



# PESD12VS1UB

ESD protection diode in SOD523 package

29 November 2018

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:  $V_{CL} = 35\text{ V}$  at  $I_{PPM} = 5\text{ A}$
- ESD protection  $> 30\text{ kV}$
- IEC 61000-4-5 (surge);  $I_{PPM} = 5\text{ A}$  at  $t_p = 8/20\text{ }\mu\text{s}$

## 3. Application information

- Computers and peripherals
- Communication systems
- Audio and video equipment
- Data lines
- CAN bus protection



## 4. Quick reference data

Table 1. Quick reference data

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 SOD523	 <i>sym035</i>
2	A	anode		

[1] The marking bar indicates pin 1.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD12VS1UB	SOD523	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

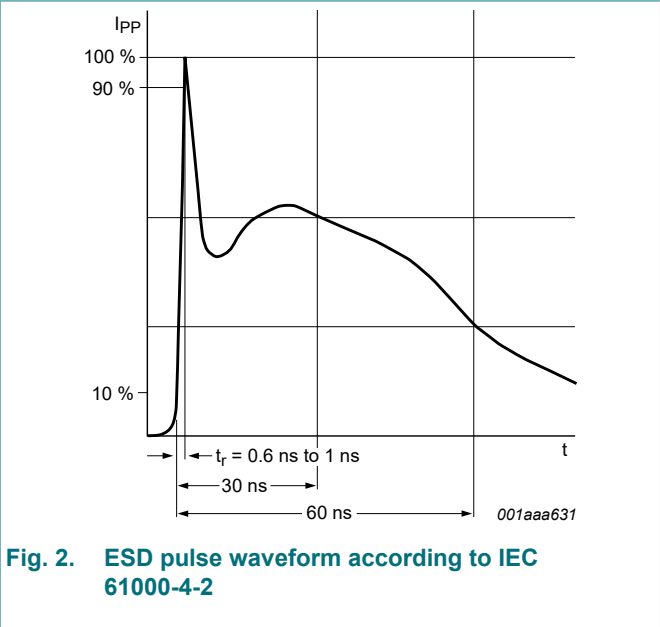
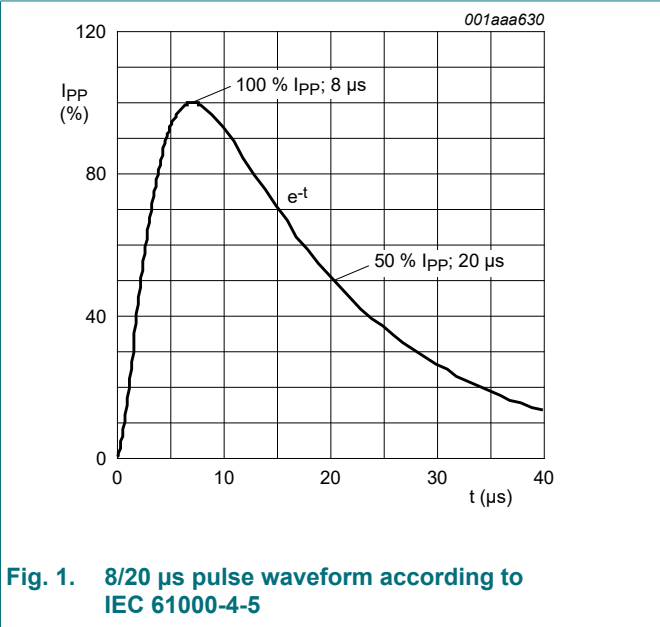
8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
P <sub>PPM</sub>	rated peak pulse power	t <sub>p</sub> = 8/20 μs	[1]	-	180	W
I <sub>PPM</sub>	rated peak pulse current	t <sub>p</sub> = 8/20 μs	[1]	-	5	A
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C
ESD maximum ratings						
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[2]	-	30	kV
		HBM MIL-STD883		-	10	kV

