



# PESD24VS1ULD

## Unidirectional ESD protection diode

22 August 2018

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
- ESD protection up to 23 kV
- Ultra small SMD plastic package
- IEC 61000-4-2; level 4 (ESD)
- Solderable side pads
- IEC 61000-4-5 (surge);  $I_{PP} = 3A$
- Package height typ. 0.37 mm
- Max. peak pulse power:  $P_{PPM} = 150 W$
- Low clamping voltage:  $V_{CL} = 70 V$
- Max. peak pulse power:  $P_{PPM} = 150 W$
- Ultra low leakage current:  $I_{RM} < 1 nA$
- AEC-Q101 qualified

### 3. Application information

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

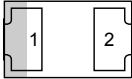
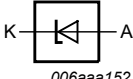
### 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}C$	-	-	24	V
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}C$	-	23	50	pF

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode <sup>[1]</sup>	 <p>Transparent top view</p> <p>DFN1006D-2 (SOD882D)</p>	 <p>006aaa152</p>
2	A	anode		

[1] The marking bar indicates the cathode.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD24VS1ULD	DFN1006D-2	leadless ultra small plastic package; 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
PESD24VS1ULD	0010 0000

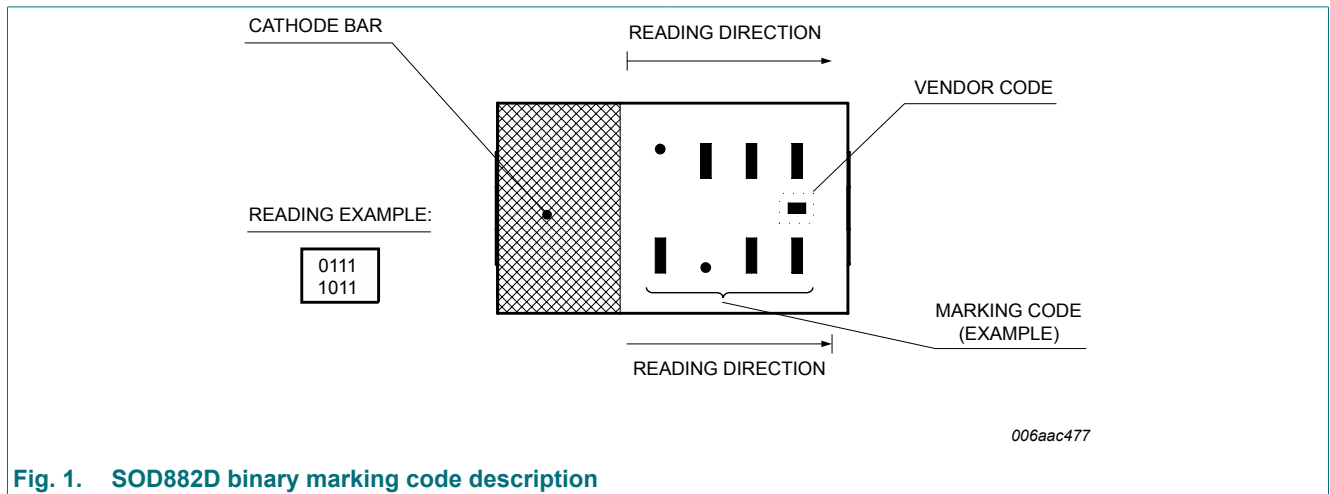


Fig. 1. SOD882D binary marking code description

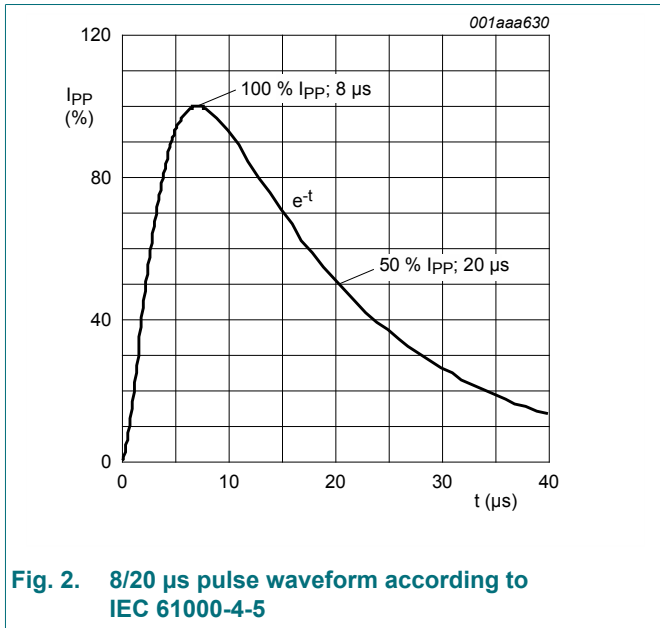
## 8. Limiting values

**Table 5. Limiting values**

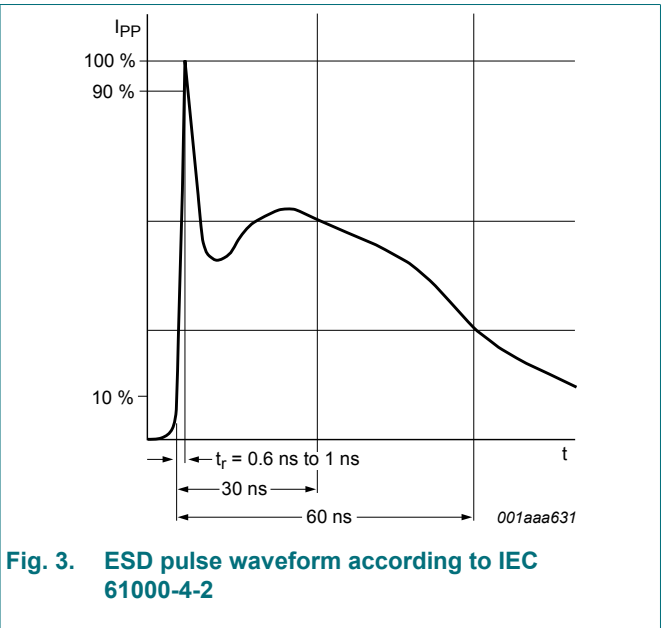
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$P_{PPM}$	rated peak pulse power	$t_p = 8/20 \mu s$	[1]	-	150	W
$I_{PPM}$	rated peak pulse current		[1]	-	3	A
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-65	150	°C
<b>ESD maximum ratings</b>						
$V_{ESD}$	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[2] [3]	-	23	kV
		MIL-STD-883 (human body model)		-	10	kV

- [1] Non-repetitive current pulse 8/20  $\mu s$  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  $\mu s$  pulse waveform according to IEC 61000-4-5**



