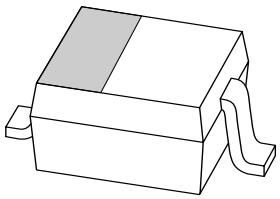
DATA SHEET



PESD5V0S1BA

Low capacitance bi-directional ESD protection diode in SOD323

Product specification

2004 Mar 22

Philips Semiconductors

PHILIPS

Low capacitance bi-directional ESD protection diode in SOD323

PESD5V0S1BA

FEATURES

- Bi-directional ESD protection of one line
- Low diode capacitance
- Max. peak pulse power: P_{pp} = 130 W at t_P = 8/20 µs
- Low clamping voltage: $V_{(CL)R}$ = 14 V at I_{pp} = 12 A
- Ultra low leakage current: I_{RM} = 5 nA at V_{RWM} = 5 V
- ESD protection 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC-61000-4-5 (surge); I_{pp} = 12 A at t_P = 8/20 µs.

APPLICATIONS

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

DESCRIPTION

Low capacitance ESD protection diode in a very small SOD323 plastic package, designed to protect one data line from ElectroStatic Discharge (ESD) damage.

MARKING

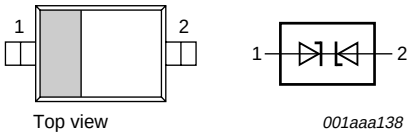
TYPE NUMBER	MARKING CODE
PESD5V0S1BA	E6

QUICK REFERENCE DATA

SYMBOL	PARAMETER	VALUE	UNIT
V_{RWM}	reverse standoff voltage	5	V
C_d	diode capacitance; f = 1 MHz; V_R = 0 V	35	pF
	number of protected lines	1	

PINNING

PIN	DESCRIPTION
1	anode 1
2	anode 2



The marking bar indicates pin 1 (cathodes are connected internally).

Fig.1 Simplified outline (SOD323) and symbol.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PESD5V0S1BA	–	plastic surface mounted package; 2 leads	SOD323

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	–	130	W
I_{pp}	peak pulse current	8/20 μs pulse; notes 1 and 2	–	12	A
T_j	junction temperature		–	150	°C
T_{amb}	operating 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 pin 1 to pin 2.

ESD maximum ratings

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
ESD	electrostatic discharge capability	IEC 61000-4-2 (contact discharge); notes 1 and 2	30	kV
		HBM MIL-Std 883	10	kV

Notes

1. Measured from pin 1 to pin 2.
2. Device stressed with ten non-repetitive ElectroStatic Discharge (ESD) pulses; see Fig.3.

ESD standards compliance

IEC 61000-4-2; level 4 (ESD); see Fig.2	>15 kV (air); >8 kV (contact)
HBM MIL-Std 883; class 3	>4 kV

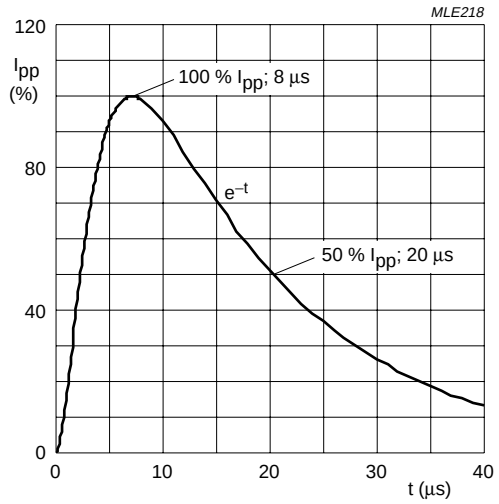


Fig.2 8/20 µs pulse waveform according to IEC 61000-4-5.

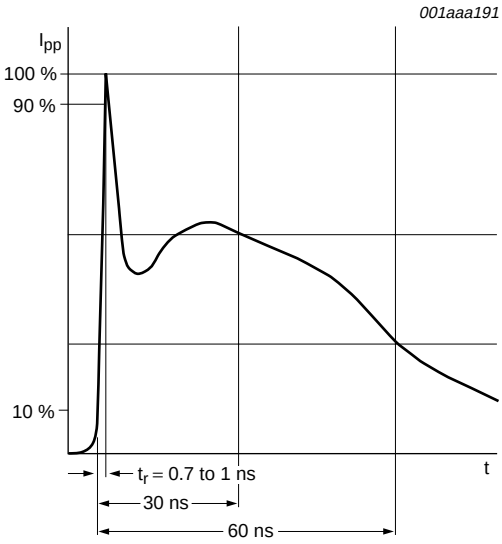


Fig.3 Electrostatic discharge (ESD) pulse waveform according to IEC 61000-4-2.

