



# MMBZ27VU-A

TVS device for surge protection of interface and supply lines

8 June 2021

Product data sheet

## 1. General description

Protection device in a small SOD323 Surface-Mounted Device (SMD) plastic package designed to protect one line from the damage caused by transient overvoltages (TVS).

## 2. Features and benefits

- Reverse stand-off voltage:  $V_{RWM} = 24\text{ V}$
- Low clamping voltage:  $V_{CL} = 60\text{ V}$  at  $I_{PP} = 4.5\text{ A}$
- ESD protection up to 30 kV (IEC61000-4-2)
- Ultra low leakage current:  $I_{RM} < 1\text{ nA}$
- AEC-Q101 qualified

## 3. Applications

ESD protection for supply and interface lines with high signal levels.

- Industrial
- Consumer
- Computing

## 4. Quick reference data

Table 1. Quick reference data


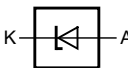
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ °C}$		-	-	24	V
$I_{PPM}$	rated peak pulse current	$t_p = 8/20\text{ }\mu\text{s}$	[1] [2]	-	-	4.5	A
$V_{CL}$	clamping voltage	$I_{PPM} = 4.5\text{ A}$ ; $t_p = 8/20\text{ }\mu\text{s}$ ; $T_{amb} = 25\text{ °C}$	[2] [1]	-	-	70	V

[1] Device stressed with 8/20  $\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1 to 2.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 SOD323	 006aaa152
2	A	anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
MMBZ27VU-A	SOD323	plastic, surface-mounted package; 2 leads; 1.3 mm pitch; 1.7 mm x 1.25 mm x 0.95 mm body	SOD323

## 7. Marking

Table 4. Marking codes

Type number	Marking code
MMBZ27VU-A	V4

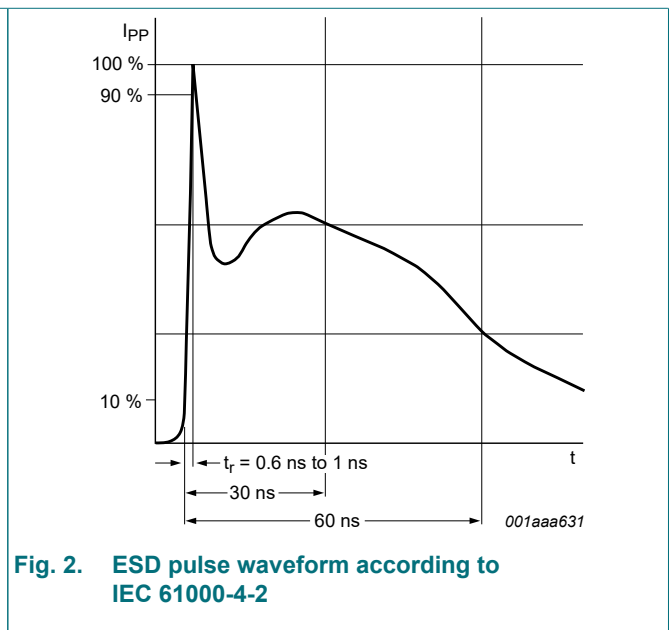
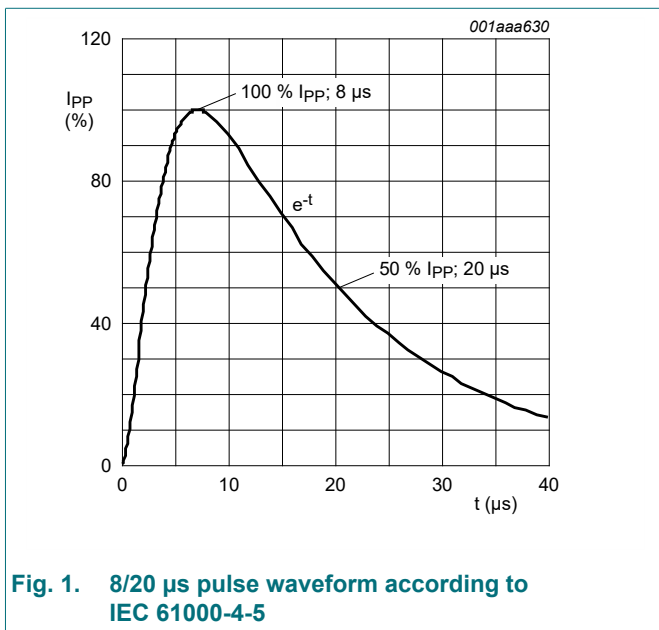
## 8. Limiting values

**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	$t_p = 8/20 \mu s$	[1] [2]	-	4.5	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]	-	30	kV
		ISO 10605: contact discharge; C = 330 pF, R = 330 $\Omega$	[2] [3]	-	19	kV
		ISO 10605: contact discharge; C = 150 pF, R = 330 $\Omega$	[2] [3]	-	30	kV

- [1] Device stressed with 8/20  $\mu s$  exponential decay waveform according to IEC 61000-4-5.
- [2] Measured from pin 1 to 2.
- [3] Device stressed with ten non-repetitive ESD pulses.



