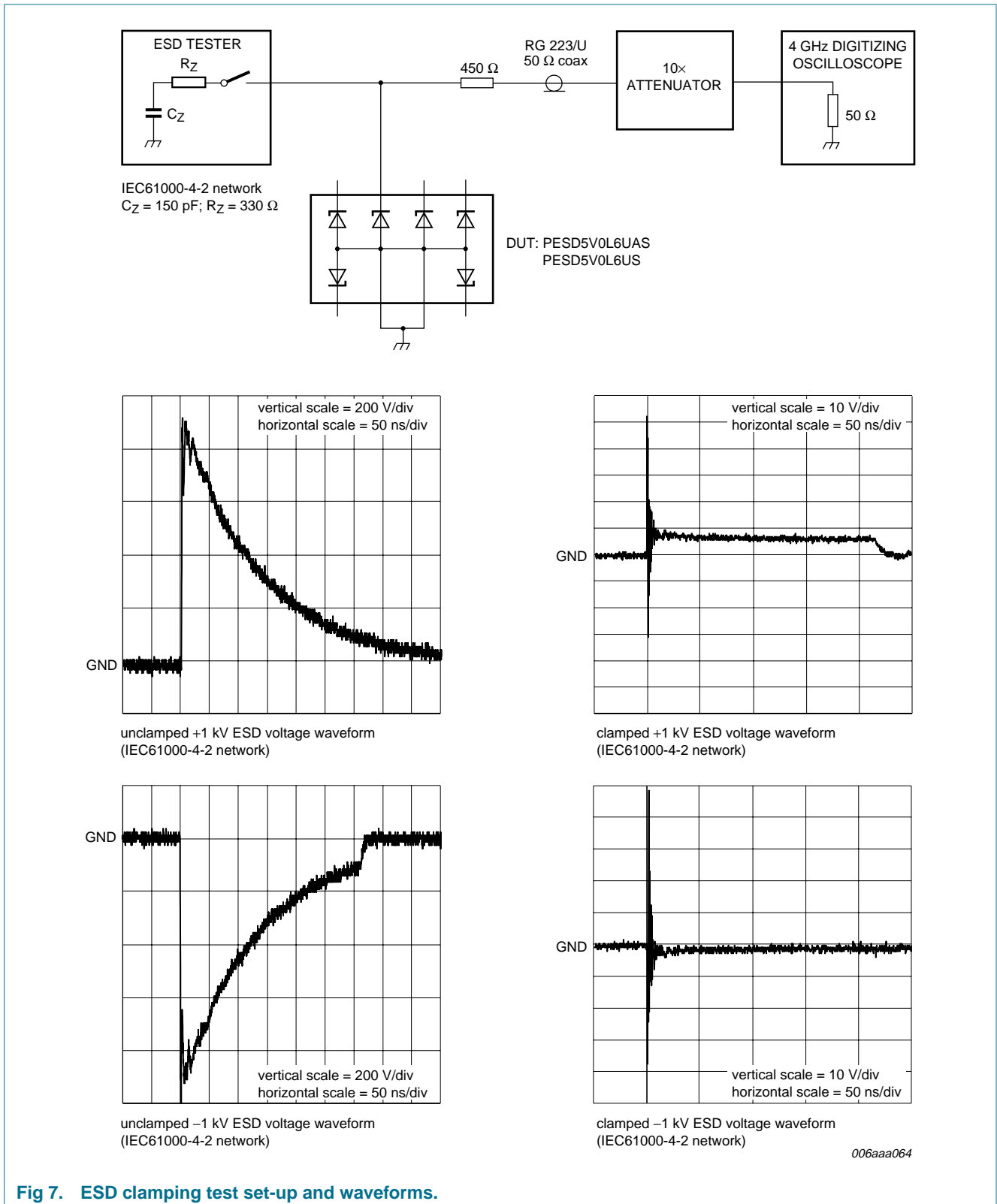
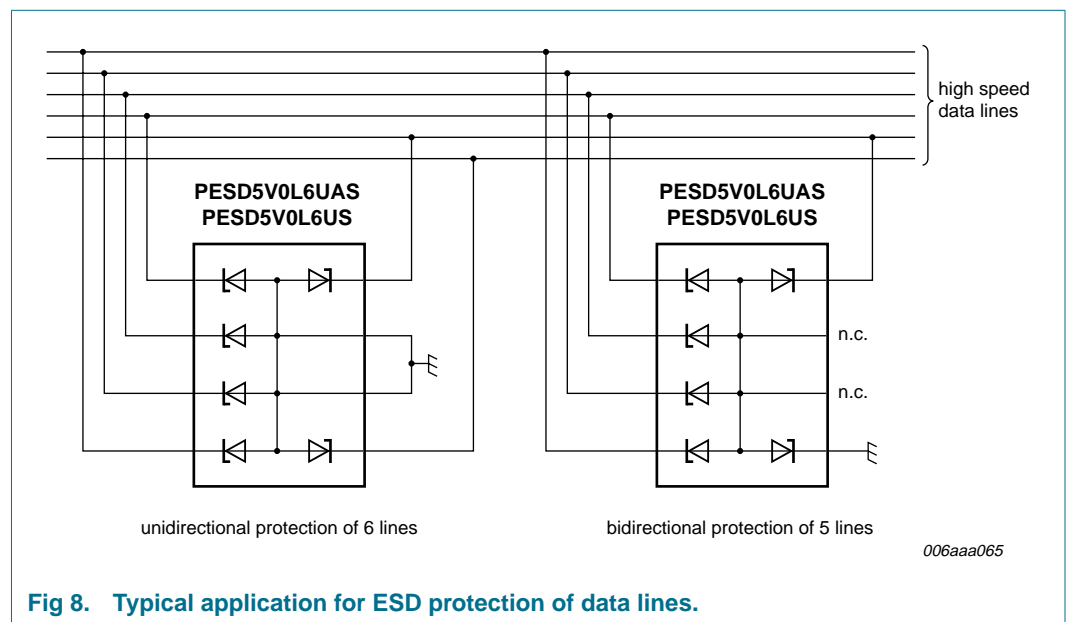


