



# PESD5V0V1BB-Q

Very low capacitance bidirectional ESD protection diode

23 August 2022

Product data sheet

## 1. General description

Very low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in an ultra-small and flat lead SOD523 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);  $I_{PPM} = 4.8 \text{ A}$
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 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


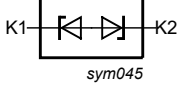
## 4. Quick reference data

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)	 <p>SC-79 (SOD523)</p>	 <p>sym045</p>
2	K2	cathode (diode 2)		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0V1BB-Q	SC-79	plastic, surface-mounted package; 2 leads; 1.2 mm x 0.8 mm x 0.6 mm body	SOD523

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PESD5V0V1BB-Q	Z9

## 8. Limiting values

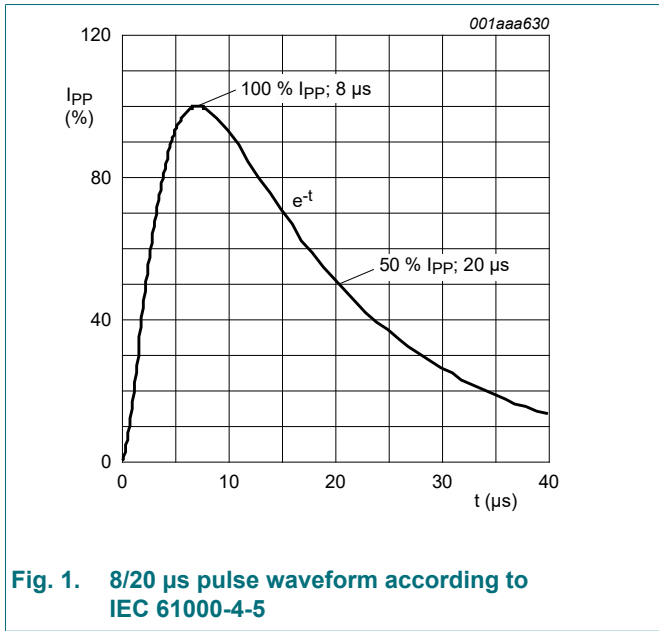
**Table 5. Limiting values**

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

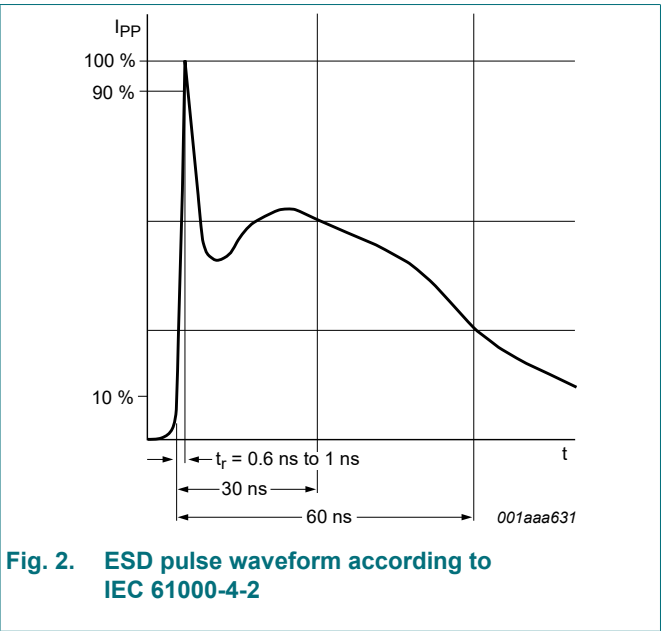
Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per diode</b>						
$P_{PPM}$	rated peak pulse power	$t_p = 8/20 \mu s$	[1]	-	45	W
$I_{PPM}$	rated peak pulse current		[1]	-	4.8	A
<b>Per device</b>						
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-55	150	°C
$T_{stg}$	storage temperature			-65	150	°C
<b>ESD maximum ratings</b>						
$V_{ESD}$	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[2]	-	30	kV
		machine model		-	2	kV
		MIL-STD-883 (human body model)		-	16	kV

[1] Non-repetitive current pulse 8/20  $\mu s$  exponentially decaying waveform according to IEC 61000-4-5

