



# PESD24VL2BT

Low capacitance double bidirectional ESD protection diode  
in SOT23

24 July 2023

Product data sheet

## 1. General description

Low capacitance double bidirectional ElectroStatic Discharge (ESD) protection diode in a small SOT23 Surface-Mounted Device (SMD) plastic package, designed to protect two signal lines from the damage caused by ESD and other transients.

## 2. Features and benefits

- ESD protection of two lines
- Max. peak pulse power:  $P_{PPM} = 200$  W
- Low clamping voltage:  $V_{CL} = 70$  V
- Small SMD plastic package
- Ultra low leakage current:  $I_{RM} = 1$  nA
- ESD protection up to 23 kV
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge);  $I_{PPM} = 3$  A
- AEC-Q101 qualified

## 3. Application information

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Portable electronics
- SIM card protection

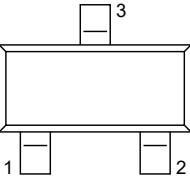
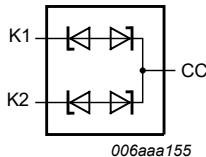
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25$ °C		-	-	24	V
$C_d$	diode capacitance	$f = 1$ MHz; $V_R = 0$ V; $T_{amb} = 25$ °C		-	11	-	pF

## 5. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode	 <b>SOT23</b>	
2	K2	cathode		
3	CC	double cathode		

## 6. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
PESD24VL2BT	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 <sup>[1]</sup>
PESD24VL2BT	V7%

[1] % = placeholder for manufacturing site code

## 8. Limiting values

**Table 5. Limiting values**

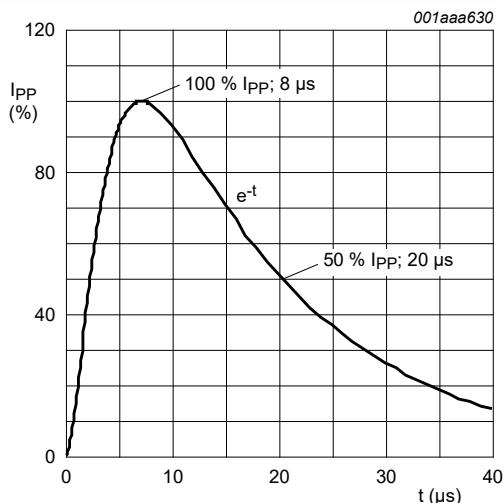
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P <sub>PPM</sub>	rated peak pulse power	$t_p = 8/20 \mu\text{s}$	[1] [2]	-	200	W
I <sub>PPM</sub>	rated peak pulse current		[1] [2]	-	3	A
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-65	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C
<b>ESD maximum ratings</b>						
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[3] [2]	-	23	kV
		MIL-STD-883; human body model (HBM)	[2]	-	10	kV

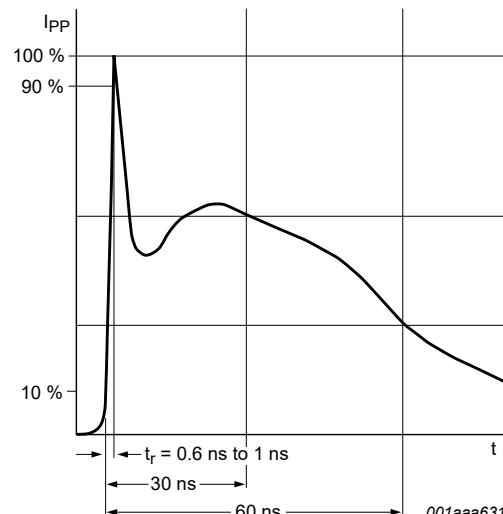
[1] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponential decay waveform according to IEC61000-4-5.

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

[3] Device stressed with ten non-repetitive ESD pulses.



