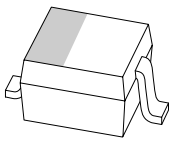


PESD24VS1UA

Unidirectional ESD protection diode

Rev. 1 — 7 March 2011 Product data sheet

1. Product profile

1.1 General description

Unidirectional ElectroStatic Discharge (ESD) protection diode in a SOD323 (SC-76) very small Surface-Mounted Device (SMD) plastic package designed to protect one signal line from the damage caused by ESD and other transients.

1.2 Features and benefits

- Unidirectional ESD protection of one line
- Max. peak pulse power: P_{PP} = 160 W
- Ultra low leakage current: I_{RM} < 1 nA
- ESD protection up to 23 kV
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge); I_{PP} = 3 A

1.3 Applications

- Computers and peripherals
- Communication systems
- Audio and video equipment
- Data lines
- Controller Area Network (CAN) bus protection

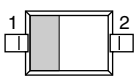
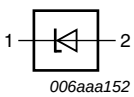
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage		-	-	24	V
C_d	diode capacitance	V_R = 0 V; f = 1 MHz	-	23	50	pF

2. Pinning information

Table 2. Pinning

Pin	Description		Simplified outline	Graphic symbol
1	cathode	[1]		
2	anode			

006aaa152

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD24VS1UA	SC-76	plastic surface-mounted package; 2 leads	SOD323

4. Marking

Table 4. Marking codes

Type number	Marking code
PESD24VS1UA	2E

5. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
P_{PP}	peak pulse power	t_p = 8/20 μs	[1]	-	160	W
I_{PP}	peak pulse current	t_p = 8/20 μs	[1]	-	3	A
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			−65	+150	°C
T_{stg}	storage temperature			−65	+150	°C

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.

Table 6. ESD maximum ratings

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Max	Unit
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1]	-	23	kV
		MIL-STD-883 (human body model)		-	10	kV

[1] Device stressed with ten non-repetitive ESD pulses.

Table 7. ESD standards compliance

Standard	Conditions
IEC 61000-4-2; level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
MIL-STD-883; class 3 (human body model)	> 4 kV

