PESD12VS1UB

ESD protection diode in SOD523 package

2 May 2024 Product data sheet

1. General description

Unidirectional ElectroStatic Discharge (ESD) protection diode in a SOD523 plastic package, designed to protect one transmission or data line from the damage caused by ESD and other transients.

2. Features and benefits

- Unidirectional ESD protection of one line
- Low clamping voltage: V_{CL} = 35 V at I_{PPM} = 5 A
- ESD protection up to 30 kV
- IEC 61000-4-5 (surge); I_{PPM} = 5 A at t_p = 8/20 µs

3. Application information

- Computers and peripherals
- Communication systems
- Audio and video equipment
- Data lines

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	12	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	38	75	pF

nexperia

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 SC-79 (SOD523)	 sym035
2	A	anode		

[1] The marking bar indicates pin 1.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD12VS1UB	SC-79	plastic, surface-mounted package; 2 leads; 1.2 mm x 0.8 mm x 0.6 mm body	SOD523

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD12VS1UB	N3

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P_{PPM}	rated peak pulse power	t_p = 8/20 µs	[1]	-	180	W
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1]	-	5	A
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C
ESD maximum ratings						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[2]	-	30	kV
		MIL-STD-883; human body model (HBM)		-	10	kV

[1] Non-repetitive current pulse 8/20 µs exponentially decay waveform.
[2] Device stressed with ten non-repetitive ESD pulses.

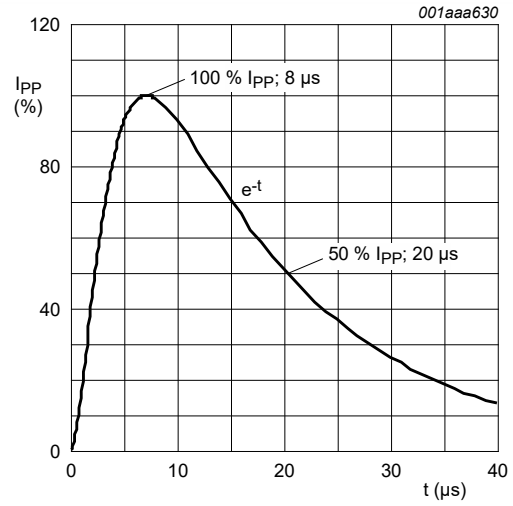


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

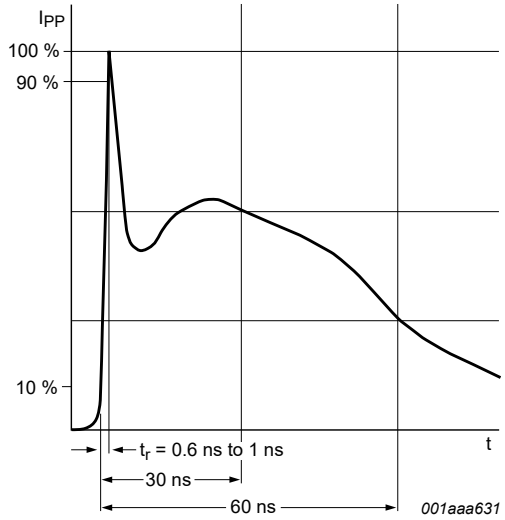


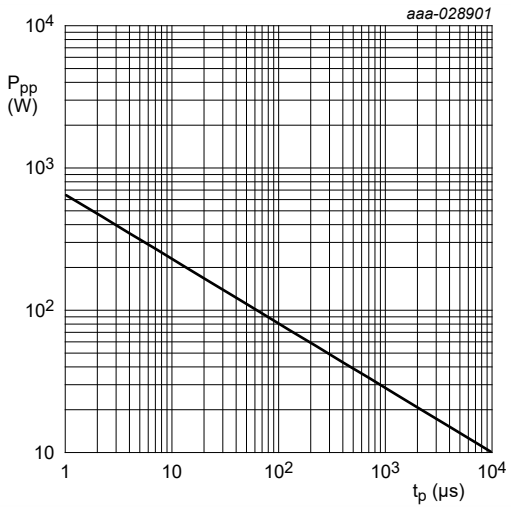
Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	12	V
V_{BR}	breakdown voltage	I_R = 5 mA; T_{amb} = 25 °C		14.7	15	15.3	V
I_{RM}	reverse leakage current	V_{RWM} = 12 V; T_{amb} = 25 °C		-	1	50	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	38	75	pF
V_{CL}	clamping voltage	I_{PP} = 1 A; T_{amb} = 25 °C	[1]	-	-	19	V
		I_{PPM} = 5 A; T_{amb} = 25 °C	[1]	-	-	35	V
R_{diff}	differential resistance	I_R = 1 mA; T_{amb} = 25 °C		-	-	200	Ω