**Fig. 1. 8/20  $\mu\text{s}$  pulse waveform according to IEC 61000-4-5**



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

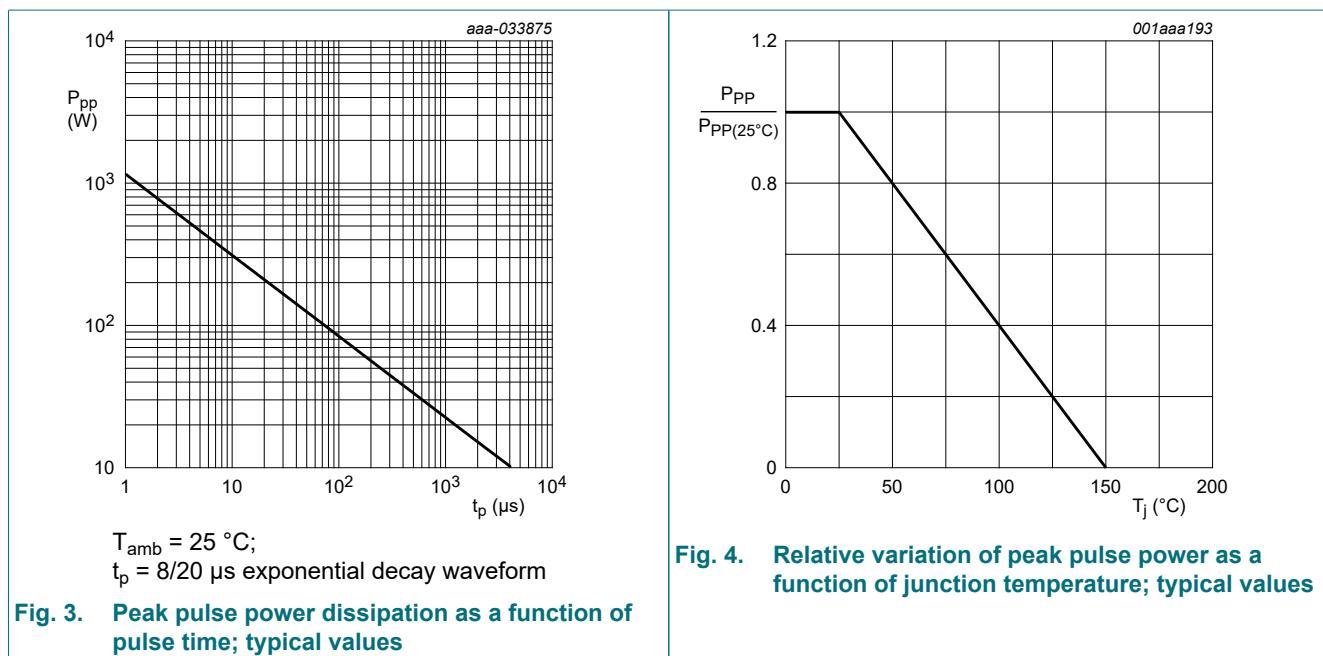
## 9. Characteristics

Table 6. Characteristics

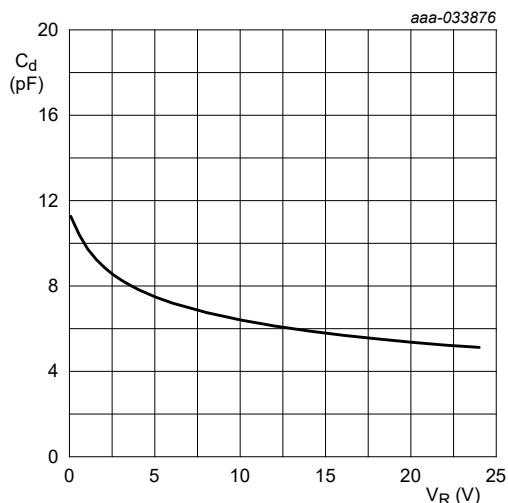
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25^\circ C$		-	-	24	V
$V_{BR}$	breakdown voltage	$I_R = 5 \text{ mA}; T_{amb} = 25^\circ C$		25.4	27.8	30.3	V
$I_{RM}$	reverse leakage current	$V_{RWM} = 24 \text{ V}; T_{amb} = 25^\circ C$		-	1	50	nA
$C_d$	diode capacitance	$f = 1 \text{ MHz}; V_R = 0 \text{ V}; T_{amb} = 25^\circ C$		-	11	-	pF
$V_{CL}$	clamping voltage	$I_{PP} = 1 \text{ A}; T_{amb} = 25^\circ C$	[1] [2]	-	-	40	V
		$I_{PPM} = 3 \text{ A}; T_{amb} = 25^\circ C$	[1] [2]	-	-	70	V
$R_{diff}$	differential resistance	$I_R = 1 \text{ mA}; T_{amb} = 25^\circ C$		-	-	300	$\Omega$

