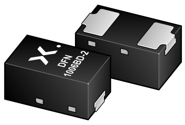


MMBZ16VZLS-Q

TVS device for surge protection of interface and supply lines

6 January 2022 — Product data sheet

1. General description

ESD protection device in an ultra small DFN1006BD-2 (SOD882BD) Surface-Mounted Device (SMD) plastic package with side wettable flanks, designed to protect one line from the damage caused by transient overvoltages (TVS).

2. Features and benefits

- Reverse stand-off voltage: V_{RWM} = 13 V
- Low clamping voltage: V_{CL} = 36 V at I_{PP} = 7 A
- Ultra low leakage current: I_{RM} < 1 nA
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

ESD protection for supply and interface lines with high signal levels for use in automotive environments with highest quality standards.

4. Quick reference data

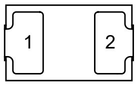
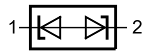
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	13	V
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1]	-	-	7	A
V_{CL}	clamping voltage	I_{PPM} = 7 A; t_p = 8/20 µs; T_{amb} = 25 °C	[1]	-	36	43	V

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 Transparent top view **DFN1006BD-2 (SOD882BD)**	
2	K2	cathode (diode 2)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
MMBZ16VZLS-Q	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
MMBZ16VZLS-Q	ZHZ

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]	-	7	A
		t_p = 10/1000 µs	[2]	-	0.8	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	[3]	-	23	kV
		ISO 10605: contact discharge; C = 330 pF, R = 330 Ω	[3]	-	20	V
		ISO 10605: contact discharge; C = 150 pF, R = 330 Ω	[3]	-	23	V

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5.
[2] Device stressed with 10/1000 µs exponential decay waveform according to IEC 61643-321.
[3] Device stressed with ten non-repetitive ESD pulses.

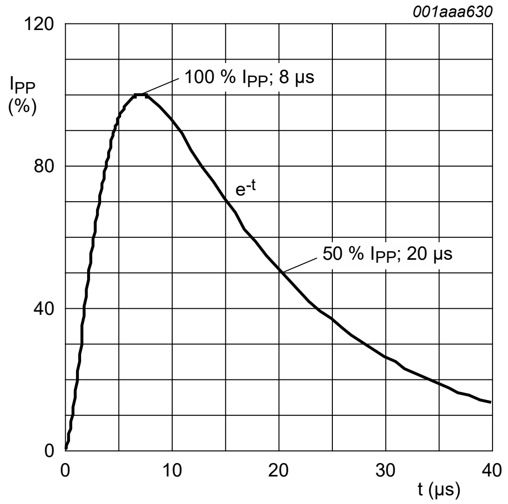


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

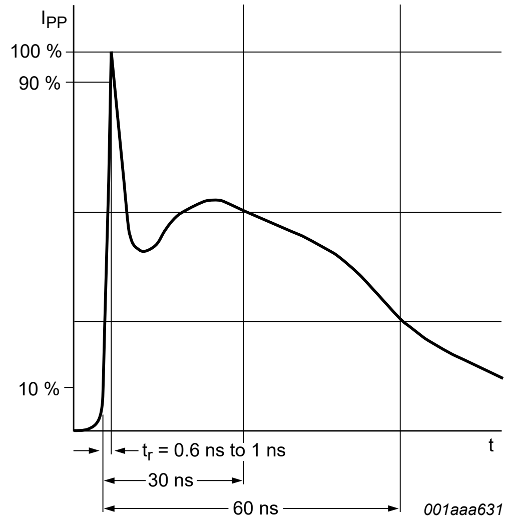


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	13	V
V_{BR}	breakdown voltage	I_R = 1 mA; T_{amb} = 25 °C		15.9	16.4	17	V
I_{RM}	reverse leakage current	V_{RWM} = 13 V; T_{amb} = 25 °C		-	1	10	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	15	20	pF
V_{CL}	clamping voltage	I_{PPM} = 1 A; t_p = 8/20 µs; T_{amb} = 25 °C	[1]	-	18.6	-	V
		I_{PPM} = 7 A; t_p = 8/20 µs; T_{amb} = 25 °C	[1]	-	36	43	V
		I_{PPM} = 0.8 A; t_p = 10/1000 µs; T_{amb} = 25 °C	[1]	-	21.5	26	V
		I_{PP} = 16 A; t_p = TLP; T_{amb} = 25 °C	[2]	-	32.9	-	V

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5.
[2] Non-repetitive current pulse, Transmission Line Pulse (TLP); square pulse; ANSI / ESD STM5.5.1-2008.

