PESD12VS1ULD

Unidirectional ESD protection diode

14 April 2023 **Product data sheet**

1. General description

Unidirectional ElectroStatic Discharge (ESD) protection diode designed to protect one signal line from the damage caused by ESD and other transients. The device is housed in a SOD882D leadless ultra small Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

2. Features and benefits

- ESD protection of one line
- Ultra small SMD plastic package
- Solderable side pads
- Package height typ. 0.37 mm
- Low clamping voltage: V_{CL} = 19 V
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); I_{PP} = 5 A
- Max. peak pulse power: P_{PP} = 150W
- Ultra low leakage current: I_{RM} < 1 nA

3. Applications

- Computers and peripherals
- Audio and video equipment
- Communication systems
- Portable electronics

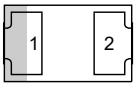
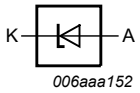
4. Quick reference data

Table 1. Quick reference data

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 Transparent top view **DFN1006D-2 (SOD882D)**	
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD12VS1ULD	DFN1006D-2	leadless ultra small plastic package with side-wettable flanks (SWF); 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.4 mm body	SOD882D

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD12VS1ULD	1010 0000

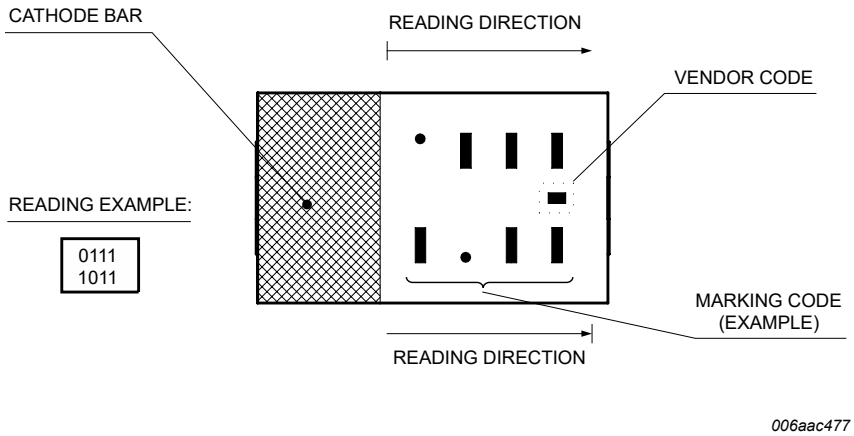


Fig. 1. SOD882D binary marking code description

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), T_{amb} = 25 °C	[2] [3]	-	30	kV
		IEC 61000-4-2 (air discharge), T_{amb} = 25 °C	[2] [3]	-	15	kV
		MIL-STD-883 (human body model), T_{amb} = 25 °C	[2] [3]	-	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.
[3] Measured from pin 1 to 2.

