PESD12VS1ULS

Unidirectional ESD protection diode

1 February 2021 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 leadless ultra small DFN1006BD-2 (SOD882BD) Surface-Mounted Device (SMD) plastic package with side-wettable flanks (SWF).

2. Features and benefits

- ESD protection of one line
- Ultra small SMD plastic package
- Side wettable flanks
- 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
- Ultra low leakage current: I_{RM} < 1 nA
- AEC-Q101 qualified

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

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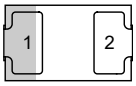
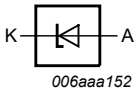
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 Transparent top view **DFN1006BD-2 (SOD882BD)**	
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD12VS1ULS	DFN1006BD-2	Leadless ultra small plastic package with side-wettable flanks (SWF); 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.47 mm body	SOD882BD

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD12VS1ULS	3U

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[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] [3]	-	30	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.

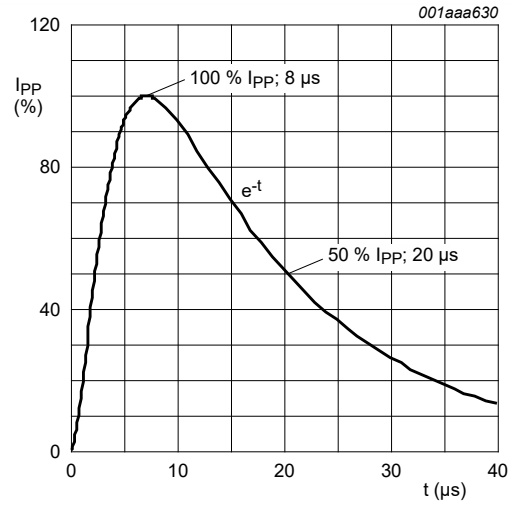


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

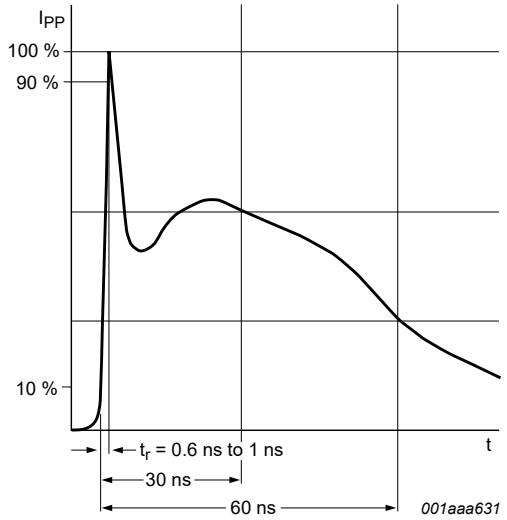


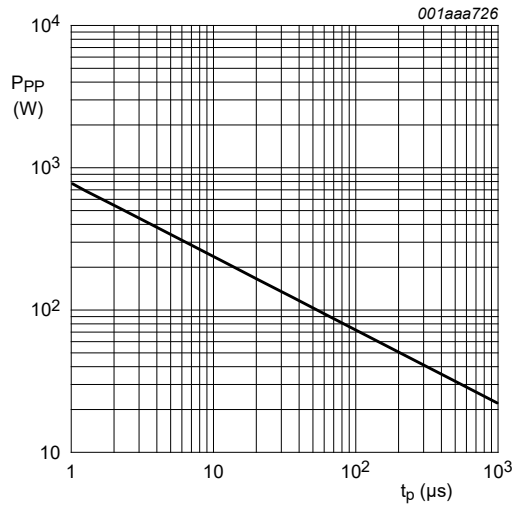
Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	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	[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) t_p = 100 ns; square pulse; ANSI/ESD STM5.5.1 - 2008.



