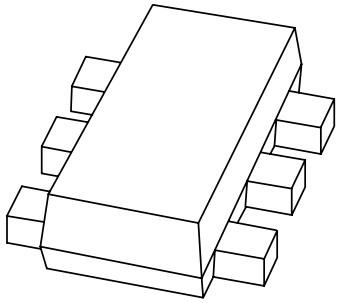
DATA SHEET



PESD3V3L5UV; PESD5V0L5UV

Low capacitance 5-fold ESD protection diode arrays in SOT666 package

Product specification

2004 Mar 23

Philips
Semiconductors

Low capacitance 5-fold ESD protection diode arrays in SOT666 package

PESD3V3L5UV; PESD5V0L5UV

FEATURES

- Uni-directional ESD protection of up to five lines
- Bi-directional ESD protection of up to four lines
- Low diode capacitance
- Maximum peak pulse power: P_{pp} = 25 W at t_p = 8/20µs
- Low clamping voltage: $V_{CL(R)}$ = 12 V at I_{pp} = 2.5 A
- Ultra low leakage current: I_{RM} = 8 nA at V_{RWM} = 5 V
- ESD protection > 20 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); I_{pp} = 2.5 A at T_p = 8/20 µs.

APPLICATIONS

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

DESCRIPTION

Low capacitance 5-fold ESD protection array in the ultra small SOT666 plastic package designed to protect up to five transmission or data lines from the damage caused by Electrostatic Discharge (ESD).

MARKING

TYPE NUMBER	MARKING CODE(1)
PESD3V3L5UV	*E1
PESD5V0L5UV	*E2

Note

1. * = p: Made in Hong Kong.
   * = t: Made in Malaysia.
   * = W: Made in China.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	VALUE	UNIT
V_{RWM}	reverse standoff voltage		
	PESD3V3L5UV	3.3	V
	PESD5V0L5UV	5	V
C_d	diode capacitance		
	PESD3V3L5UV	22	pF
	PESD5V0L5UV	16	pF
	number of protected lines	5	

PINNING

PIN	DESCRIPTION
1	cathode 1
2	common anode
3	cathode 2
4	cathode 3
5	cathode 4
6	cathode 5

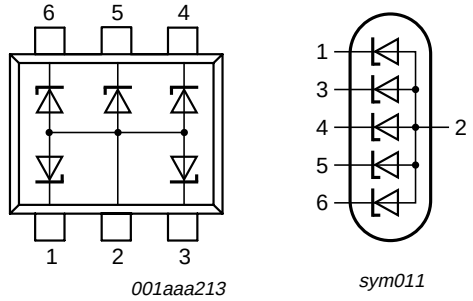


Fig.1 Simplified outline (SOT666) and symbol.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PESD3V3L5UV	–	plastic surface mounted package; 6 leads	SOT666
PESD5V0L5UV	–	plastic surface mounted package; 6 leads	SOT666

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; notes 1 and 2	–	25	W
I_{pp}	peak pulse current	8/20 μs pulse; notes 1 and 2	–	2.5	A
T_j	junction temperature		–	150	°C
T_{amb}	operation ambient temperature		–65	+150	°C
T_{stg}	storage temperature		–65	+150	°C

Notes

1. Non-repetitive current pulse 8/20 μs exponentially decaying waveform; see Fig.2.
2. Measured from any of pins 1, 3, 4, 5 or 6 to pin 2.

ESD maximum ratings

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
Per diode				
ESD	electrostatic discharge capability	IEC 61000-4-2 (contact discharge); notes 1 and 2	20	kV
		HBM MIL-Std 883	10	kV

Notes

1. Device stressed with ten non-repetitive Electrostatic Discharge (ESD) pulses; see Fig.3.
2. Measured from any of pins 1, 3, 4, 5 or 6 to pin 2.

ESD standards compliance

ESD STANDARD	CONDITIONS
IEC 61000-4-2, level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
HBM MIL-Std 883, class 3	> 4 kV

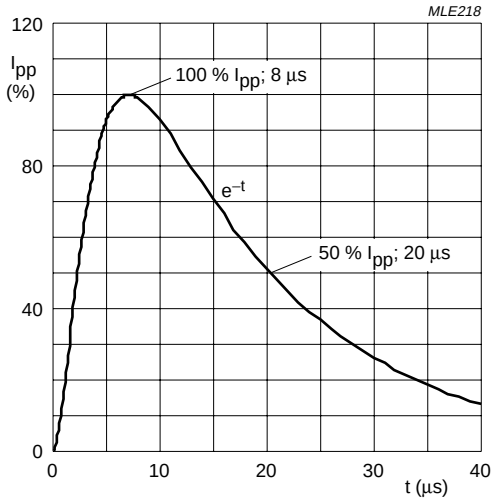


Fig.2 8/20 µs pulse waveform according to IEC 61000-4-5.

