PESD5Z5.0

Low capacitance unidirectional ESD protection diodes

6 April 2021 Product data sheet

1. General description

Low capacitance unidirectional ElectroStatic Discharge (ESD) protection diode in a SOD523 (SC-79) ultra small and flat lead Surface-Mounted Device (SMD) plastic package designed to protect one signal line from the damage caused by ESD and other transients.

2. Features and benefits

- ESD protection of one line
- Low diode capacitance
- Max. peak pulse power: P_{PPM} = 180 W
- Low clamping voltage: V_{CL} = 12 V
- Low leakage current: I_{RM} = 5 nA
- ESD protection up to 30 kV (IEC 61000-4-2)
- IEC 61000-4-5 (surge); I_{PPM} = 10 A

3. Application information

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- 10/100/1000 Mbit/s Ethernet
- Communication systems
- Portable electronics
- SIM card protection
- High-speed 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		-	-	5	V
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1] [2]	-	-	10	A
V_{CL}	clamping voltage	I_{PP} = 10 A; T_{amb} = 25 °C	[1] [2]	-	-	18	V

[1] Non-repetitive current pulse 8/20 µs exponentially decaying waveform according to IEC 61000-4-5.
[2] Measured from pin 1 to pin 2.

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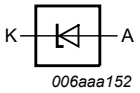
5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5Z5.0	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
PESD5Z5.0	N9

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] [2]	-	180	W
I_{PPM}	rated peak pulse current		[1] [2]	-	10	A
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C
ESD maximum ratings						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[3] [2]	-	30	kV
		HBM MIL-STD 883 (human body model)		-	10	kV
		machine model		-	400	V

[1] Non-repetitive current pulse 8/20 µs exponentially decaying waveform according to IEC 61000-4-5.
[2] Measured from pin 1 to pin 2.
[3] Device stressed with ten non-repetitive ESD pulses.

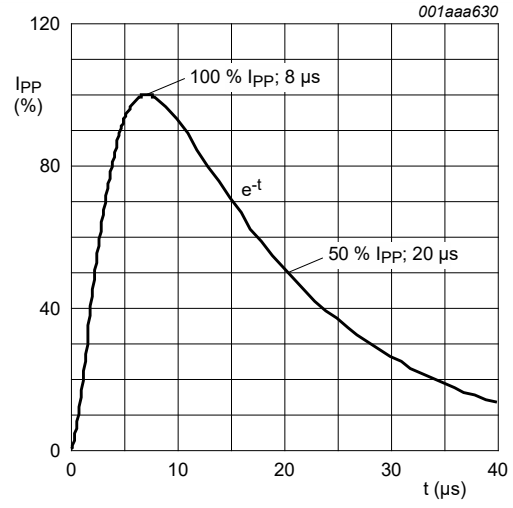


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

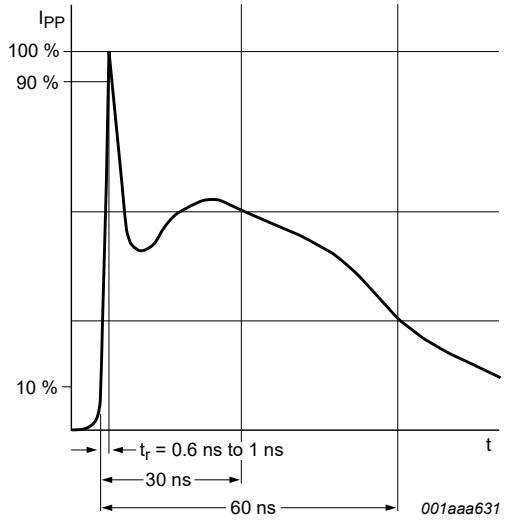


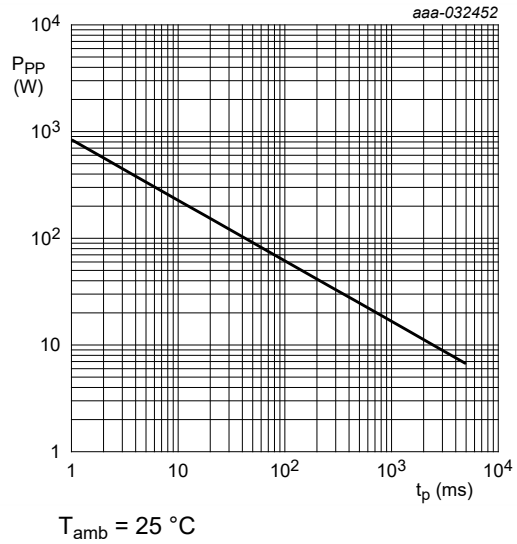
Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	5	V
V_{BR}	breakdown voltage	I_R = 1 mA; T_{amb} = 25 °C		6.2	-	-	V
I_{RM}	reverse leakage current	V_{RWM} = 5 V; T_{amb} = 25 °C		-	5	50	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	89	150	pF
V_{CL}	clamping voltage	I_{PP} = 5 A; T_{amb} = 25 °C	[1] [2]	-	12	13	V
		I_{PP} = 10 A; T_{amb} = 25 °C	[1] [2]	-	-	18	V
r_{dif}	differential resistance	I_R = 5 mA; T_{amb} = 25 °C		-	-	15	Ω