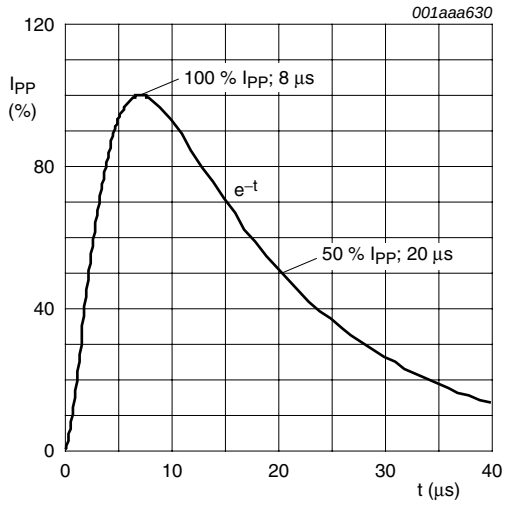


Fig 1. 8/20 µs pulse waveform according to IEC 61000-4-5

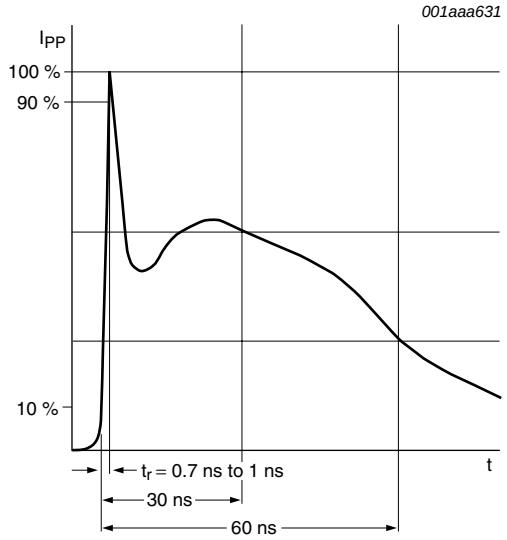


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

Table 8. Characteristics

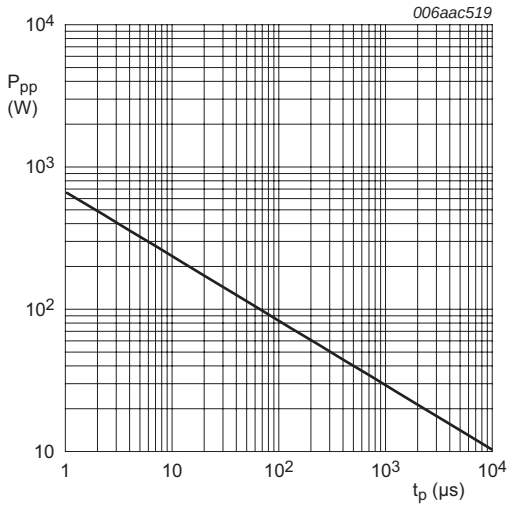
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage			-	-	24	V
I_{RM}	reverse leakage current	V_{RWM} = 24 V		-	< 1	50	nA
V_{BR}	breakdown voltage	I_R = 5 mA		26.5	27.0	27.5	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V		-	23	50	pF
V_{CL}	clamping voltage		[1][2]				
		I_{PP} = 1 A		-	-	36	V
		I_{PP} = 3 A		-	-	70	V
r_{dyn}	dynamic resistance	I_R = 10 A	[2][3]	-	1.53	-	Ω

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1 to pin 2.

[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) t_p = 100 ns; square pulse; ANS/IESD STM5-1-2008.



T_{amb} = 25 °C

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

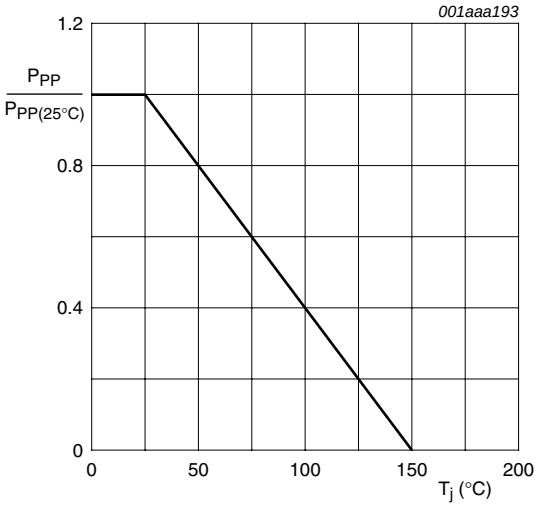
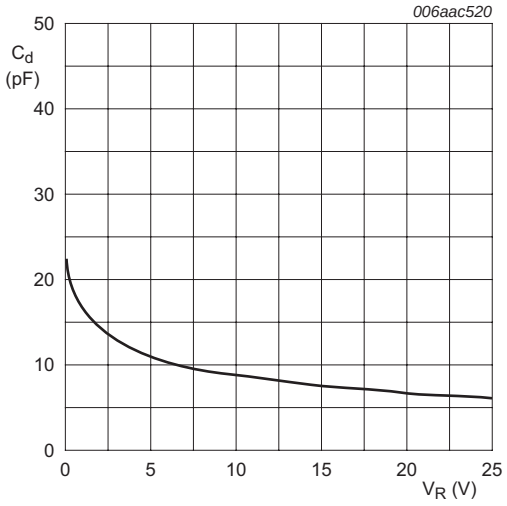
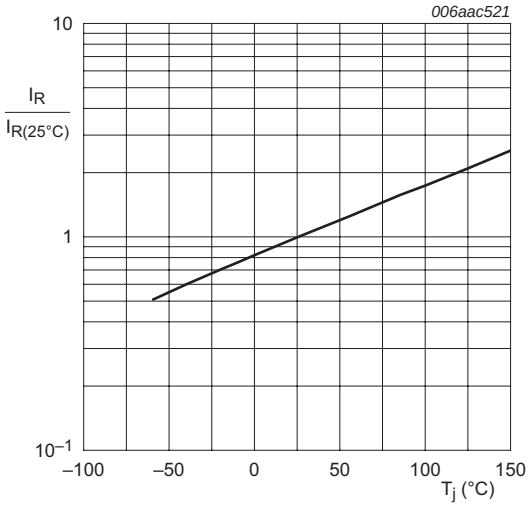