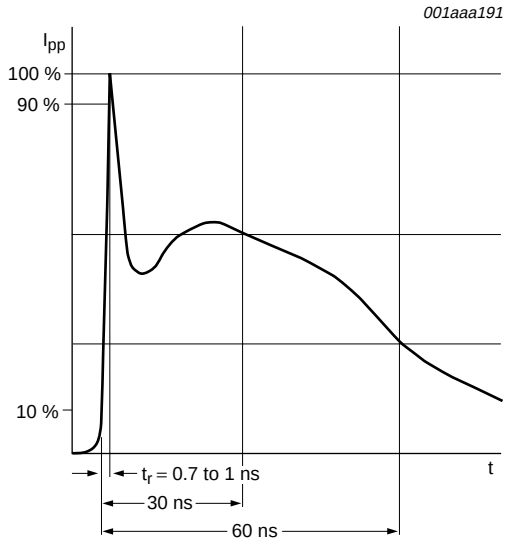


Fig.3 Electrostatic Discharge (ESD) pulse waveform according to IEC 61000-4-2.

CHARACTERISTICS

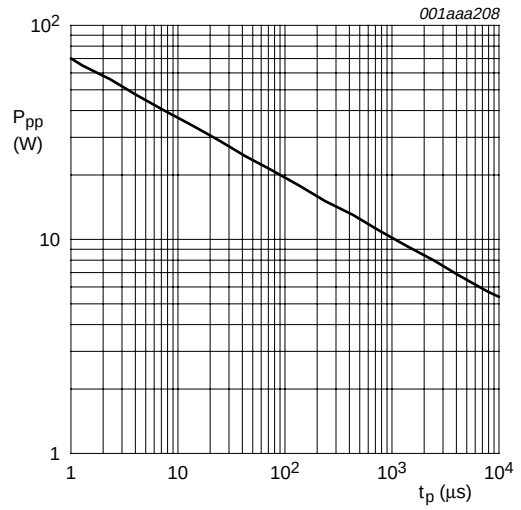
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per diode						
V_{RWM}	reverse stand-off voltage					
	PESD3V3L5UV		–	–	3.3	V
	PESD5V0L5UV		–	–	5	V
I_{RM}	reverse leakage current					
	PESD3V3L5UV	V_{RWM} = 3.3 V	–	75	300	nA
	PESD5V0L5UV	V_{RWM} = 5 V	–	5	25	nA
V_{BR}	breakdown voltage	I_R = 1 mA				
	PESD3V3L5UV		5.3	5.6	5.9	V
	PESD5V0L5UV		6.4	6.8	7.2	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; see Fig.5				
	PESD3V3L5UV		–	22	28	pF
	PESD5V0L5UV		–	16	19	pF
$V_{CL(R)}$	clamping voltage	notes 1 and 2				
	PESD3V3L5UV	I_{pp} = 1 A	–	–	10	V
		I_{pp} = 2.5 A	–	–	12	V
	PESD5V0L5UV	I_{pp} = 1 A	–	–	10	V
		I_{pp} = 2.5 A	–	–	12	V
r_{diff}	differential resistance	I_R = 1 mA				
	PESD3V3L5UV		–	–	200	Ω
	PESD5V0L5UV		–	–	100	Ω

Notes

1. Non-repetitive current pulse 8/20 μs exponentially decaying waveform; see Fig.2.
2. Measured from any of pins 1, 3, 4, 5 or 6 to pin 2.

GRAPHICAL DATA



T_{amb} = 25 °C.
I_{pp} = 8/20 µs exponentially decaying waveform; see Fig.2.

Fig.4 Peak pulse power dissipation as a function of pulse time; typical values.

