



MMBZ27VA-T

TVS device for surge protection of interface and supply lines

14 April 2023

Product data sheet

1. General description

ESD protection device in a small SOT23 Surface-Mounted Device (SMD) plastic package designed to protect two lines from the damage caused by transient overvoltages (TVS).

2. Features and benefits

- Reverse stand-off voltage: $V_{RWM} = 22\text{ V}$
- Low clamping voltage: $V_{CL} = 55\text{ V max at } I_{PP} = 4.2\text{ A}$
- ESD protection up to 30 kV (IEC 61000-4-2)
- Ultra low leakage current: $I_{RM} < 1\text{ nA}$

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	$T_{amb} = 25\text{ °C}$		-	-	22	V
I_{PPM}	rated peak pulse current	$t_p = 8/20\text{ }\mu\text{s}$	[1] [2]	-	-	4.2	A
		$t_p = 10/1000\text{ }\mu\text{s}$	[3] [2]	-	-	0.61	A
V_{CL}	clamping voltage	$I_{PPM} = 4.2\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ °C}$	[1] [2]	-	46	55	V

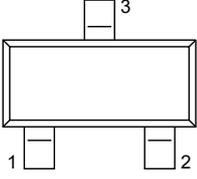
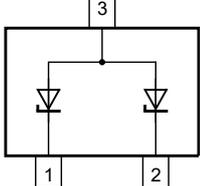
[1] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1 or pin 2 to pin 3.

[3] In accordance with IEC 61643-321 (10/1000 μs current waveform).

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	C1	cathode (diode 1)	 <p>SOT23</p>	 <p>006aaa154</p>
2	C2	cathode (diode 2)		
3	CA	common anode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
MMBZ27VA-T	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
MMBZ27VA-T	FN%

[1] % = placeholder for manufacturing site code

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	$t_p = 10/1000 \mu s$	[1] [2]	-	24	W
I_{PPM}	rated peak pulse current	$t_p = 8/20 \mu s$	[3] [2]	-	4.2	A
		$t_p = 10/1000 \mu s$	[1] [2]	-	0.61	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	[4] [2]	-	30	kV

- [1] In accordance with IEC 61643-321 (10/1000 μs current waveform).
- [2] Measured from pin 1 or pin 2 to pin 3.
- [3] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.
- [4] Device stressed with ten non-repetitive ESD pulses.