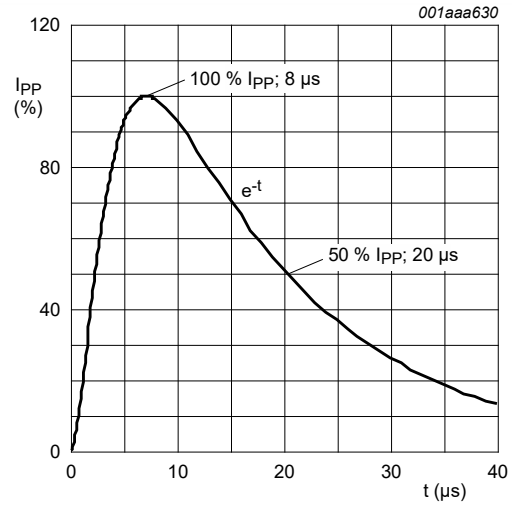


Fig. 2. 8/20 µs pulse waveform according to IEC 61000-4-5

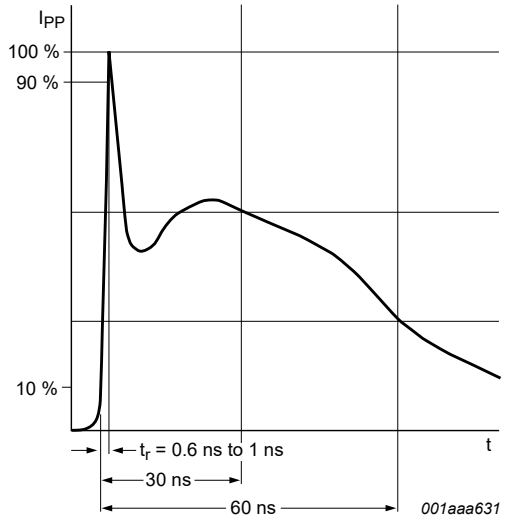


Fig. 3. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	12	V
V_{BR}	breakdown voltage	I_R = 5 mA; T_{amb} = 25 °C		14.7	15	15.3	V
I_{RM}	reverse leakage current	V_{RWM} = 12 V; T_{amb} = 25 °C		-	1	50	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	38	75	pF
V_{CL}	clamping voltage	I_{PP} = 1 A; T_{amb} = 25 °C	[1] [2]	-	-	19	V
		I_{PPM} = 5 A; T_{amb} = 25 °C	[1] [2]	-	-	35	V
R_{dyn}	dynamic resistance	I_R = 10 A; T_{amb} = 25 °C	[3]	-	0.6	-	Ω

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

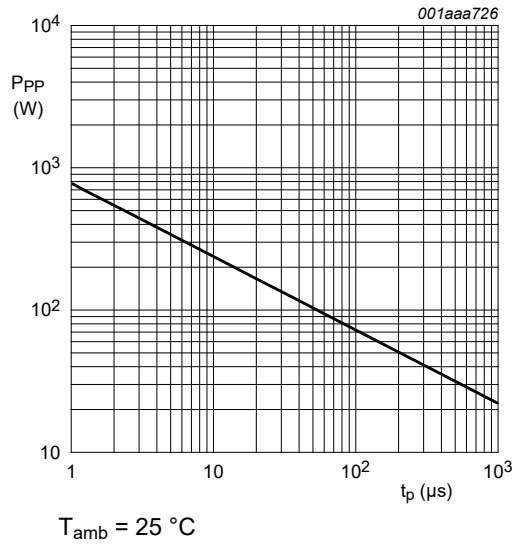


Fig. 4. Peak pulse power dissipation as a function of pulse duration; typical values

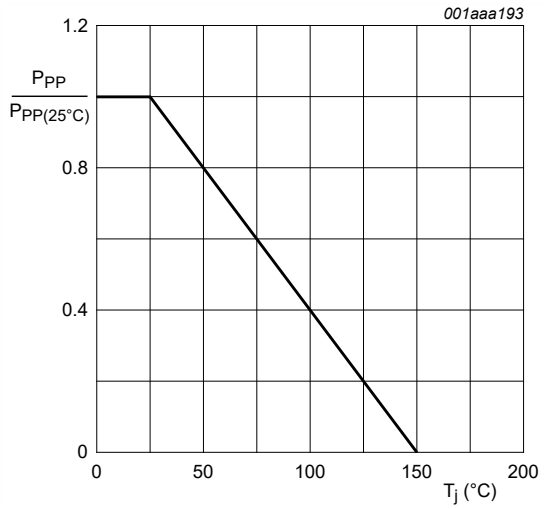
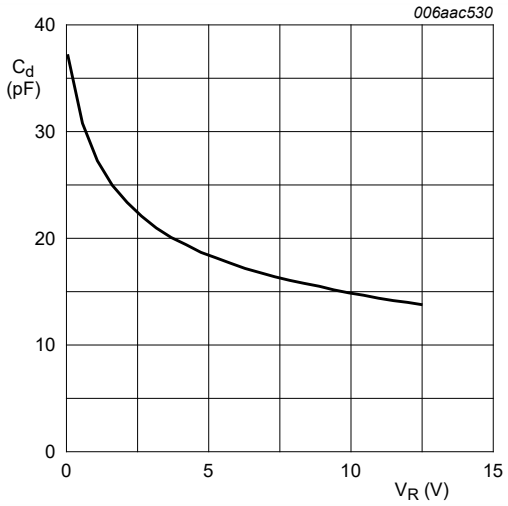