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

## 9. Characteristics

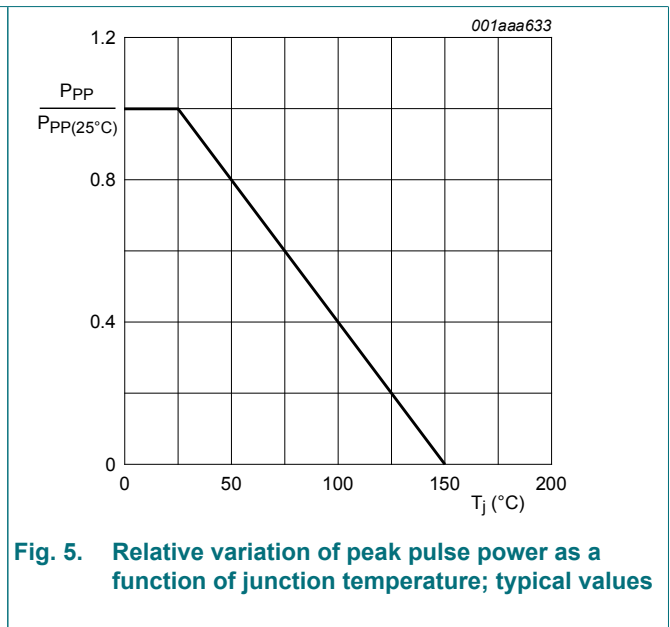
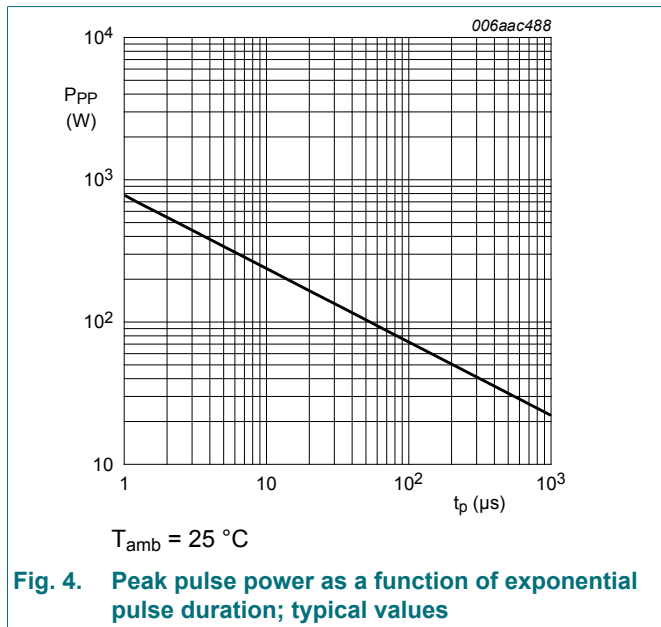
Table 6. Characteristics

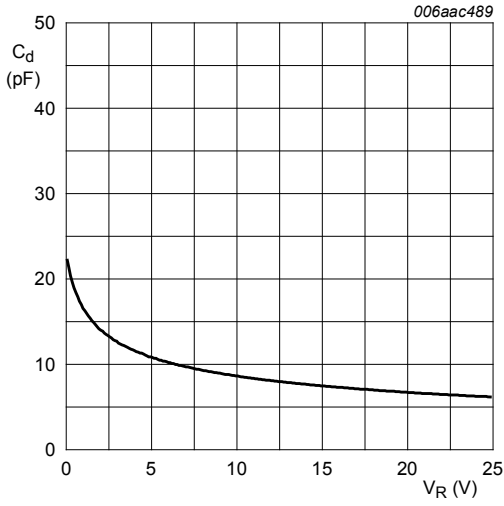
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	24	V
$V_{BR}$	breakdown voltage	$I_R = 5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	26.5	27	27.5	V
$I_{RM}$	reverse leakage current	$V_{RWM} = 24\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	1	50	nA
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	23	50	pF
$V_{CL}$	clamping voltage	$I_{PP} = 1\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [2]	-	36	V
		$I_{PP} = 3\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [2]	-	70	V
$R_{dyn}$	dynamic resistance	$I_R = 10\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[3] [2]	1.6	-	$\Omega$

[1] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponential decay waveform according to IEC61000-4-5.

[2] Measured from pin 1 to pin 2.

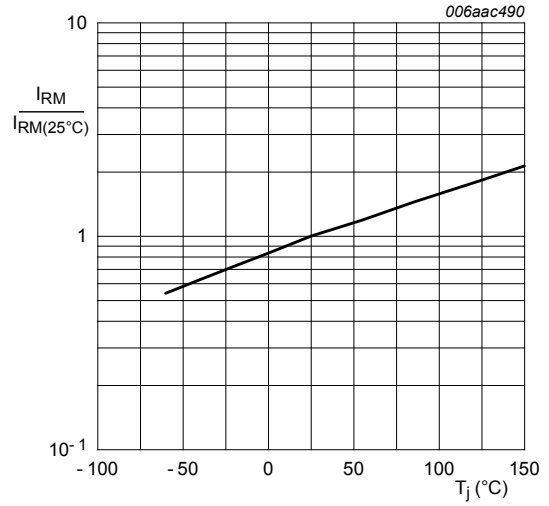
[3] Non-repetitive current pulse, Transmission Line Pulse (TLP)  $t_p = 100\text{ ns}$ ; square pulse; ANSI / ESD STM5.5.1-2008.