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values



f = 1 MHz; T_{amb} = 25 °C

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



V_{RWM} = 24 V

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

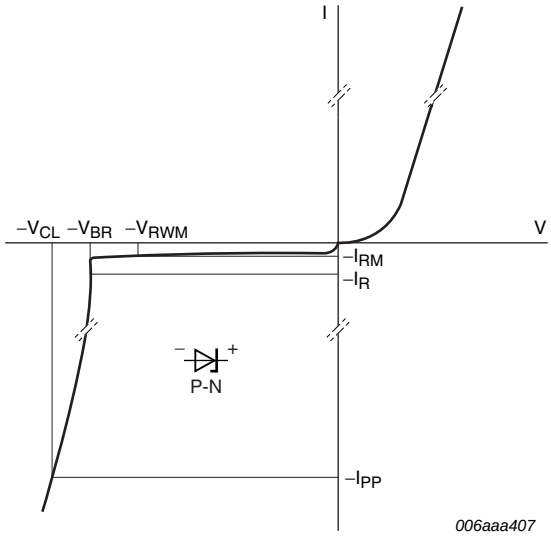


Fig 7. V-I characteristics for a unidirectional ESD protection diode

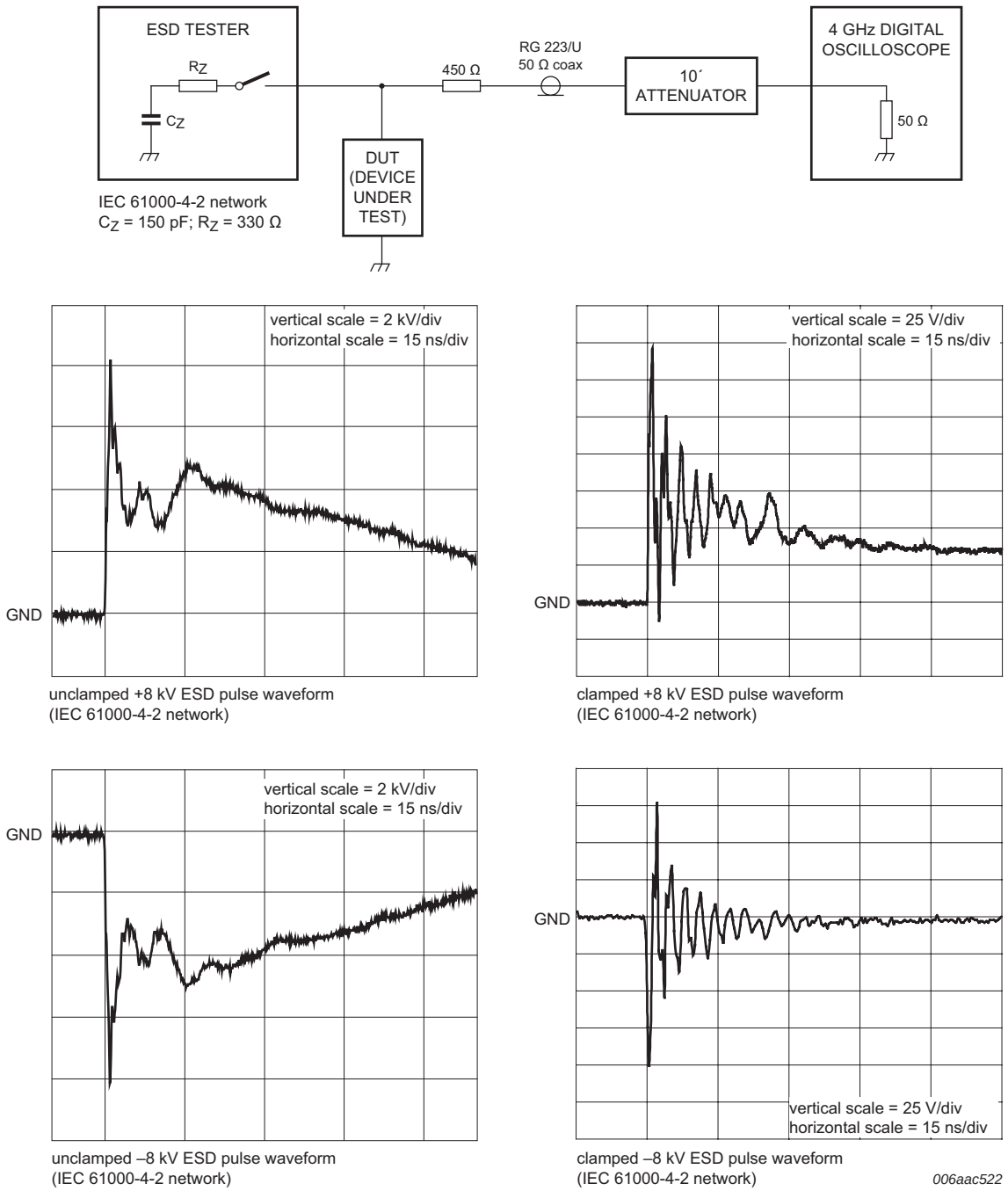


Fig 8. ESD clamping setup and waveforms

7. Application information

The PESD24VS1UA 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 PESD24VS1UA provides a surge capability of 160 W per line for an 8/20 μs waveform.

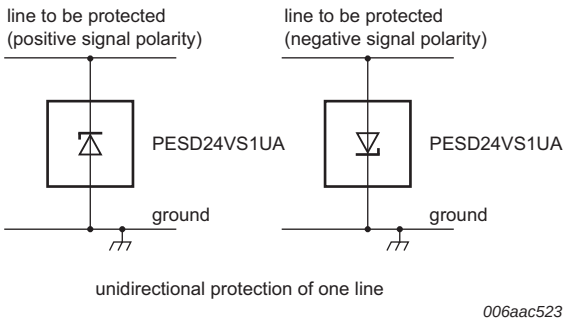


Fig 9. Unidirectional protection of one line

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 PESD24VS1UA as close to the input terminal or connector as possible.
2. The path length between the PESD24VS1UA 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. Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

8. Test information

8.1 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.