### 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	$I_R = 10\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	26.2	27	27.5	V
$I_{RM}$	reverse leakage current	$V_R = 24\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	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	$I_{PPM} = 1\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [2]	-	30	36	V
		$I_{PPM} = 4.5\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [2]	-	-	70	V
		$I_{PP} = 16\text{ A}; t_p = \text{TLP}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [3]	-	67.5	-	V
$R_{dyn}$	dynamic resistance	$I_R = 10\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [3]	-	1.6	-	$\Omega$

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

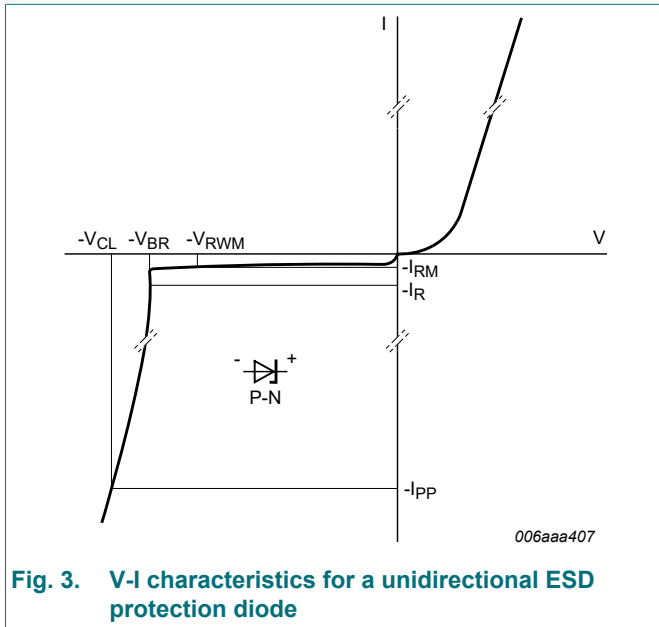


Fig. 3. V-I characteristics for a unidirectional ESD protection diode

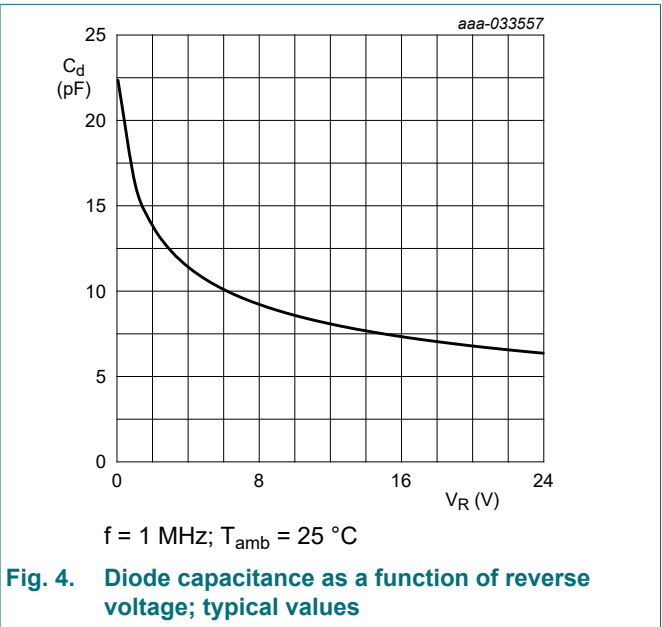
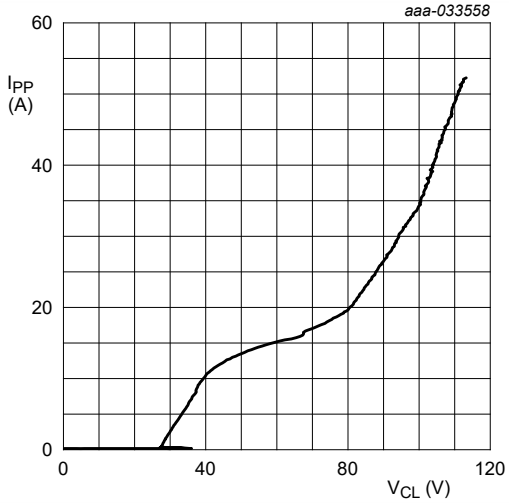
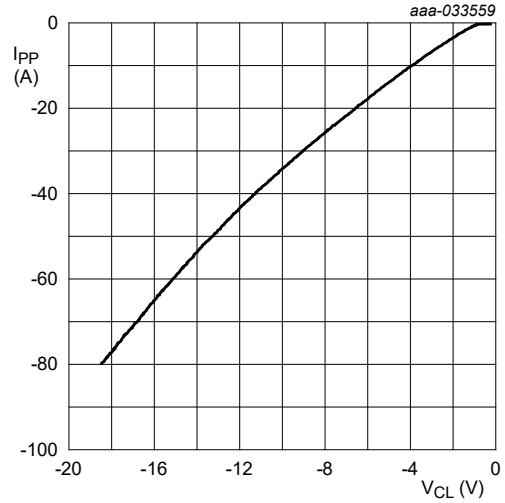