[1] Non-repetitive current pulse 8/20 µs exponentially decaying waveform according to IEC 61000-4-5.
[2] Measured from pin 1 to pin 2.



T_{amb} = 25 °C

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

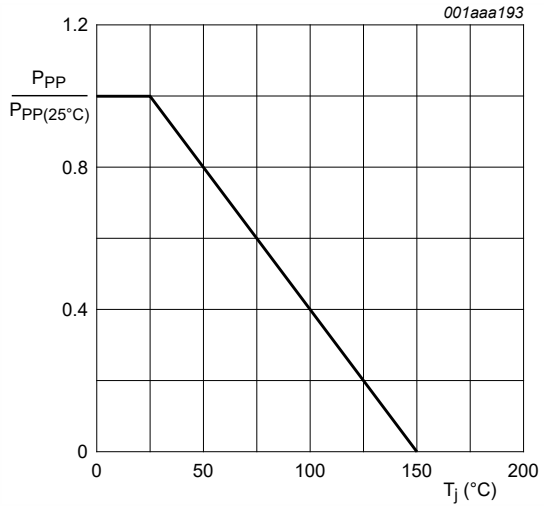


Fig. 4. Relative variation of peak pulse power as a function of junction temperature; typical values

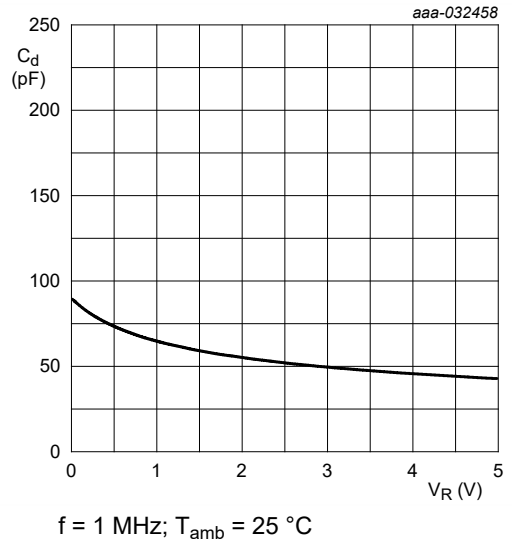


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

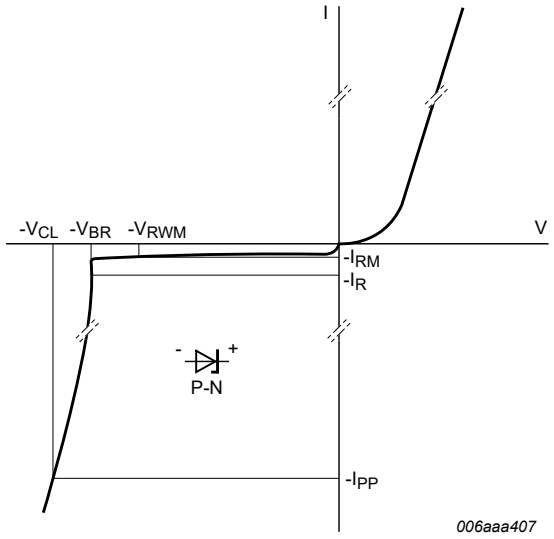


Fig. 6. V-I characteristics for a unidirectional ESD protection diode

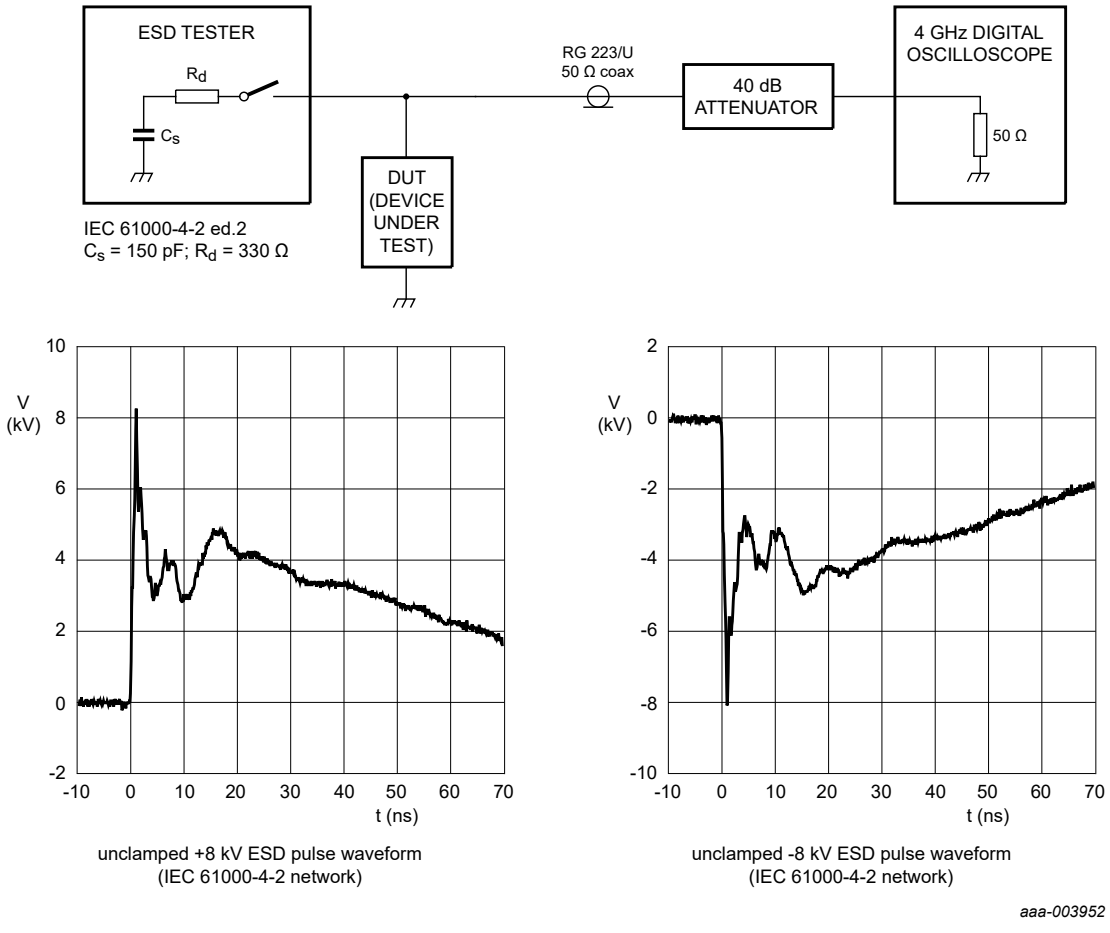