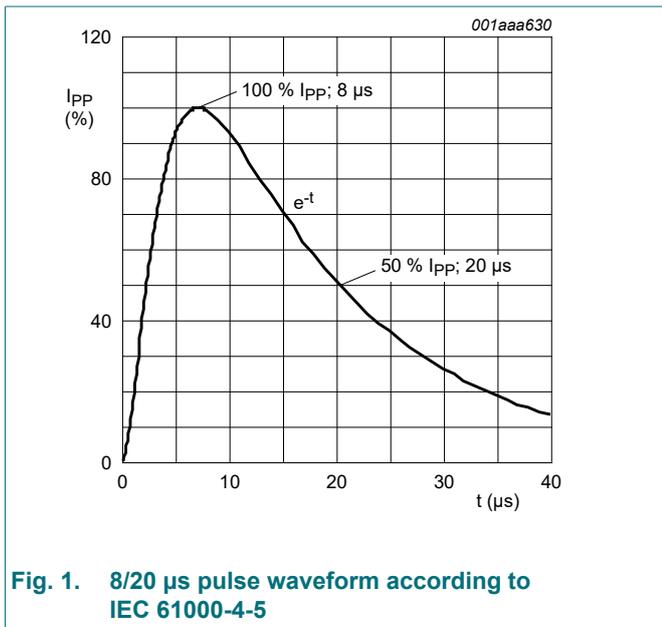


Fig. 1. 8/20 μs pulse waveform according to IEC 61000-4-5

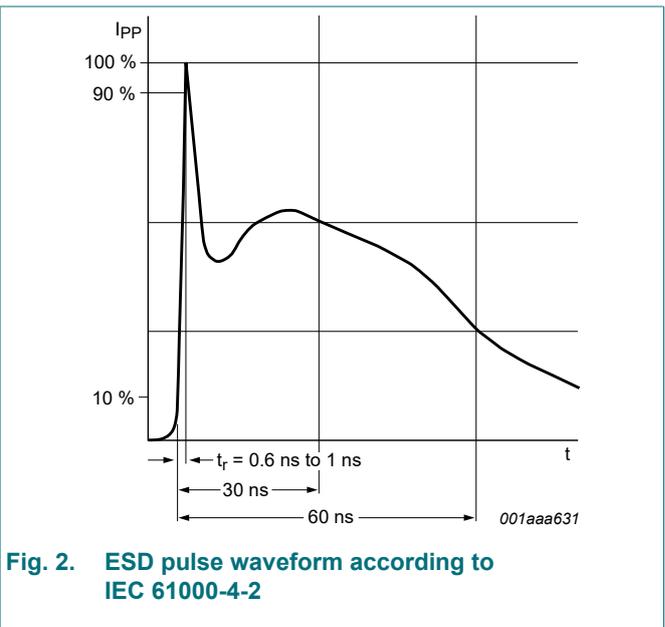


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	22	V
V_{BR}	breakdown voltage	$I_R = 1\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	25.65	27	28.35	V
I_{RM}	reverse leakage current	$V_{RWM} = 22\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	1	50	nA
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	22	30	pF
V_{CL}	clamping voltage	$I_{PPM} = 1\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[2] [1]	-	30	-	V
		$I_{PPM} = 4.2\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[2] [1]	-	46	55	V
		$I_{PPM} = 0.61\text{ A}; t_p = 10/1000\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1] [3]	-	34.5	41	V

- [1] Measured from pin 1 or pin 2 to pin 3.
- [2] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.
- [3] In accordance with IEC 61643-321 (10/1000 μs current waveform).