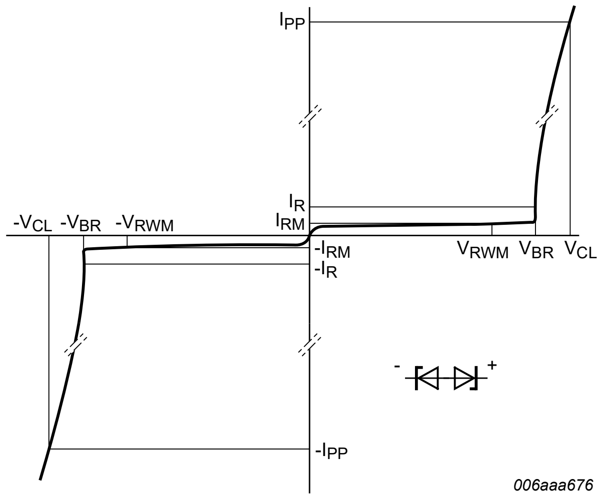
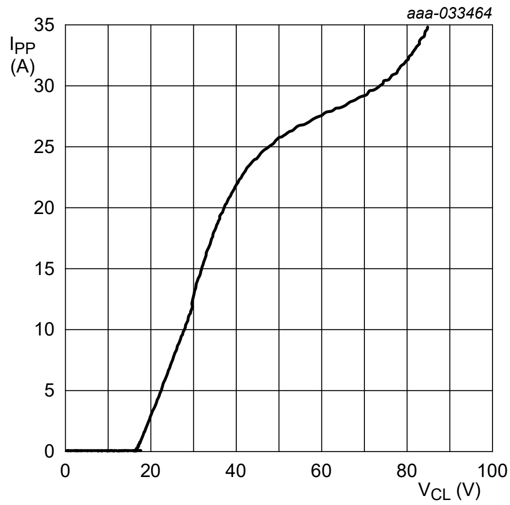
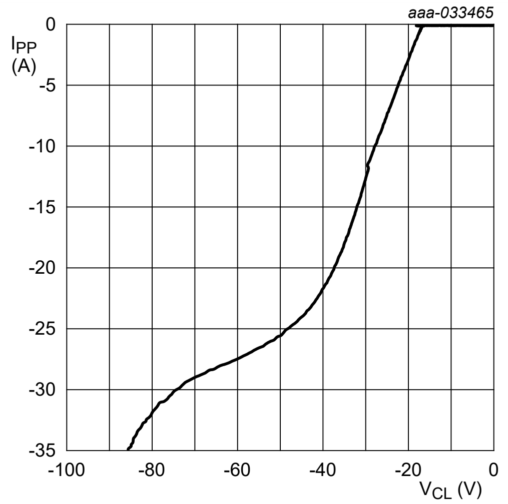


Fig. 3. V-I characteristics for a bidirectional ESD protection diode



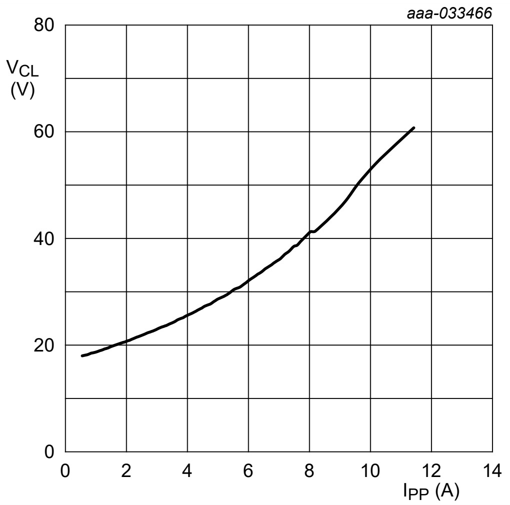
Transmission Line Pulse (TLP);
t_p = 100 ns; t_r = 1 ns

Fig. 4. Dynamic resistance with positive clamping; typical values



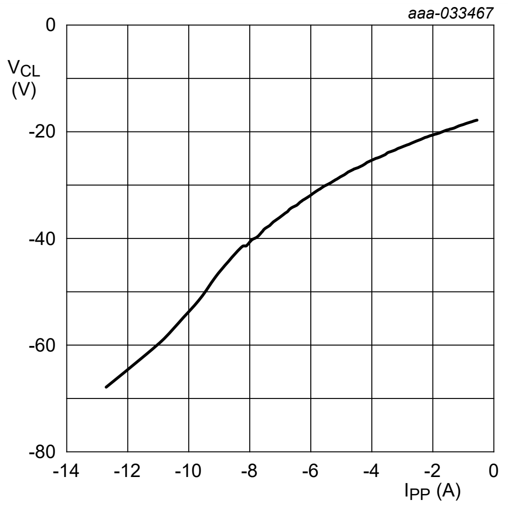
Transmission Line Pulse (TLP);
t_p = 100 ns; t_r = 1 ns

