



PESD5V0S1ULD

Unidirectional ESD protection diode

19 July 2019

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 30 kV
- Ultra small SMD plastic package
- IEC 61000-4-2; level 4 (ESD)
- Solderable side pads
- IEC 61000-4-5 (surge); $I_{PP} = 15\text{ A}$
- Package height typ. 0.37 mm
- Max. peak pulse power: $P_{PP} = 150\text{ W}$
- Low clamping voltage: $V_{CL} = 20\text{ V}$
- Ultra low leakage current: $I_{RM} = 100\text{ nA}$
- AEC-Q101 qualified

3. Applications

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

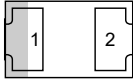
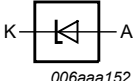
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	$T_{amb} = 25\text{ °C}$	-	-	5.5	V
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ °C}$	-	152	200	pF

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode ^[1]	 <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

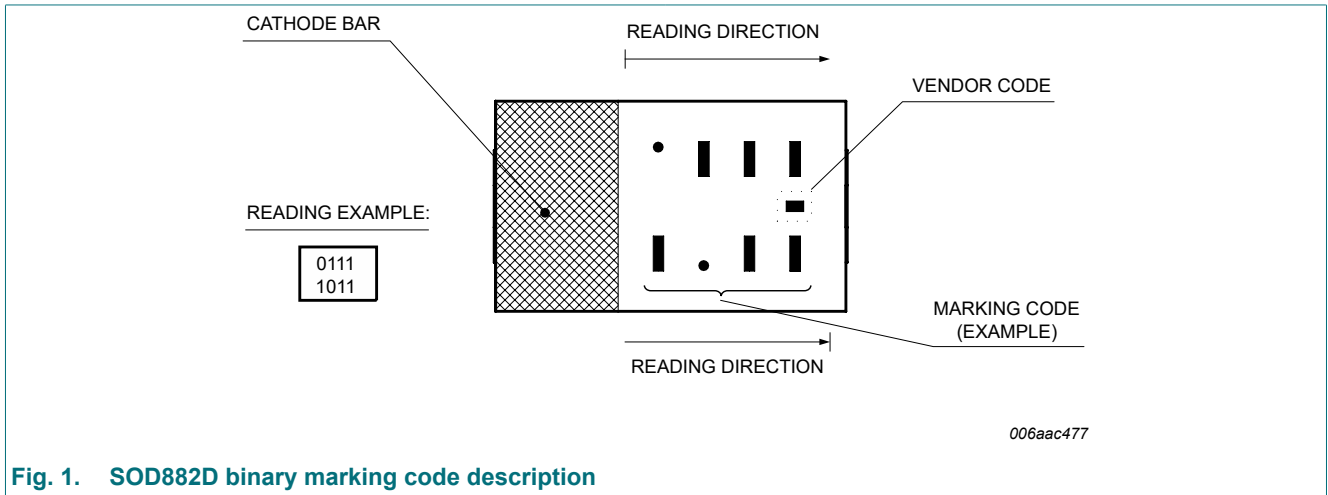
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0S1ULD	DFN1006D-2	DFN1006D-2: leadless ultra small plastic package; 2 terminals	SOD882D

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD5V0S1ULD	0100 0000



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]	-	15	A
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	125	°C
T_{stg}	storage temperature			-65	150	°C
ESD maximum ratings						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[2] [3]	-	30	kV
		MIL-STD-883 (human body model)		-	10	kV

- [1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.
- [2] Device stressed with ten non-repetitive ESD pulses.
- [3] Measured from pin 1 to pin 2.