[1] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponential decay waveform according to IEC61000-4-5.

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



## Low capacitance double bidirectional ESD protection diode in SOT23



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

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

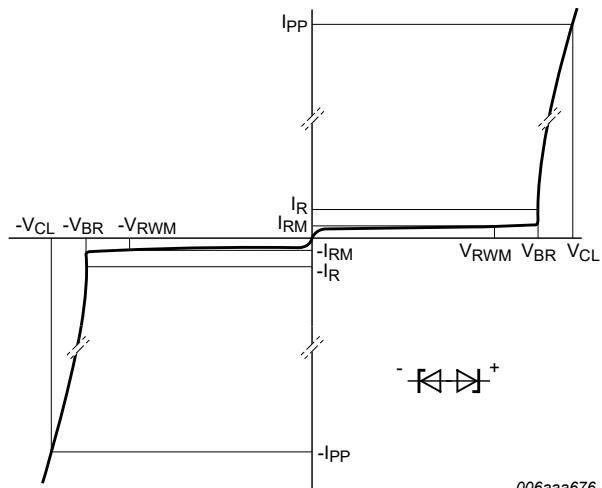


Fig. 6. V-I characteristics for a bidirectional ESD protection diode

## Low capacitance double bidirectional ESD protection diode in SOT23

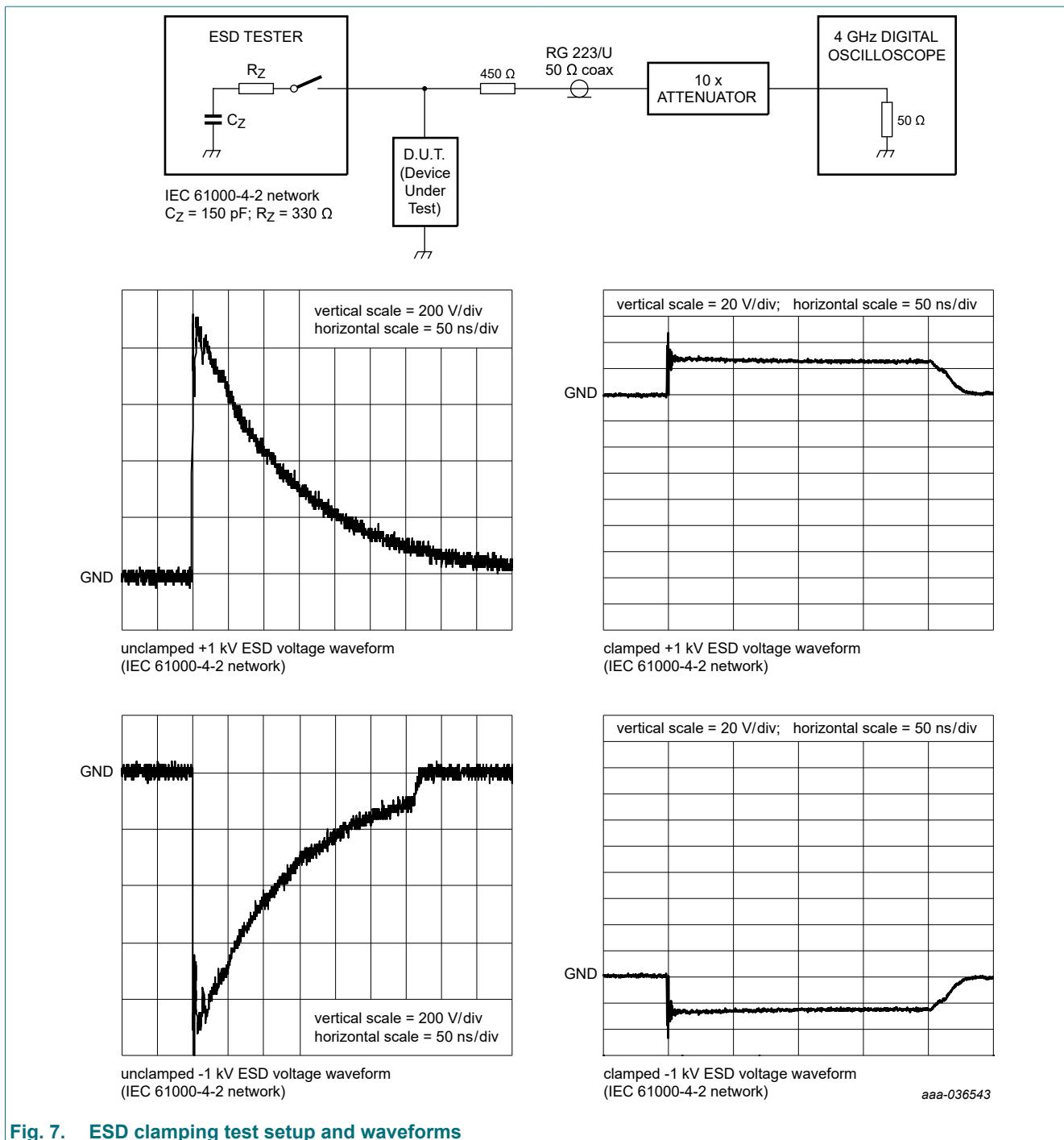


Fig. 7. ESD clamping test setup and waveforms

## 10. Application information

The device is designed for the protection of two bidirectional signal lines from the damage caused by ESD and surge pulses. The device may be used on lines where the signal polarities are above and below ground.