Fig. 5. Relative variation of peak pulse power as a function of junction temperature; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig. 6. Diode capacitance as a function of reverse voltage; typical values

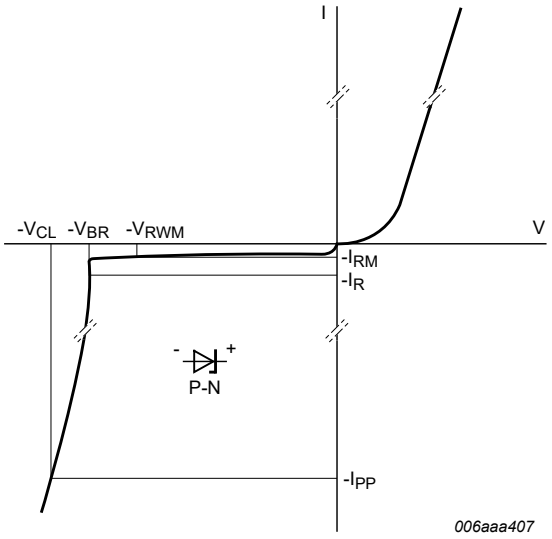


Fig. 7. V-I characteristics for a unidirectional ESD protection diode

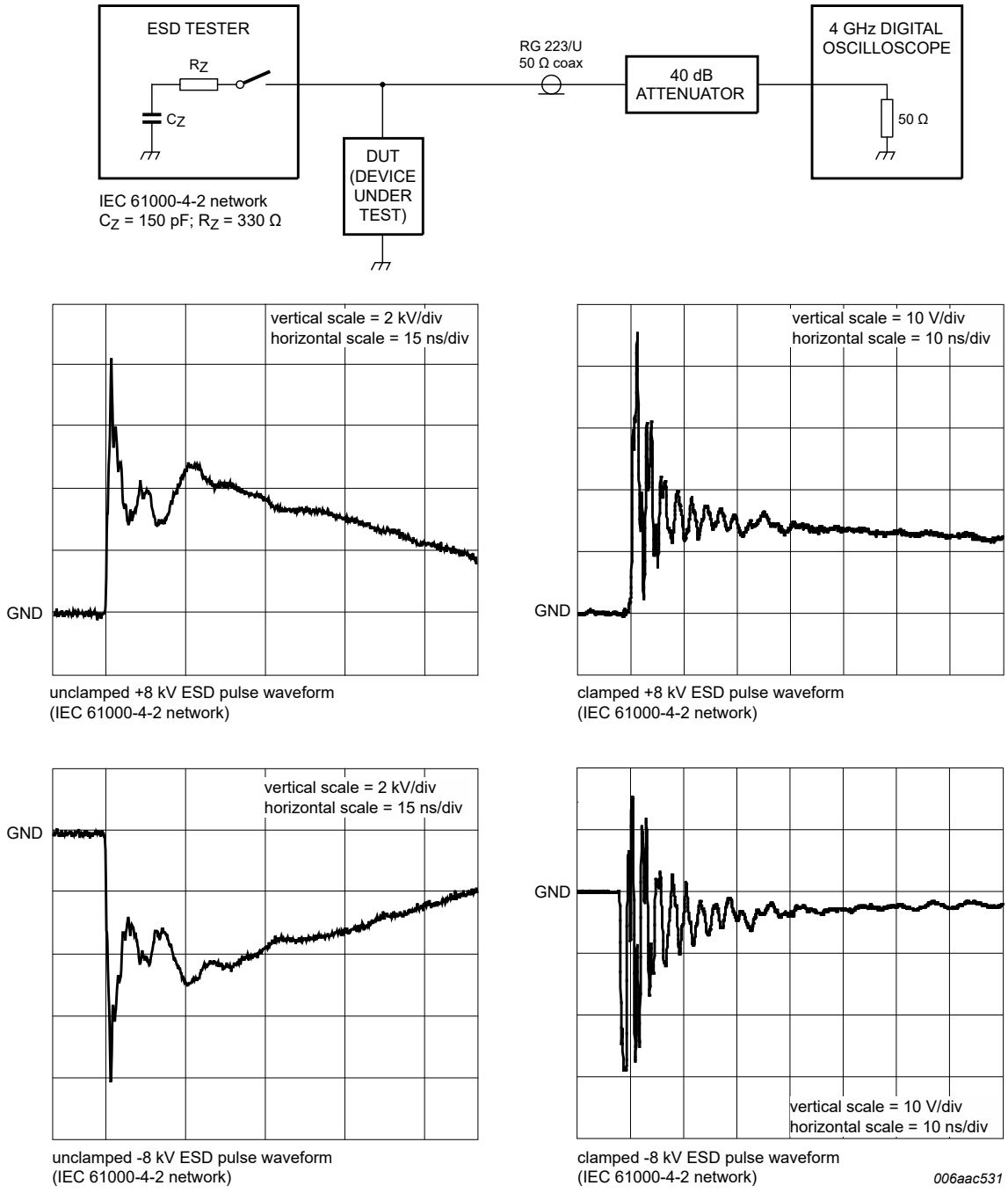


Fig. 8. ESD clamping test setup and waveforms

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.

