PESD15VS1UL

Unidirectional ESD protection diode

15 January 2020 **Product data sheet**

1. General description

Unidirectional ElectroStatic Discharge (ESD) protection diode 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.

2. Features and benefits

- Ultra small SMD plastic package
- ESD protection of one line
- Max. peak pulse power: P_{PPM} = 150 W
- Low clamping voltage: V_{CL} = 40 V
- Ultra low leakage current: I_{RM} < 1 nA
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5; (surge); I_{PPM} = 5 A
- AEC-Q101 qualified

3. Applications

- Computers and peripherals
- Audio and video equipment
- Parallel ports
- Communication systems
- High-speed data lines

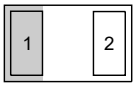
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	15	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	32	70	pF

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 Transparent top view **DFN1006-2 (SOD882)**	 *sym035*
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD15VS1UL	DFN1006-2	plastic, leadless ultra small package; 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.48 mm body	SOD882

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD15VS1UL	G4

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]	-	150	W
I_{PPM}	rated peak pulse current		[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)	[2]	-	30	kV
		MIL-STD-883 (human body model)	[2]	-	10	kV

[1] Non-repetitive current pulse 8/20 µs exponential decay waveform according to IEC61000-4-5.
[2] Device stressed with ten non-repetitive ESD pulses.

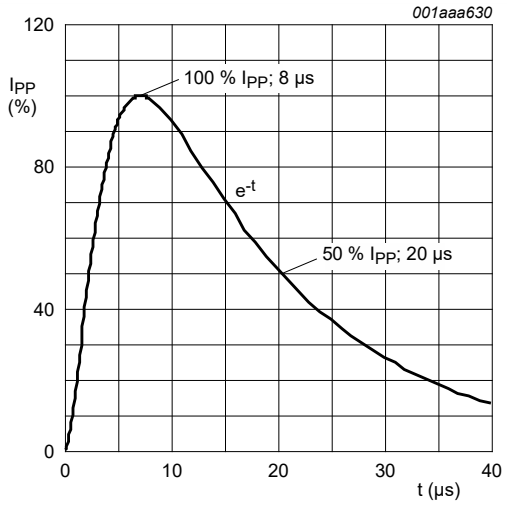


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

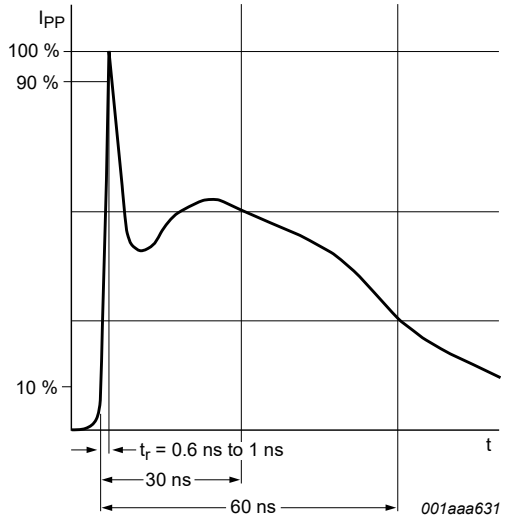


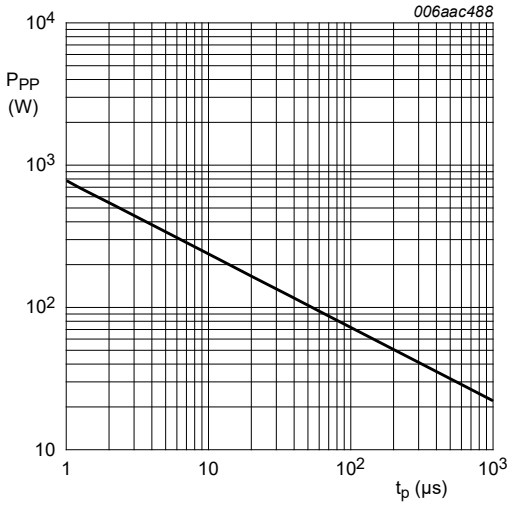
Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	15	V
V_{BR}	breakdown voltage	I_R = 5 mA; T_{amb} = 25 °C	[1]	17.6	18	18.4	V
I_{RM}	reverse leakage current	V_{RWM} = 15 V; T_{amb} = 25 °C		-	1	50	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	32	70	pF
V_{CL}	clamping voltage	I_{PP} = 1 A; T_{amb} = 25 °C	[2]	-	-	23	V
		I_{PPM} = 5 A; T_{amb} = 25 °C	[2]	-	-	40	V
r_{dif}	differential resistance	I_R = 1 mA; T_{amb} = 25 °C		-	-	225	Ω

[1] Pulse test: $t_p \leq 300$ µs; duty cycle ≤ 0.02.
[2] Non-repetitive current pulse 8/20 µs exponential decay waveform according to IEC61000-4-5.



