

# PESD5V0V1BA; PESD5V0V1BB; PESD5V0V1BL

Very low capacitance bidirectional ESD protection diodes

Rev. 01 — 28 July 2009

Product data sheet

## 1. Product profile

### 1.1 General description

Very low capacitance bidirectional ElectroStatic Discharge (ESD) protection diodes in small Surface-Mounted Device (SMD) plastic packages designed to protect one signal line from the damage caused by ESD and other transients.

Table 1. Product overview

Type number	Package		Package configuration
	NXP	JEITA	
PESD5V0V1BA	SOD323	SC-76	very small
PESD5V0V1BB	SOD523	SC-79	ultra small and flat lead
PESD5V0V1BL	SOD882	-	leadless ultra small

### 1.2 Features

- Bidirectional ESD protection of one line
- Very low diode capacitance:  $C_d = 11$  pF
- Max. peak pulse power:  $P_{PP} = 45$  W
- Low clamping voltage:  $V_{CL} = 12.5$  V
- Ultra low leakage current:  $I_{RM} < 1$  nA
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge);  $I_{PP} = 4.8$  A
- AEC-Q101 qualified

### 1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Subscriber Identity Module (SIM) card protection
- Communication systems
- Portable electronics
- 10/100 Mbit/s Ethernet
- FireWire

### 1.4 Quick reference data


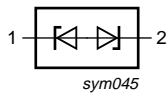

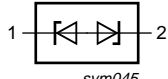
Table 2. Quick reference data

$T_{amb} = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage		-	-	5	V
$C_d$	diode capacitance	$f = 1$ MHz; $V_R = 0$ V	-	11	13	pF

## 2. Pinning information

**Table 3. Pinning**

Pin	Description	Simplified outline	Graphic symbol
PESD5V0V1BA; PESD5V0V1BB			
1	cathode (diode 1) <a href="#">[1]</a>	 001aab540	 sym045
2	cathode (diode 2)		
PESD5V0V1BL			
1	cathode (diode 1) <a href="#">[1]</a>	 Transparent top view	 sym045
2	cathode (diode 2)		

[1] The marking bar indicates pin 1.

## 3. Ordering information

**Table 4. Ordering information**

Type number	Package		
	Name	Description	Version
PESD5V0V1BA	SC-76	plastic surface-mounted package; 2 leads	SOD323
PESD5V0V1BB	SC-79	plastic surface-mounted package; 2 leads	SOD523
PESD5V0V1BL	-	leadless ultra small plastic package; 2 terminals; body 1.0 × 0.6 × 0.5 mm	SOD882

## 4. Marking

**Table 5. Marking codes**

Type number	Marking code
PESD5V0V1BA	1K
PESD5V0V1BB	Z9
PESD5V0V1BL	X1

## 5. Limiting values

**Table 6. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per diode</b>					
P <sub>PP</sub>	peak pulse power	t <sub>p</sub> = 8/20 μs <sup>[1]</sup>	-	45	W
I <sub>PP</sub>	peak pulse current	t <sub>p</sub> = 8/20 μs <sup>[1]</sup>	-	4.8	A

Table 6. Limiting values ...continued  
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
Per device					
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

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.

Table 7. ESD maximum ratings  
T<sub>amb</sub> = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1] -	30	kV
		machine model	-	2	kV
		MIL-STD-883 (human body model)	-	16	kV

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

Table 8. ESD standards compliance

Standard	Conditions
IEC 61000-4-2; level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
MIL-STD-883; class 3B (human body model)	> 8 kV