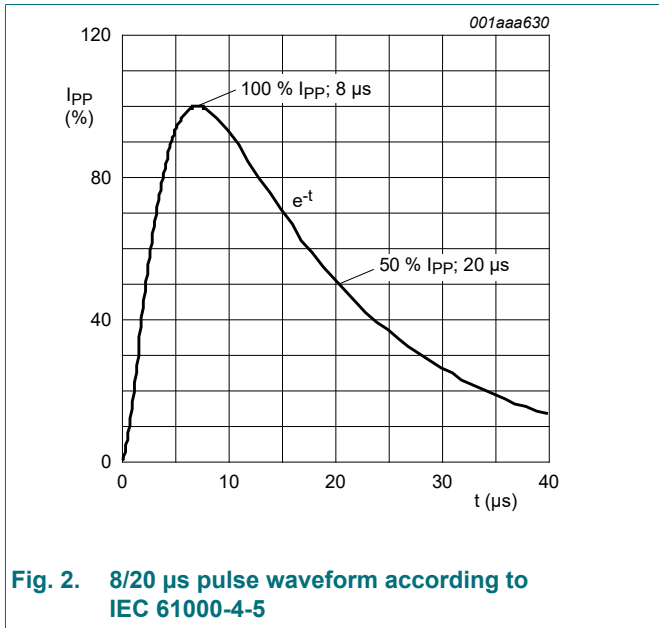


Fig. 2. 8/20 μs pulse waveform according to IEC 61000-4-5

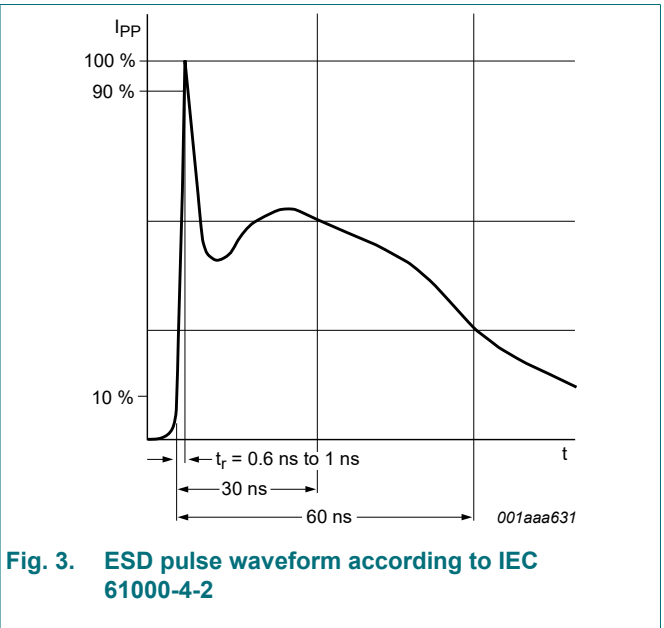


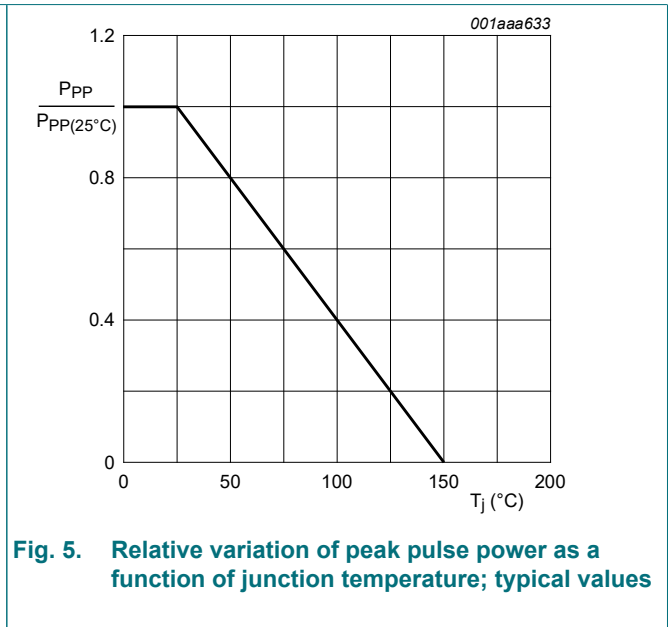
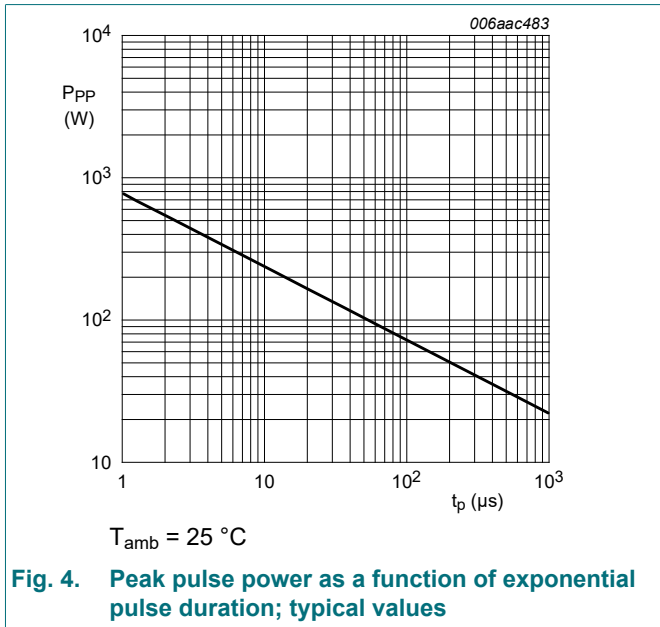
Fig. 3. ESD pulse waveform according to IEC 61000-4-2

