



# PESD5V0V1BA

Very low capacitance bidirectional ESD protection diode

1 April 2023

Product data sheet

## 1. General description

Very low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in a very small SOD323 (SC-76) Surface-Mounted Device (SMD) plastic package designed to protect one signal line from the damage caused by ESD and other transients.

## 2. Features and benefits

- Bidirectional ESD protection of one line
- Very low diode capacitance:  $C_d = 11 \text{ pF}$
- Max. peak pulse power:  $P_{PPM} = 45 \text{ W}$
- Low clamping voltage:  $V_{CL} = 12.5 \text{ V}$
- Ultra low leakage current:  $I_{RM} < 1 \text{ nA}$
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge);  $I_{PPM} = 4.8 \text{ A}$

## 3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- SIM card protection
- Communication systems
- Portable electronics
- 10/100 Mbit/s Ethernet


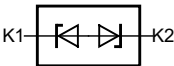
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25 \text{ }^{\circ}\text{C}$	-	-	5	V
$C_d$	diode capacitance	$f = 1 \text{ MHz}; V_R = 0 \text{ V}; T_{amb} = 25 \text{ }^{\circ}\text{C}$	-	11	13	pF

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 SOD323	 sym045
2	K2	cathode (diode 2)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0V1BA	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
PESD5V0V1BA	1K

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 <sub>p</sub> = 8/20 μs	[1]	-	45	W
I <sub>PPM</sub>	rated peak pulse current		[1]	-	4.8	A
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C
ESD maximum ratings						
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[2]	-	30	kV
		machine model		-	2	kV
		MIL-STD-883 (human body model)		-	16	kV

- [1] Non-repetitive current pulse 8/20 μs exponentially decaying waveform according to IEC 61000-4-5  
[2] Device stressed with ten non-repetitive ESD pulses.

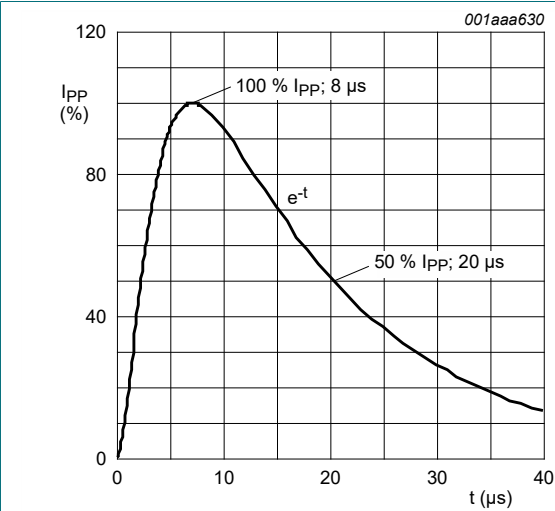


Fig. 1. 8/20 μs pulse waveform according to IEC 61000-4-5

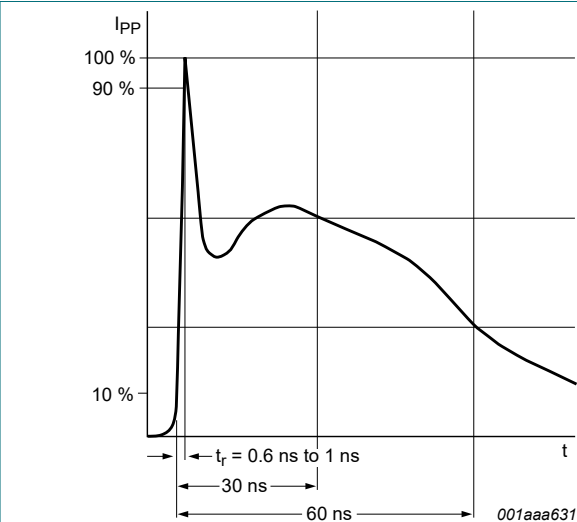


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	5	V
$V_{BR}$	breakdown voltage	$I_R = 5\text{ mA}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$		5.8	6.8	7.8	V
$I_{RM}$	reverse leakage current	$V_{RWM} = 5\text{ V}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$		-	1	10	nA
$C_d$	diode capacitance	$f = 1\text{ MHz}$ ; $V_R = 0\text{ V}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$		-	11	13	pF
$V_{CL}$	clamping voltage	$I_{PP} = 4.8\text{ A}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	-	12.5	V
$R_{dyn}$	dynamic resistance	$I_R = 10\text{ A}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[2]	-	0.2	-	$\Omega$
$R_{diff}$	differential resistance	$I_R = 5\text{ mA}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	35	$\Omega$