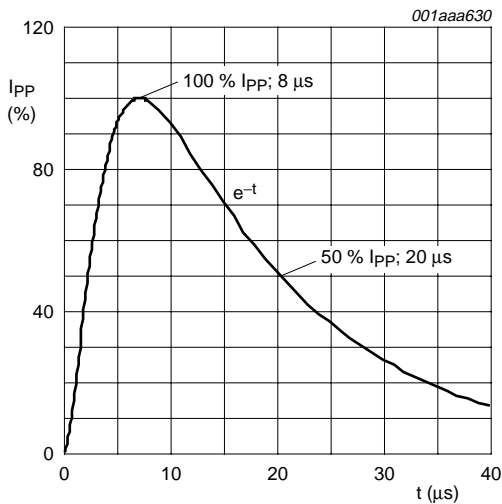


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5

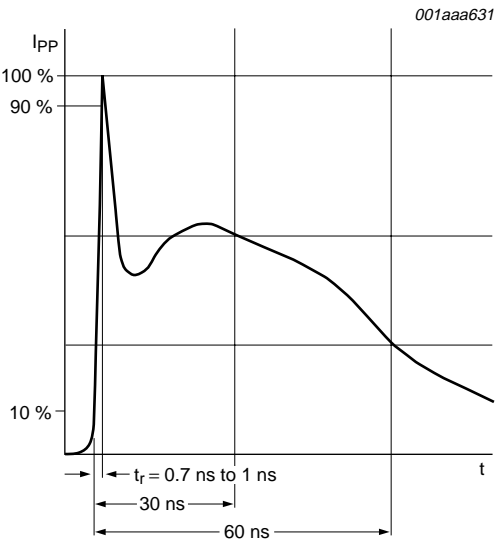


Fig 2. ESD pulse waveform according to IEC 61000-4-2

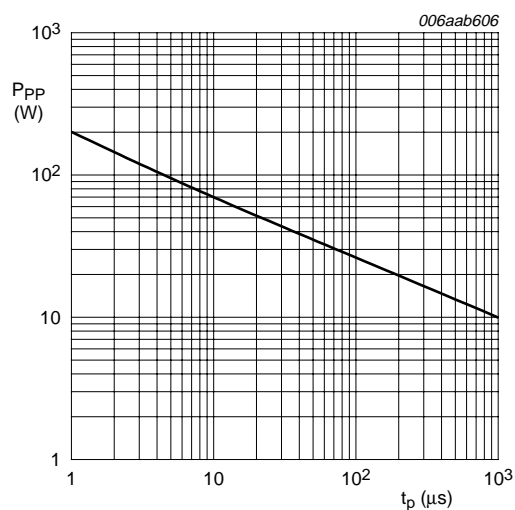
## 6. Characteristics

**Table 9. Characteristics**

$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

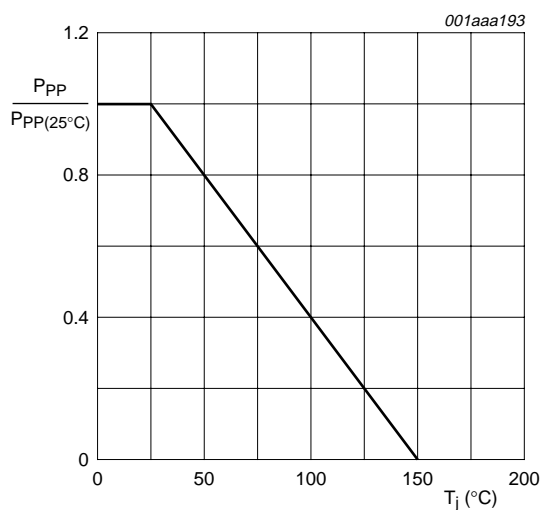
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage		-	-	5	V
$I_{RM}$	reverse leakage current	$V_{RWM} = 5\text{ V}$	-	< 1	10	nA
$V_{BR}$	breakdown voltage	$I_R = 5\text{ mA}$	5.8	6.8	7.8	V
$C_d$	diode capacitance	$f = 1\text{ MHz};$ $V_R = 0\text{ V}$	-	11	13	pF
$V_{CL}$	clamping voltage	$I_{PP} = 4.8\text{ A}$	[1]	-	12.5	V
$r_{dif}$	differential resistance	$I_R = 5\text{ mA}$	-	-	35	$\Omega$

[1] Non-repetitive current pulse 8/20  $\mu\text{s}$  exponential decay waveform according to IEC 61000-4-5.