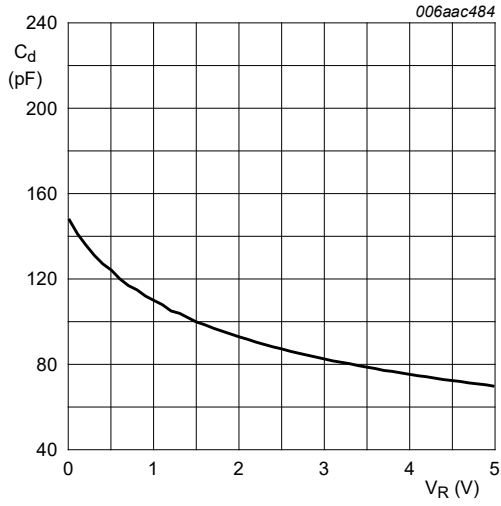
9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	5.5	V
V_{BR}	breakdown voltage	$I_R = 5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	6.4	6.8	7.2	V
I_{RM}	reverse leakage current	$V_{RWM} = 5.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	0.1	1	μA
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	152	200	pF
V_{CL}	clamping voltage	$I_{PP} = 1\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[2] [1]	-	9	V
		$I_{PP} = 15\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[2] [1]	-	20	V
R_{dyn}	dynamic resistance	$I_R = 10\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [3]	0.3	-	Ω

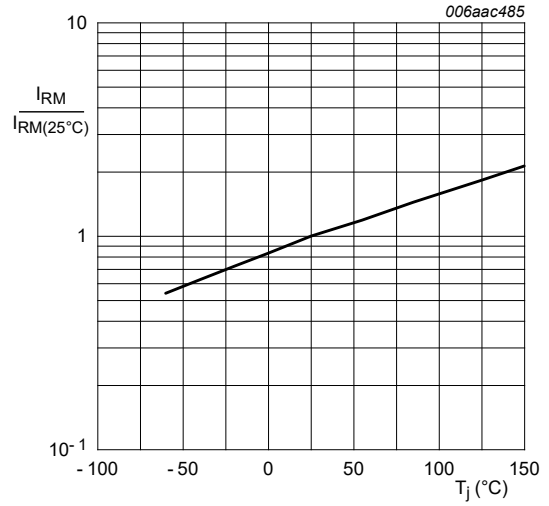
- [1] Measured from pin 1 to pin 2.
- [2] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.
- [3] Non-repetitive current pulse; Transmission Line Pulse (TLP) $t_p = 100\text{ ns}$; square pulse; ANSI / ESD STM5.5.1-2008.