Fig. 4. Diode capacitance as a function of reverse voltage; typical values



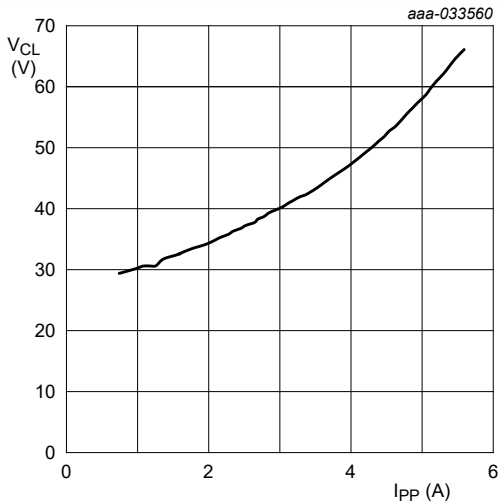
Transmission Line Pulse (TLP);  
 $t_p = 100 \text{ ns}$ ;  $t_r = 1 \text{ ns}$

**Fig. 5. Dynamic resistance with positive clamping; typical values**



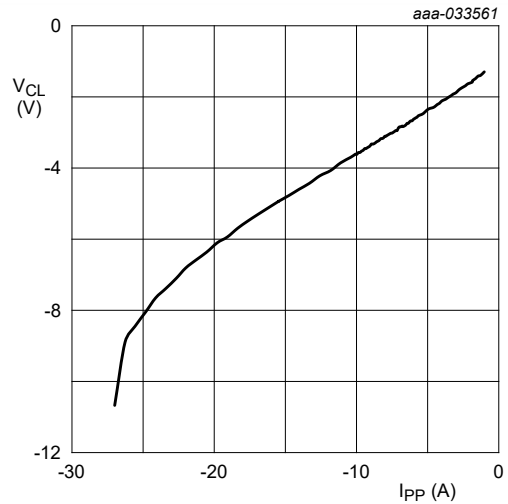
Transmission Line Pulse (TLP);  
 $t_p = 100 \text{ ns}$ ;  $t_r = 1 \text{ ns}$