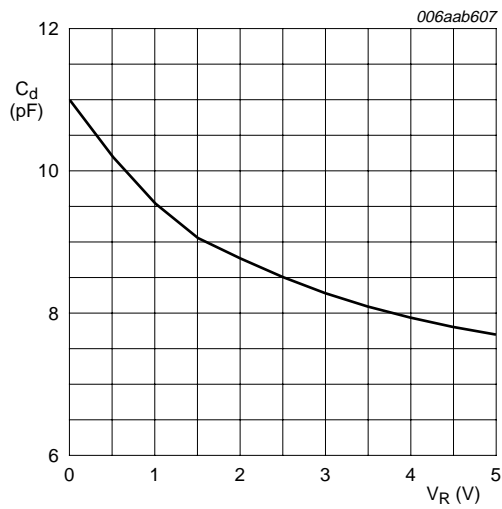


$T_{amb} = 25\text{ }^{\circ}\text{C}$

**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**



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

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

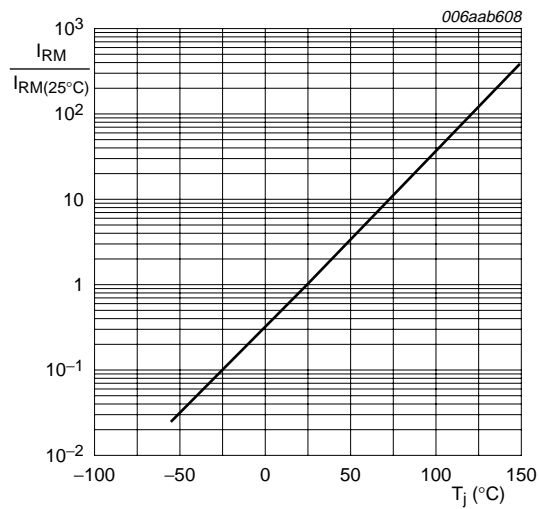


Fig 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

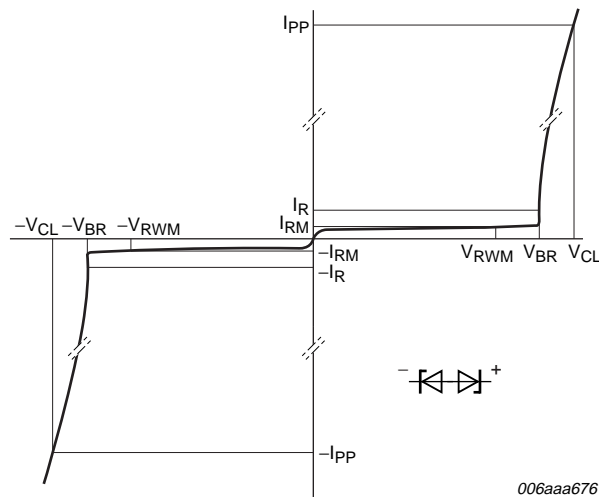


Fig 7. V-I characteristics for a bidirectional ESD protection diode

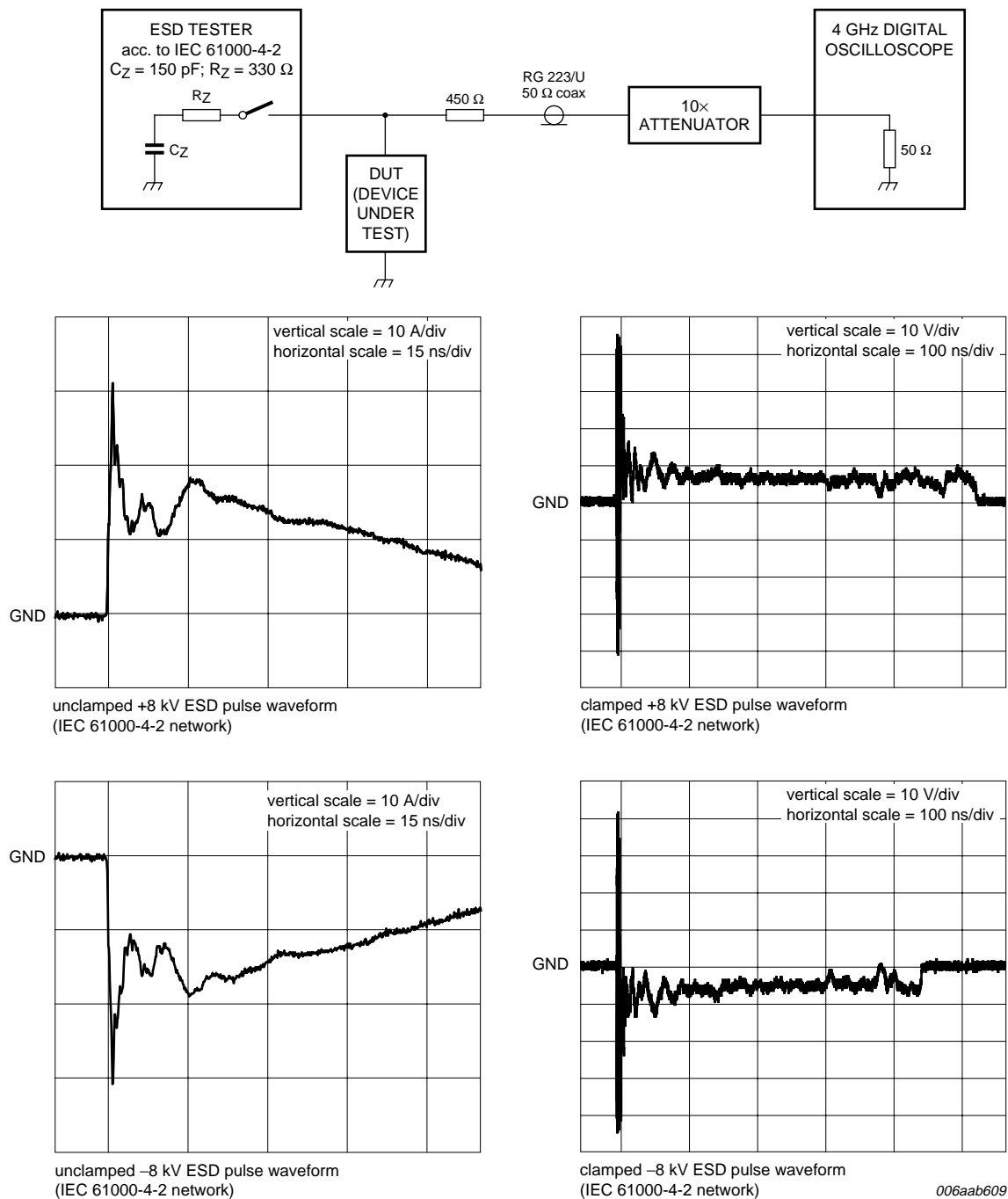
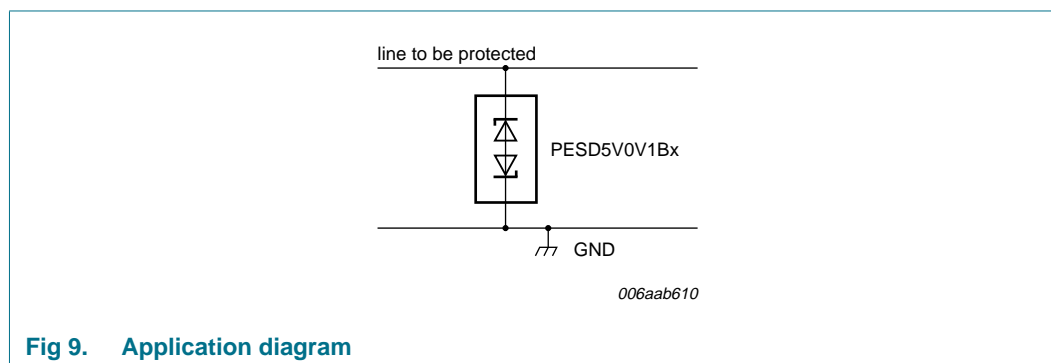


Fig 8. ESD clamping test setup and waveforms

## 7. Application information

The PESD5V0V1Bx series is designed for the protection of one bidirectional data or signal line from the damage caused by ESD and surge