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

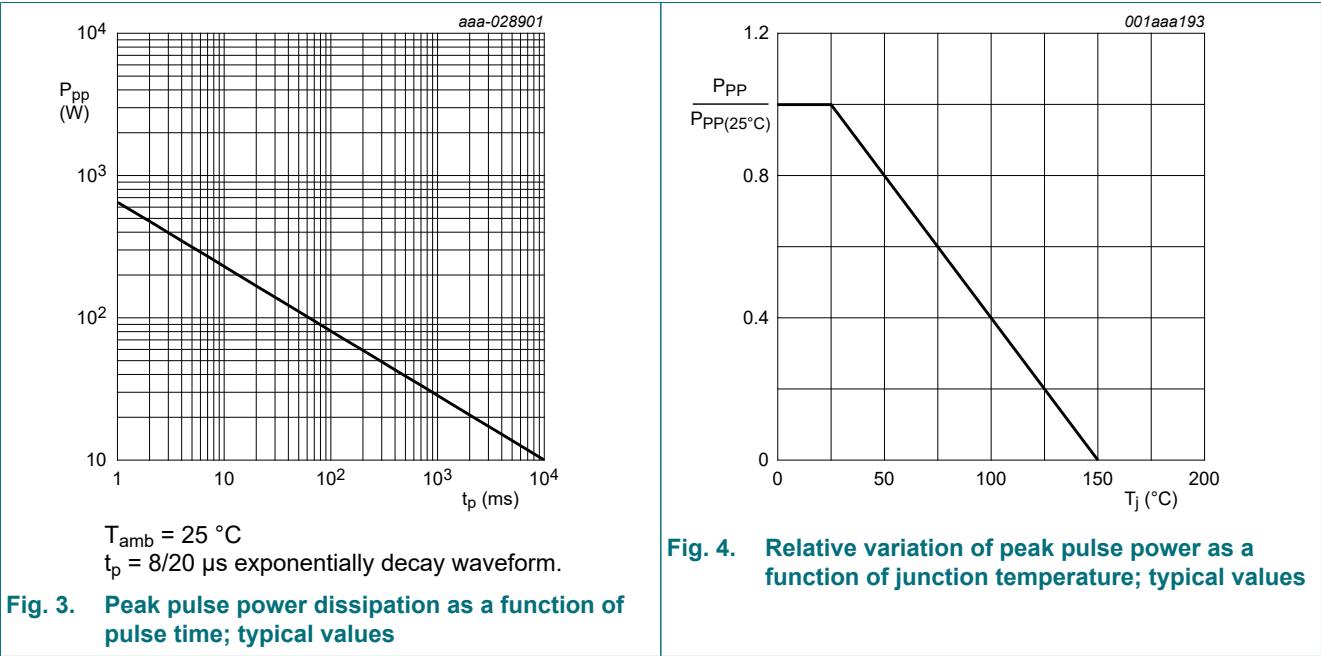


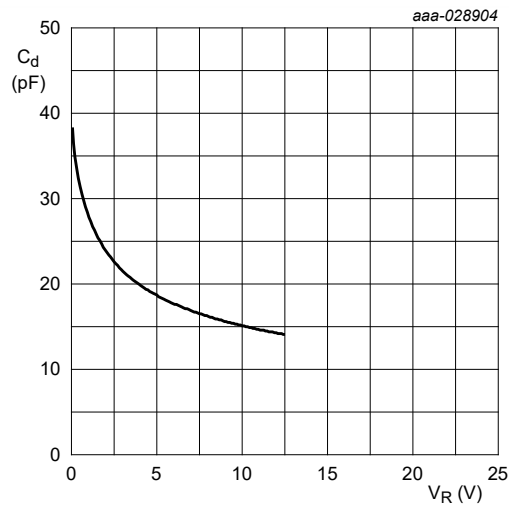
9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V <sub>RWM</sub>	reverse standoff voltage	T <sub>amb</sub> = 25 °C		-	-	12	V
V <sub>BR</sub>	breakdown voltage	I <sub>R</sub> = 5 mA; T <sub>amb</sub> = 25 °C		14.7	15	15.3	V
I <sub>RM</sub>	reverse leakage current	V <sub>RWM</sub> = 12 V; T <sub>amb</sub> = 25 °C		-	1	50	nA
C <sub>d</sub>	diode capacitance	f = 1 MHz; V <sub>R</sub> = 0 V; T <sub>amb</sub> = 25 °C		-	38	75	pF
V <sub>CL</sub>	clamping voltage	I <sub>PPM</sub> = 1 A; T <sub>amb</sub> = 25 °C	[1]	-	-	19	V
		I <sub>PPM</sub> = 5 A; T <sub>amb</sub> = 25 °C	[1]	-	-	35	V
r <sub>dif</sub>	differential resistance	I <sub>R</sub> = 1 mA; T <sub>amb</sub> = 25 °C		-	-	200	Ω

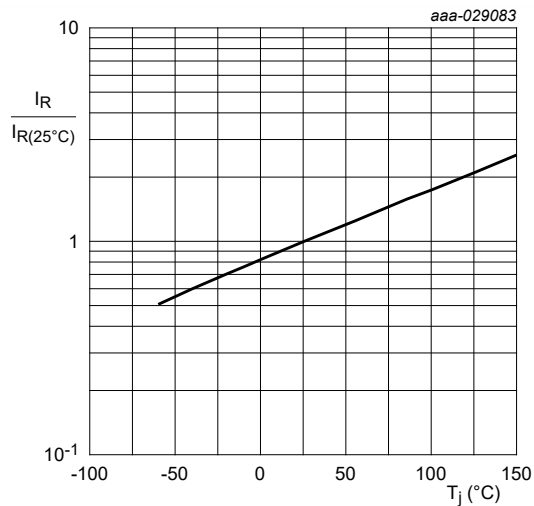
[1] Non-repetitive current pulse 8/20 μs exponentially decay waveform.