Fig. 5. Dynamic resistance with negative clamping; typical values



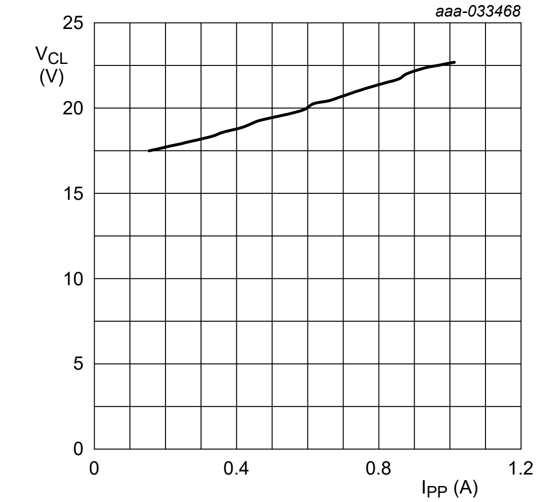
IEC 61000-4-5; t_p = 8/20 μs; positive pulse

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



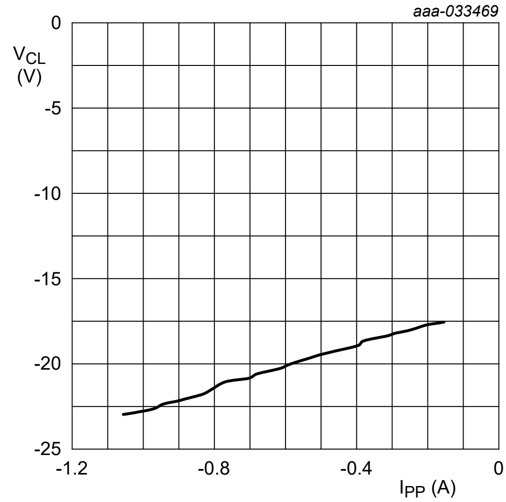
IEC 61000-4-5; t_p = 8/20 μs; negative pulse

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



IEC 61000-4-5; t_p = 10/1000 μs; positive pulse

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



IEC 61000-4-5; t_p = 10/1000 μs; negative pulse

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

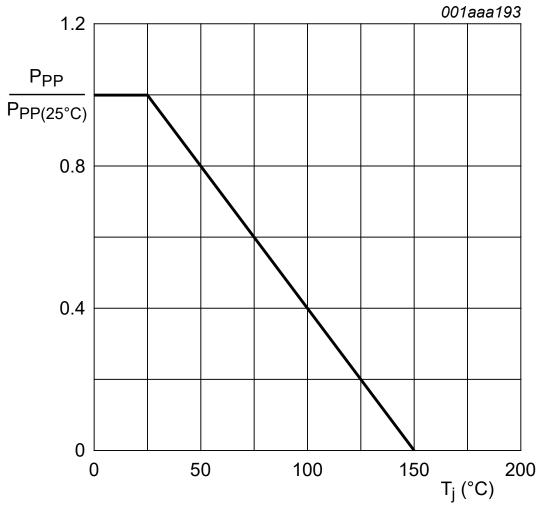
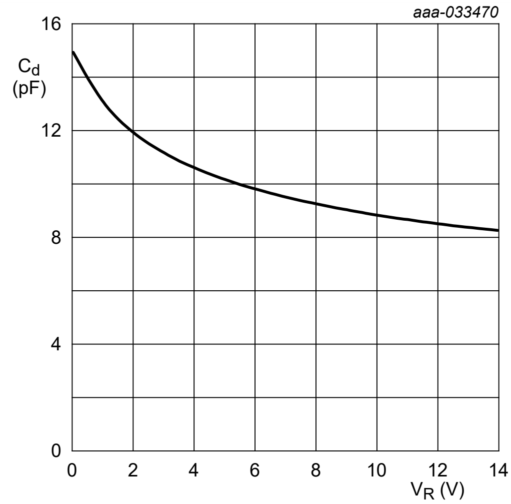


Fig. 10. **Relative variation of peak pulse power as a function of junction temperature; typical values**



f = 1 MHz; T_{amb} = 25 °C

Fig. 11. **Diode capacitance as a function of reverse voltage; typical values**

10. Application information

The device is designed for the protection of one bidirectional data line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are both positive and negative with respect to ground.