pulses. The devices may be used on lines where the signal polarities are both, positive or negative with respect to ground. The PESD5V0V1Bx series provides a surge capability of 45 W per line for an 8/20  $\mu$ s waveform.



### 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:

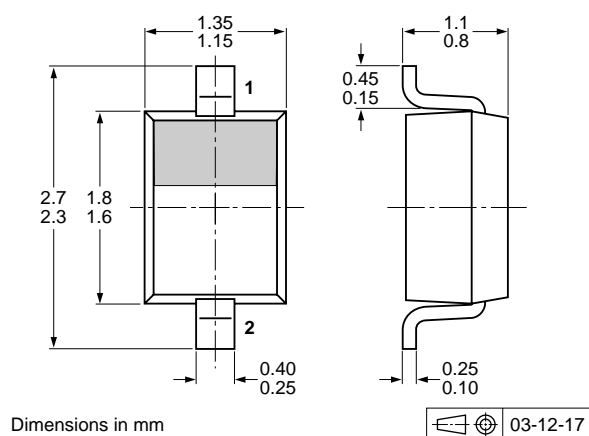
1. Place the device as close to the input terminal or connector as possible.
2. The path length between the device and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit 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. Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

## 8. Test information

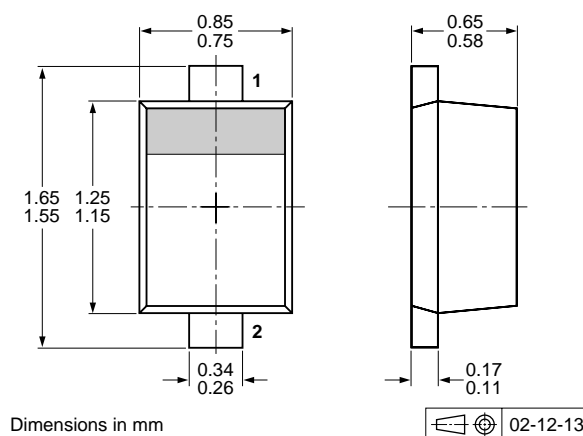
### 8.1 Quality information

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.

