

PESD5V0X1UB

Ultra low capacitance unidirectional ESD protection diode

6 April 2021 Product data sheet

1. General description

Ultra 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.

The combination of extremely low capacitance and ultra low clamping voltage makes the device ideal for high-speed data line protection applications.

2. Features and benefits

- ESD protection of one line
- Ultra low diode capacitance C_d = 0.95 pF
- Ultra low clamping voltage: V_{CL} = 8 V
- Ultra low leakage current: I_{RM} = 1 nA
- ESD protection up to 8 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); I_{PP} = 1.5 A
- AEC-Q101 qualified

3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- 10/100/1000 Mbit/s Ethernet
- Communication systems
- Portable electronics
- Subscriber Identity Module (SIM) card protection
- USB, High-Definition Multimedia Interface (HDMI), FireWire
- High-speed data lines

4. Quick reference data

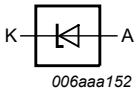
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	5.5	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	0.95	1.1	pF

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5. Pinning information

Table 2. Pinning information

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

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0X1UB	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
PESD5V0X1UB	Y1

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8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1] [2]	-	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); contact discharge	[3] [2]	-	8	kV
		machine model		-	400	V
		HBM MIL-STD883	[2]	-	10	kV

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

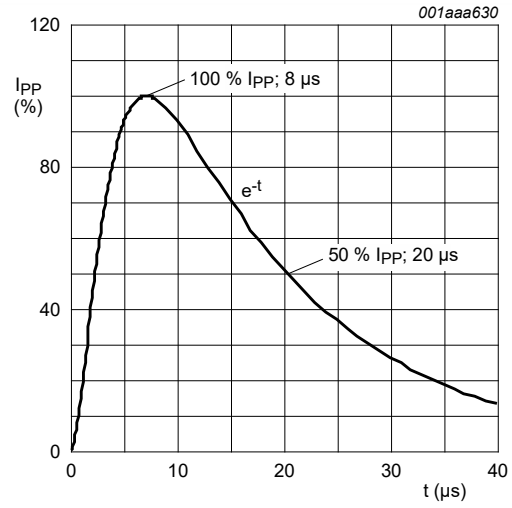


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

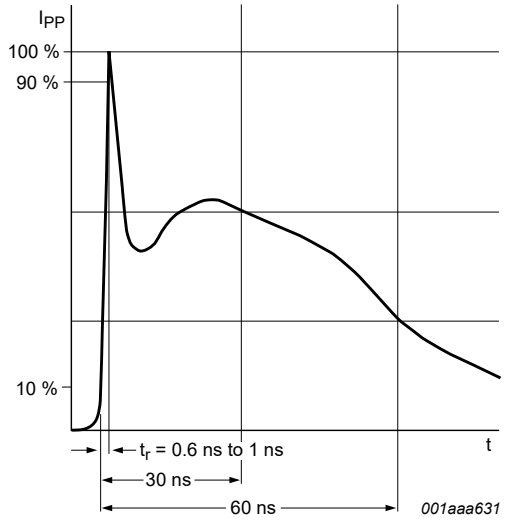


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

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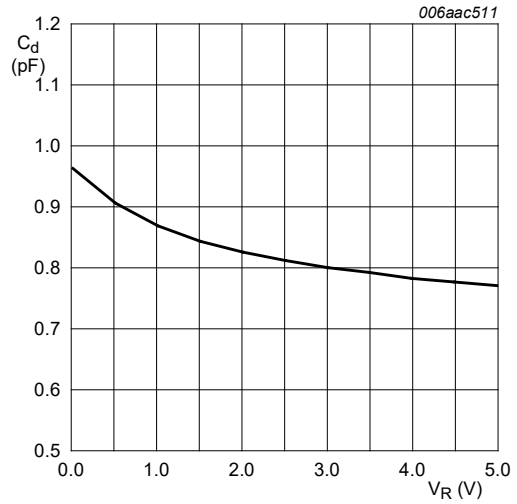
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9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	5.5	V
V_{BR}	breakdown voltage	I_R = 10 mA; T_{amb} = 25 °C		5.8	7.5	10	V
I_{RM}	reverse leakage current	V_{RWM} = 5 V; T_{amb} = 25 °C		-	1	100	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	0.95	1.1	pF
V_{CL}	clamping voltage	I_{PPM} = 1.5 A; T_{amb} = 25 °C	[1] [2]	-	8	-	V
R_{dyn}	dynamic resistance	I_R = 10 A; T_{amb} = 25 °C	[3]	-	0.25	-	Ω

[1] Non-repetitive current pulse 8/20 µs exponentially decay waveform according to IEC 61000-4-5.
[2] Measured from pin 1 to 2.
[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) t_p = 100 ns; square pulse; ANSI / ESD STM5.5.1-2008.