T_{amb} = 25 °C

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

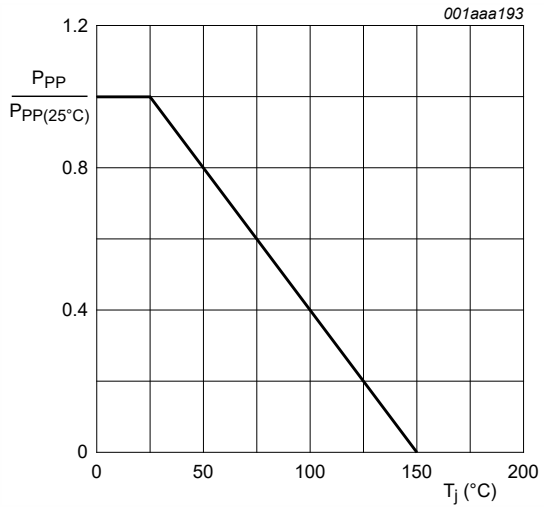
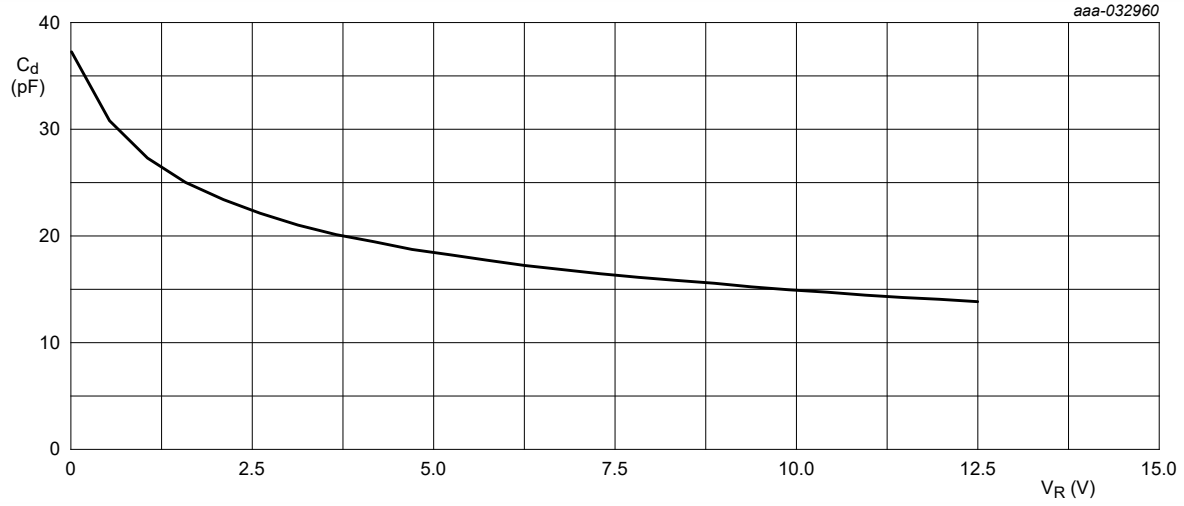
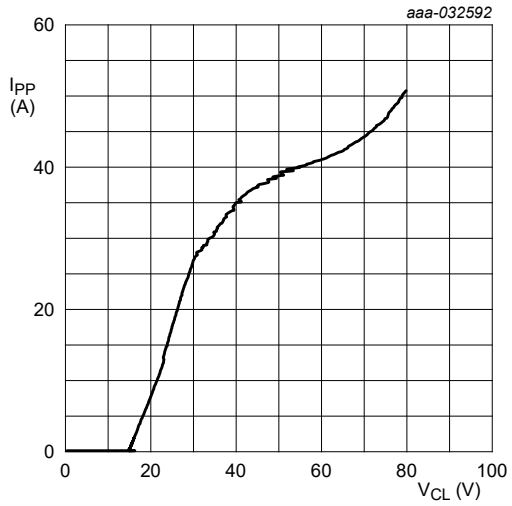


Fig. 4. Relative variation of peak pulse power as a function of junction temperature; typical values