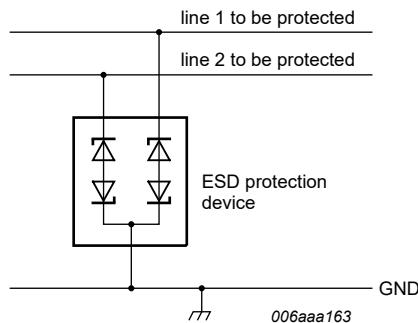


Fig. 8. Application diagram

### 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

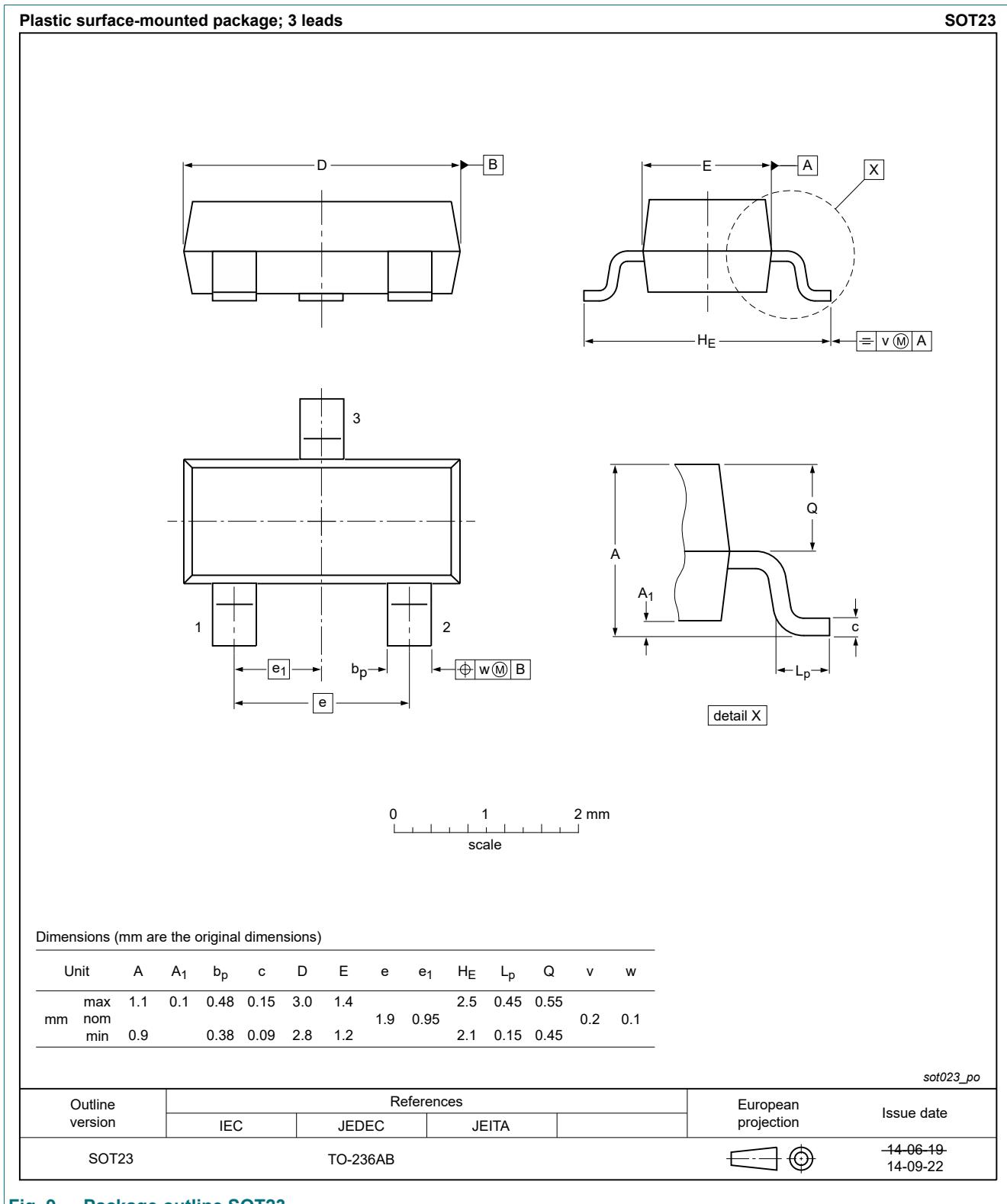


Fig. 9. Package outline SOT23

## 12. Soldering

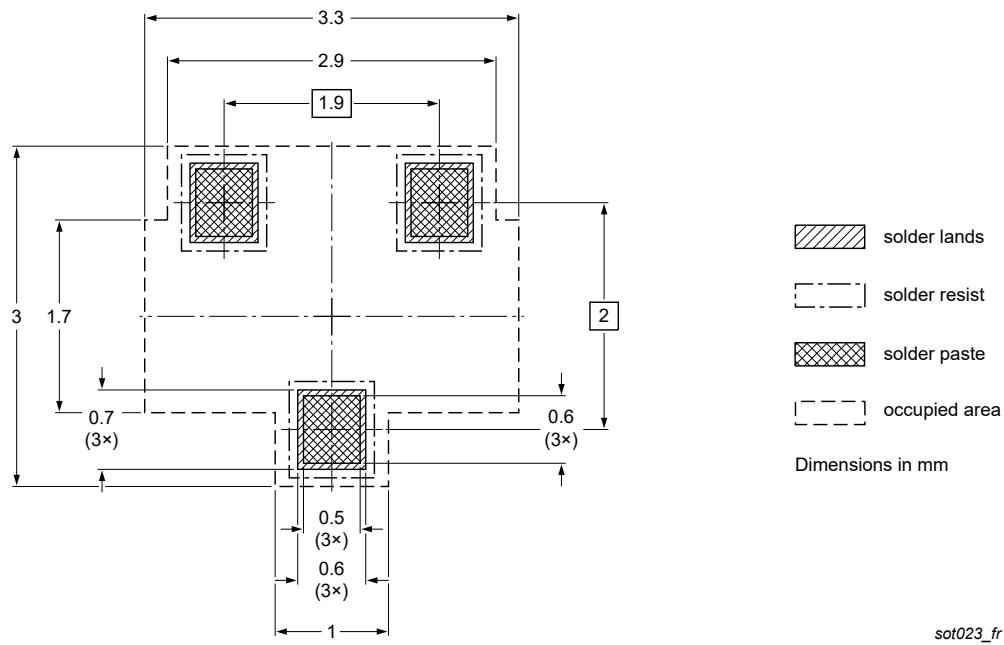


Fig. 10. Reflow soldering footprint for SOT23