[1] Non-repetitive current pulse 8/20 µs exponentially decay waveform.



T_{amb} = 25 °C
t_p = 8/20 µs exponentially decay waveform.

Fig. 3. Peak pulse power dissipation as a function of pulse time; typical values

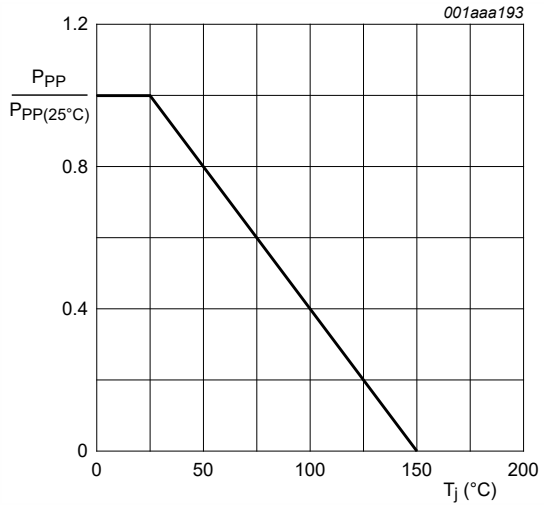
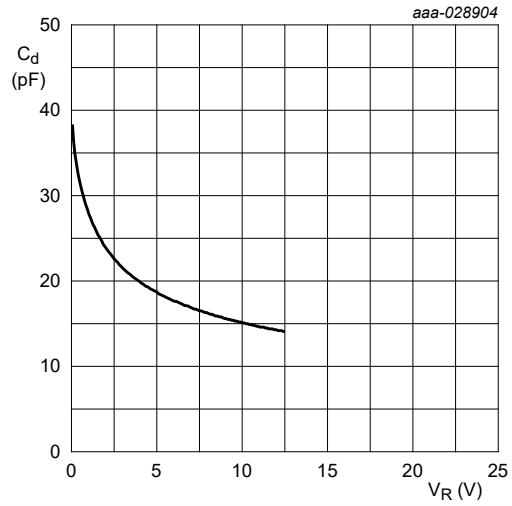
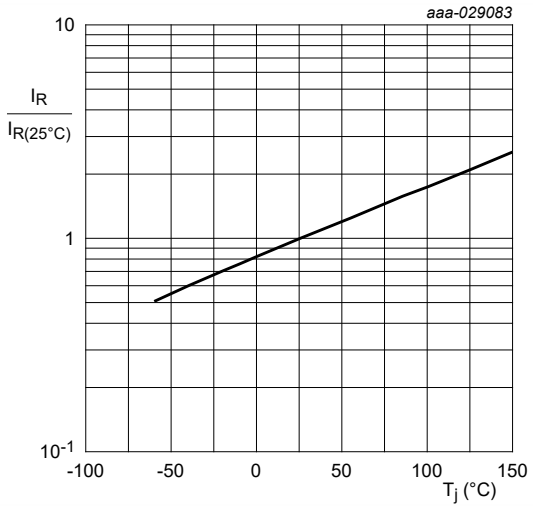