f = 1 MHz; T_{amb} = 25 °C

Fig. 3. Diode capacitance as a function of reverse voltage; typical values

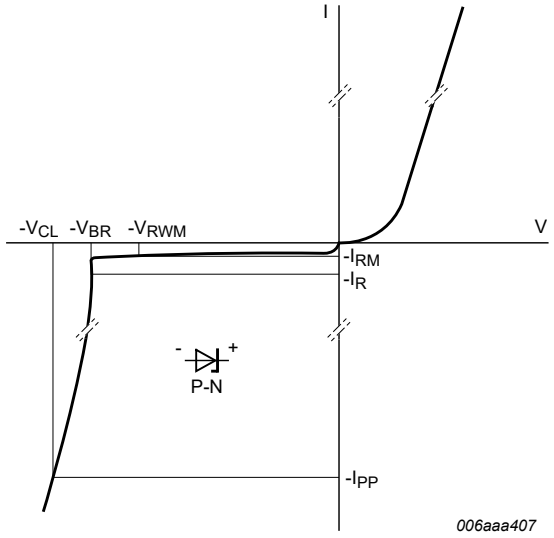


Fig. 4. V-I characteristics for a unidirectional ESD protection diode

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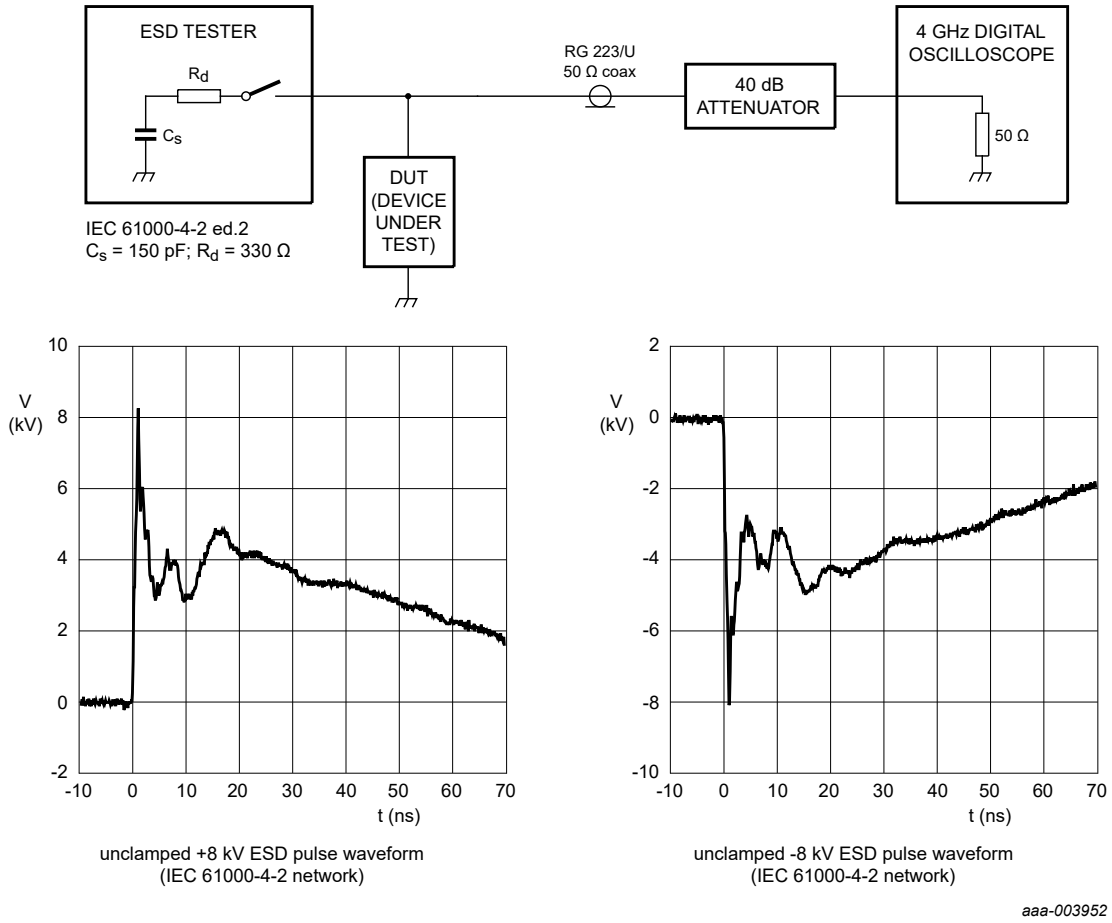