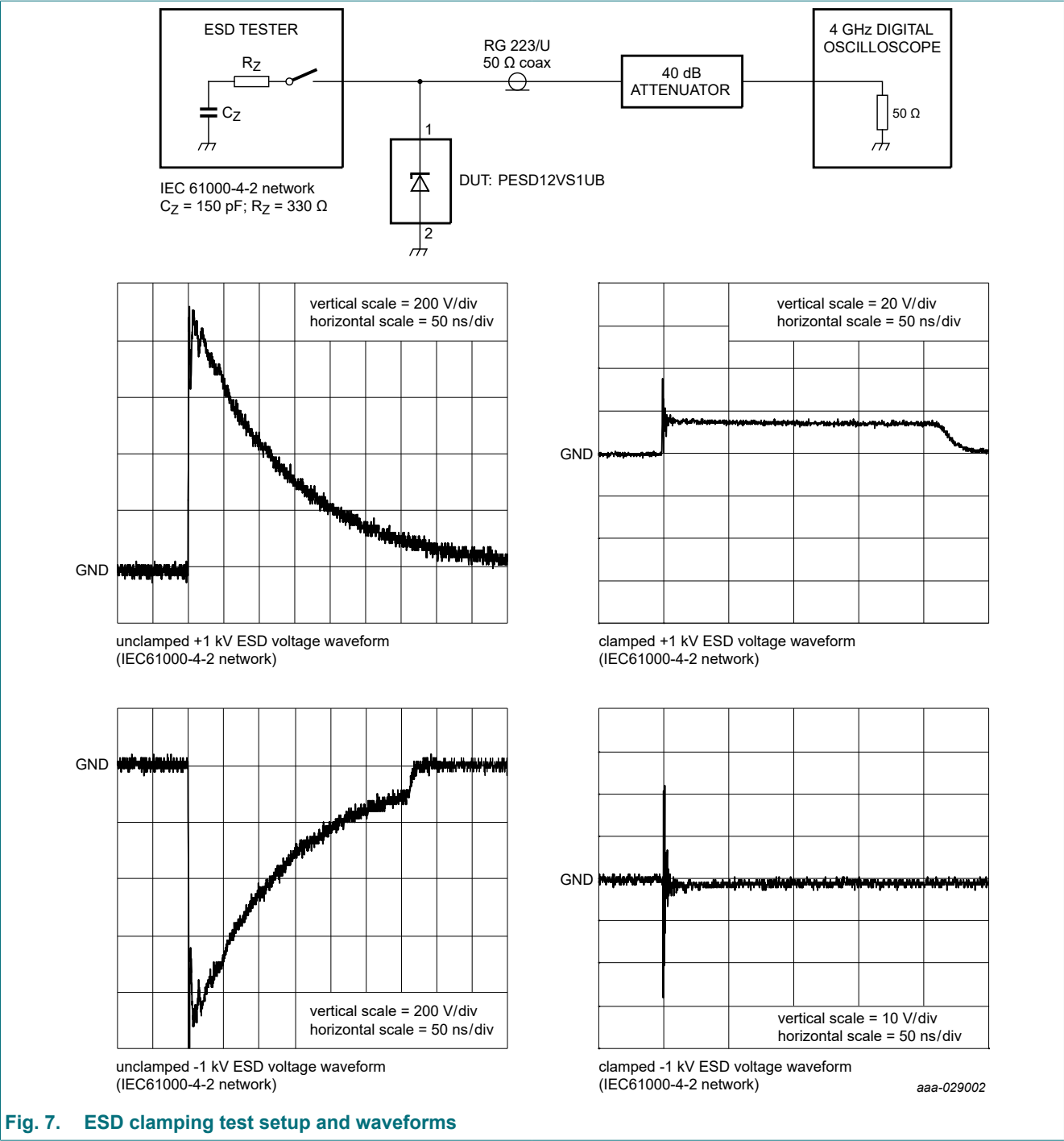
$f = 1\text{ MHz}$ ;  $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$

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



$I_R$  is less than 10 nA at 150  $^{\circ}\text{C}$   
 $V_{\text{RWM}} = 12\text{ V}$

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



vertical scale = 200 V/div  
horizontal scale = 50 ns/div

GND

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

vertical scale = 20 V/div  
horizontal scale = 50 ns/div

GND

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

vertical scale = 200 V/div  
horizontal scale = 50 ns/div

GND

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

vertical scale = 10 V/div  
horizontal scale = 50 ns/div

GND

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

aaa-029002

Fig. 7. ESD clamping test setup and waveforms

## 10. Application information

The device is designed for unidirectional protection of one single data line from the damage caused by ESD and surge pulses. The device may be used on lines where the signal polarity is above or below ground. It provides a surge capability of up to 180 W per line for a 8/20  $\mu$ s waveform.