Fig. 4. Relative variation of peak pulse power as a function of junction temperature; typical values



f = 1 MHz; T_{amb} = 25 °C

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



I_R is less than 10 nA at 150 °C
V_{RWM} = 12 V

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

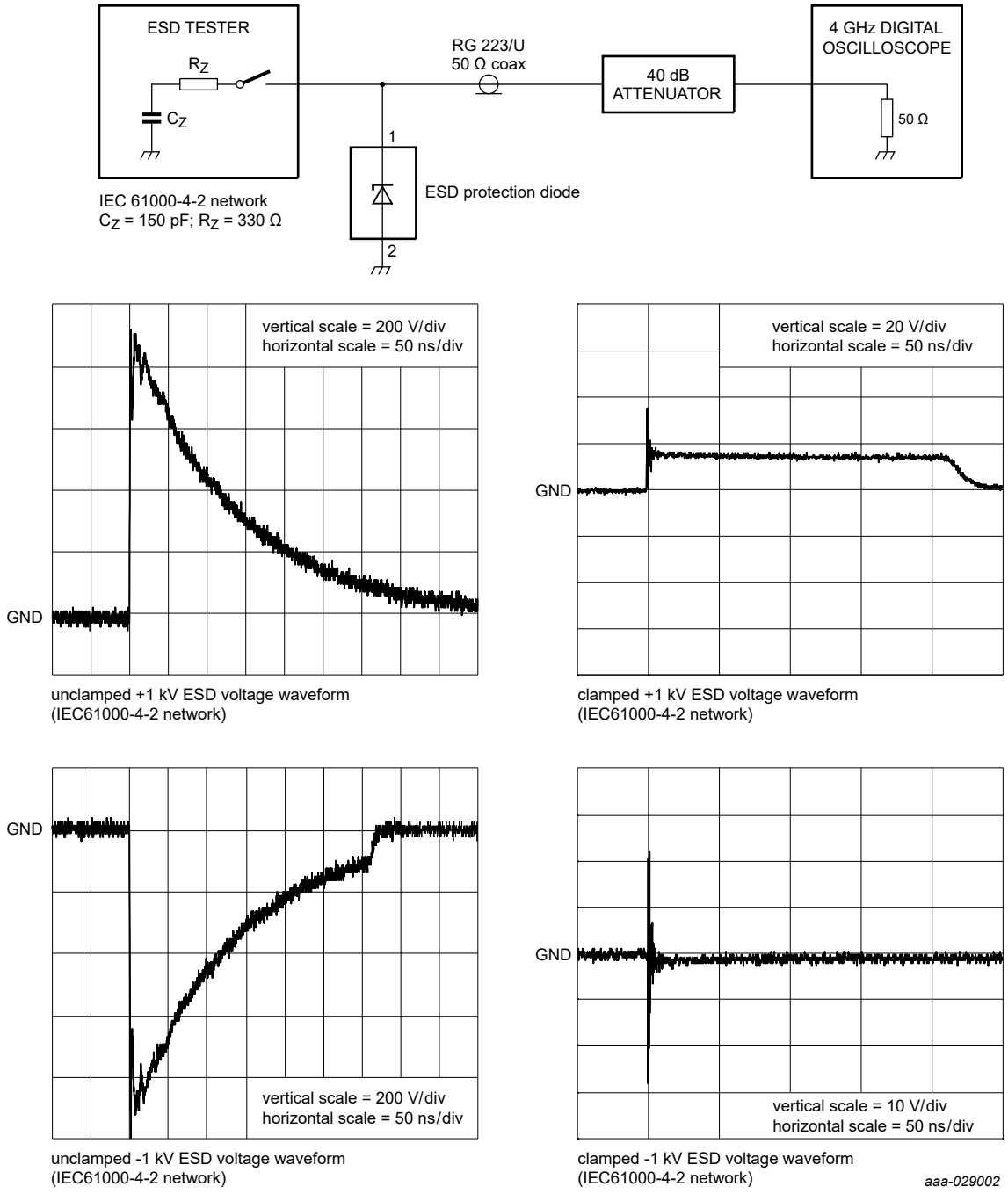


Fig. 7. ESD clamping test setup and waveforms

10. Application information

The device is designed for protection of one unidirectional data or signal line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are either positive or negative with respect to ground.