Fig 7. ESD clamping test set-up and waveforms.

## 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  $\mu$ 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

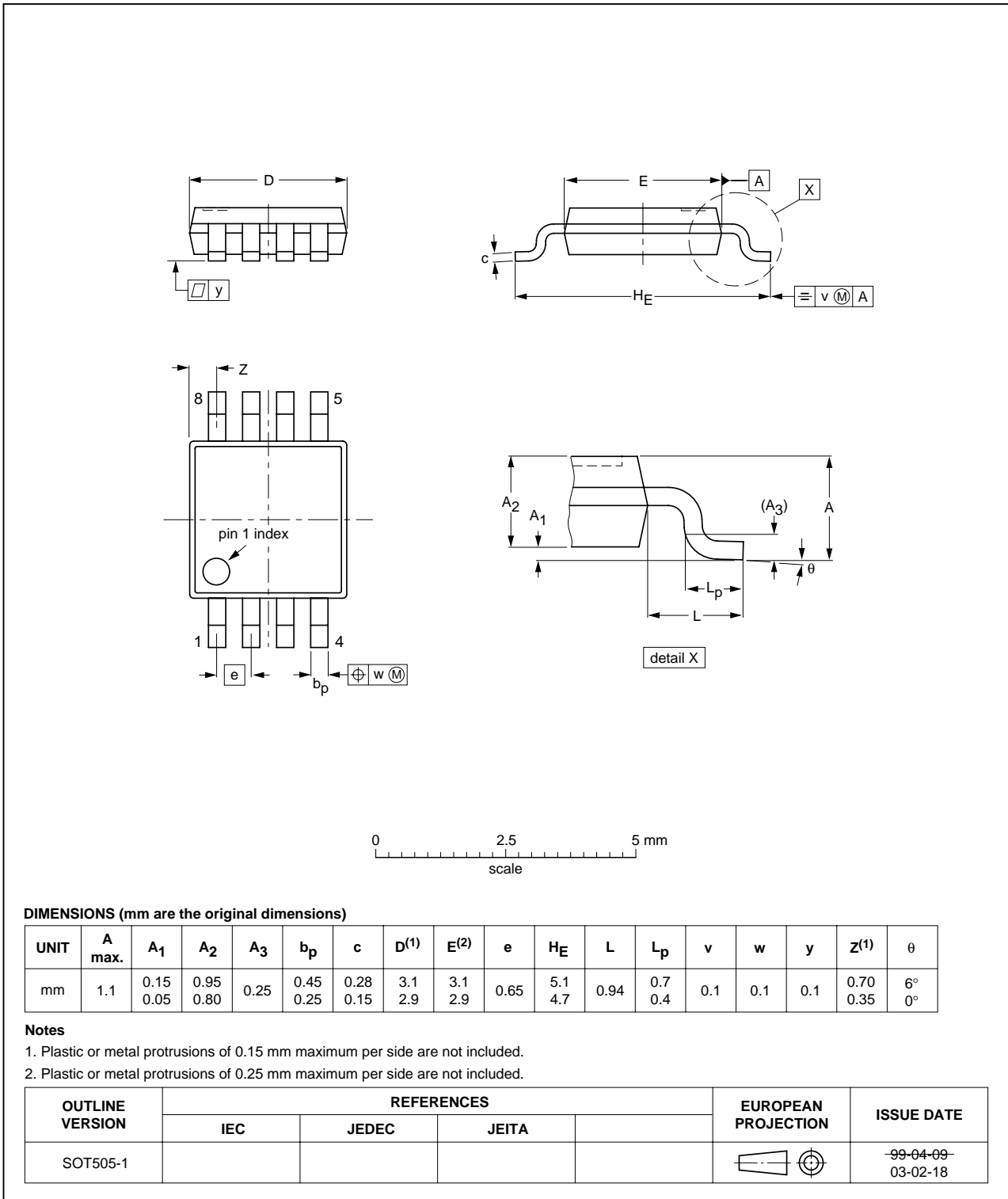


Fig 9. Package outline SOT505-1 (TSSOP8).