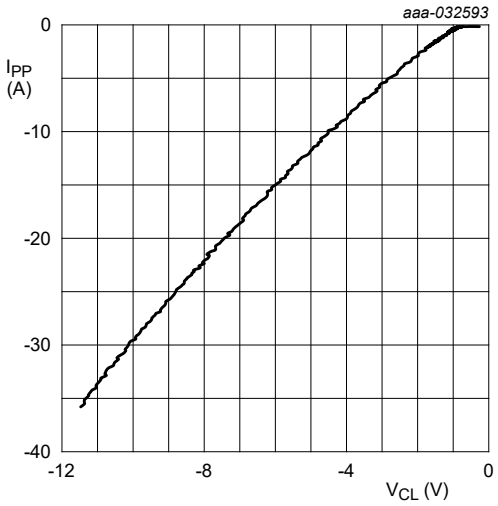
f = 1 MHz; T_{amb} = 25 °C

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



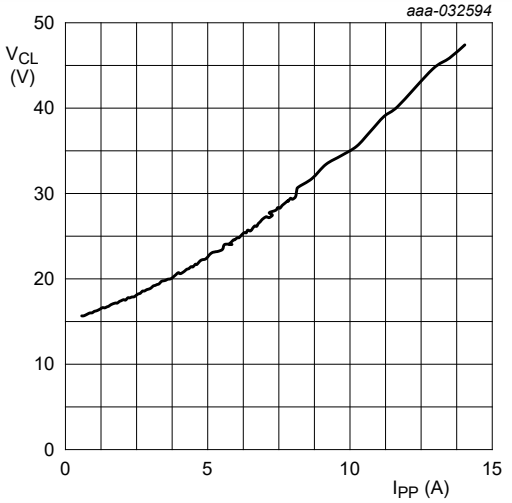
Transmission Line Pulse (TLP);
t_p = 100 ns; t_r = 1 ns

Fig. 6. Dynamic resistance with positive clamping; typical values



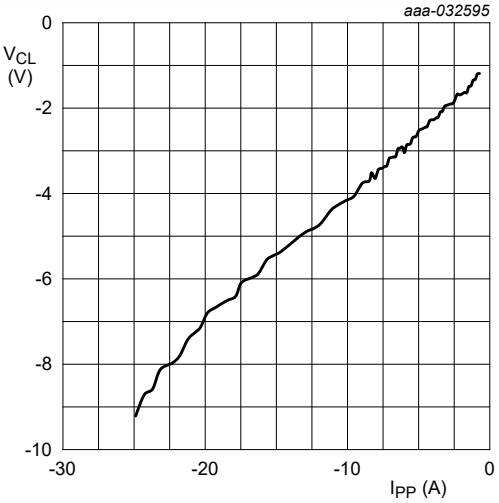
Transmission Line Pulse (TLP);
t_p = 100 ns; t_r = 1 ns

Fig. 7. Dynamic resistance with negative clamping; typical values



IEC 61000-4-5; t_p = 8/20 µs; positive pulse

Fig. 8. Dynamic resistance with positive clamping; typical values



IEC 61000-4-5; t_p = 8/20 µs; negative pulse

Fig. 9. Dynamic resistance with negative clamping; typical values

10. Application information

The device is designed for the protection of one unidirectional data or signal line from the damage caused by ESD and surge pulses. The device may be used on lines where the signal polarities are either positive or negative with respect to ground.

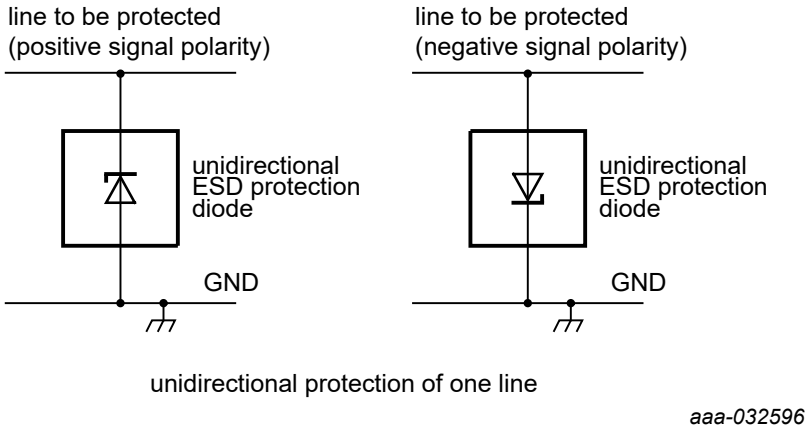


Fig. 10. Application diagram

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. 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.