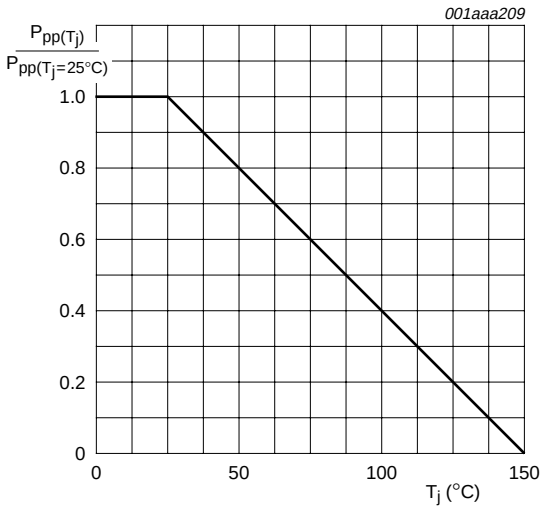
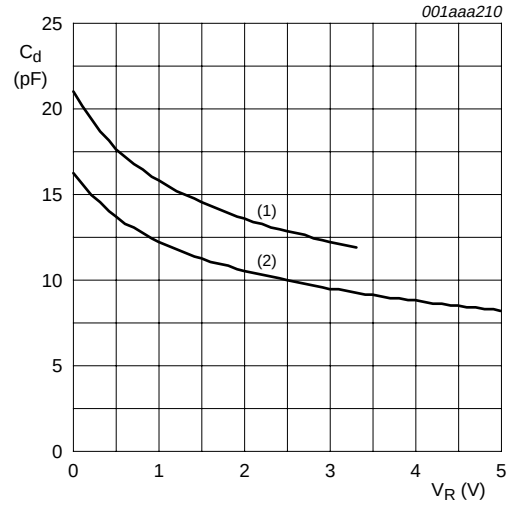


Fig.5 Relative variation of peak pulse power as a function of junction temperature; typical values.



(1) PESD3V3L5UV.
(2) PESD5V0L5UV.
f = 1 MHz; T_{amb} = 25 °C.

Fig.6 Diode capacitance as a function of reverse voltage; typical values.

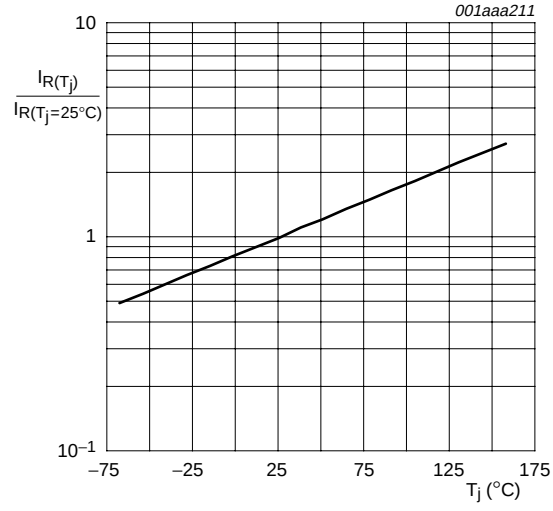
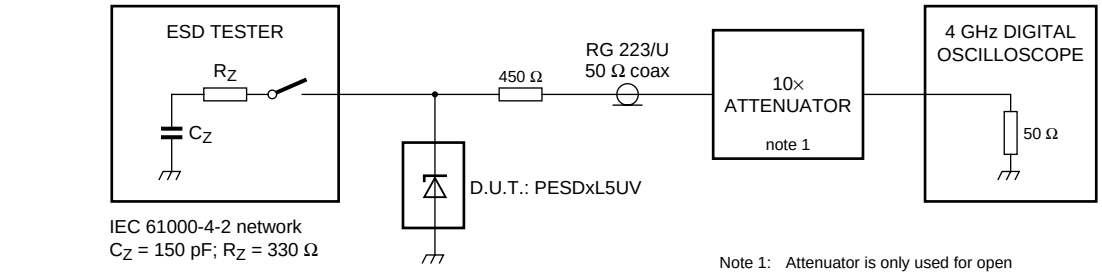
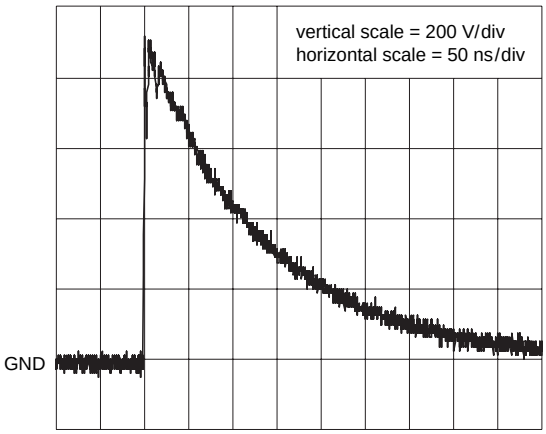