**Fig. 6. Dynamic resistance with negative clamping; typical values**



IEC 61000-4-5;  $t_p = 8/20 \mu\text{s}$ ; positive pulse

**Fig. 7. Dynamic resistance with positive clamping; typical values**

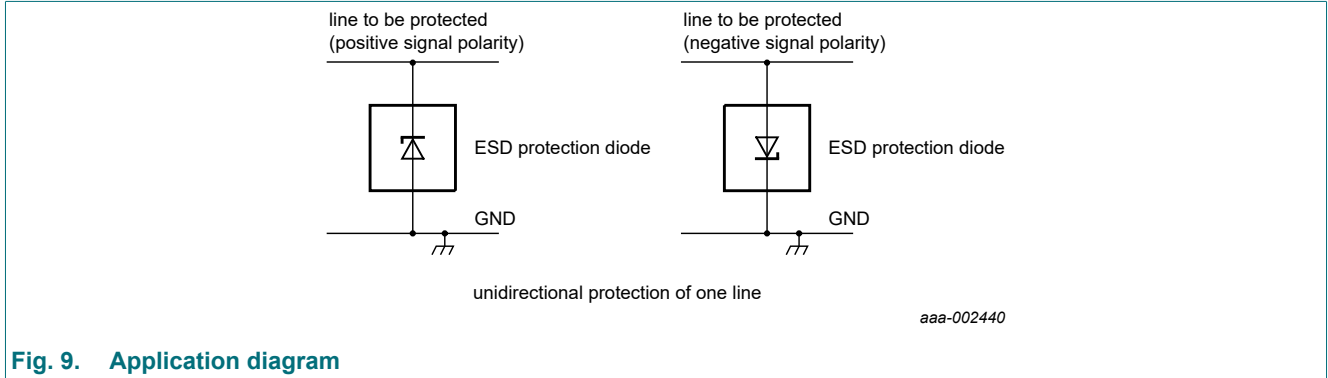


IEC 61000-4-5;  $t_p = 8/20 \mu\text{s}$ ; negative pulse

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

## 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

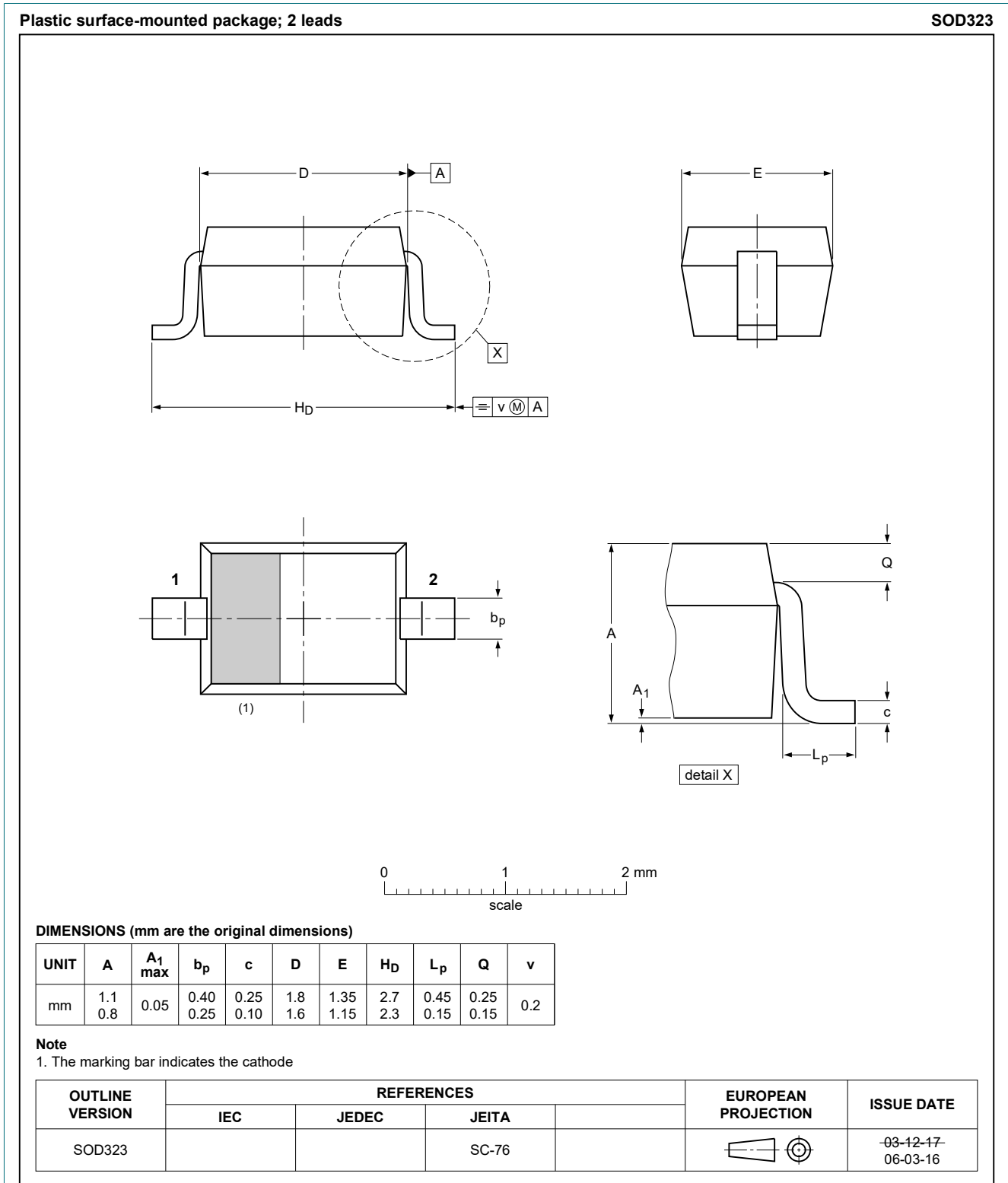


