

PESD9X5.0L; PESD9X7.0L

Unidirectional ESD protection diodes

Rev. 1 — 16 December 2010

Product data sheet

1. Product profile

1.1 General description

Single unidirectional ElectroStatic Discharge (ESD) protection diodes in a SOD882 leadless ultra 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

- ESD protection of one line
- Max. peak pulse power: $P_{PP} = 150$ W
- Low clamping voltage: $V_{CL} = 10$ V
- Ultra low leakage current: $I_{RM} = 3$ nA
- AEC-Q101 qualified
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 10$ A
- Ultra small SMD plastic package

1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Portable electronics
- Communication systems

1.4 Quick reference data

Table 1. Quick reference data


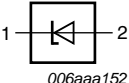
$T_{amb} = 25$ °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage					
	PESD9X5.0L		-	-	5.0	V
	PESD9X7.0L		-	-	7.0	V
C_d	diode capacitance	$f = 1$ MHz; $V_R = 0$ V				
	PESD9X5.0L		-	68	100	pF
	PESD9X7.0L		-	62	100	pF



2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode ^[1]	 <p>Transparent top view</p>	 <p>006aaa152</p>
2	anode		

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD9X5.0L	-	leadless ultra small plastic package; 2 terminals;	SOD882
PESD9X7.0L	-	body 1.0 × 0.6 × 0.5 mm	

4. Marking

Table 4. Marking codes

Type number	Marking code
PESD9X5.0L	AS
PESD9X7.0L	AT

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	$t_p = 8/20 \mu\text{s}$	^{[1][2]} -	150	W
I_{PP}	peak pulse current	$t_p = 8/20 \mu\text{s}$	^{[1][2]} -	10	A
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	+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.

[2] Measured from pin 1 to pin 2.

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][2] -	30	kV
		machine model	-	400	V
		MIL-STD-883 (human body model)	-	10	kV

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

[2] Measured from pin 1 to pin 2.