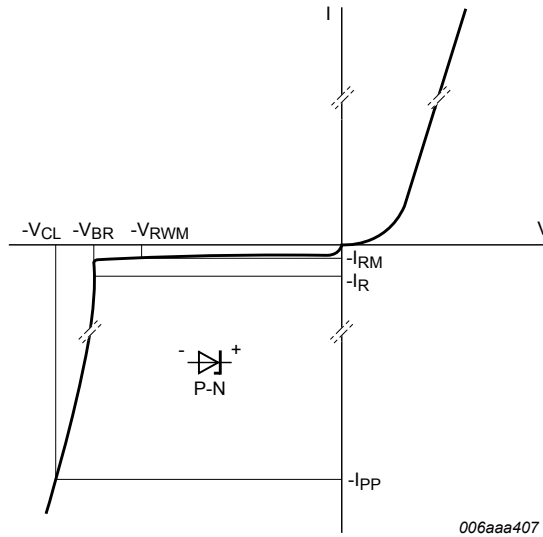


$f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$

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



**Fig. 7. Relative variation of reverse leakage current as a function of junction temperature; typical values**



**Fig. 8. V-I characteristics for unidirectional ESD protection diode**

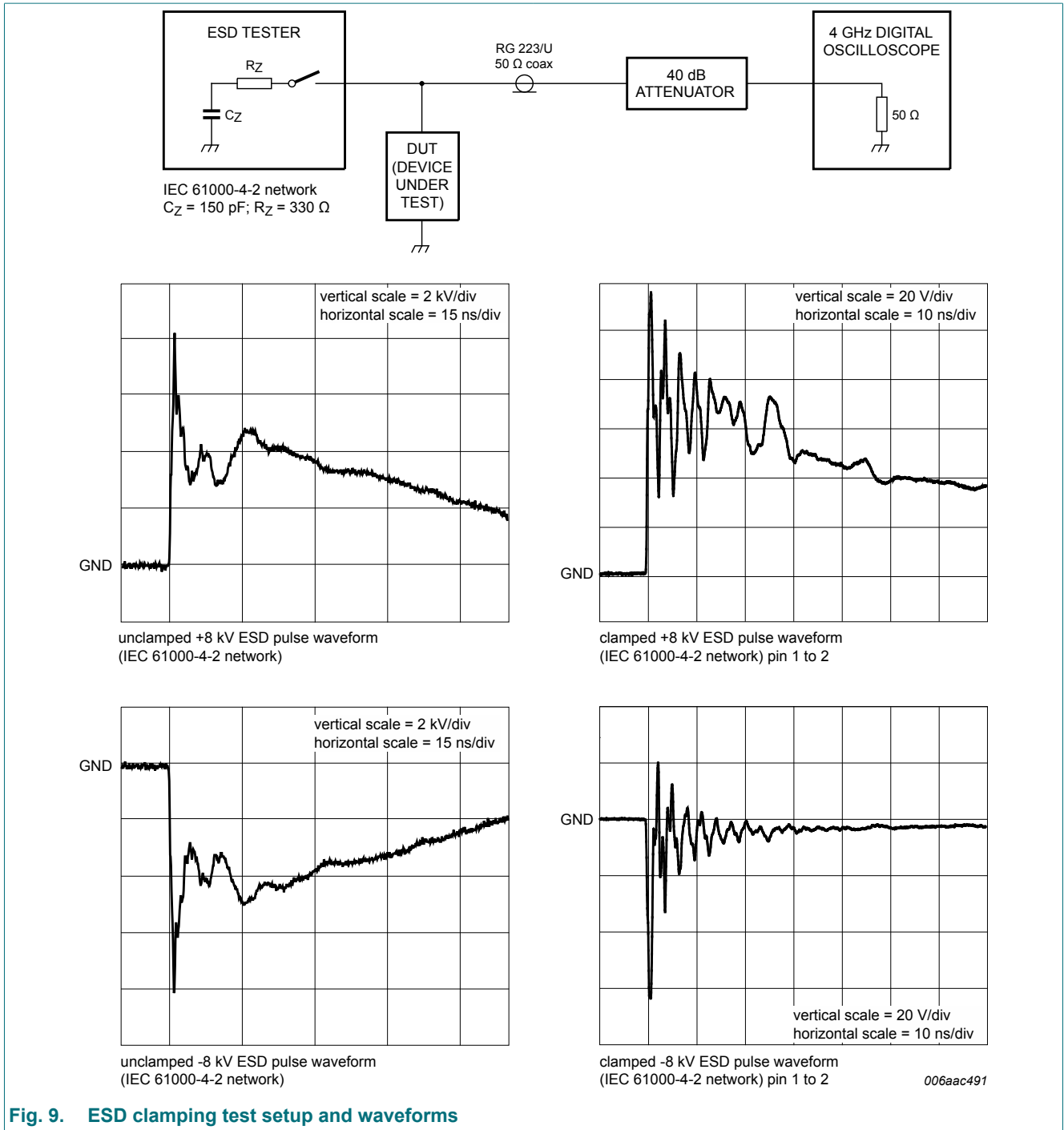
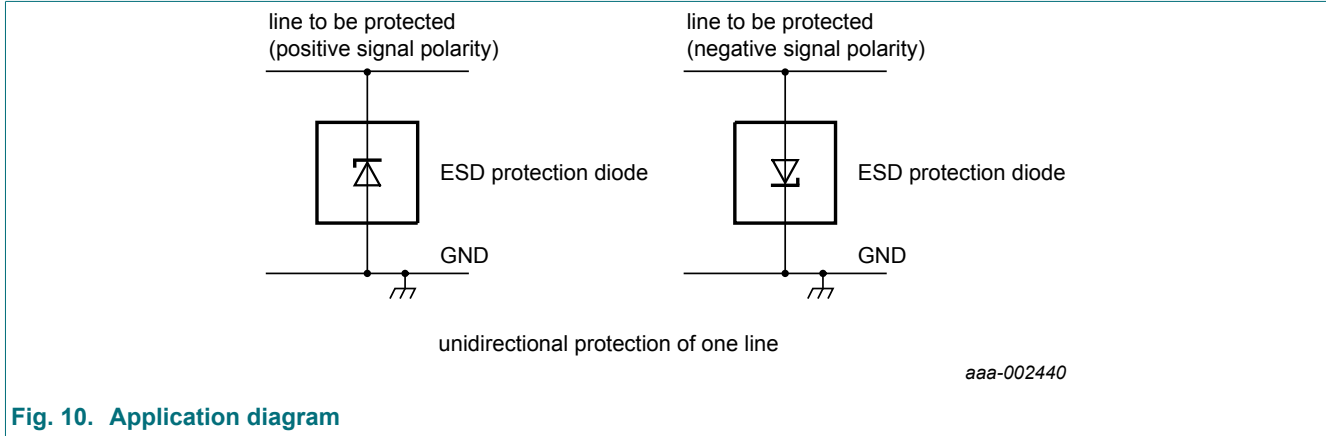