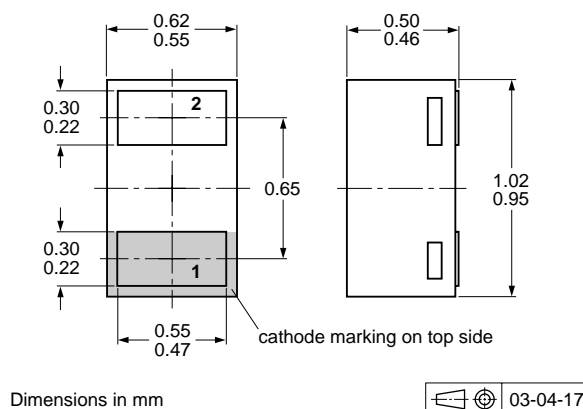
## 9. Package outline



**Fig 10. Package outline**  
**PESD5V0V1BA (SOD323/SC-76)**



**Fig 11. Package outline**  
**PESD5V0V1BB (SOD523/SC-79)**



**Fig 12. Package outline PESD5V0V1BL (SOD882)**

## 10. Packing information

**Table 10. Packing methods**

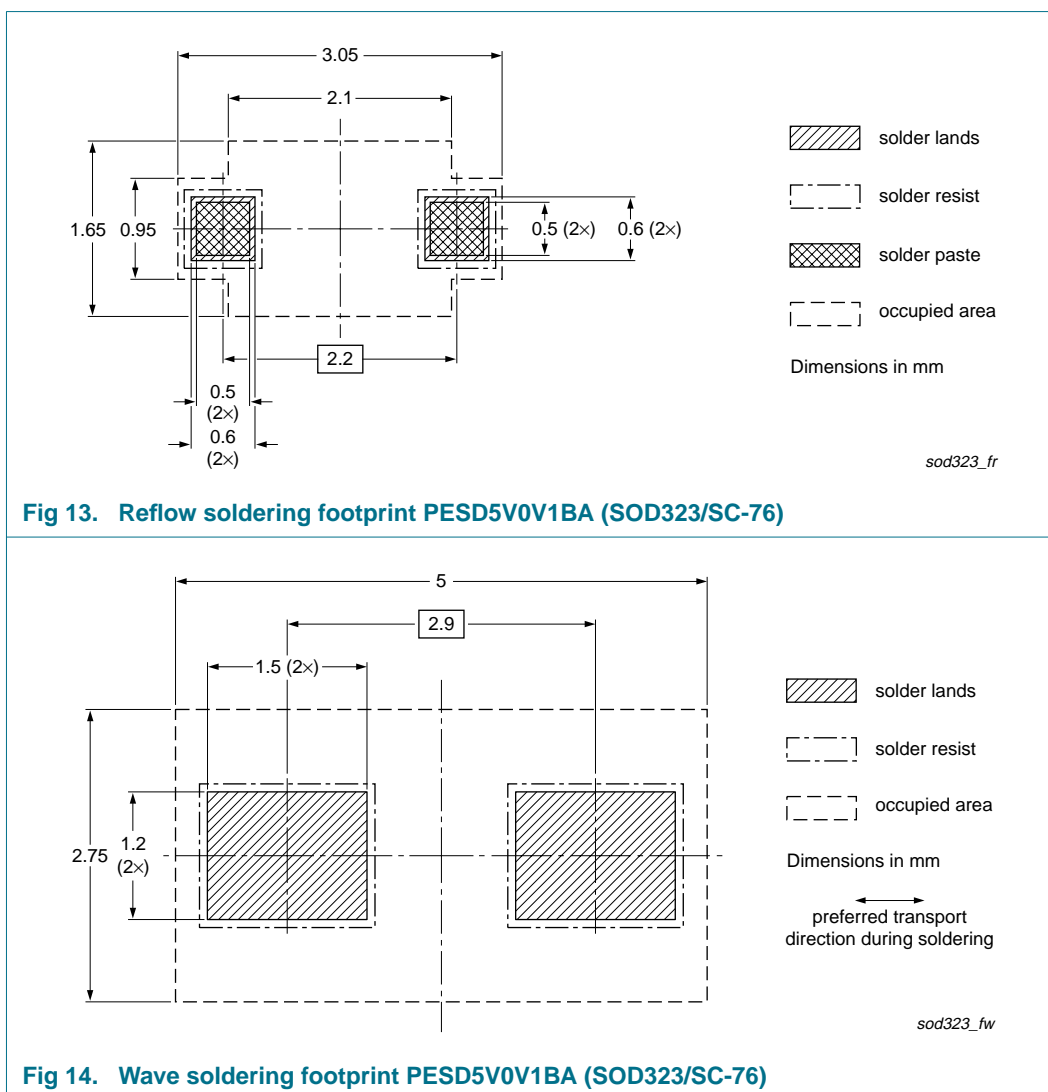
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