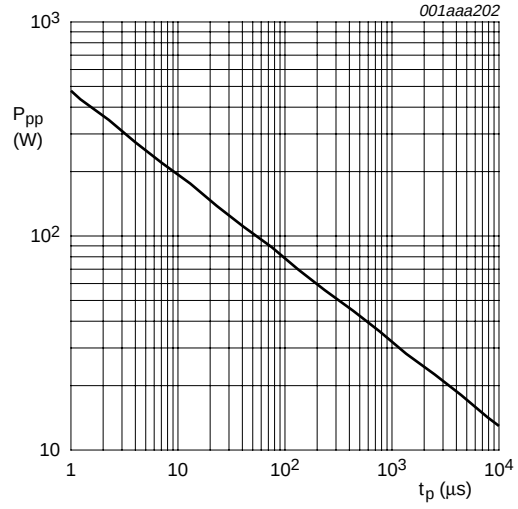
ELECTRICAL CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per diode						
V_{RWM}	reverse standoff voltage		–	–	5	V
I_{RM}	reverse leakage current	V_{RWM} = 5 V	–	5	100	nA
$V_{(CL)R}$	clamping voltage	note 1				
		I_{pp} = 1 A; note 2	–	–	10	V
		I_{pp} = 12 A; note 2	–	–	14	V
V_{BR}	breakdown voltage	I_R = 1 mA	5.5	–	9.5	V
r_{diff}	differential resistant	I_R = 1 mA	–	–	50	Ω
C_d	diode capacitance	f = 1 MHz; V_R = 0 V	–	35	45	pF

Notes

1. Non-repetitive current pulse 8/20 μs exponentially decaying waveform; see Fig.2.
2. Measured from pin 1 to pin 2.



T_{amb} = 25 °C.

Fig.4 Peak pulse power as a function of 8/20 μs exponentially decaying waveform (see Fig.2); typical values.

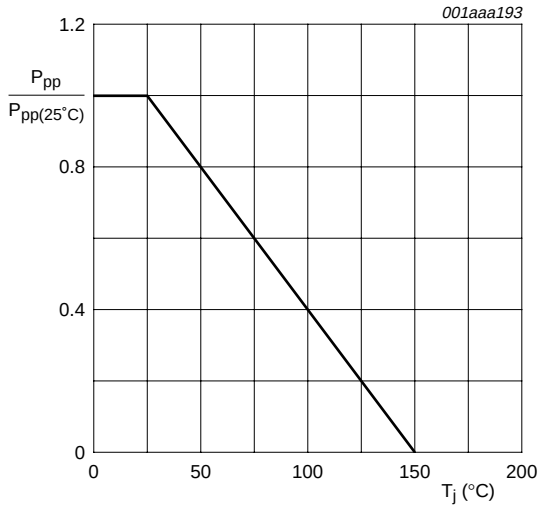
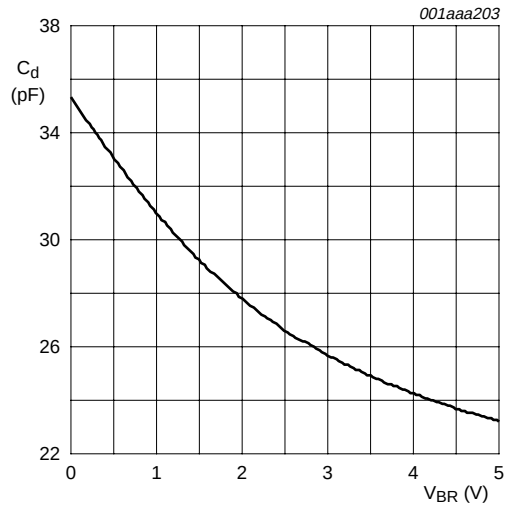
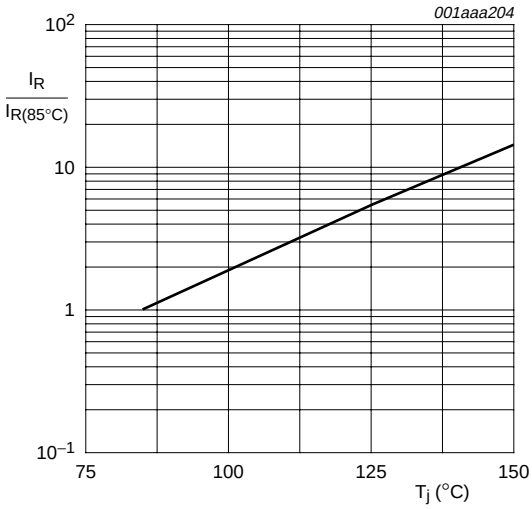


Fig.5 Relative variation of peak pulse power as a function of junction temperature; typical values.