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

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



$V_{\text{RWM}} = 5.5 \text{ V}$

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

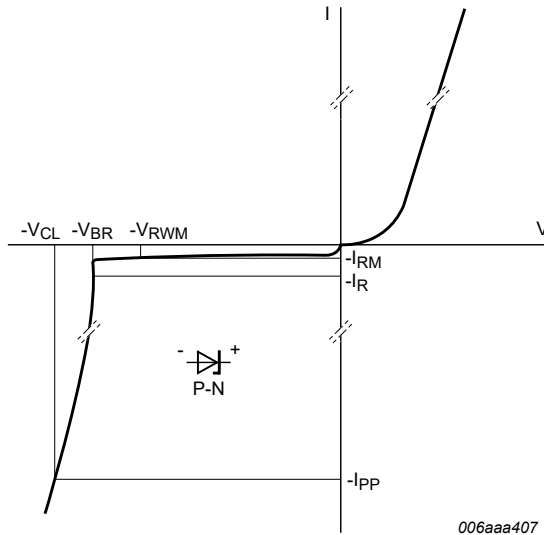


Fig. 8. V-I characteristics for a unidirectional ESD protection diode

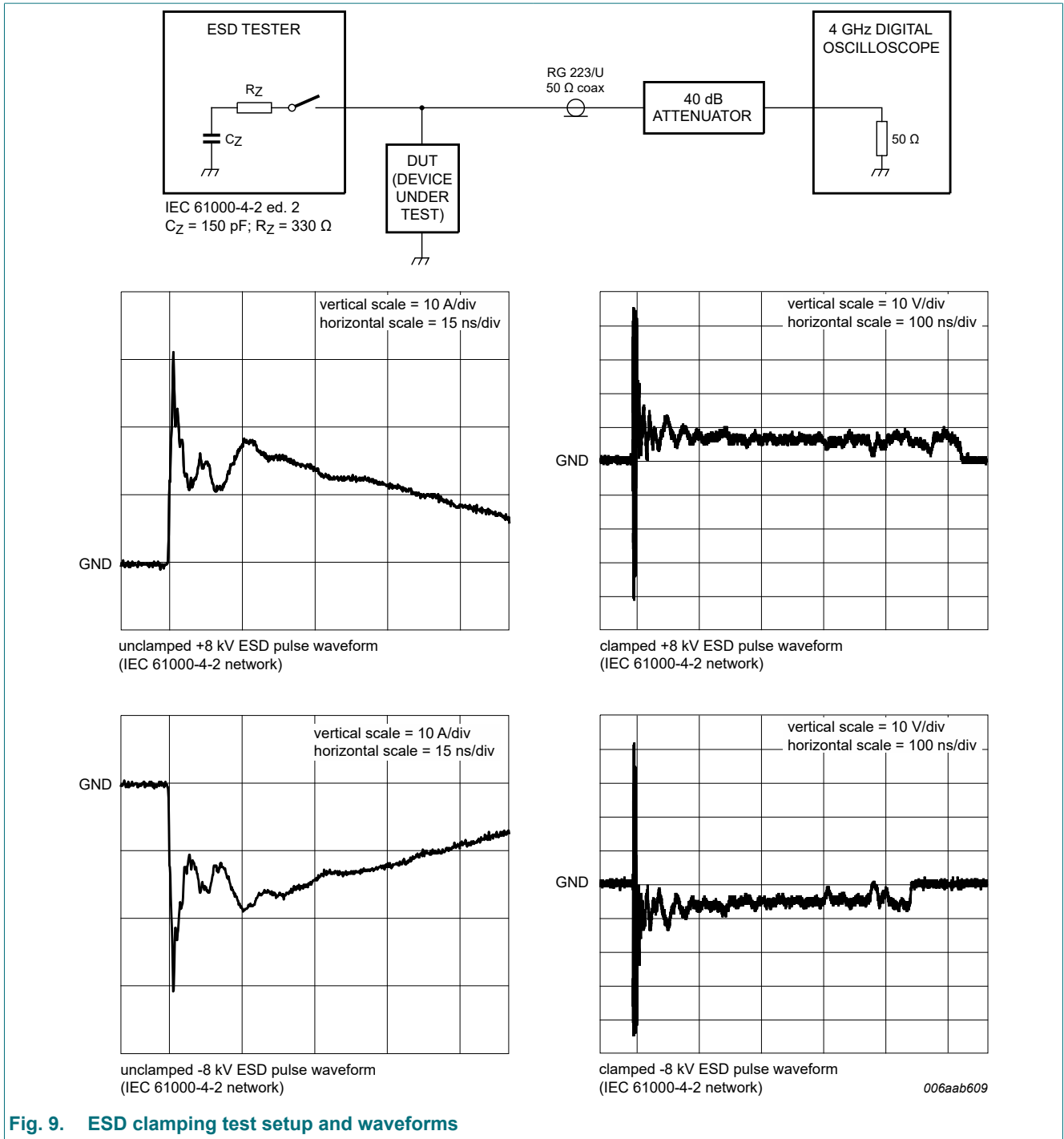


Fig. 9. ESD clamping test setup and waveforms

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 μ s waveform.