- [1] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.  
[2] Non-repetitive current pulse, Transmission Line Pulse (TLP)  $t_p = 100\text{ ns}$ ; square pulse; ANSI/ESD STM5.5.1-2008

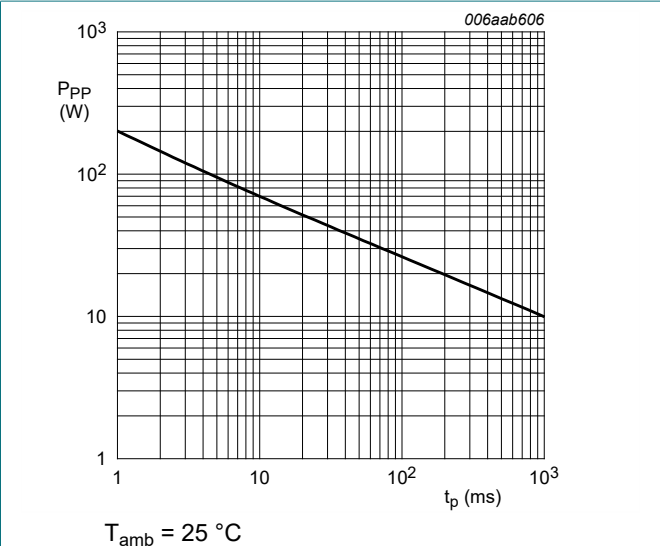


Fig. 3. Peak pulse power as a function of exponential pulse duration; typical values

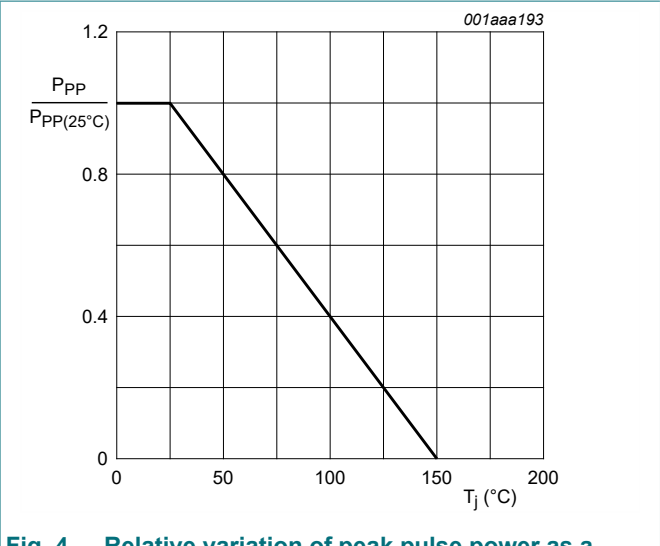


Fig. 4. Relative variation of peak pulse power as a function of junction temperature; typical values