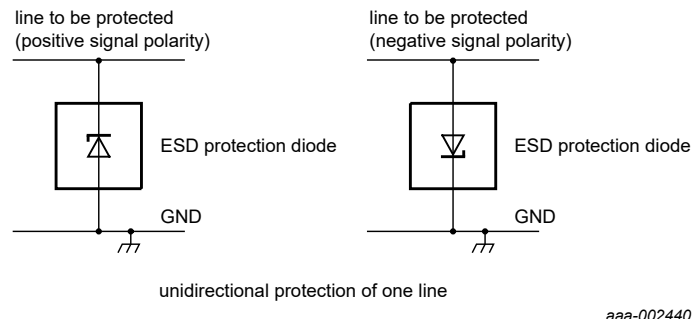


Fig. 8. Unidirectional protection of one line

### 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. 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

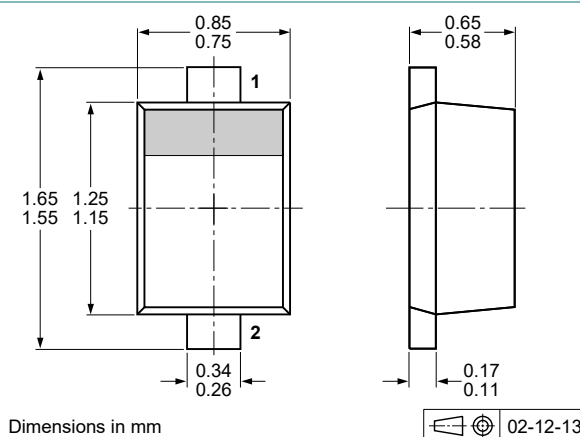


Fig. 9. Package outline SOD523

12. Soldering

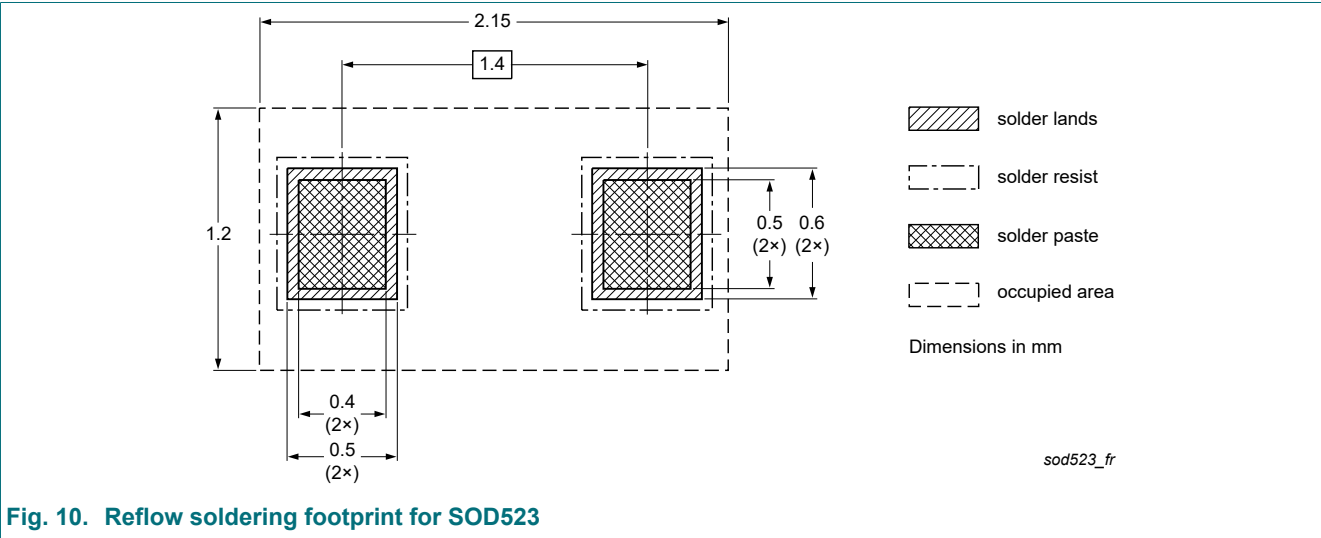


Fig. 10. Reflow soldering footprint for SOD523



## 13. Revision history

**Table 7. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD12VS1UB v.1	20181129	Product data sheet	-	PESDXS1UB_SERIES_2
Modifications:	<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Soldering section added.</li><li>• Application information: updated.</li><li>• Figure 9: updated.</li><li>• T<sub>amb</sub> value updated from -65°C to -55°C</li></ul>			
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".
- [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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