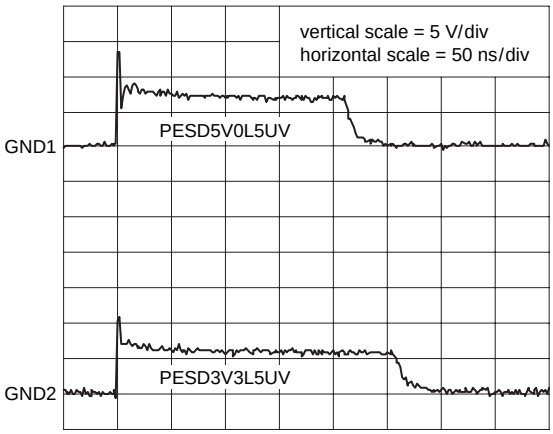
Fig.7 Relative variation of reverse leakage current as a function of junction temperature; typical values.



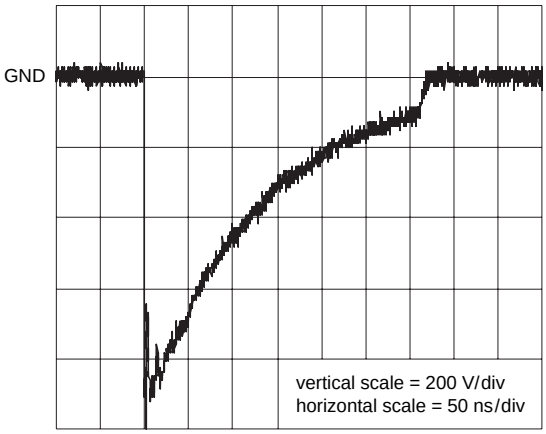
Note 1: Attenuator is only used for open socket high voltage measurements



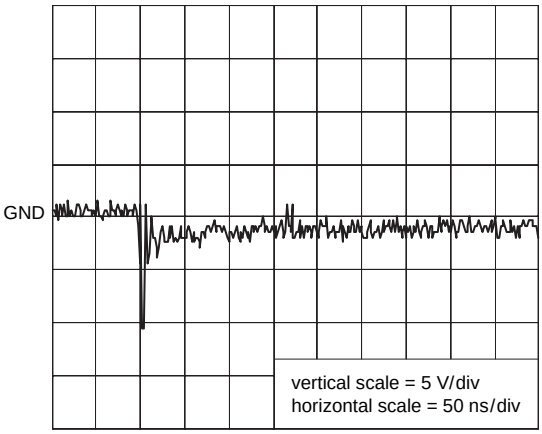
unclamped +1 kV ESD voltage waveform (IEC61000-4-2 network)



clamped +1 kV ESD voltage waveform (IEC61000-4-2 network)



unclamped −1 kV ESD voltage waveform (IEC61000-4-2 network)



clamped −1 kV ESD voltage waveform (IEC61000-4-2 network)

001aaa219

Fig.8 ESD clamping test setup and waveforms.

APPLICATION INFORMATION

The PESDxL5UV is designed for the uni-directional protection of up to five lines or bi-directional protection of four lines from the damage caused by Electrostatic Discharge (ESD) and surge pulses. The PESDxL5UV may be used on lines where the signal polarities are above or below ground. PESDxL5UV can withstand and provides protection from a surge of 25 watts peak pulse power per line for a 8/20 μs waveform.

Typical application

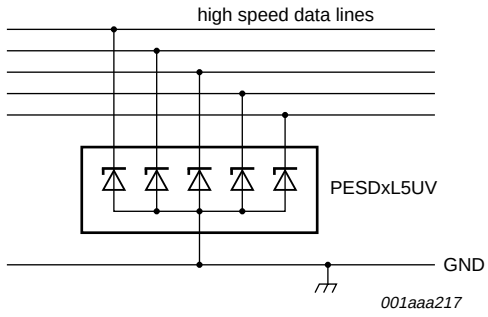


Fig.9 Typical application for uni-directional protection of five lines.