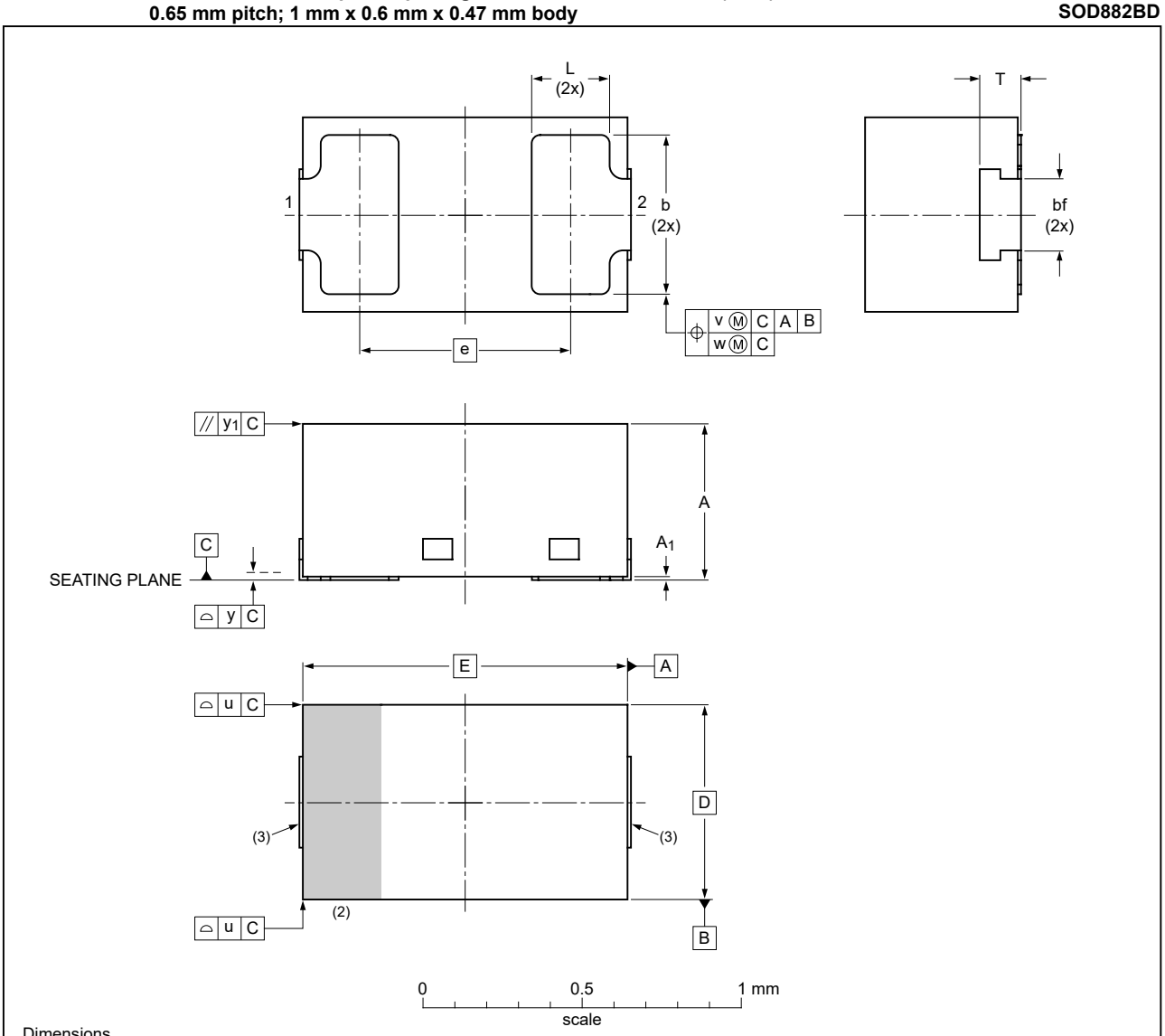
11. Test information

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

DFN1006BD-2 **Leadless ultra small plastic package with side-wettable flanks (SWF); 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.47 mm body** **SOD882BD**



Dimensions

Unit		$A^{(1)}$	A_1	$bf^{(1)}$	b	D	E	e	L	$T^{(1)}$	u	v	w	y	y_1
	max	0.50	0.04		0.55				0.30	0.22					
mm	nom	0.47			0.50	0.60	1.00	0.65	0.25	0.16	0.05	0.10	0.05	0.05	0.05
	min	0.44		0.20	0.45				0.22	0.10					

Note
1. Dimension including plating thickness.
2. The marking bar indicates the cathode.
3. Solderable lead end, protrusion max. 0.02 mm.

sod882bd_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD882BD		MO-343AA				~~20-06-22~~ 20-06-23

Fig. 11. Package outline DFN1006BD-2 (SOD882BD)