9. Package outline

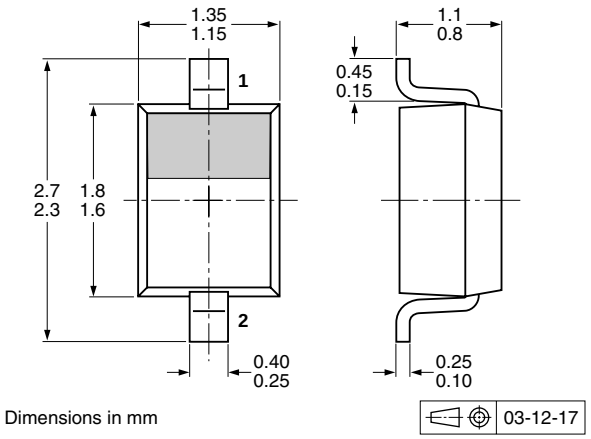


Fig 10. Package outline PESD24VS1UA (SOD323/SC-76)

10. Packing information

Table 9. Possible packing methods

The indicated -xxx are the last three digits of the 12 NC ordering code.[1]

Type number	Package	Description	Packing quantity	
			3000	10000
PESD24VS1UA	SOD323	4 mm pitch, 8 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see Section 14.

11. Soldering

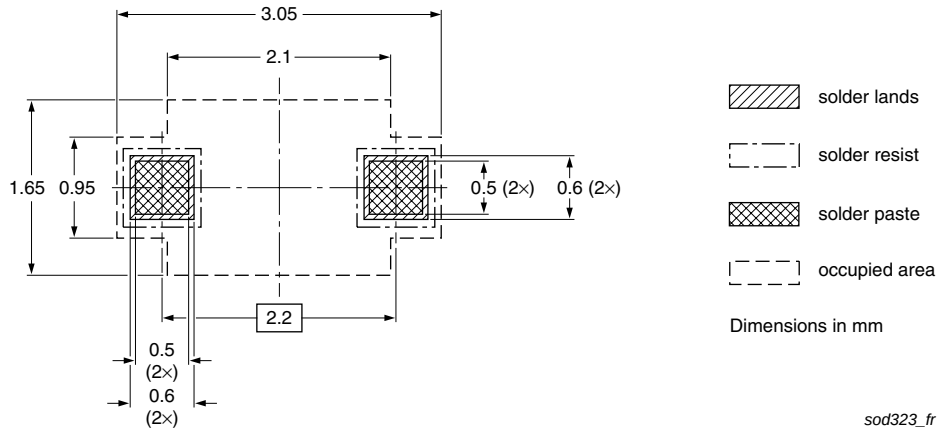


Fig 11. Reflow soldering footprint PESD24VS1UA (SOD323/SC-76)

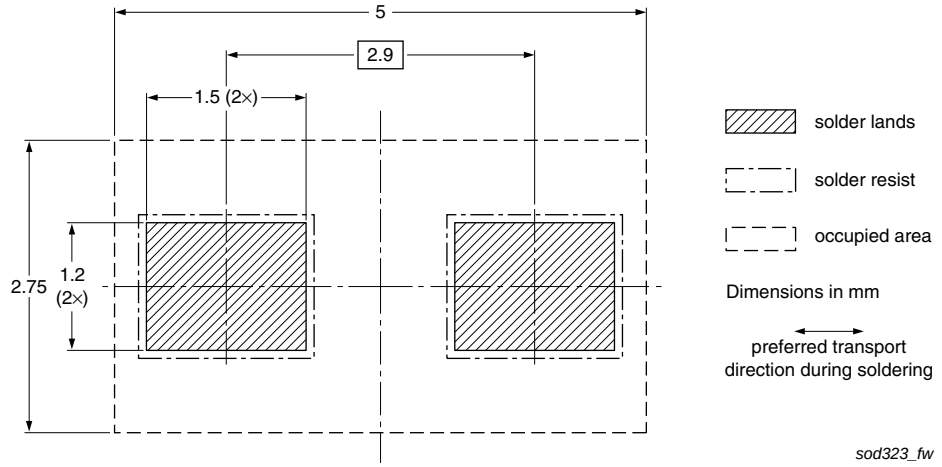


Fig 12. Wave soldering footprint PESD24VS1UA (SOD323/SC-76)

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD24VS1UA v.1	20110307	Product data sheet	-	-

13. Legal information

13.1 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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