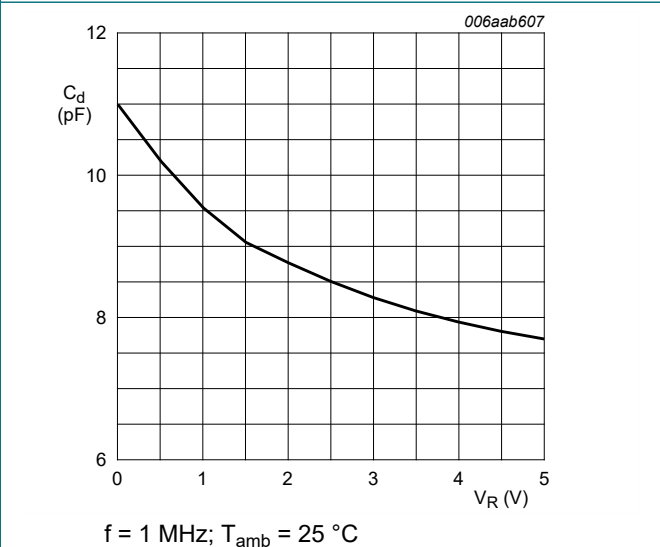


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

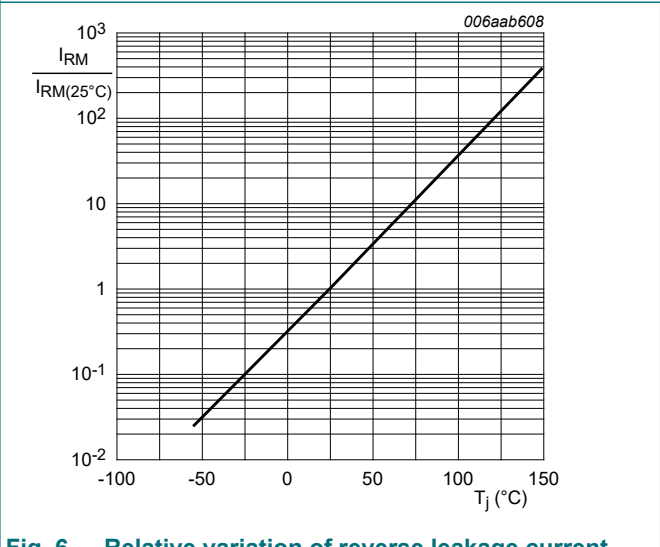