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

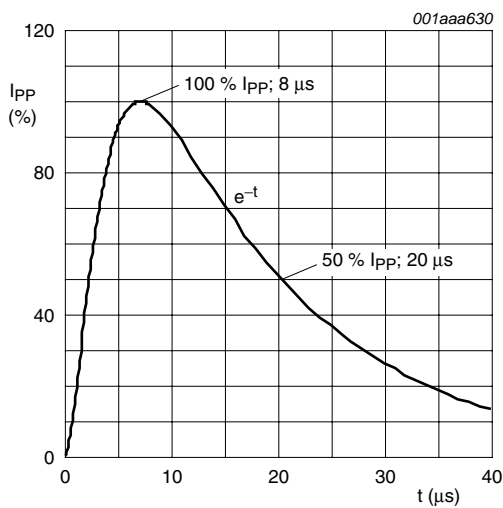


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5

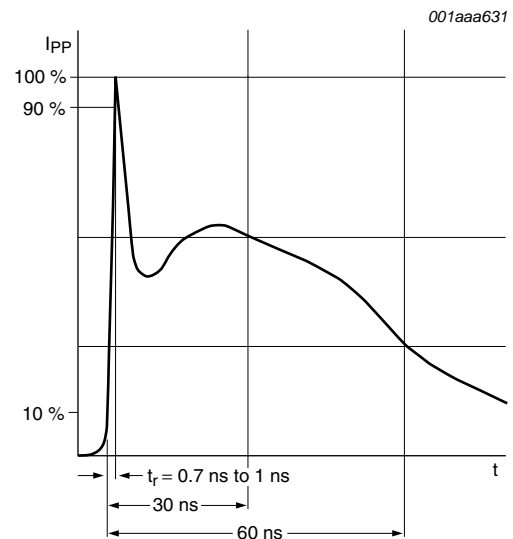


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

Table 8. Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage					
	PESD9X5.0L		-	-	5.0	V
	PESD9X7.0L		-	-	7.0	V
I_{RM}	reverse leakage current					
	PESD9X5.0L	$V_{RWM} = 5.0\text{ V}$	-	3	100	nA
	PESD9X7.0L	$V_{RWM} = 7.0\text{ V}$	-	35	500	nA
V_{BR}	breakdown voltage	$I_R = 1\text{ mA}$				
	PESD9X5.0L		6.2	-	-	V
	PESD9X7.0L		7.5	-	-	V
C_d	diode capacitance	$f = 1\text{ MHz};$ $V_R = 0\text{ V}$				
	PESD9X5.0L		-	68	100	pF
	PESD9X7.0L		-	62	100	pF
V_{CL}	clamping voltage		[1][2]			
	PESD9X5.0L	$I_{PP} = 10\text{ A}$	-	-	18	V
		$I_{PP} = 1\text{ A}$	-	-	10	V
	PESD9X7.0L	$I_{PP} = 10\text{ A}$	-	-	18	V
		$I_{PP} = 1\text{ A}$	-	-	11	V
r_{dyn}	dynamic resistance	$I_R = 10\text{ A}$	[2][3]	-	0.4	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) $t_p = 100\text{ ns}$; square pulse; ANSI/ESD STM5.1-2008.

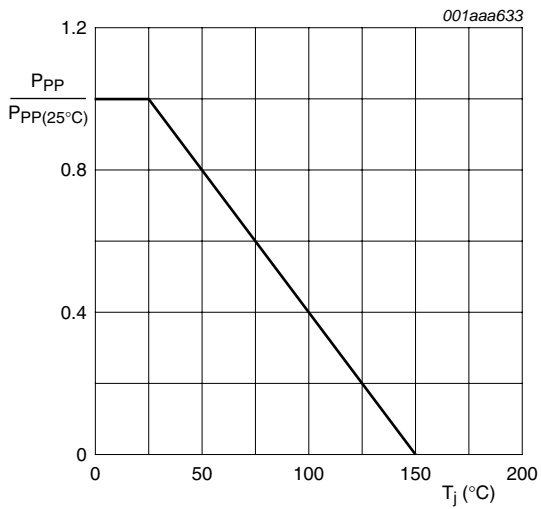


Fig 3. Relative variation of peak pulse power as a function of junction temperature; typical values

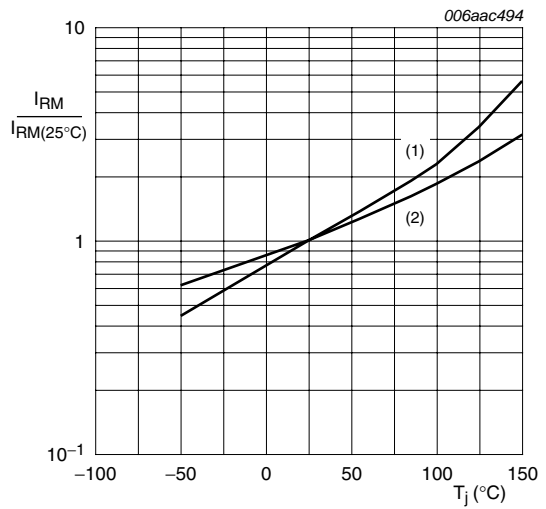
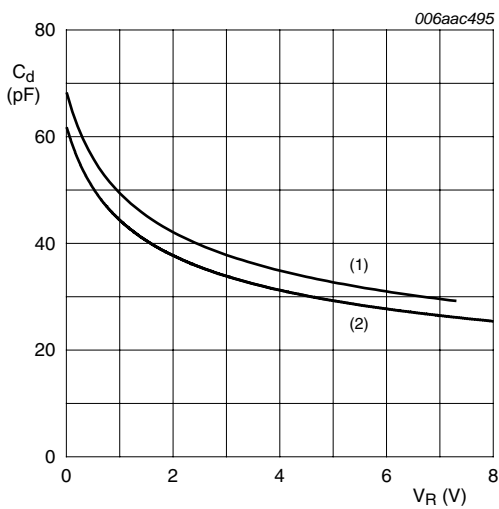