Fig. 7. ESD clamping test setup and waveforms

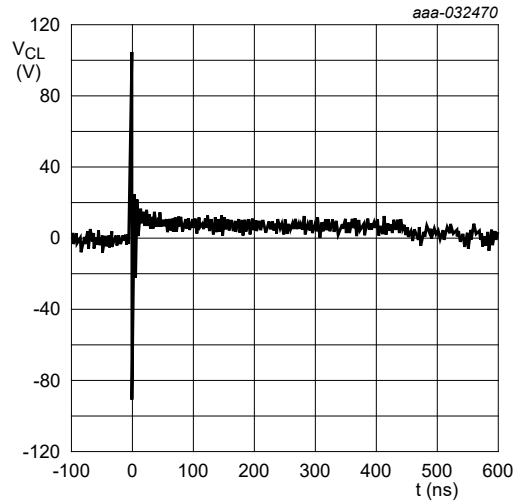


Fig. 8. Clamped +8 kV ESD pulse waveform (IEC 61000-4-2 network)

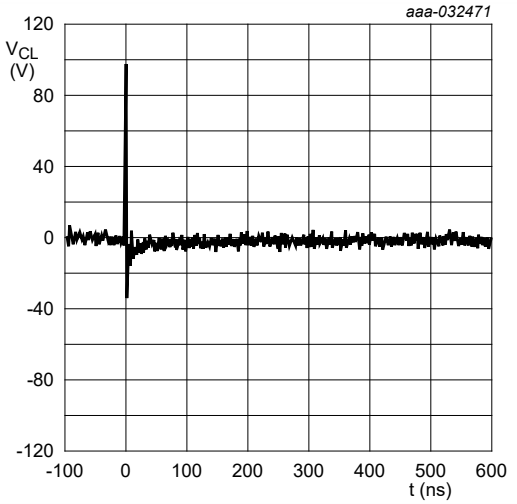


Fig. 9. Clamped -8 kV ESD pulse waveform (IEC 61000-4-2 network)

10. Application information

The device is designed for the protection of one unidirectional data or signal line from the damage caused by ESD and surge pulses. The device may be used on lines where the signal polarities are either positive or negative with respect to ground. The device provides a surge capability of 260 W per line for an 8/20 µs waveform.