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



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



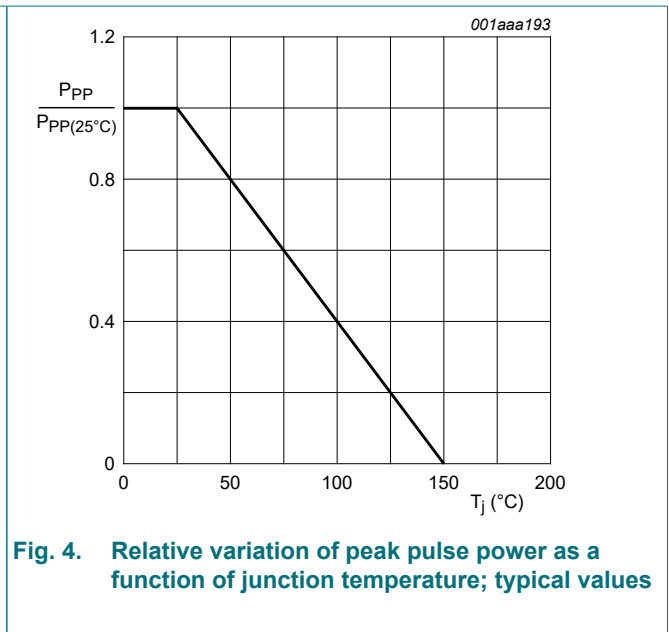
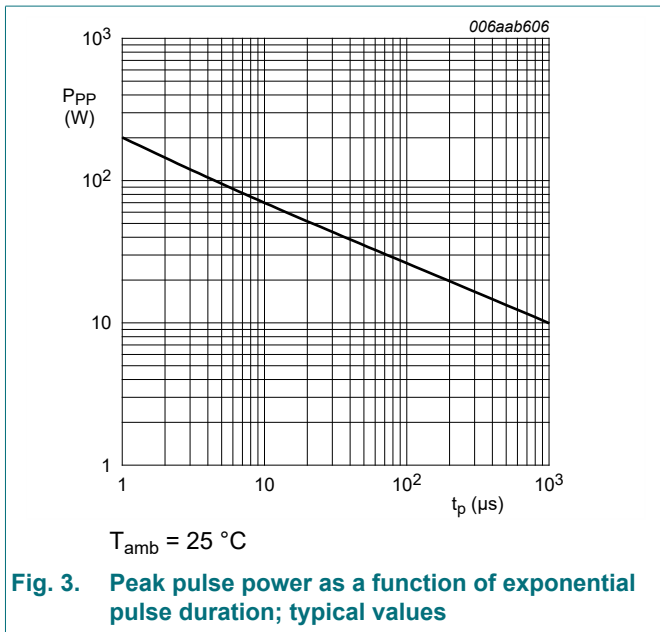
**Fig. 2. ESD pulse waveform according to IEC 61000-4-2**

### 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	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	-	$\Omega$
$R_{dif}$	differential resistance	$I_R = 5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	35	$\Omega$

- [1] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponentially decaying 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