13. Soldering

Footprint information for reflow soldering of DFN1006BD-2 package **SOD882BD**

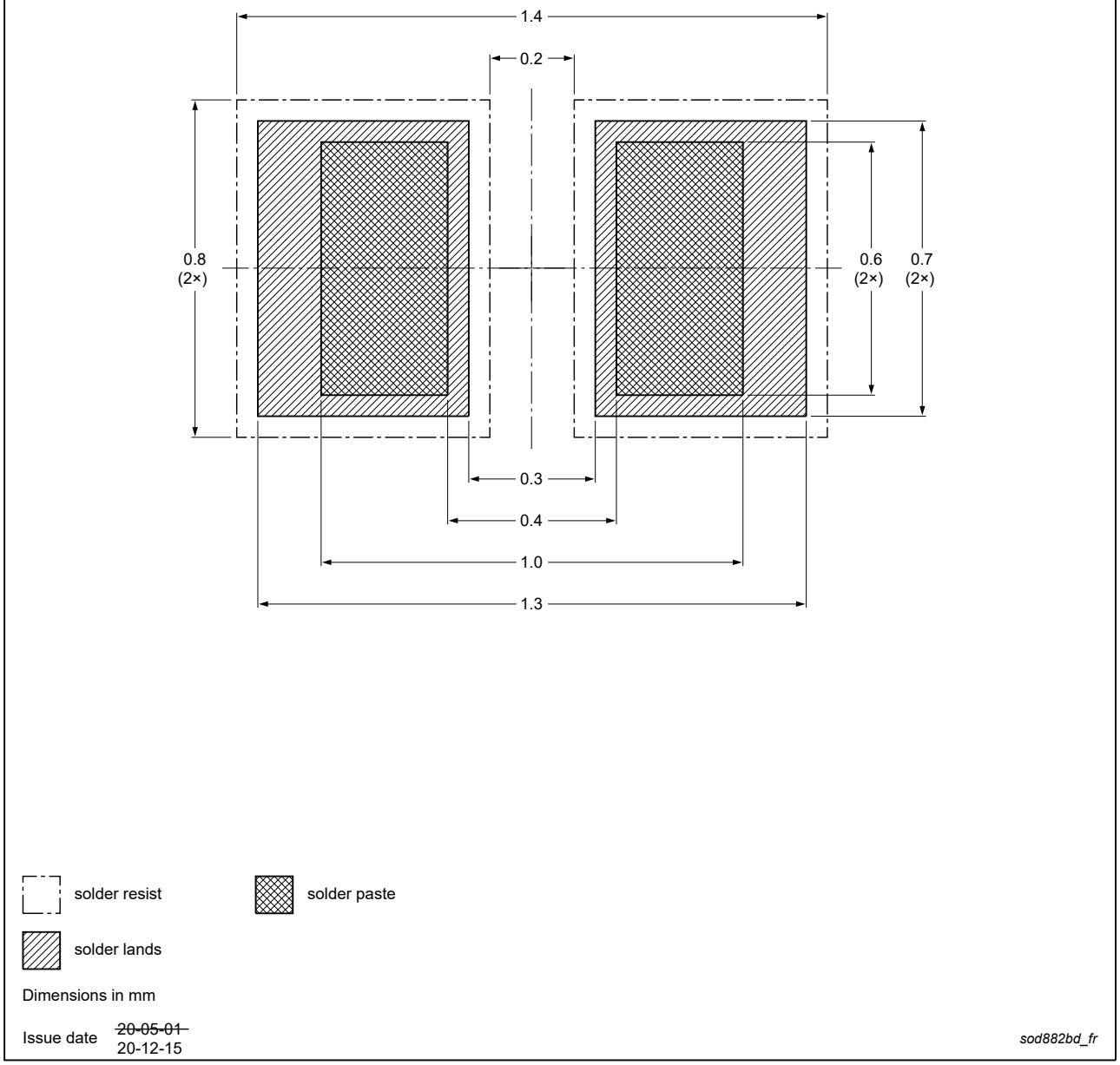


Fig. 12. Reflow soldering footprint for DFN1006BD-2 (SOD882BD)

14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD12VS1ULS v.2	20210201	Product data sheet	-	PESD12VS1ULS v.1
Modifications:	• Chapter "Features and benefits": Clarification			
PESD12VS1ULS v.1	20210115	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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