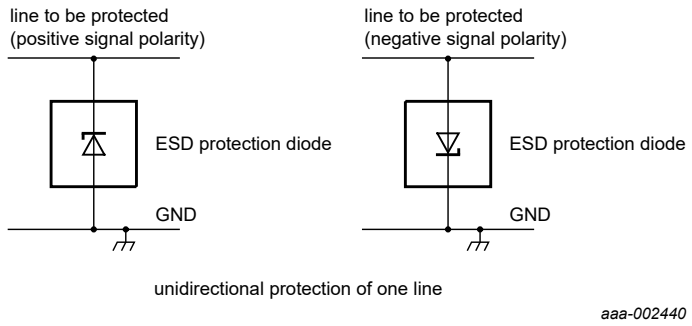


Fig. 9. Application diagram

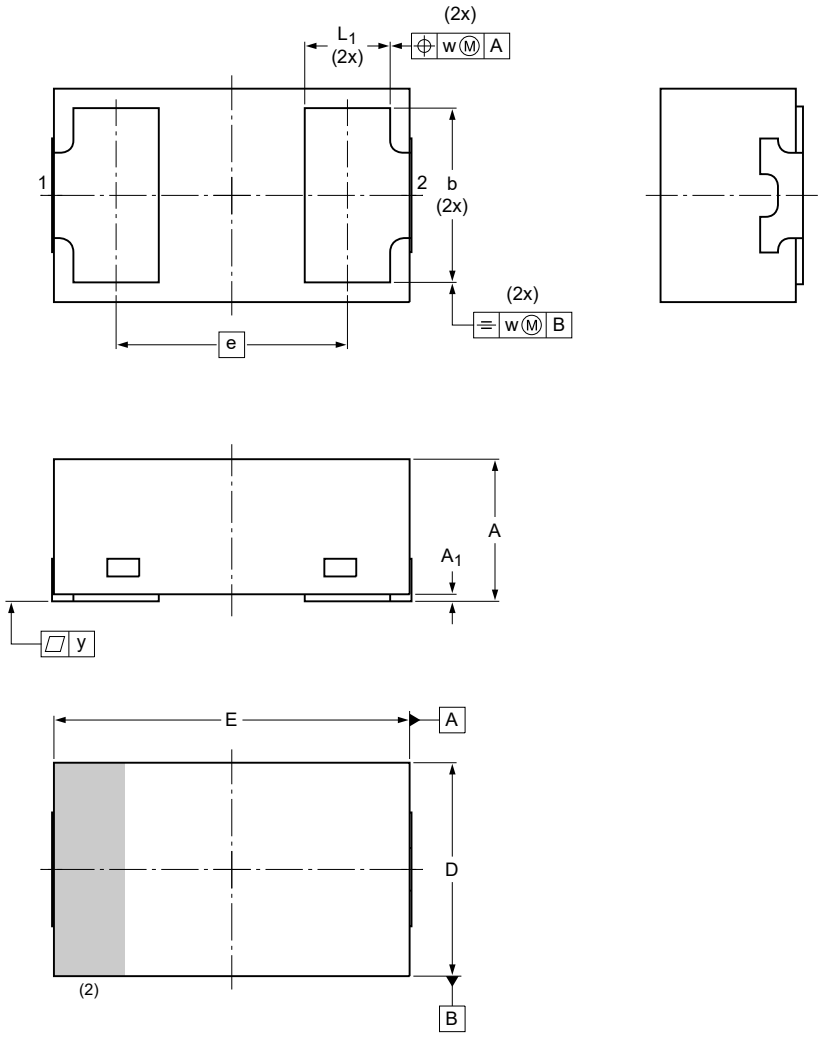
Circuit board layout and protection device placement

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. 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.

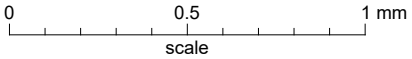
11. Package outline

DFN1006D-2: Leadless ultra small plastic package; 2 terminals; body 1 x 0.6 x 0.4 mm **SOD882D**



Dimensions

Unit		$A^{(1)}$	A_1	b	D	E	e	L_1	w	y
mm	max	0.4	0.04	0.55	0.65	1.05		0.30	0.1	0.03
	nom			0.50	0.60	1.00	0.65	0.25		
	min			0.45	0.55	0.95		0.22		



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