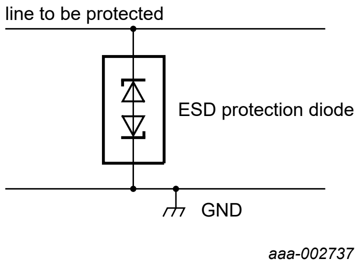


Fig. 12. Application diagram

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.

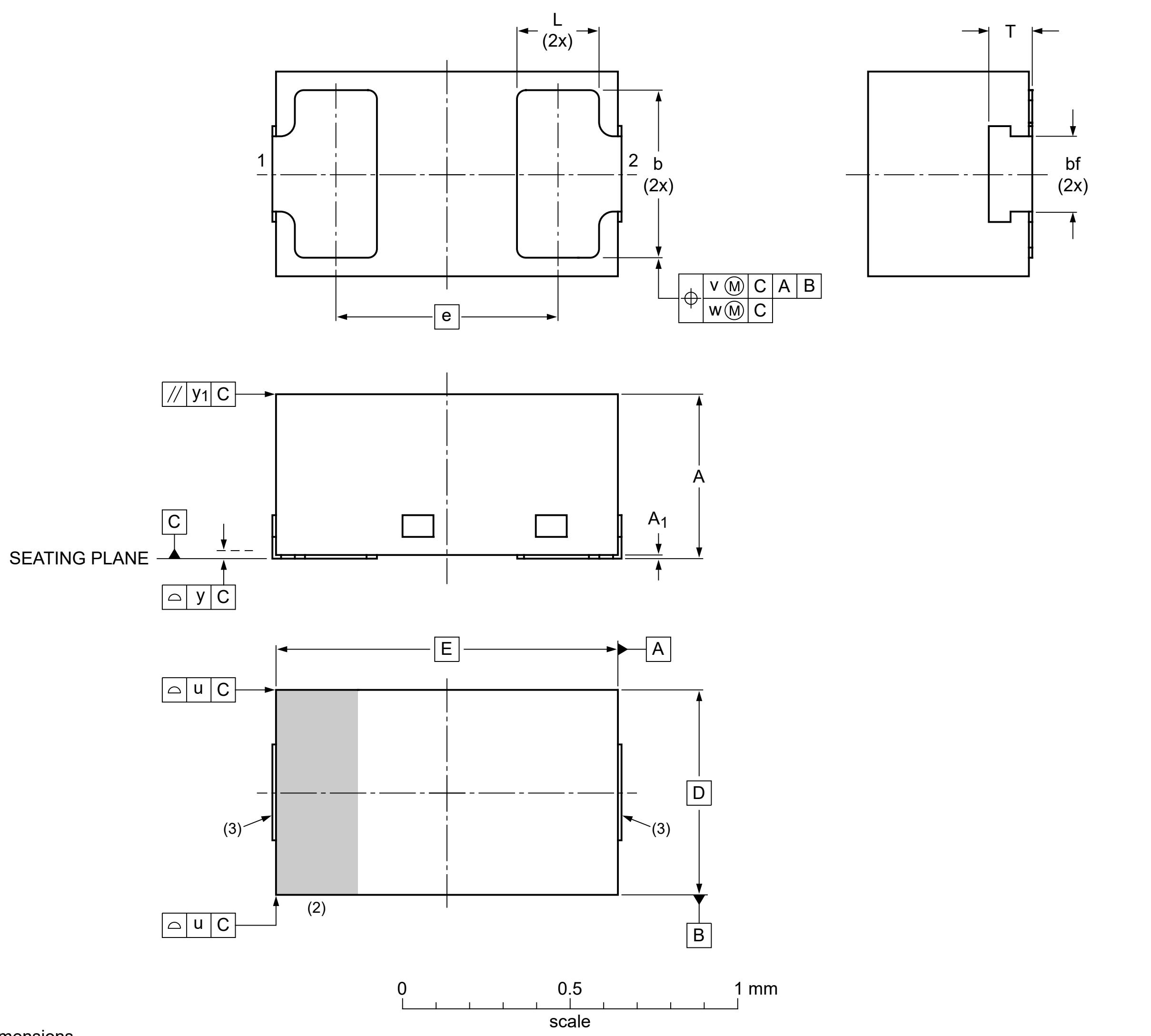
11. Test information

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

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. 13. Package outline DFN1006BD-2 (SOD882BD)