Fig. 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

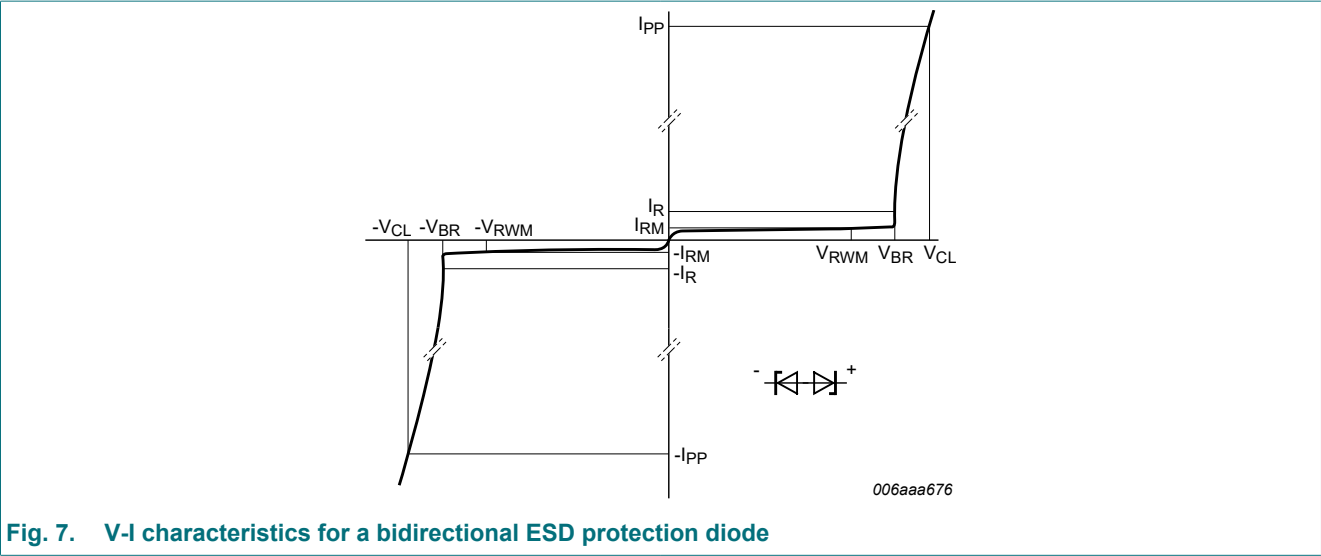
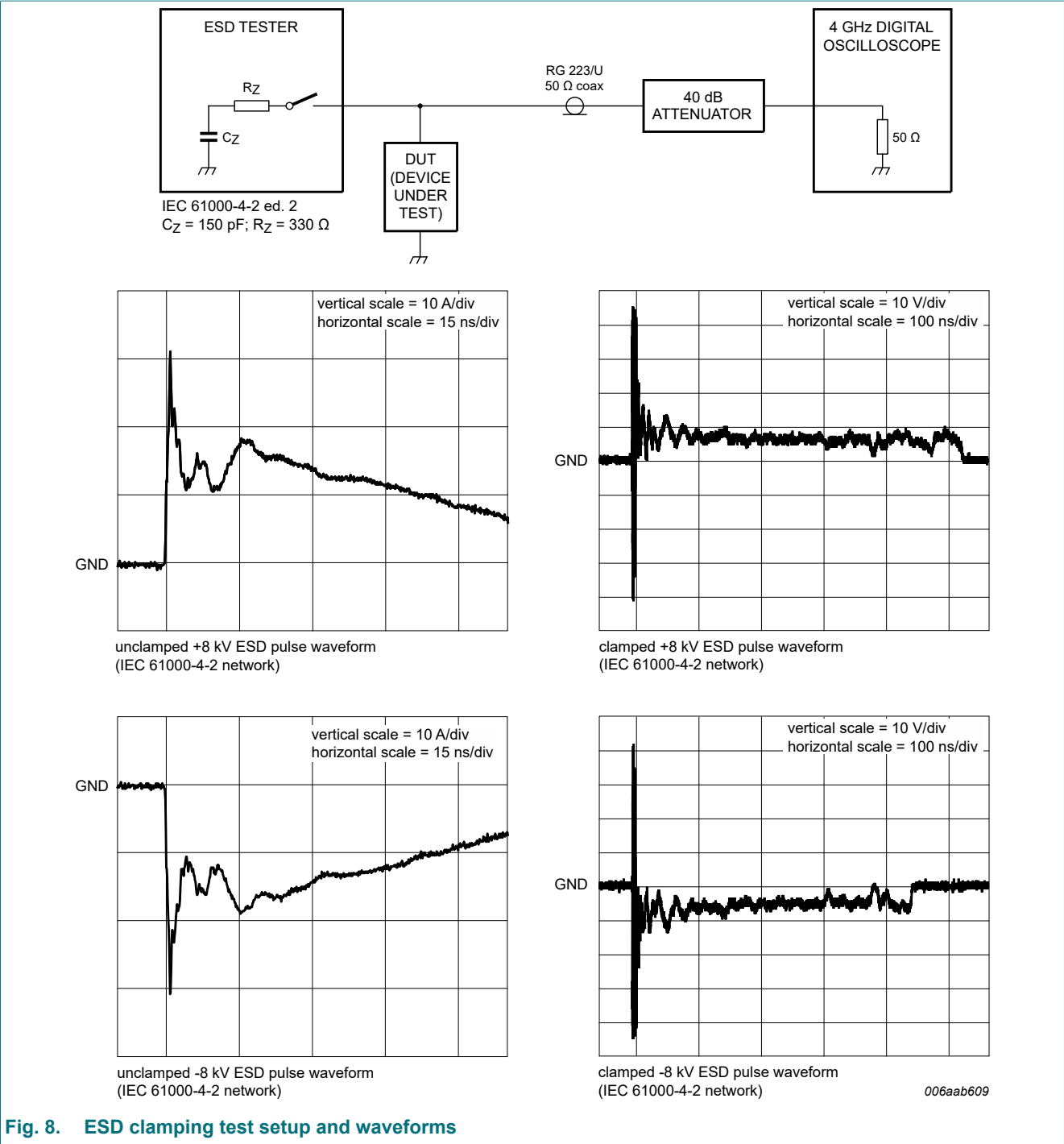
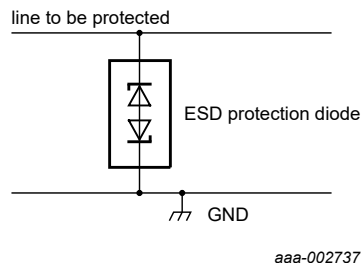