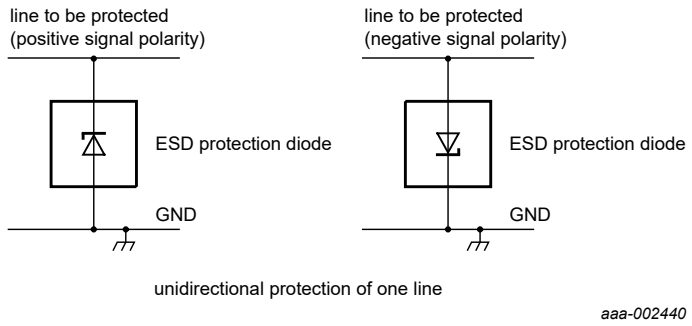


Fig. 8. Application diagram

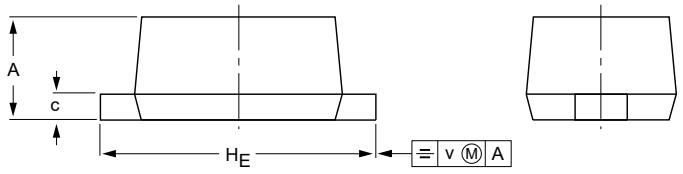
Circuit board layout and protection device placement

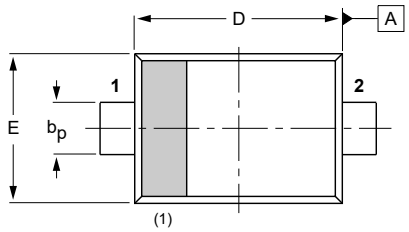
Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

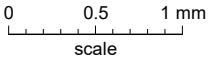
1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit 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. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

11. Package outline

Plastic surface-mounted package; 2 leads **SOD523**







DIMENSIONS (mm are the original dimensions)

UNIT	A	b_p	c	D	E	H_E	v
mm	0.65 0.58	0.34 0.26	0.17 0.11	1.25 1.15	0.85 0.75	1.65 1.55	0.1

Note

1. The marking bar indicates the cathode.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOD523			SC-79			~~02-12-13~~ 06-03-16

Fig. 9. Package outline SC-79 (SOD523)

12. Soldering

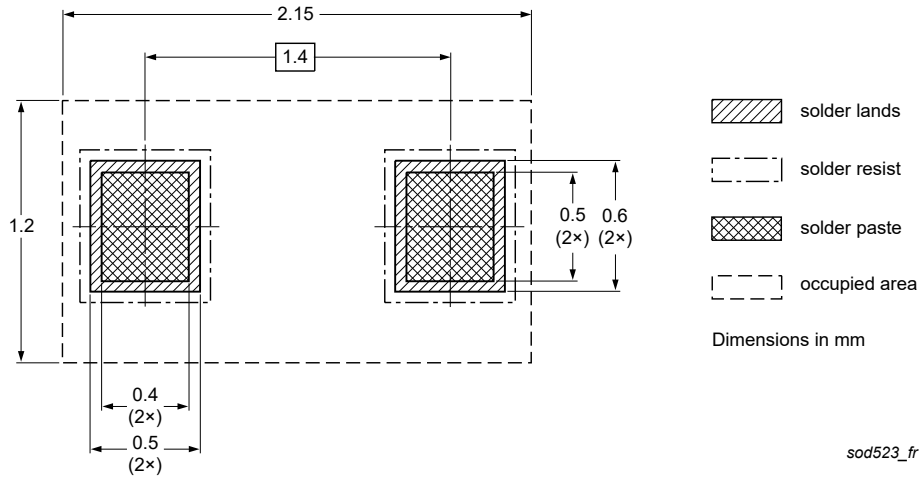


Fig. 10. Reflow soldering footprint for SC-79 (SOD523)

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD12VS1UB v.4	20240502	Product data sheet	-	PESD12VS1UB v.3
Modifications:	• Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). • Chapter "Characteristics": Typo correction on Fig. 3, unit "ms" changed to "µs"			
PESD12VS1UB v.3	20181129	Product data sheet	-	PESDXS1UB_SERIES_2
PESDXS1UB_SERIES_2	20090824	Product data sheet	-	PESDXS1UB_SERIES_1
PESDXS1UB_SERIES_1	20040614	Product data sheet	-	-

14. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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".
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