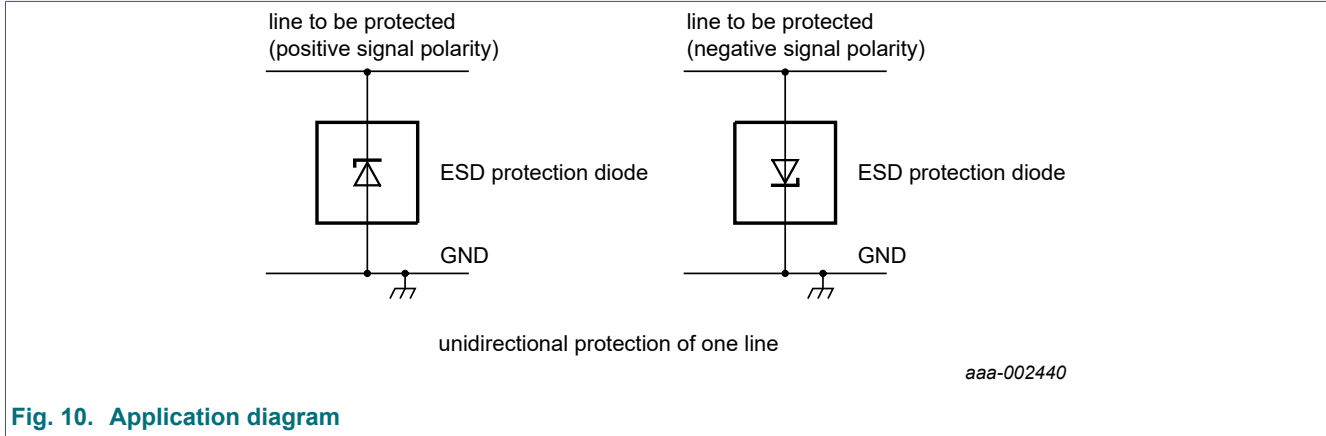


Fig. 10. Application diagram

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

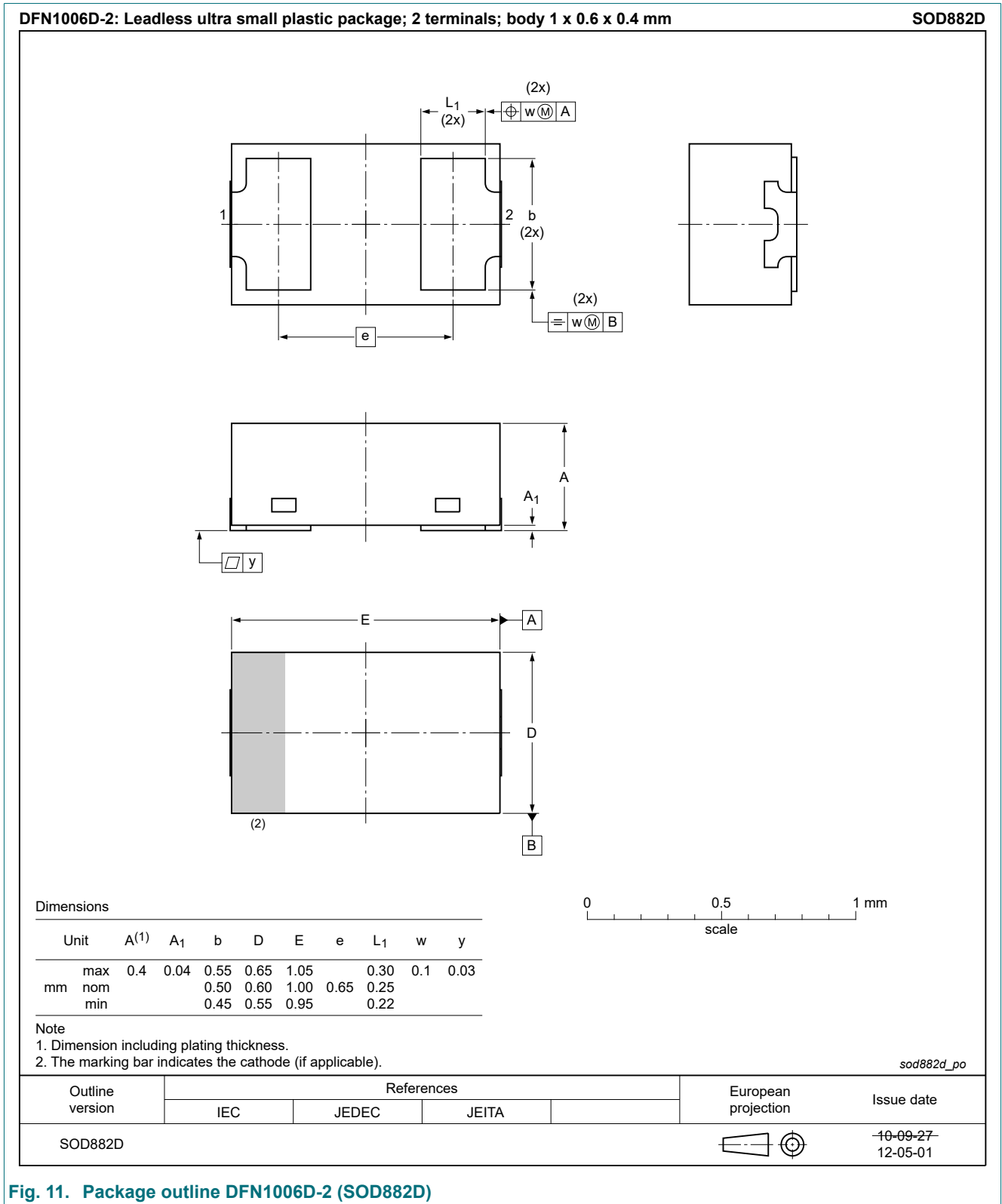


Fig. 11. Package outline DFN1006D-2 (SOD882D)

13. Soldering

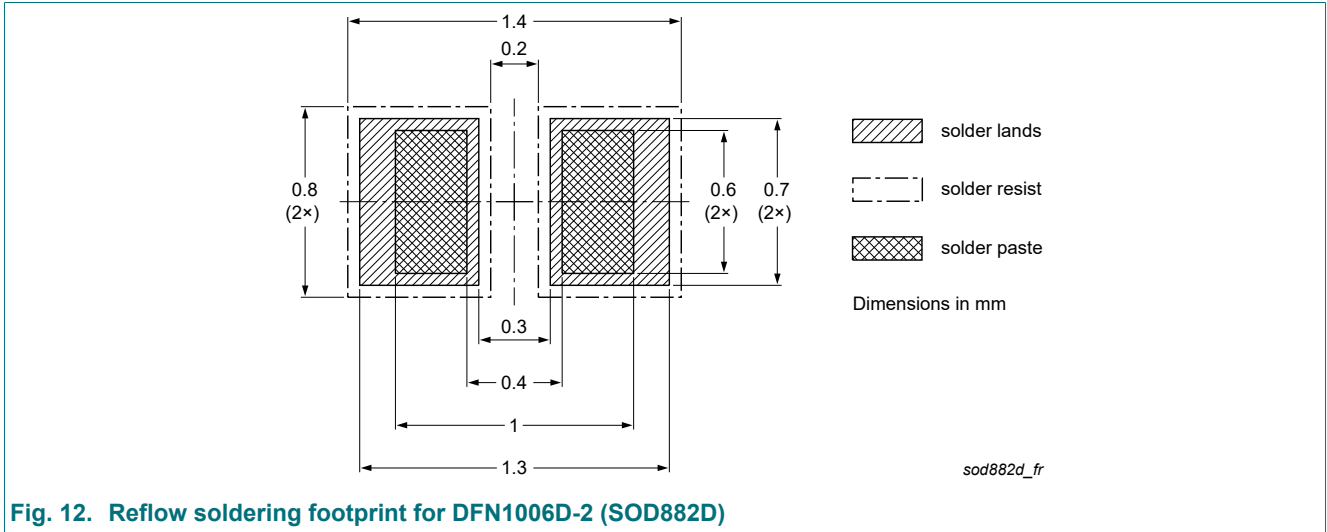


Fig. 12. Reflow soldering footprint for DFN1006D-2 (SOD882D)

14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0S1ULD v.3	20190719	Product data sheet	-	PESD5V0S1ULD v.2
Modifications:	<ul style="list-style-type: none">Table "Characteristics": corrected footnotes 1 and 3Changed chapter "Application information"			
PESD5V0S1ULD v.2	20170308	Product data sheet	-	PESD5V0S1ULD v.1
PESD5V0S1ULD 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".
- [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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