Fig. 9. ESD clamping test setup and waveforms

## 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  $\mu$ s waveform.



**Fig. 10. 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:

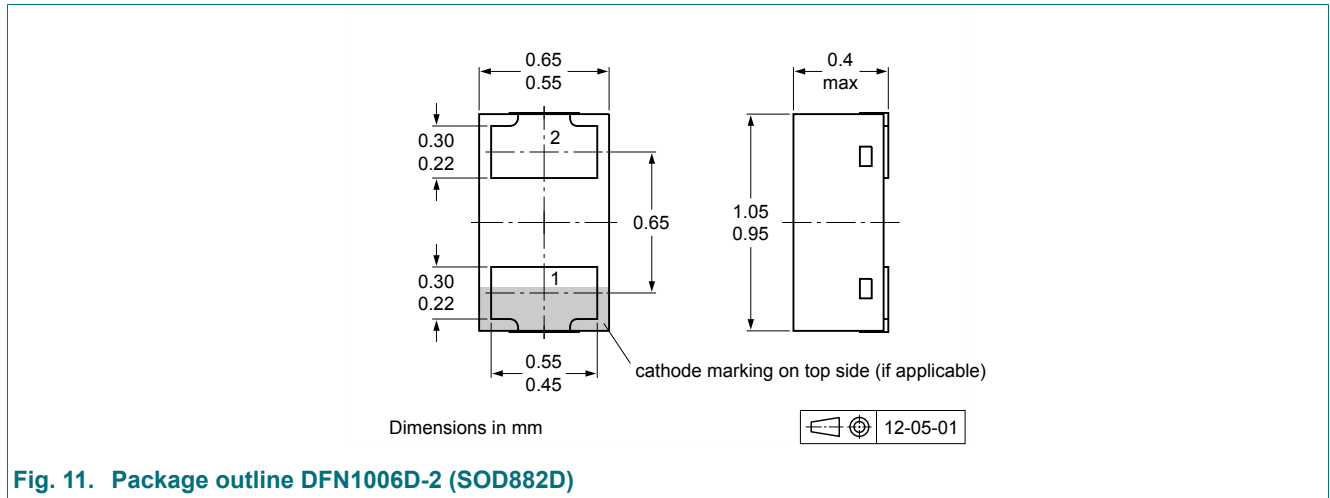
1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit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

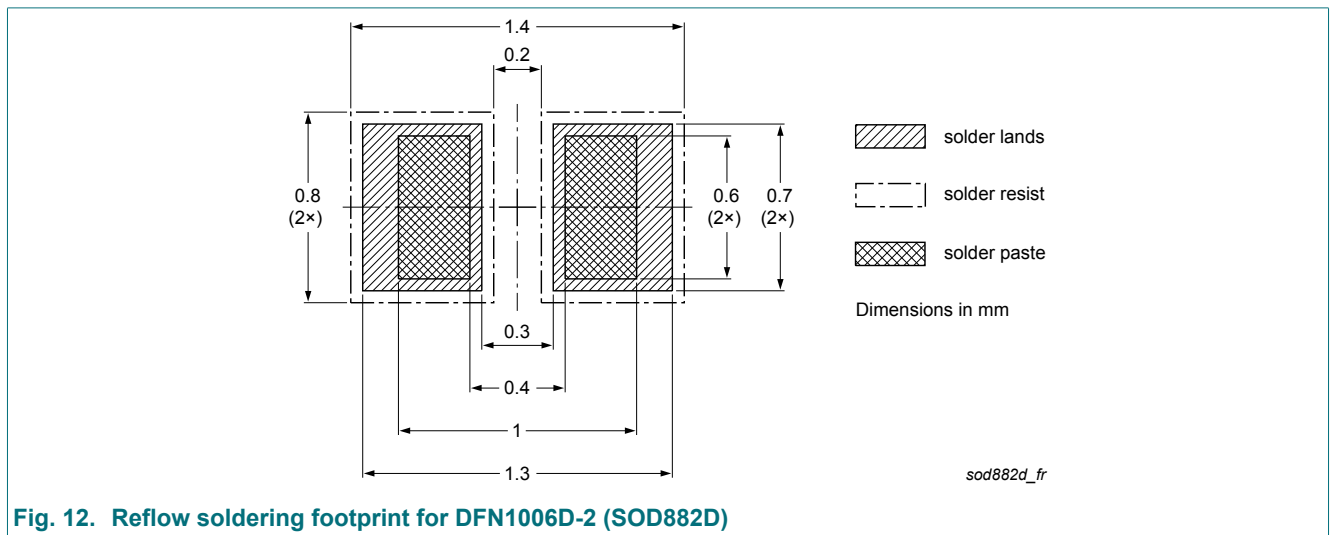
### Quality information

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



## 13. Soldering





## 14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD24VS1ULD v.2	20180822	Product data sheet	-	PESD24VS1ULD v.1
Modifications:	<ul style="list-style-type: none"><li>• Application information: updated.</li><li>• Package drawing: updated.</li><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></ul>			
PESD24VS1ULD v.1	20101019	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".
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