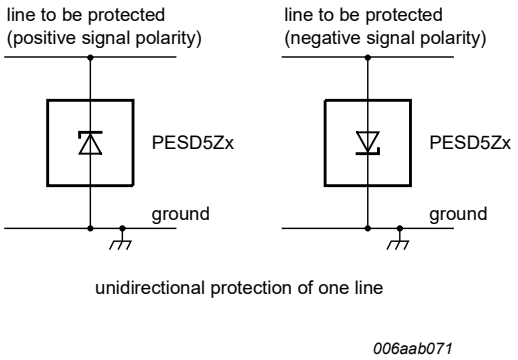


Fig. 10. Unidirectional protection of one line

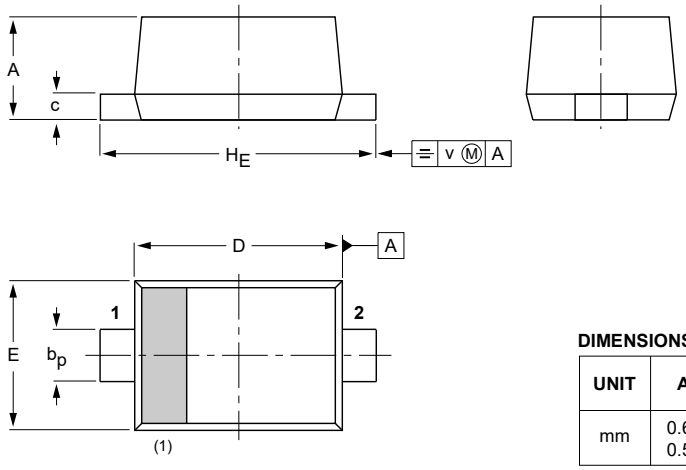
Circuit board layout and protection device placement

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. The path length between the device and the protected line should be minimized.
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. 11. Package outline SC-79 (SOD523)

12. Soldering

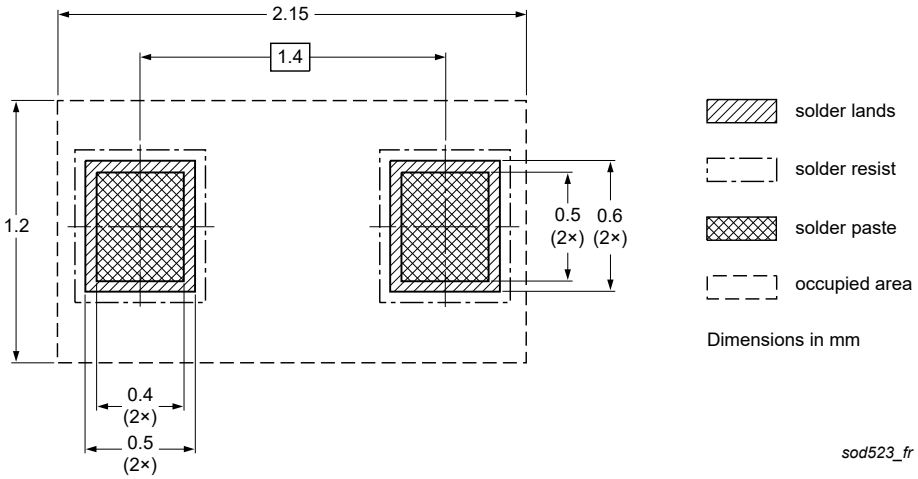


Fig. 12. Reflow soldering footprint for SC-79 (SOD523)

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD5Z5_0 v.3	20210406	Product data sheet	-	PESD5ZX_SER_2
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Family data sheet reduced to single type data sheet. • Figure "ESD clamping test setup and waveforms" updated. • Figure "Reflow soldering footprint for SOD523" updated.			
PESD5ZX_SER_2	20080404	Product data sheet	-	PESD5ZX_SER_1
PESD5ZX_SER_1	20070813	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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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