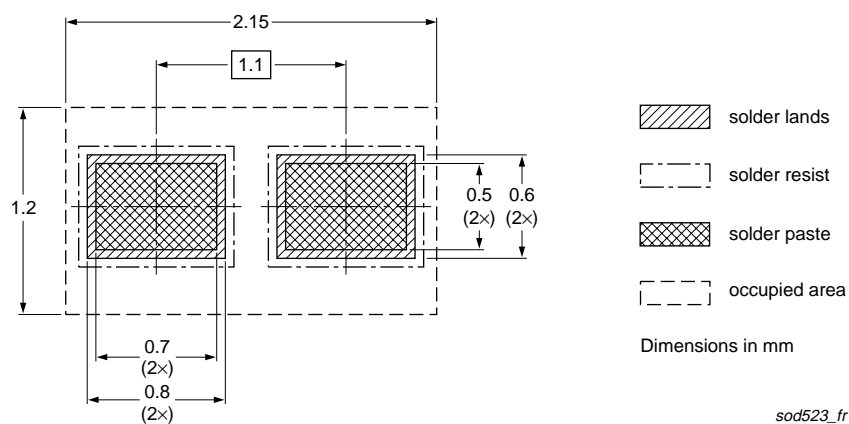
Type number	Package	Description	Packing quantity		
			3000	8000	10000
PESD5V0V1BA	SOD323	4 mm pitch, 8 mm tape and reel	-115	-	-135
PESD5V0V1BB	SOD523	2 mm pitch, 8 mm tape and reel	-	-315	-
		4 mm pitch, 8 mm tape and reel	-115	-	-135
PESD5V0V1BL	SOD882	2 mm pitch, 8 mm tape and reel	-	-	-315

[1] For further information and the availability of packing methods, see [Section 14](#).



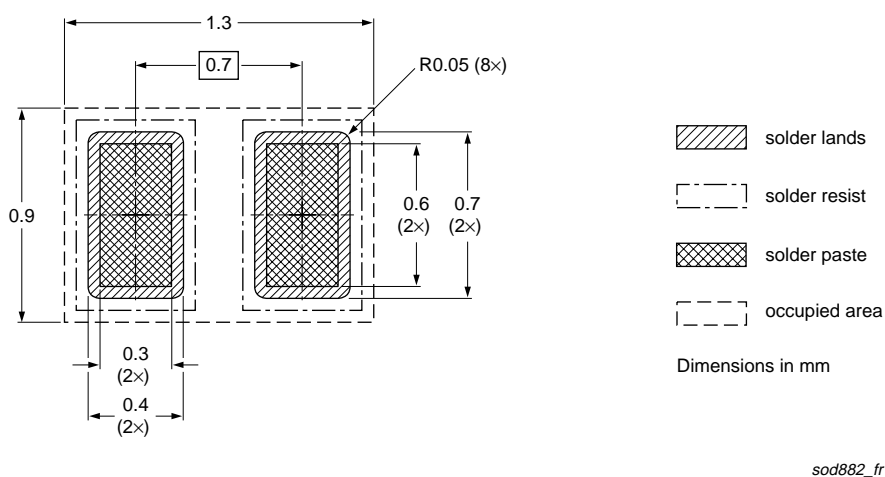
## 11. Soldering





Reflow soldering is the only recommended soldering method.

**Fig 15. Reflow soldering footprint PESD5V0V1BB (SOD523/SC-79)**



Reflow soldering is the only recommended soldering method.

**Fig 16. Reflow soldering footprint PESD5V0V1BL (SOD882)**

## 12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0V1BA_BB_BL_1	20090728	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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