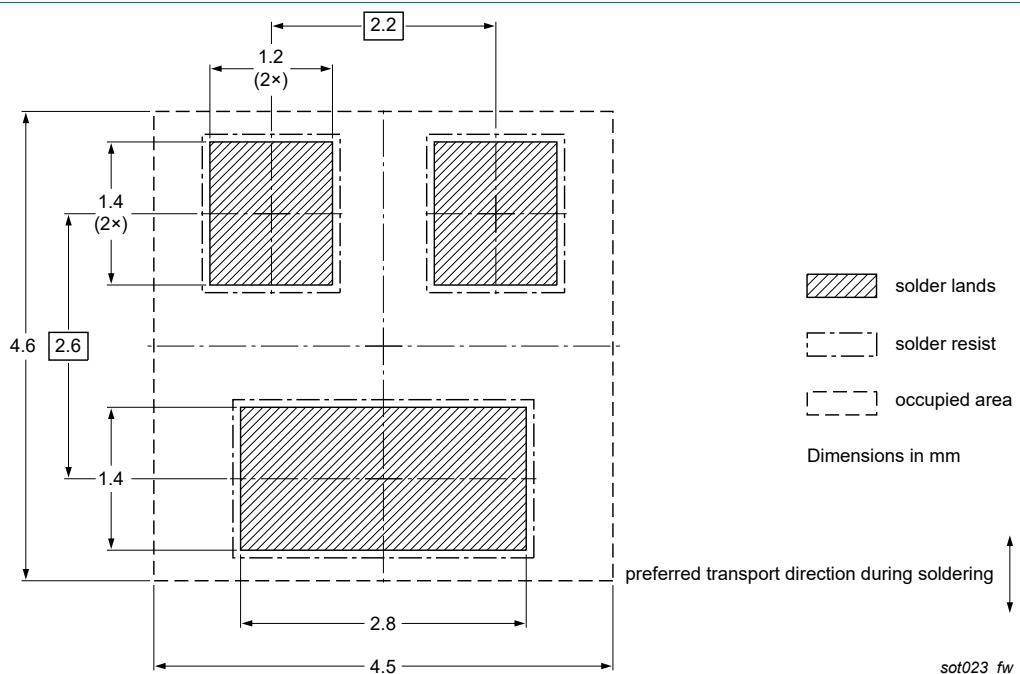


Fig. 11. Wave soldering footprint for SOT23

## 13. Revision history

**Table 7. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD24VL2BT v.3	20230724	Product data sheet	-	PESDXL2BT_SER_2
Modifications:	<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia</li><li>• Family data sheet reduced to single type data sheet</li></ul>			
PESDXL2BT_SER_2	20090825	Product data sheet	-	PESDXL2BT_SER_1
PESDXL2BT_SER_1	20051101	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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