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

SOT96-1

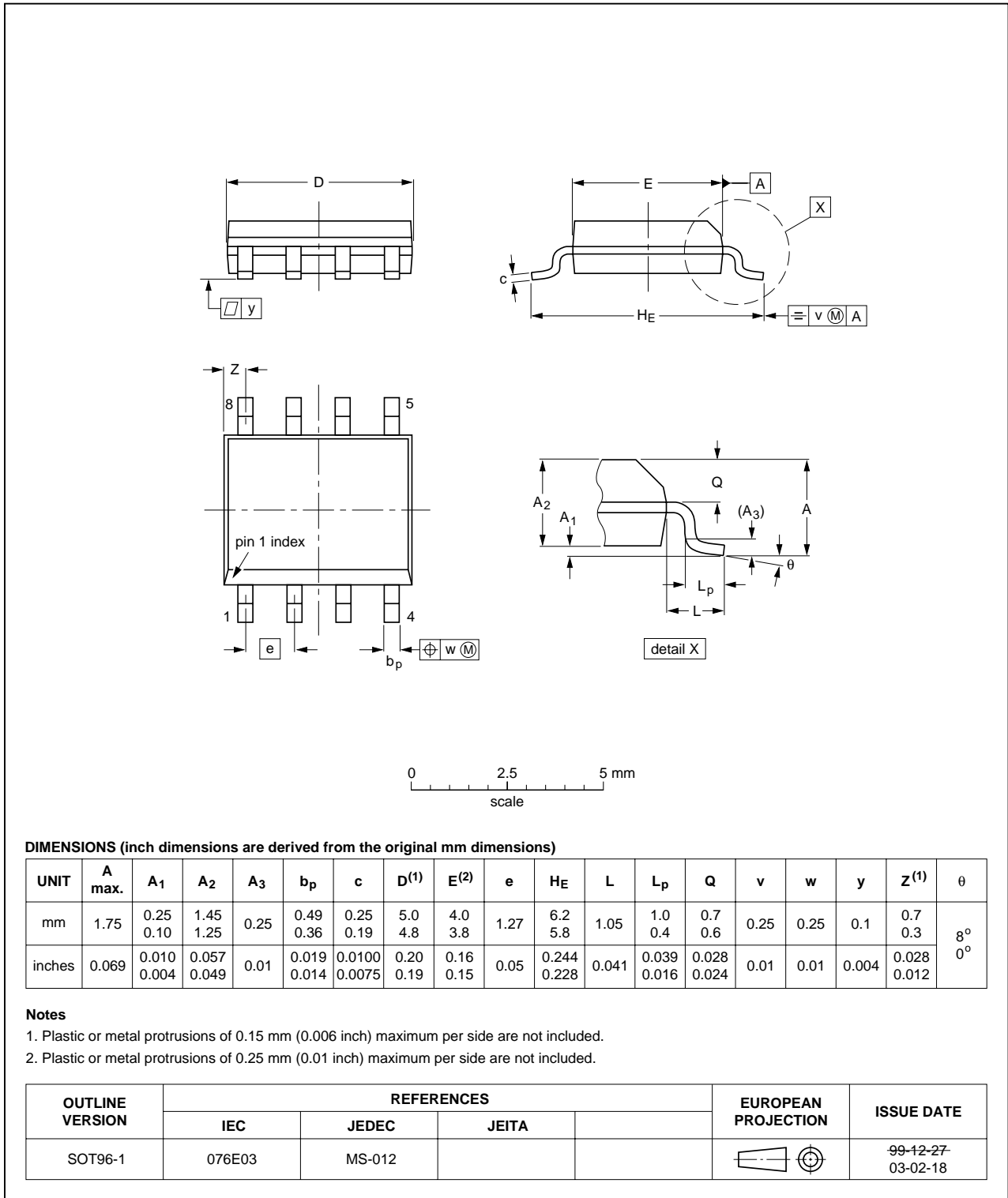


Fig 10. Package outline SOT96-1 (SO8/MS-012).

## 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"><li>• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.</li><li>• PESD5V0L6UAS added</li><li>• <a href="#">Table 1</a>: product overview added</li><li>• <a href="#">Section 9</a>: packing information added</li></ul>
PESD5V0L6US_1	20040315	Product specification	-	9397 750 12248	-

## 11. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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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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**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**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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Date of release: 9 November 2004  
Document order number: 9397 750 13537

Published in The Netherlands