Fig 4. Relative variation of reverse leakage current as a function of junction temperature; typical values



$f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$
 (1) PESD9X5.0L
 (2) PESD9X7.0L

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

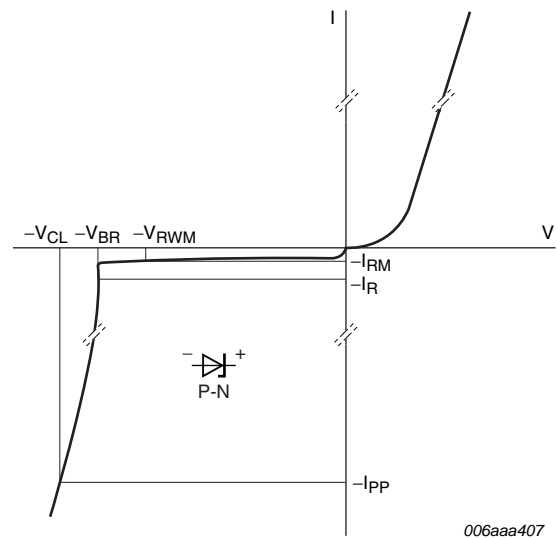


Fig 6. V-I characteristics for a unidirectional ESD protection diode

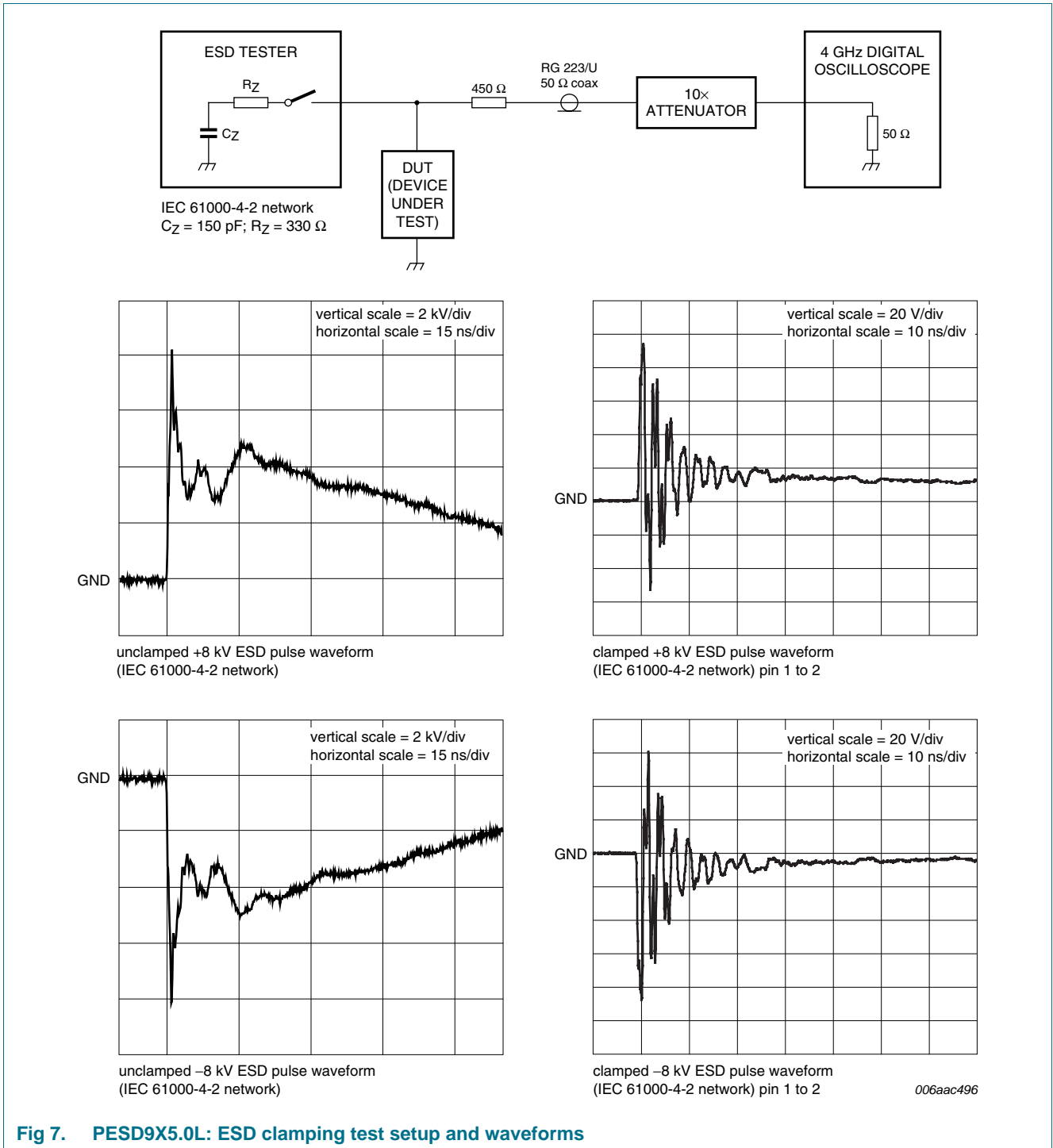


Fig 7. PESD9X5.0L: ESD clamping test setup and waveforms

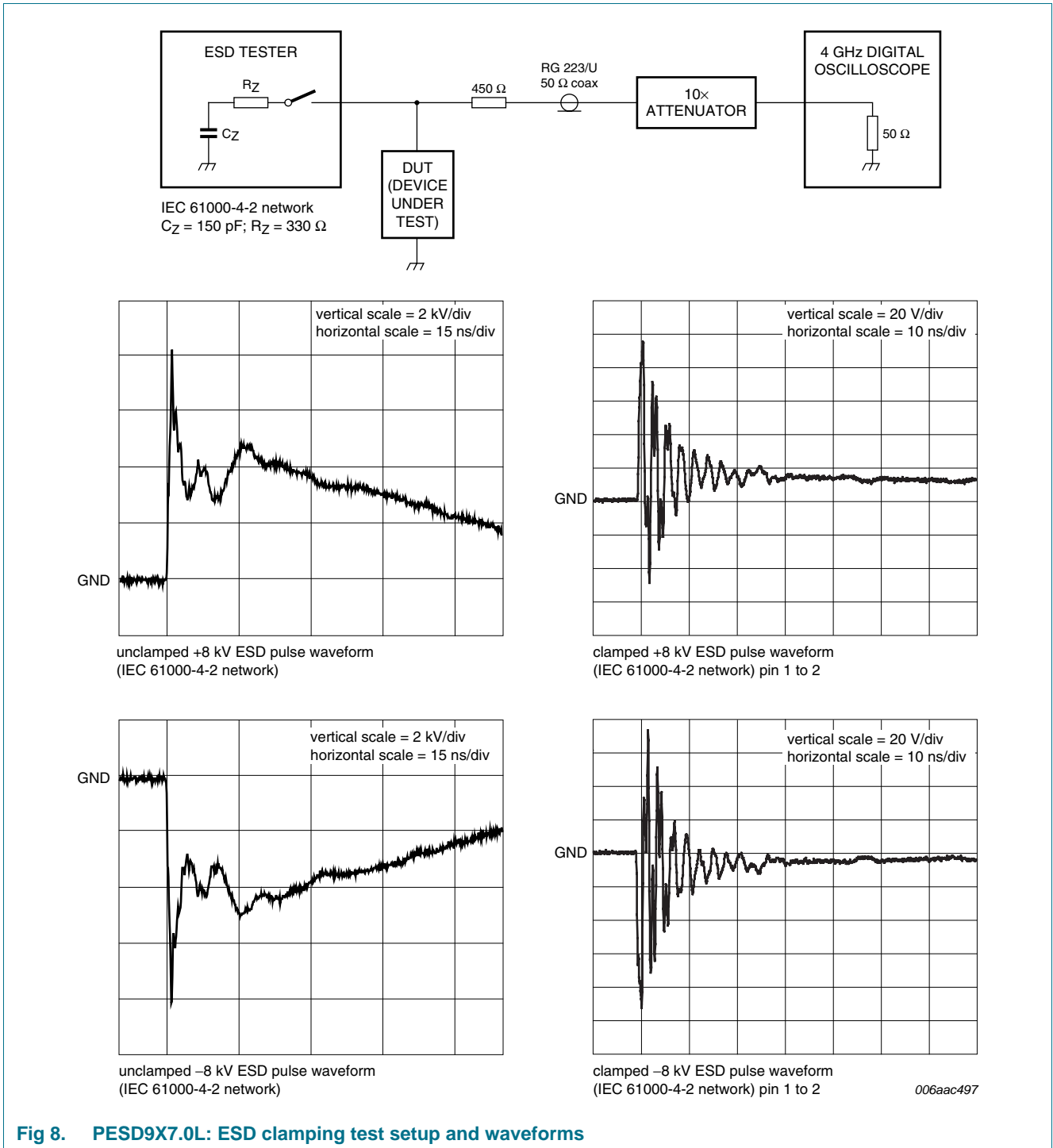


Fig 8. PESD9X7.0L: ESD clamping test setup and waveforms

7. Application information

The PESD9X5.0L and the PESD9X7.0L are designed for the protection of one unidirectional data or signal line from the damage