Very low capacitance bidirectional ESD protection diode

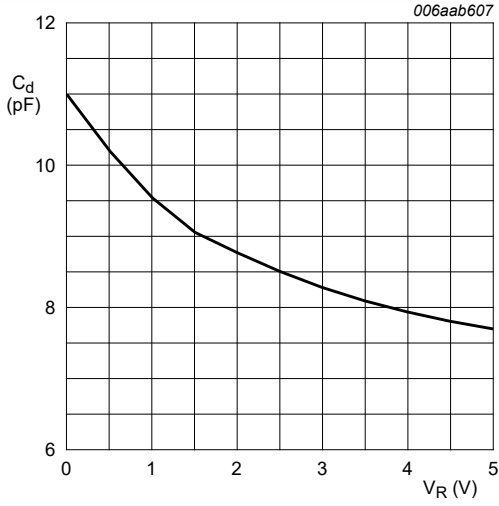


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

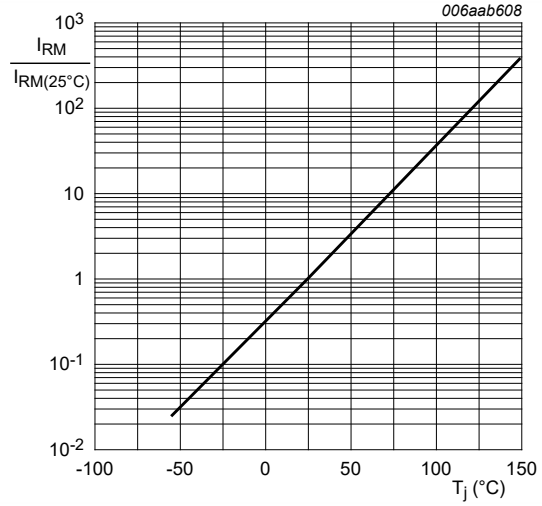


Fig. 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

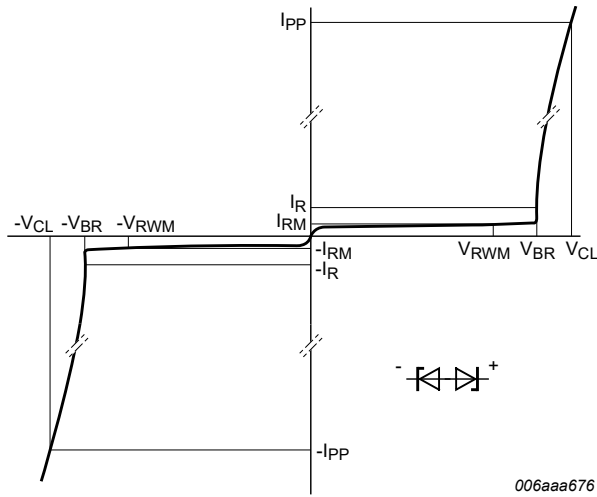


Fig. 7. V-I characteristics for a bidirectional ESD protection diode

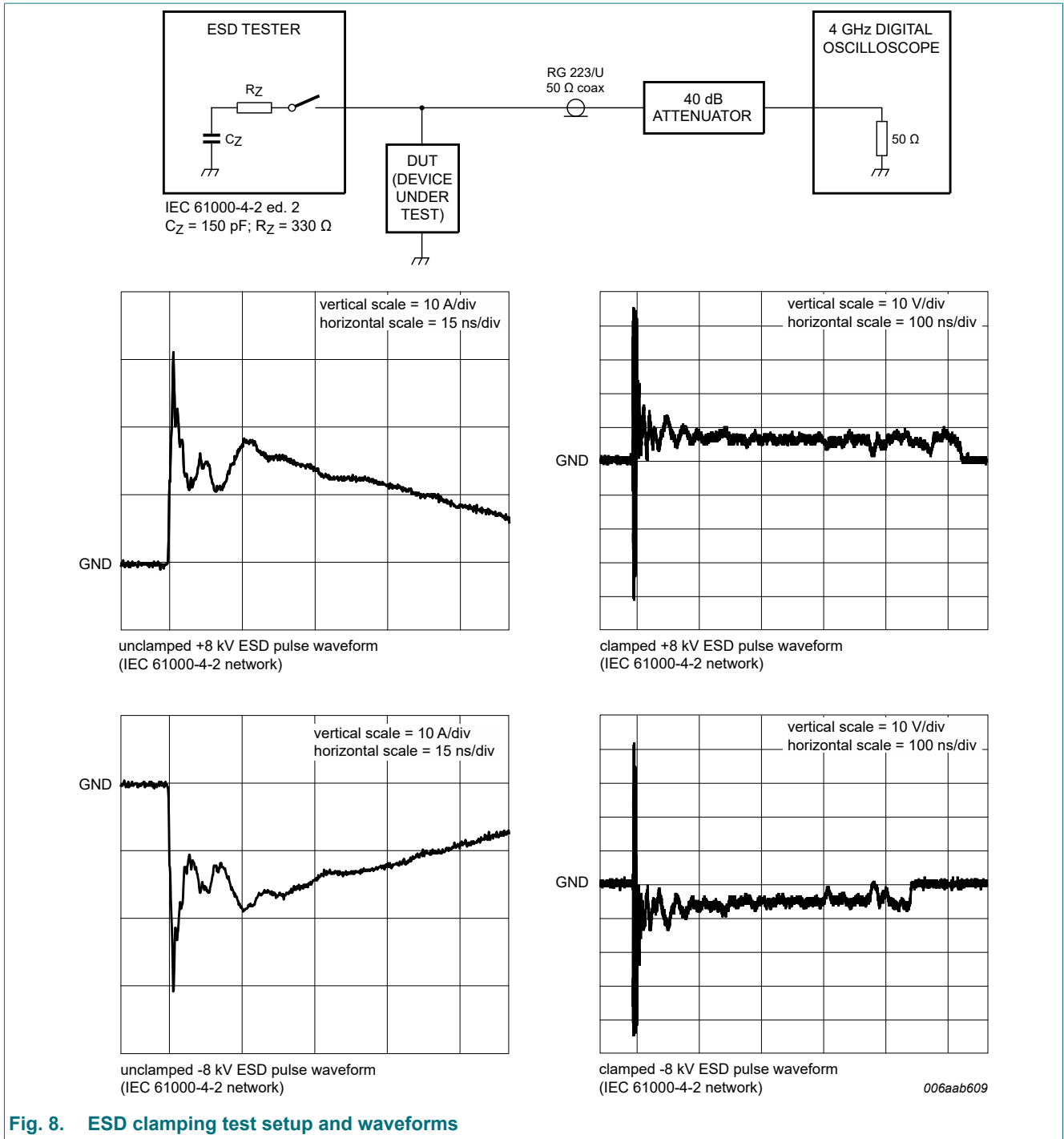


Fig. 8. ESD clamping test setup and waveforms

## 10. Application information

The device is designed for the protection of one bidirectional data or signal line from the damage caused by ESD and/or other surge pulses. The device