T_{amb} = 25 °C

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

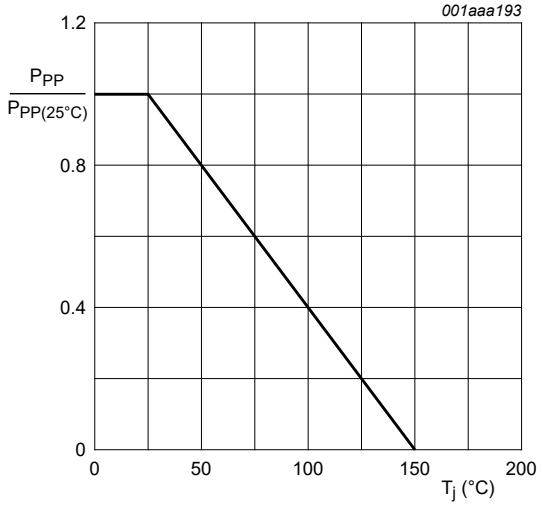
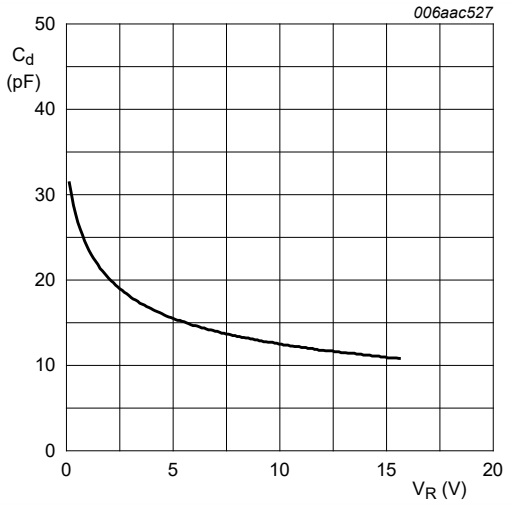


Fig. 4. Relative variation of peak pulse power as a function of junction temperature; typical values