Fig. 10. Package outline SOD323

## 12. Soldering

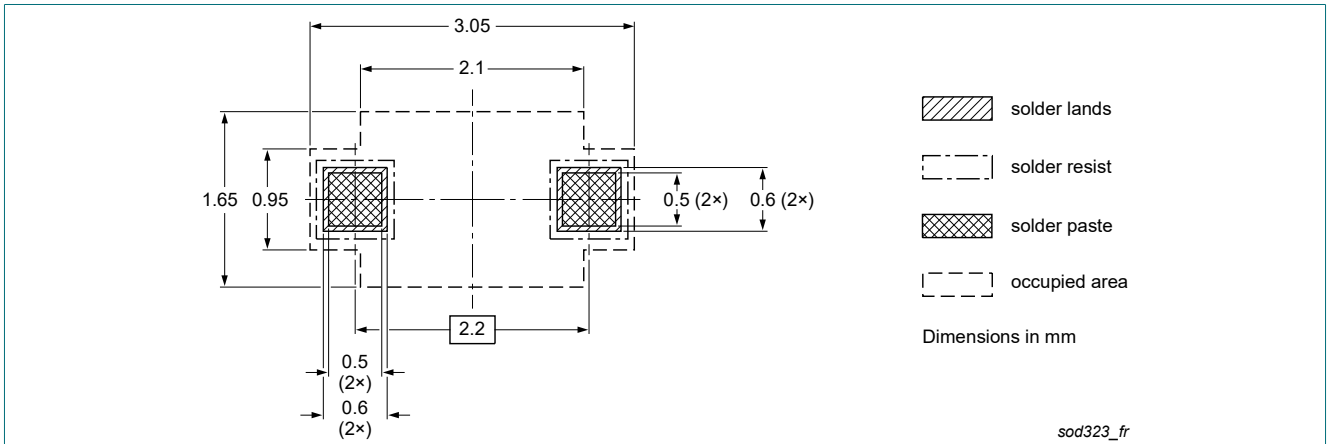


Fig. 11. Reflow soldering footprint for SOD323

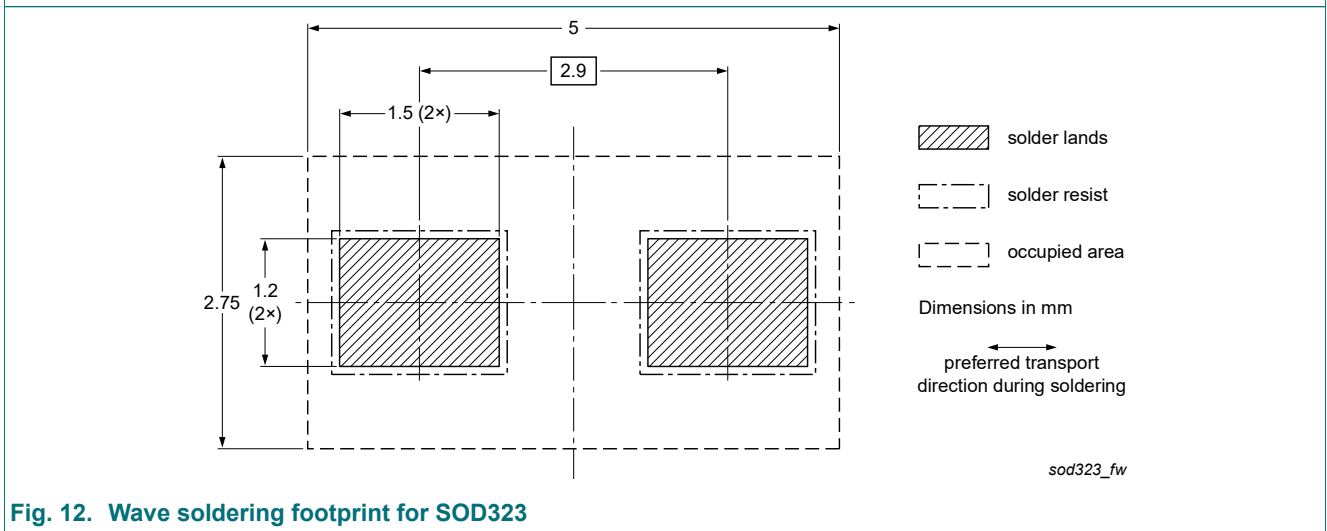


Fig. 12. Wave soldering footprint for SOD323



## 13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
MMBZ27VU-A v.1	20210608	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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