sod882d_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD882D						~~10-09-27~~ 12-05-01

Fig. 10. Package outline DFN1006D-2 (SOD882D)

12. Soldering

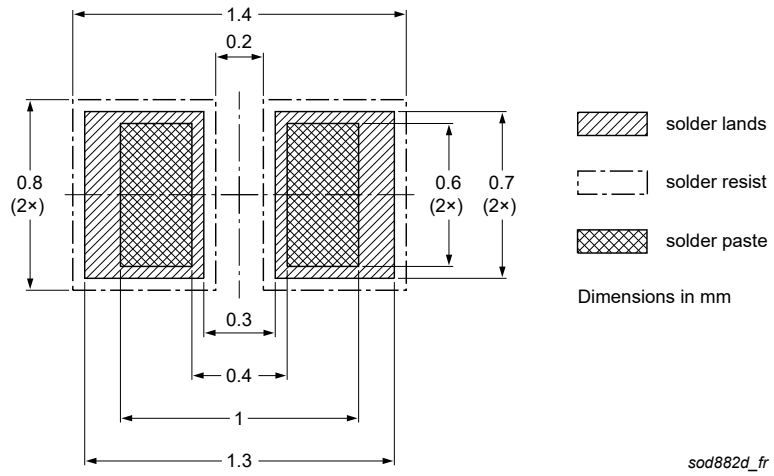


Fig. 11. Reflow soldering footprint for DFN1006D-2 (SOD882D)

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD12VS1ULD v.2	20230414	Product data sheet	-	PESD12VS1ULD v.1
Modifications:	• Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s) • The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia			
PESD12VS1ULD v.1	20110511	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".
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