f = 1 MHz; T_{amb} = 25 °C

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

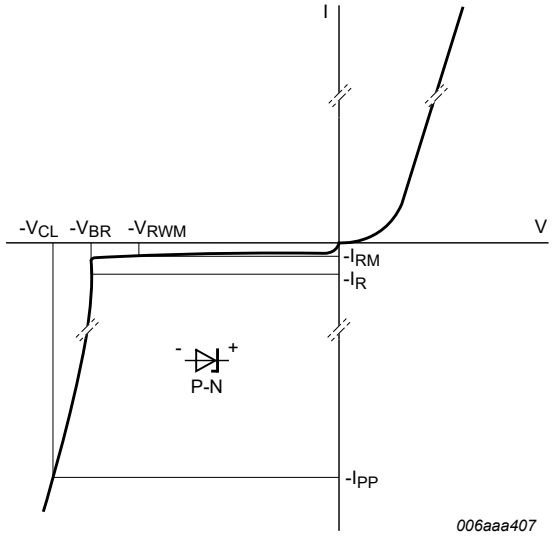


Fig. 6. V-I characteristics for a unidirectional ESD protection diode

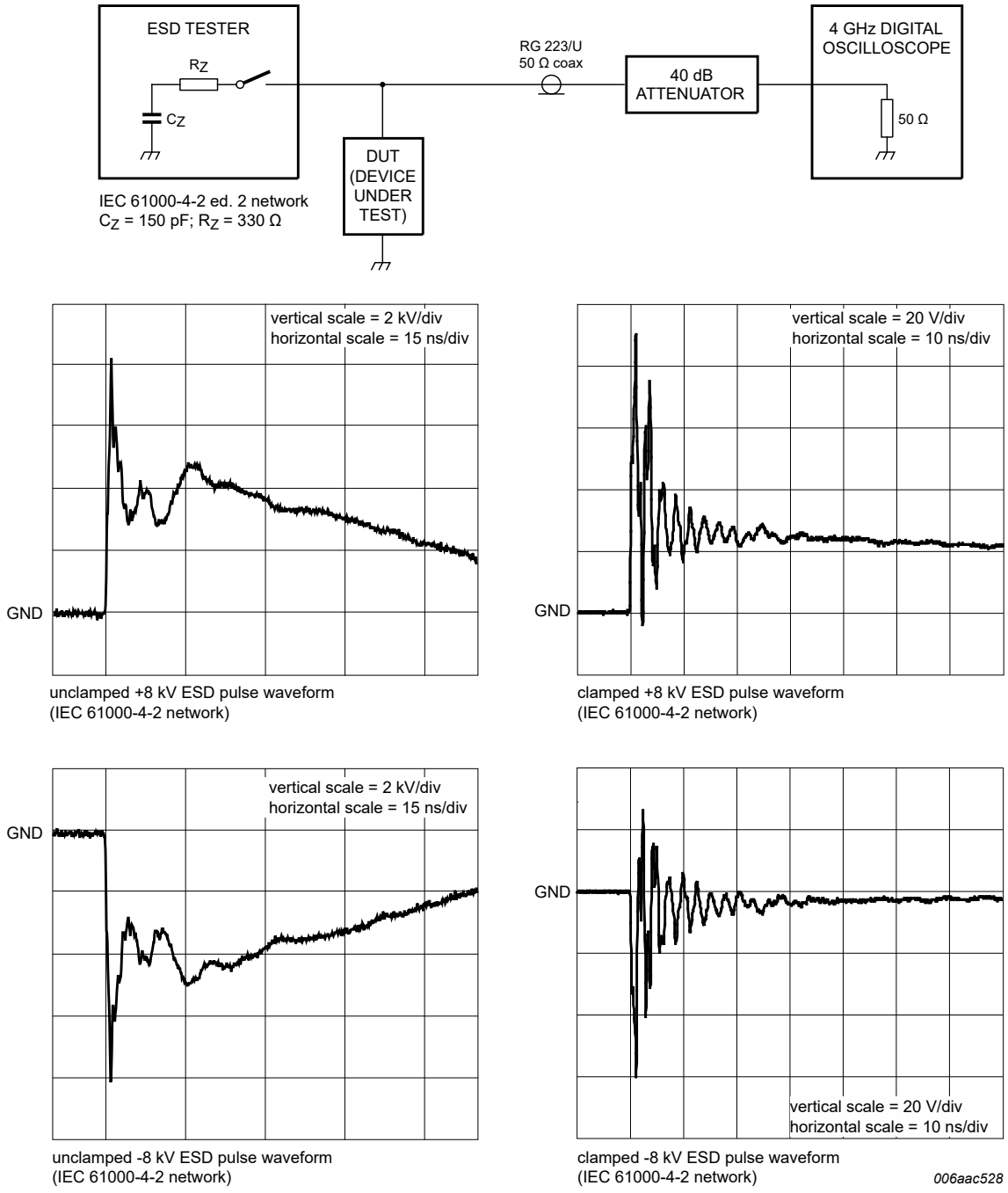


Fig. 7. ESD clamping test setup and waveforms

10. Application information

The device is designed for the protection of one unidirectional data 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. The device provides a surge capability of 150 W for an 8/20 µs waveform.

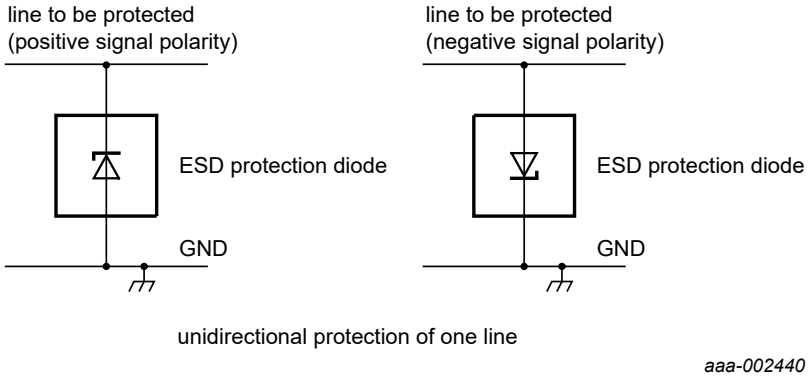


Fig. 8. Application diagram

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.