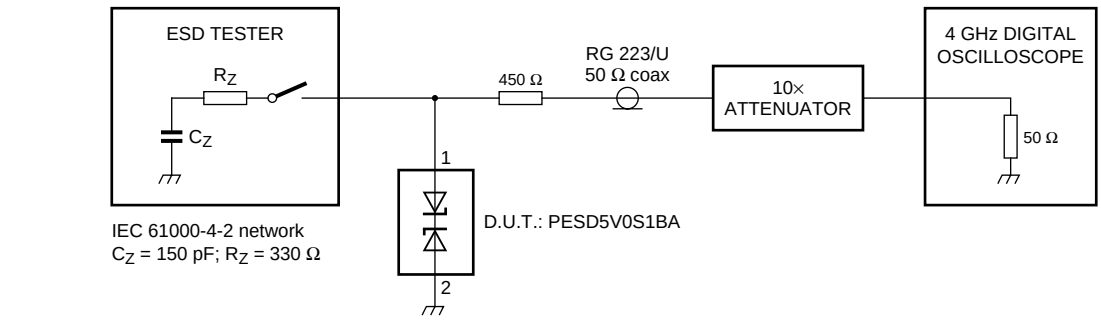
T_{amb} = 25 °C; f = 1 MHz.

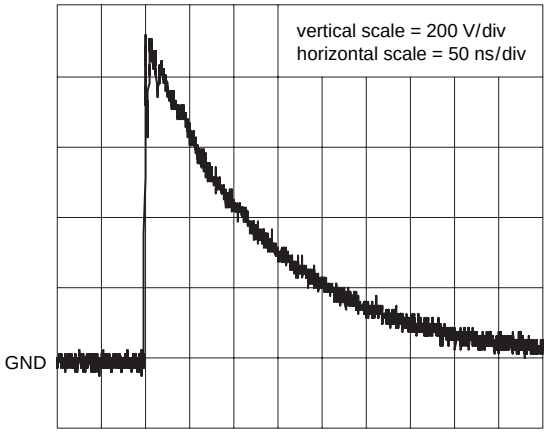
Fig.6 Diode capacitance as a function of reverse voltage; typical values.



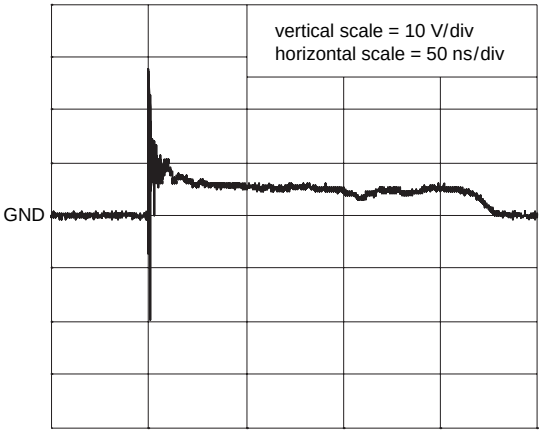
I_R < 1 nA at 25 °C.

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

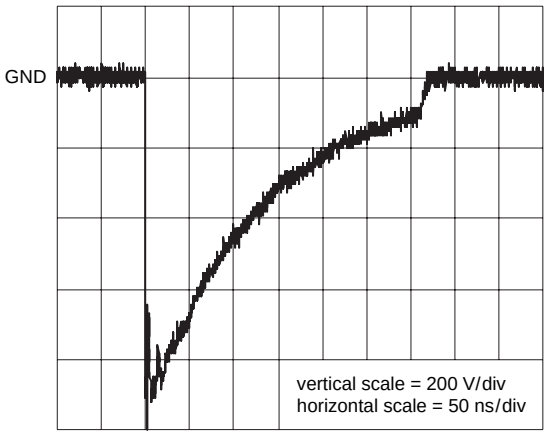




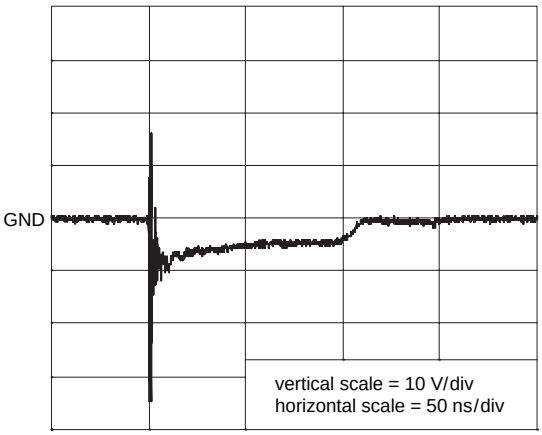
unclamped +1 kV ESD voltage waveform
(IEC61000-4-2 network)



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)

001aaa139

Fig.8 ESD clamping test set-up and waveforms.