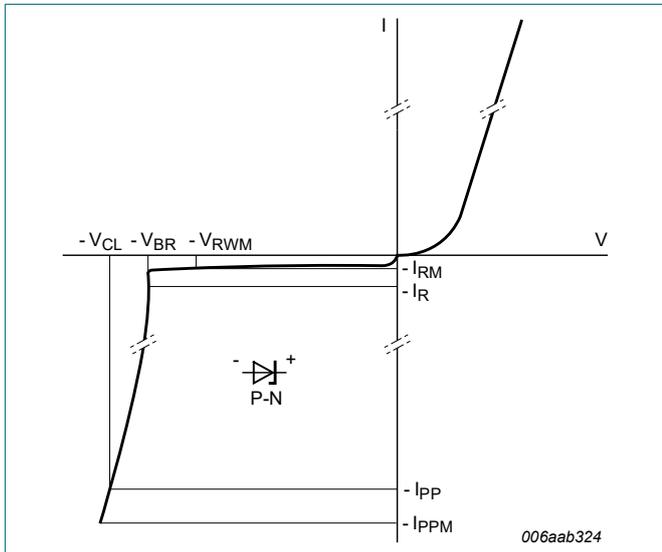


Fig. 3. V-I characteristics for a unidirectional TVS protection diode

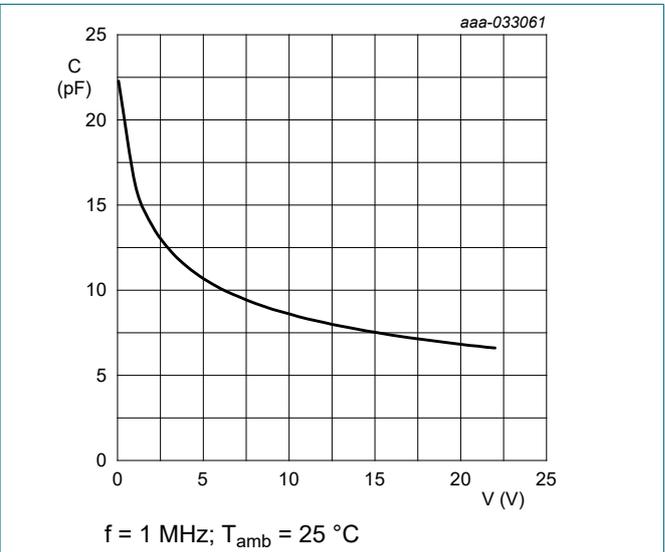
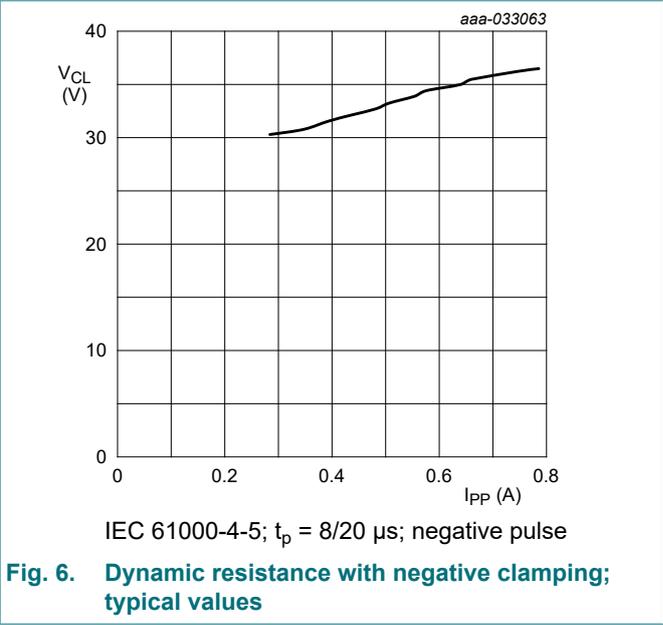
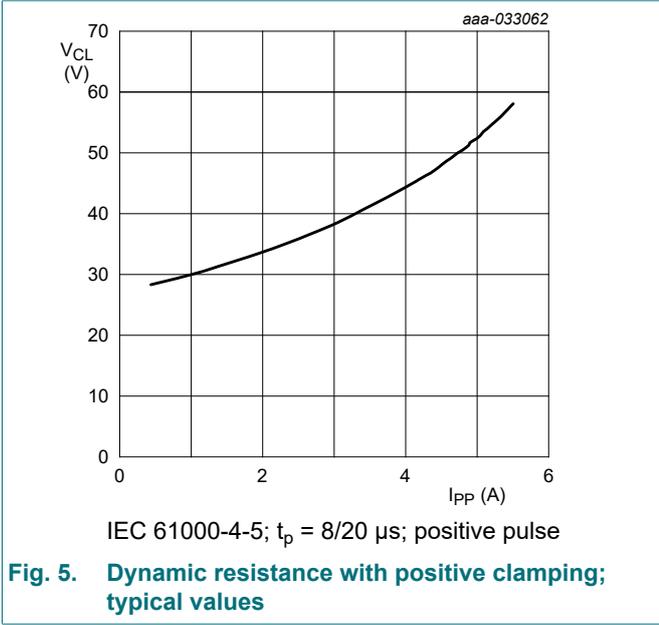