may be used on lines where the signal polarities are both, positive and negative with respect to ground. It provides a surge capability of 45 W per line for an 8/20  $\mu$ s waveform.

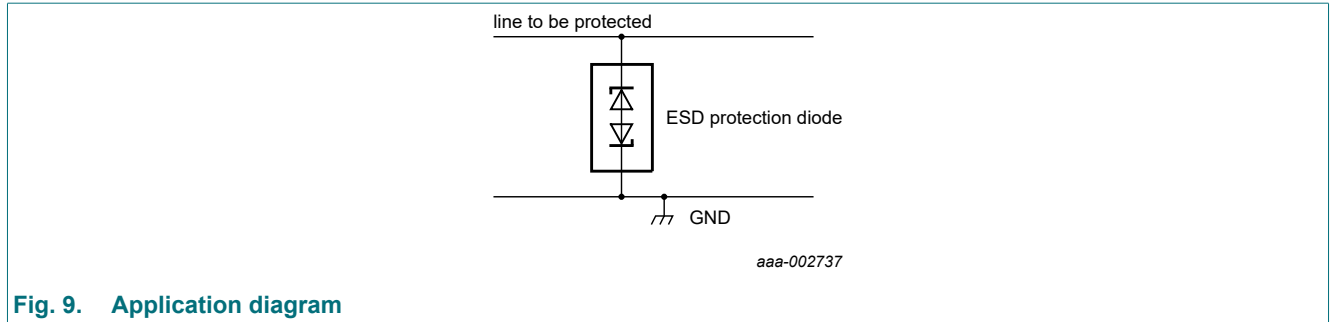


Fig. 9. Application diagram

### 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. Avoid running protected conductors in parallel with unprotected conductors.
4. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
5. Minimize the length of the transient return path to ground.
6. Avoid using shared transient return paths to a common ground point.
7. 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