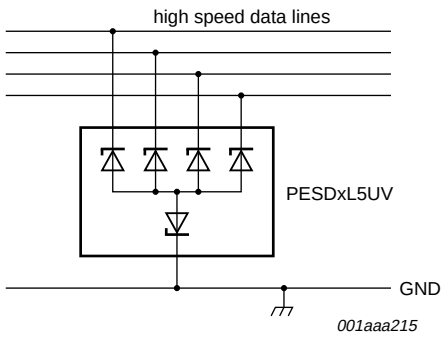


Fig.10 Typical application for bi-directional protection of four lines.

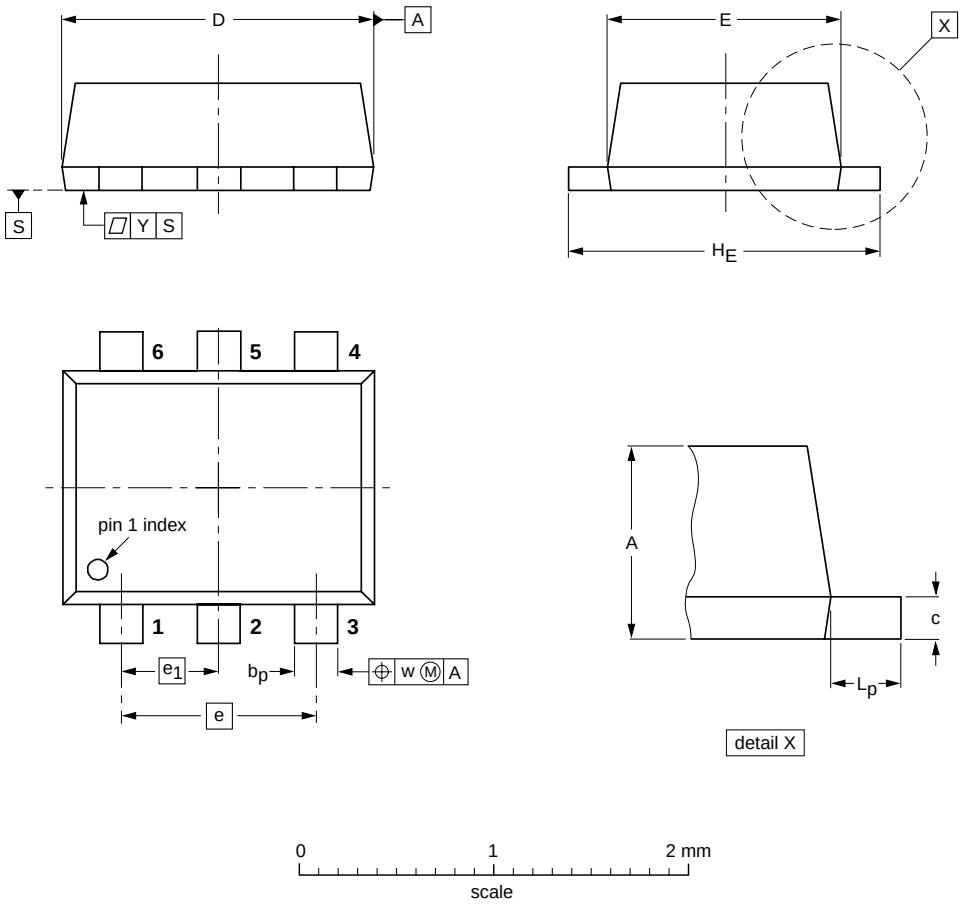
Circuit board layout and protection device placement

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

1. The protection device should be placed as closely as possible to the input terminal or connector.
2. The path length between the protection device and the protected line should be as short as possible.
3. Parallel signal paths should be kept to a minimum.
4. Running protection conductors in parallel with unprotected conductor should be avoided.
5. All printed-circuit board conductive loops (including power and group loops) should be kept to a minimum.
6. The length of the transient return path to ground should be kept to a minimum.
7. The use of shared transient return paths to a common ground point should be avoided.
8. Ground planes should be used whenever possible.
9. For multilayer printed-circuit boards, ground vias should be used.

PACKAGE OUTLINE

Plastic surface mounted package; 6 leads **SOT666**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b_p	c	D	E	e	e_1	H_E	L_p	w	y
mm	0.6 0.5	0.27 0.17	0.18 0.08	1.7 1.5	1.3 1.1	1.0	0.5	1.7 1.5	0.3 0.1	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT666						~~01-01-04~~ 01-08-27

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS(1)	PRODUCT STATUS(2)(3)	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.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

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2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.
3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

DEFINITIONS

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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