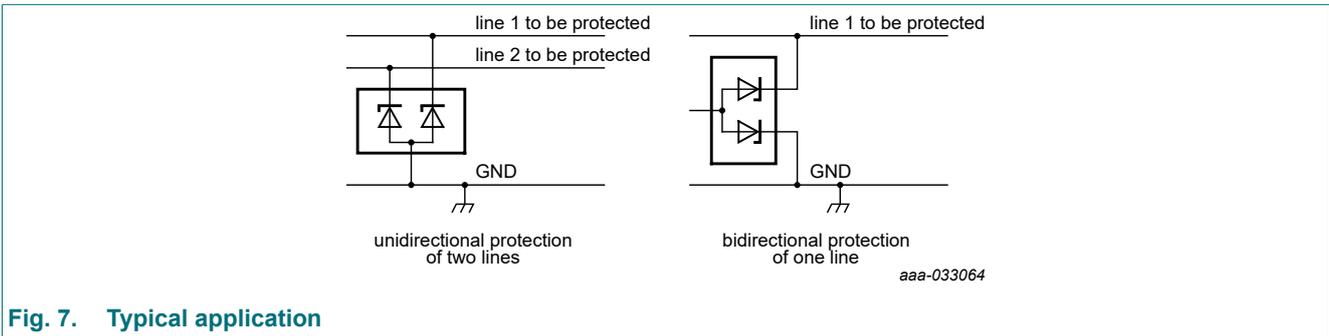
Fig. 4. Diode capacitance as a function of reverse voltage; typical values

TVS device for surge protection of interface and supply lines



10. Application information

The device is designed for the protection of two lines from the damage caused by ESD and surge pulses.