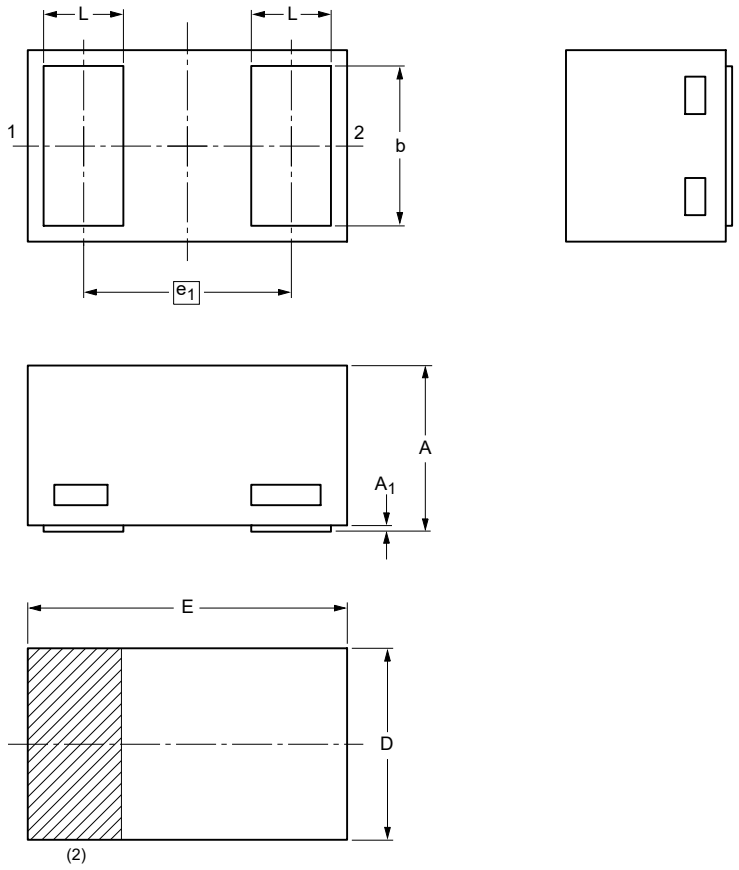
11. Test information

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.

12. Package outline

DFN1006-2: Plastic, leadless ultra small package; 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.48 mm body **SOD882**



Dimensions (mm are the original dimensions)

Unit		A(1)	A_1	b	D	E	e_1	L
mm	max	0.50	0.03	0.55	0.62	1.02		0.30
	nom						0.65	
	min	0.46		0.47	0.55	0.95		0.22

Note
1. Including plating thickness
2. The marking bar indicates the cathode (if applicable)

sod882_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD882						~~14-08-27~~ 19-10-21

Fig. 9. Package outline DFN1006-2 (SOD882)

13. Soldering

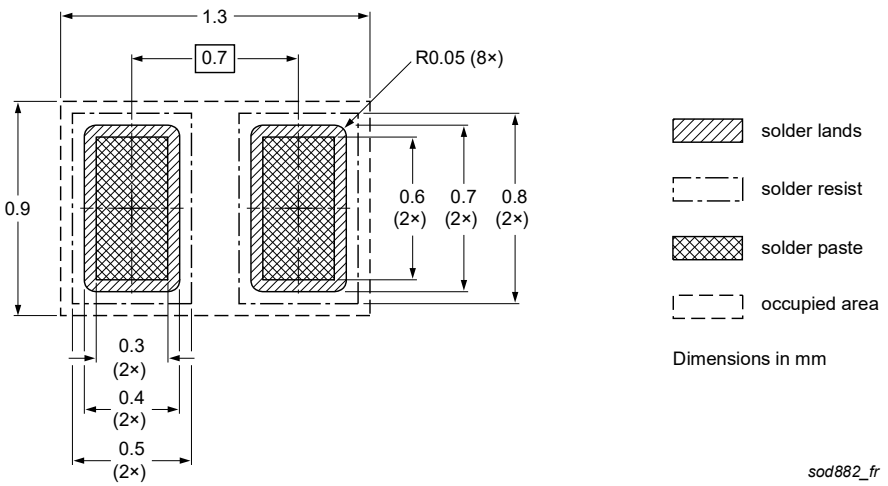


Fig. 10. Reflow soldering footprint for DFN1006-2 (SOD882)

14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD15VS1UL v.4	20200115	Product data sheet	-	PESDXS1UL_SER v.3
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. • Table Limiting values: updated T_{amb} to -55 °C minimum values • Soldering section: updated. • Application information: updated. • Figure 10: updated.			
PESDXS1UL_SER v.3	20111025	Product data sheet	-	PESDXS1UL_SER v.2
PESDXS1UL_SER v.2	20090820	Product data sheet	-	PESDXS1UL_SER v.1
PESDXS1UL_SER v.1	20060331	Product data sheet	-	-

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".
[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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