13. Soldering

Footprint information for reflow soldering of DFN1006BD-2 package SOD882BD

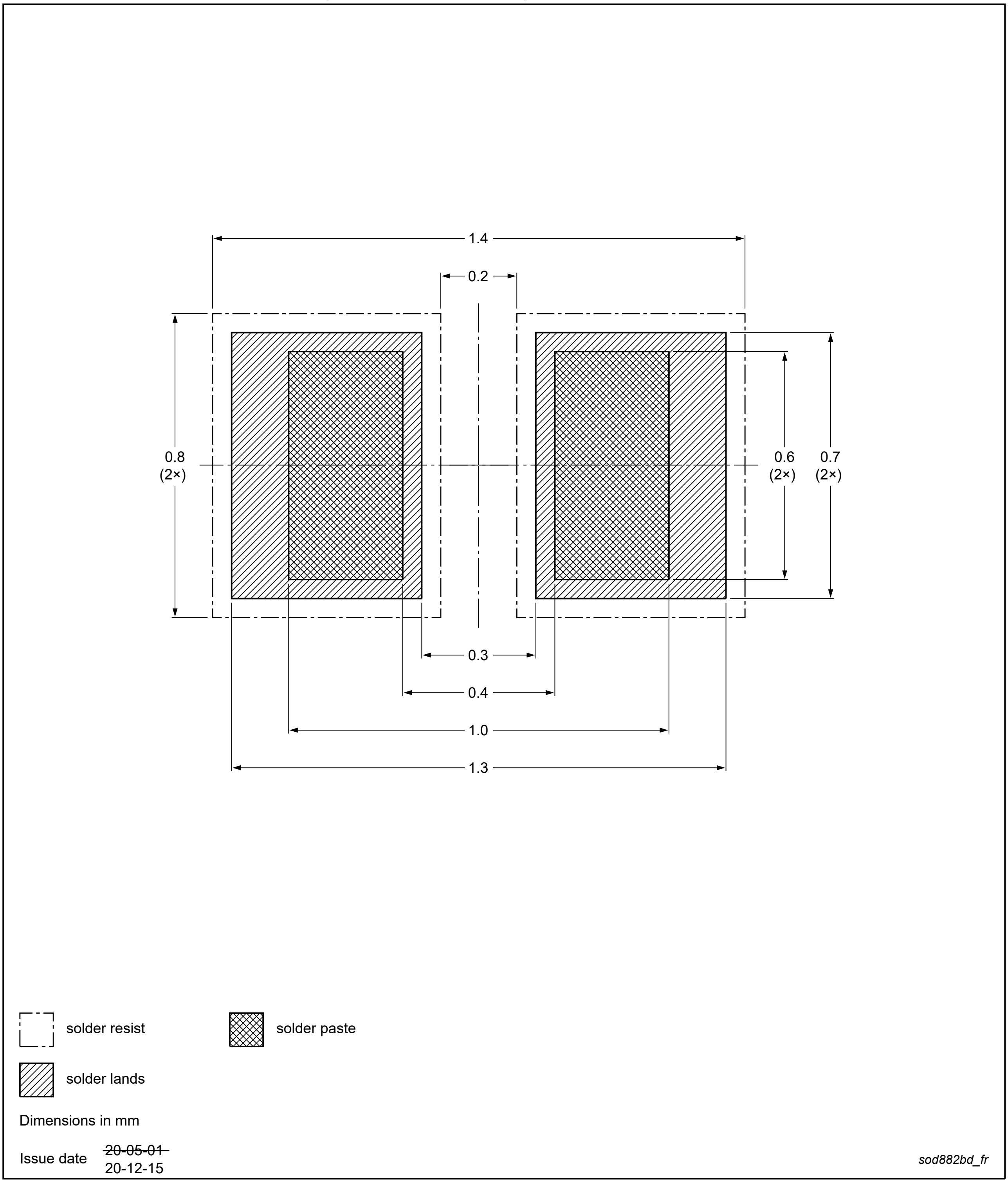


Fig. 14. Reflow soldering footprint for DFN1006BD-2 (SOD882BD)

14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
MMBZ16VZLS-Q v.2	20220106	Product data sheet	-	MMBZ16VZLS-Q v.1
Modifications:	• Chapter "Pinning information": Simplified outline corrected			
MMBZ16VZLS-Q v.1	20210727	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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Date of release: 6 January 2022