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

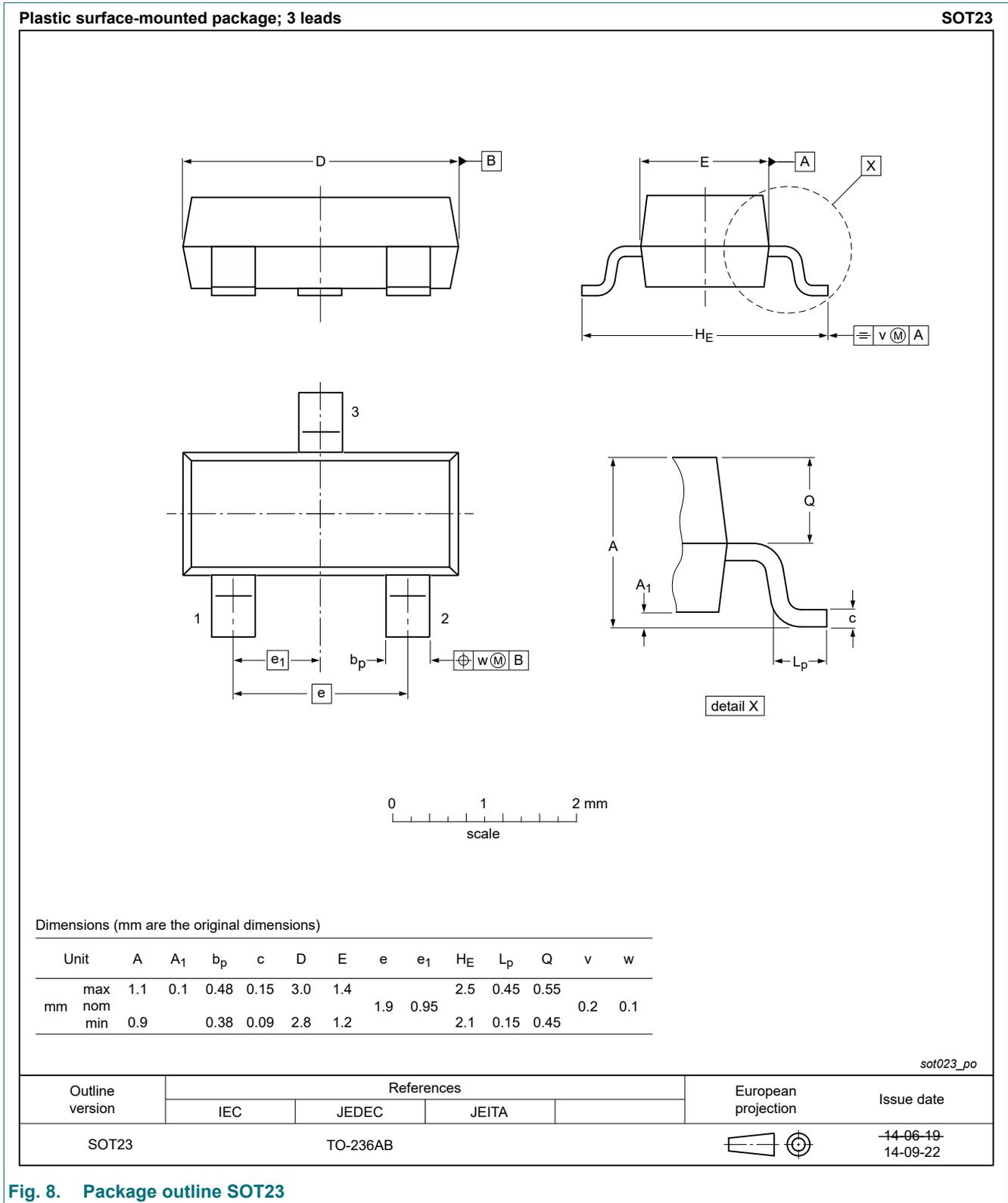


Fig. 8. Package outline SOT23

12. Soldering

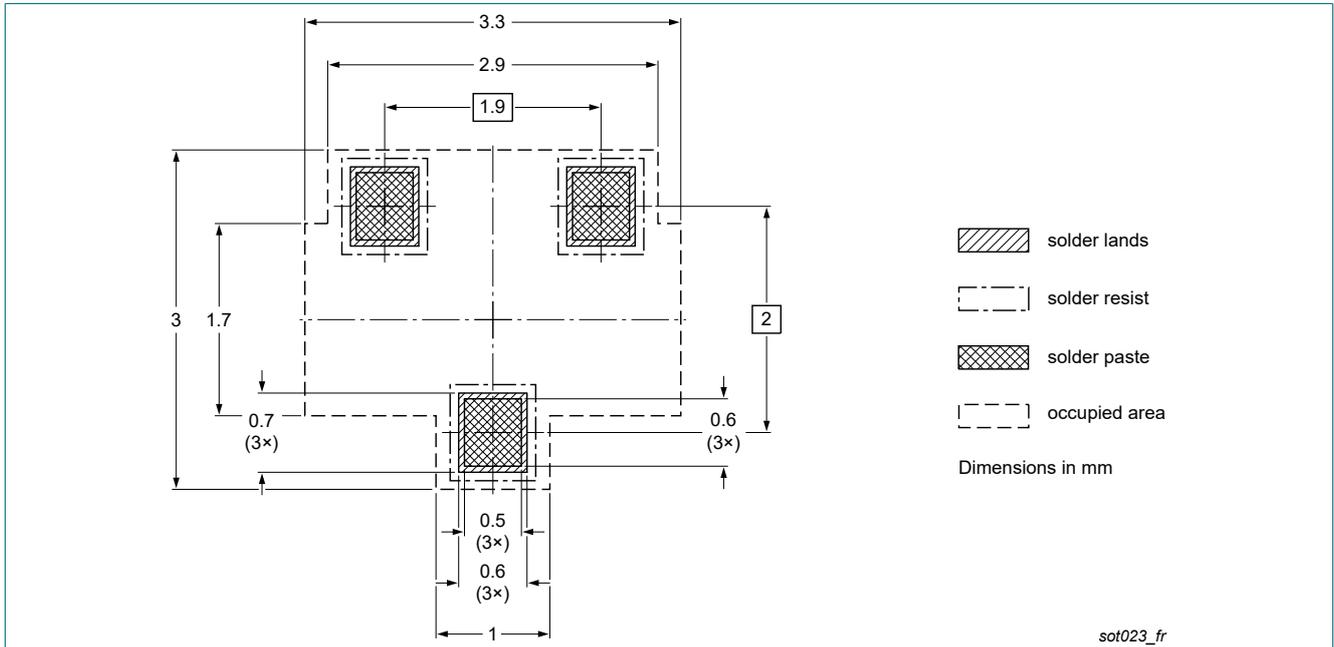


Fig. 9. Reflow soldering footprint for SOT23

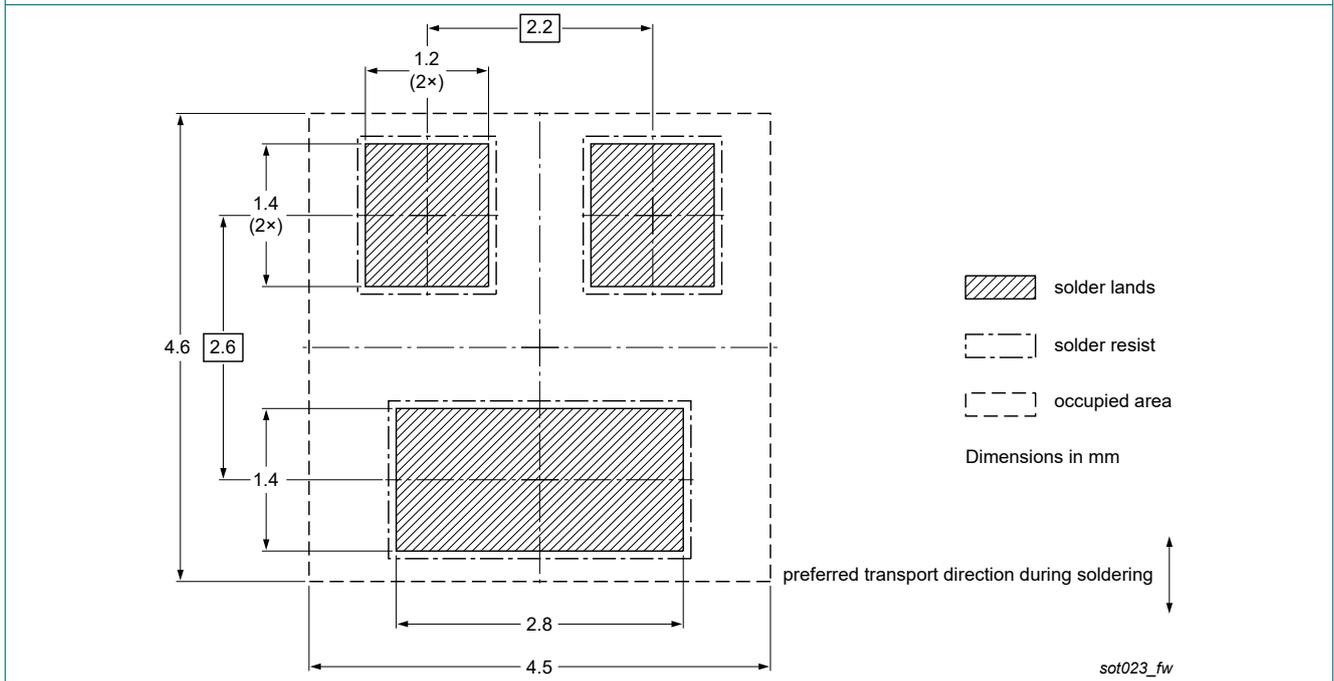


Fig. 10. Wave soldering footprint for SOT23

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
MMBZ27VA-T v.3	20230414	Product data sheet	-	MMBZ27VA-T v.2
Modifications:	<ul style="list-style-type: none">Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
MMBZ27VA-T v.2	20210505	Product data sheet	-	MMBZ27VA-T v.1
MMBZ27VA-T v.1	20210315	Preliminary 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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