APPLICATION INFORMATION

The PESD5V0S1BA is designed for bi-directional protection of one line against damage caused by ElectroStatic Discharge (ESD) and surge pulses. The PESD5V0S1BA may be used on lines where the signal polarities are above and below ground. The PESD5V0S1BA provides a surge capability of 130 W (P_{pp}) for an 8/20 μs waveform.

Typical application

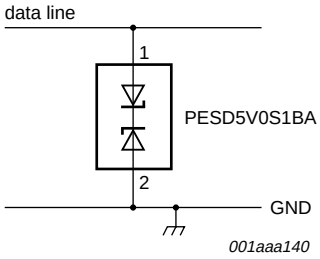


Fig.9 Bi-directional ESD protection of one data line.

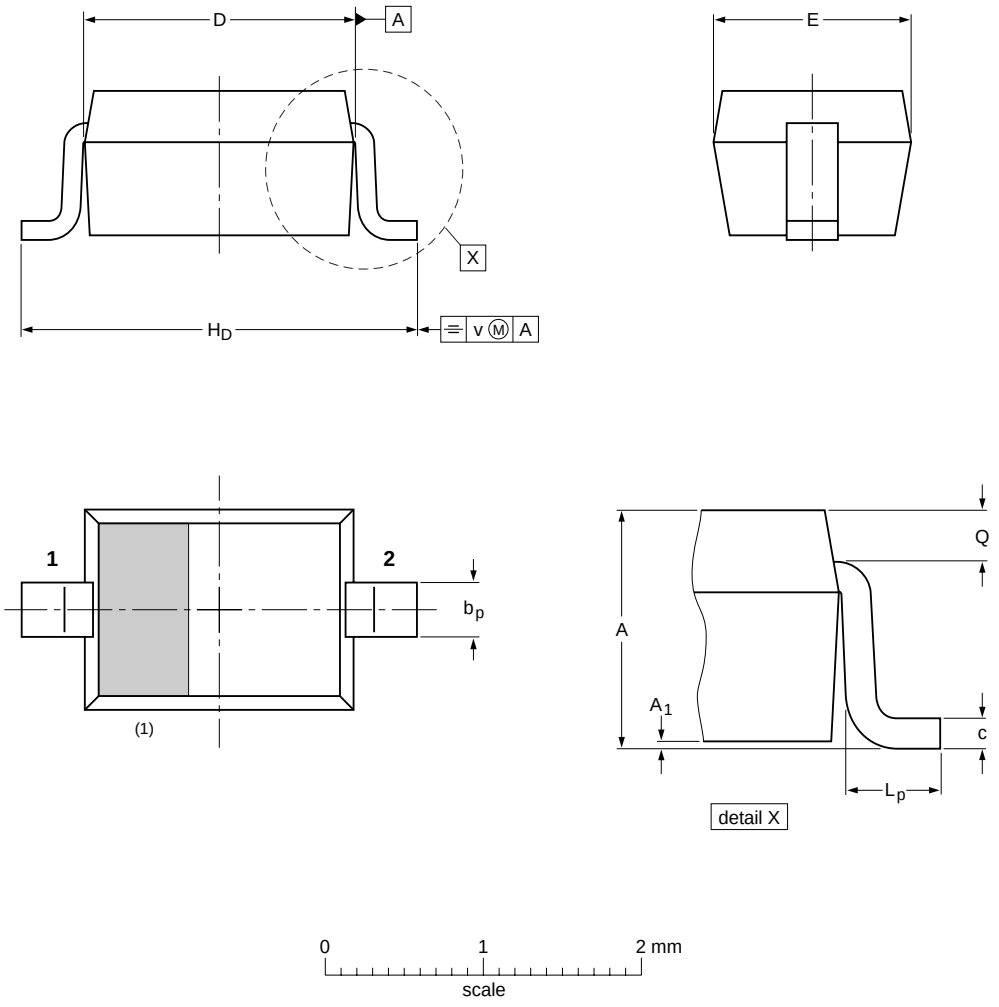
Circuit board layout and protection device placement

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

- Place the PESD5V0S1BA as close as possible to the input terminal or connector as possible
- The path length between the PESD5V0S1BA and the protected line should be minimized
- Keep parallel signal paths to a minimum
- Avoid running protected conductors in parallel with unprotected conductors
- Minimize all printed-circuit board conductive loops including power and group loops
- Minimize the length of the transient return path to ground
- Avoid using shared return paths to a common ground point
- Ground planes should be used whenever possible. For multilayer printed-circuit boards, use ground vias.

PACKAGE OUTLINE

Plastic surface mounted package; 2 leads **SOD323**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	H_D	L_p	Q	v
mm	1.1 0.8	0.05	0.40 0.25	0.25 0.10	1.8 1.6	1.35 1.15	2.7 2.3	0.45 0.15	0.25 0.15	0.2

Note
1. The marking bar indicates the cathode

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOD323			SC-76			~~99-09-13~~ 03-12-17

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.
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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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