caused by ESD and surge pulses. Both devices may be used on lines where the signal polarities are either positive or negative with respect to ground. The devices provide a surge capability of 150 W per line for an 8/20 μ s waveform.

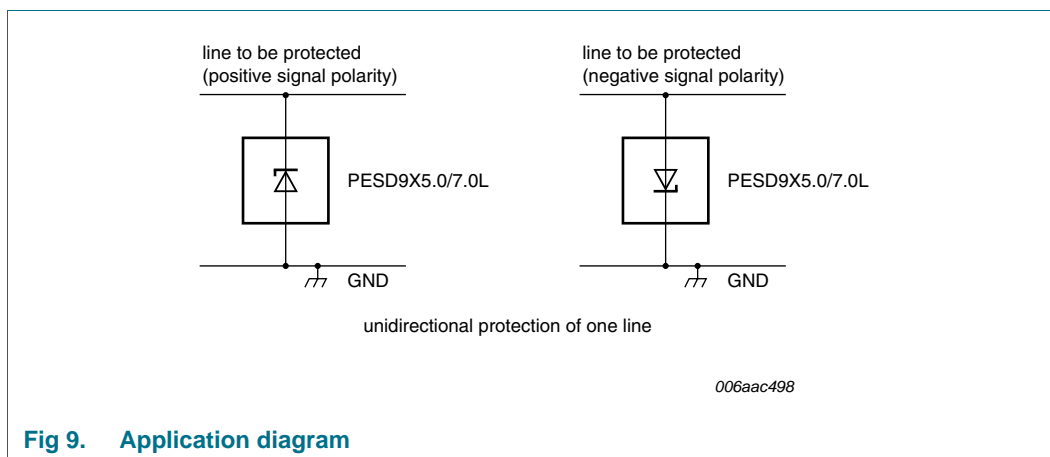


Fig 9. Application diagram

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:

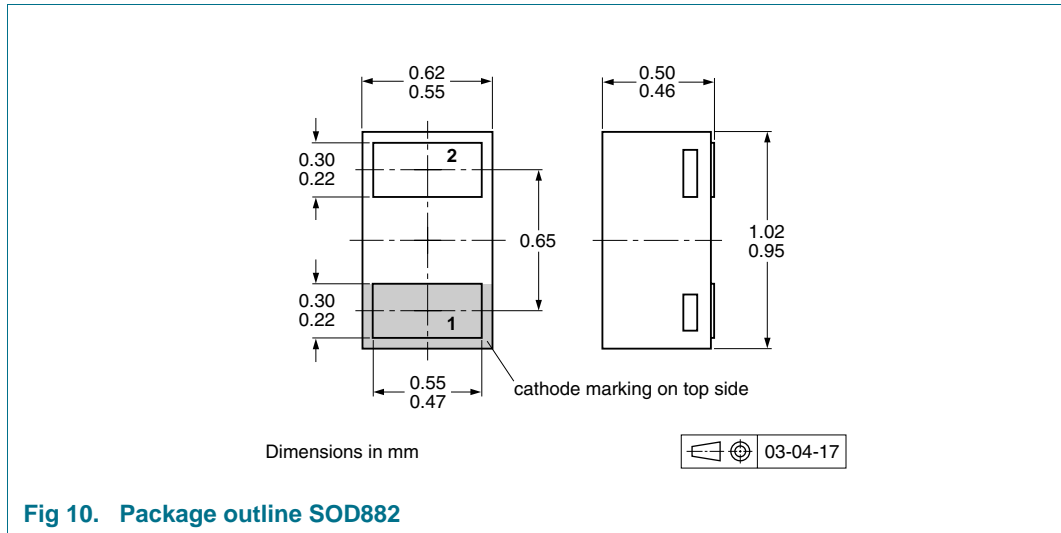
1. Place the device as close to the input terminal or connector as possible.
2. The path length between the device and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit 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. 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



10. Packing information

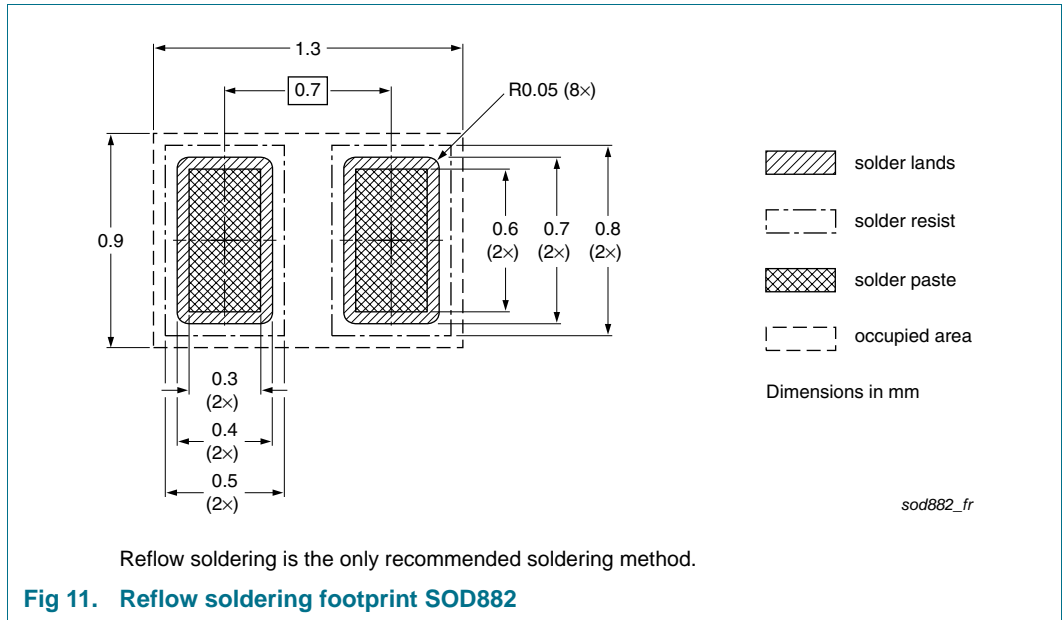
Table 9. Packing methods

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

Type number	Package	Description	Packing quantity
			10000
PESD9X5.0L	SOD882	2 mm pitch, 8 mm tape and reel	-315
PESD9X7.0L			

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

11. Soldering



12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD9XXL_SER v.1	20101216	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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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