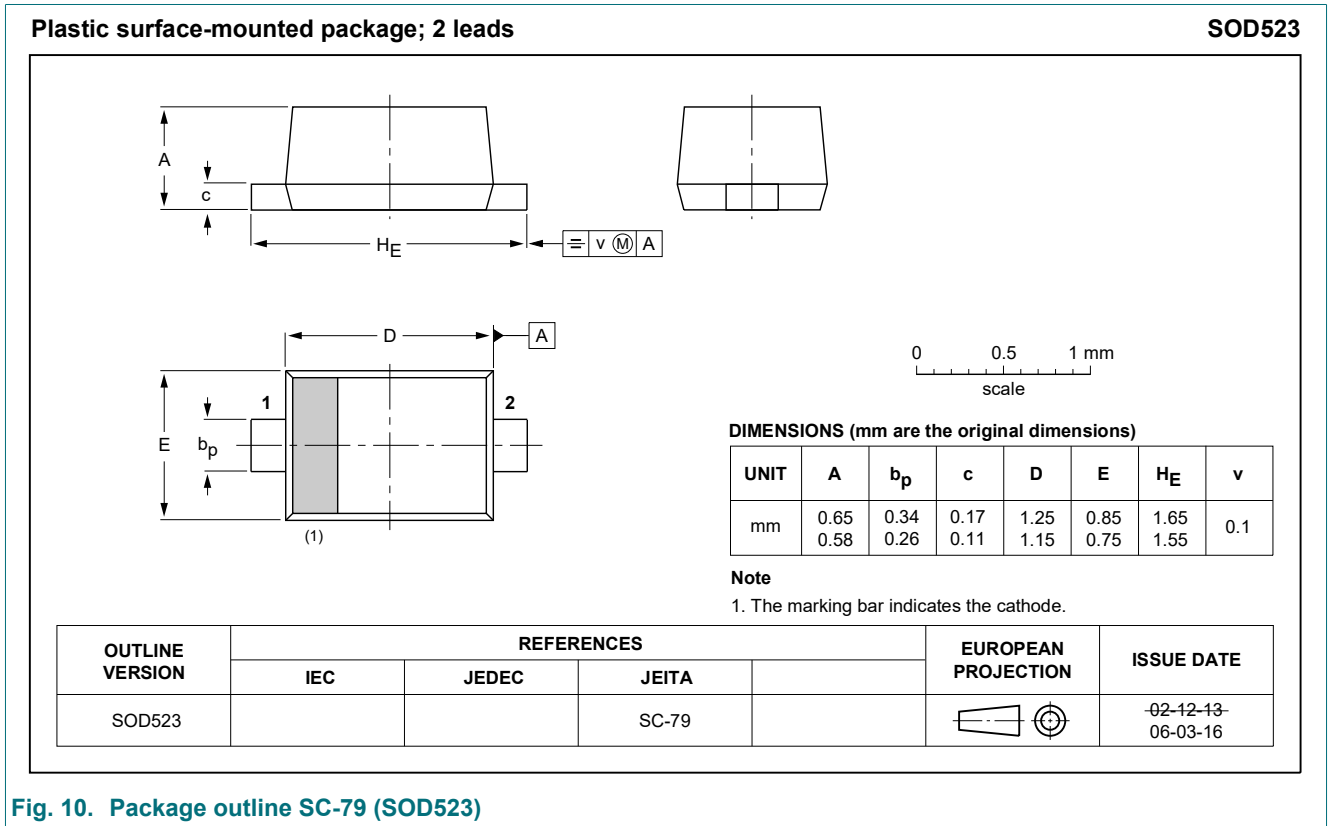


Fig. 10. Package outline SC-79 (SOD523)

## 13. Soldering

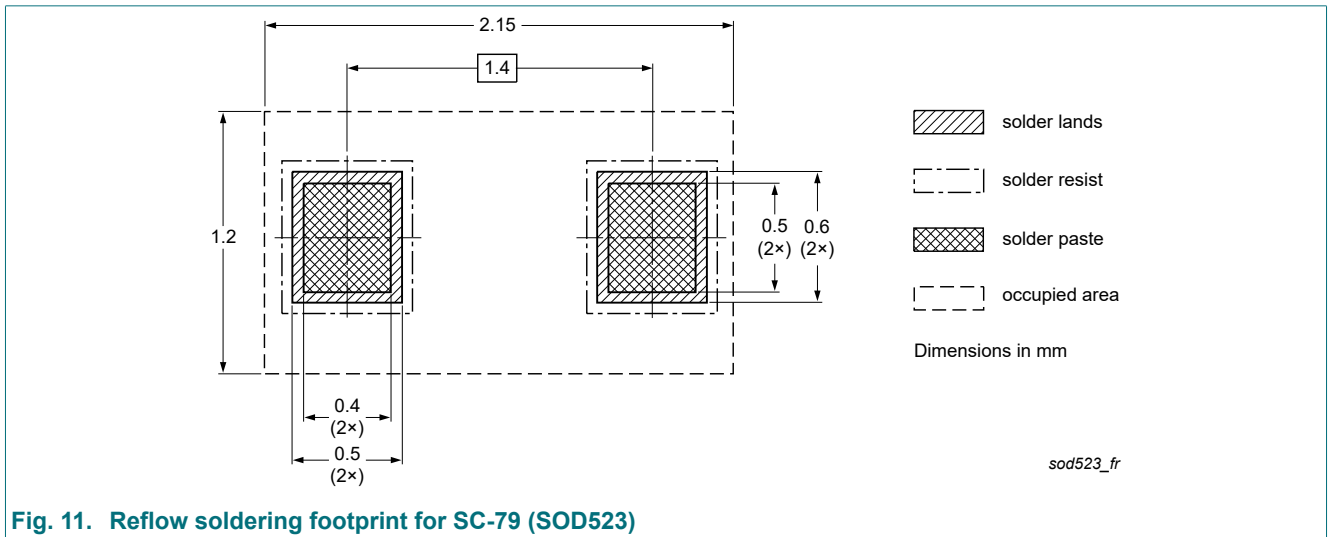


Fig. 11. Reflow soldering footprint for SC-79 (SOD523)



## 14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0V1BB-Q v.1	20220823	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.

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