Fig. 7. V-I characteristics for a bidirectional ESD protection diode



## 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. 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

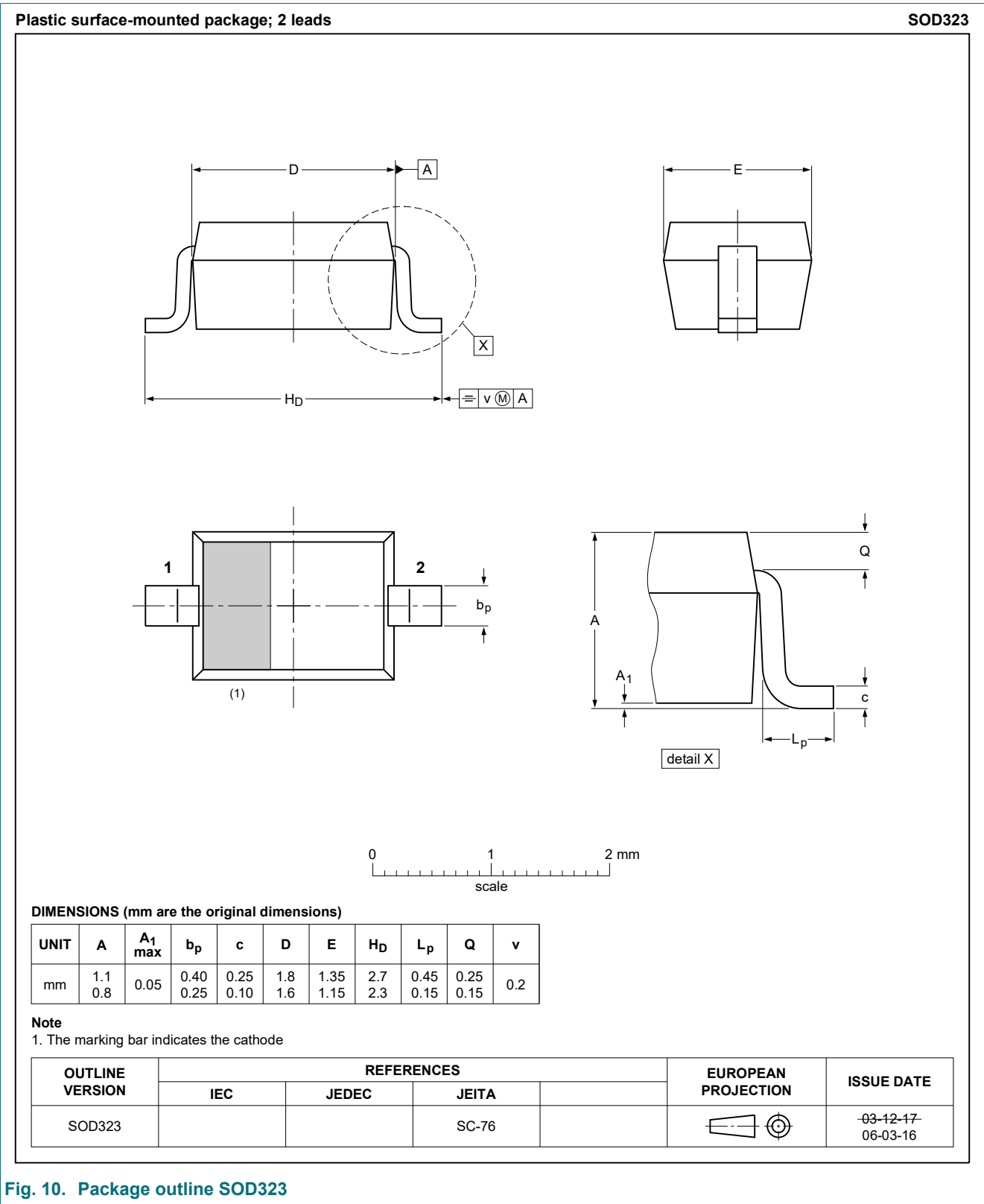
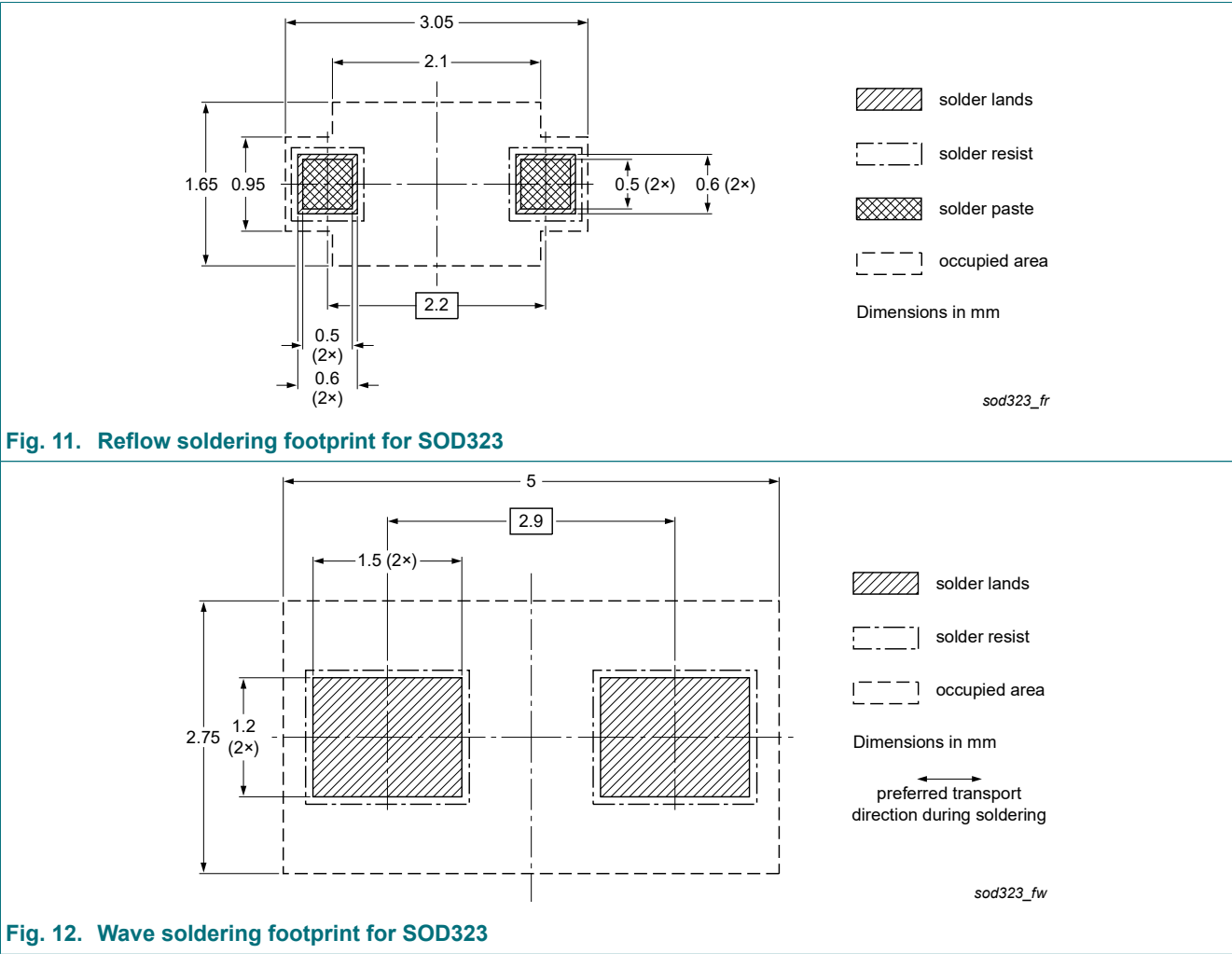


Fig. 10. Package outline SOD323



12. Soldering



13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0V1BA v.4	20230401	Product data sheet	-	PESD5V0V1BA v.3
Modifications:	<ul style="list-style-type: none"><li>Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li></ul>			
PESD5V0V1BA v.3	20180705	Product data sheet	-	PESD5V0V1BA_BB_BL v.2

## 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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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 3

9. Characteristics.....4

10. Application information..... 7

11. Package outline..... 8

12. Soldering..... 9

13. Revision history..... 10

14. Legal information..... 11

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