Fig. 5. ESD clamping test setup and waveforms

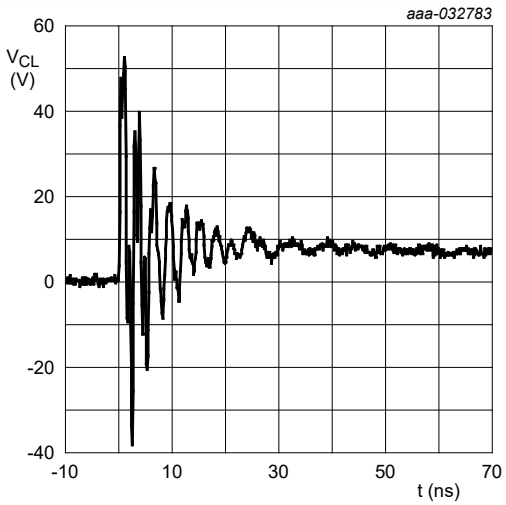


Fig. 6. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

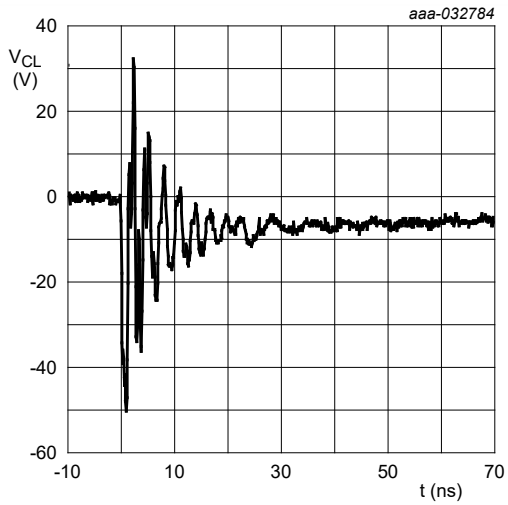


Fig. 7. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

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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.

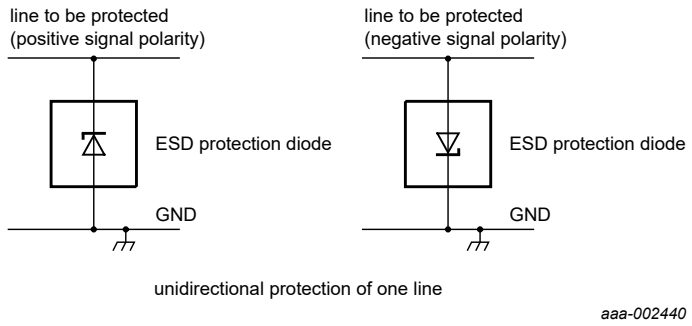


Fig. 8. Application diagram

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. Test information

Quality information

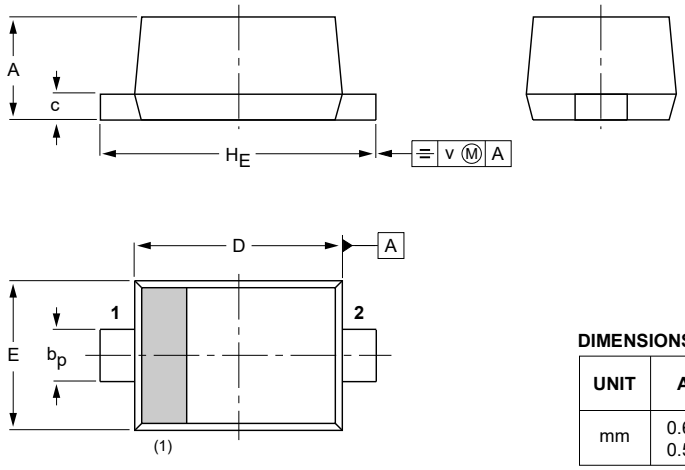
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

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12. 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)

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13. Soldering

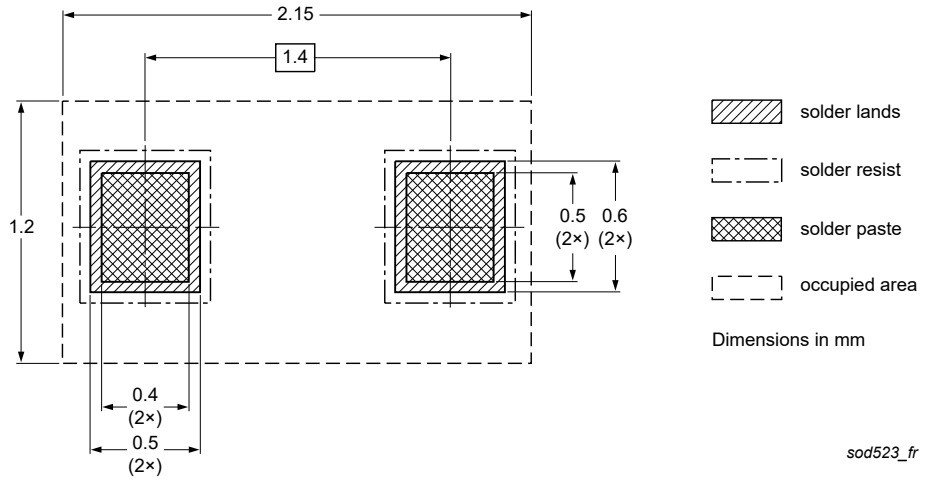


Fig. 10. Reflow soldering footprint for SC-79 (SOD523)

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14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0X1UB v.2	20210406	Product data sheet	-	PESD5V0X1UB v.1
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. • Figure "ESD clamping test setup and waveforms" updated. • Figure "Reflow soldering footprint for SOD523" updated.			
PESD5V0X1UB v.1	20110215	Product data sheet	-	-

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15. 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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