

# PESD5V0L1UA; PESD5V0L1UB; PESD5V0L1UL

Low capacitance unidirectional ESD protection diodes

Rev. 01 — 17 June 2009

Product data sheet

## 1. Product profile

### 1.1 General description

Low capacitance unidirectional 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	
PESD5V0L1UA	SOD323	SC-76	very small
PESD5V0L1UB	SOD523	SC-79	ultra small and flat lead
PESD5V0L1UL	SOD882	-	leadless ultra small

### 1.2 Features

- Unidirectional ESD protection of one line
- Low diode capacitance:  $C_d = 25$  pF
- Low clamping voltage:  $V_{CL} = 12$  V
- Very low leakage current:  $I_{RM} = 10$  nA
- ESD protection up to 26 kV
- IEC 61000-4-2; level 4 (ESD)
- AEC-Q101 qualified

### 1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Subscriber Identity Module (SIM) card protection
- Portable electronics
- FireWire
- High-speed data lines

### 1.4 Quick reference data


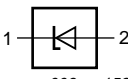

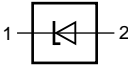
Table 2. Quick reference data

$T_{amb} = 25$  °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage		-	-	5.0	V
$C_d$	diode capacitance	$f = 1$ MHz; $V_R = 0$ V	-	25	30	pF

## 2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
PESD5V0L1UA; PESD5V0L1UB			
1	cathode	 001aab540	 006aaa152
2	anode		
PESD5V0L1UL			
1	cathode	 Transparent top view	 006aaa152
2	anode		

[1] The marking bar indicates the cathode.

## 3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0L1UA	SC-76	plastic surface-mounted package; 2 leads	SOD323
PESD5V0L1UB	SC-79	plastic surface-mounted package; 2 leads	SOD523
PESD5V0L1UL	-	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
PESD5V0L1UA	1J
PESD5V0L1UB	Z8
PESD5V0L1UL	XY

## 5. Limiting values

**Table 6. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
P <sub>PP</sub>	peak pulse power	t <sub>p</sub> = 8/20 μs	[1][2] -	42	W
I <sub>PP</sub>	peak pulse current	t <sub>p</sub> = 8/20 μs	[1][2] -	3.5	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

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

[2] Measured from pin 1 to pin 2.

**Table 7. ESD maximum ratings**

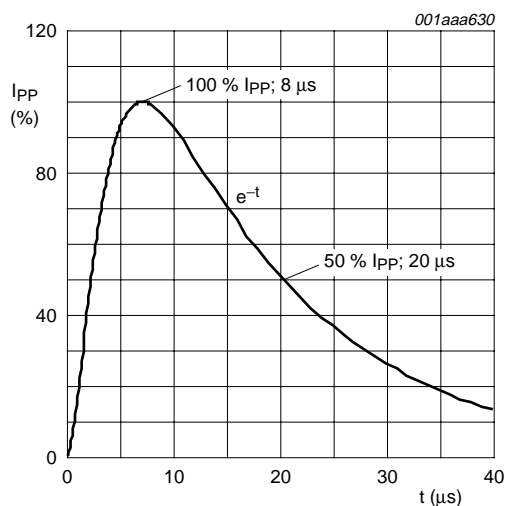
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1] -	26	kV
		machine model	-	400	V
		MIL-STD-883 (human body model)	-	10	kV

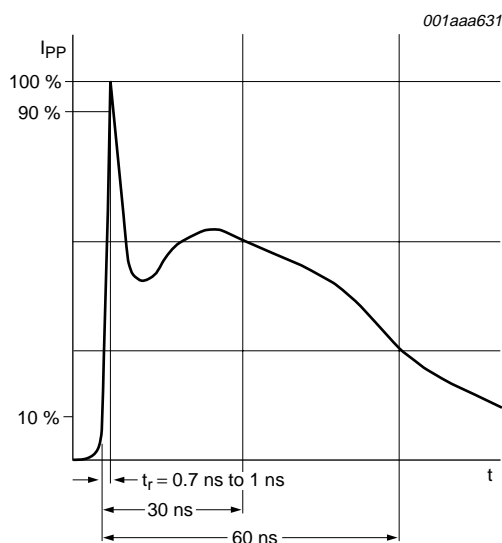
[1] Device stressed with ten non-repetitive ESD pulses.

**Table 8. ESD standards compliance**

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



**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

## 6. Characteristics

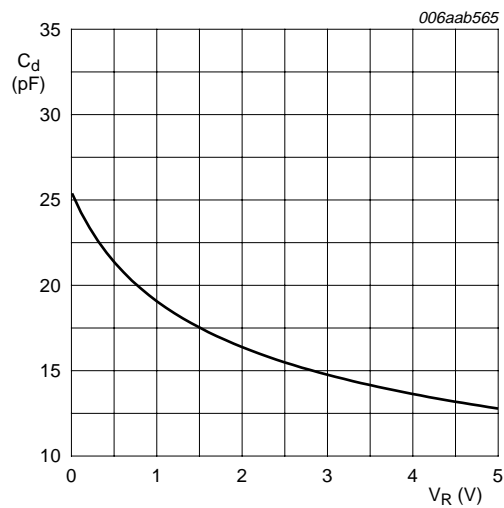
**Table 9. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage		-	-	5.0	V
$I_{RM}$	reverse leakage current	$V_{RWM} = 5.0\text{ V}$	-	10	100	nA
$V_{BR}$	breakdown voltage	$I_R = 5\text{ mA}$	6.4	6.8	7.2	V
$C_d$	diode capacitance	$f = 1\text{ MHz};$ $V_R = 0\text{ V}$	-	25	30	pF
$V_{CL}$	clamping voltage	[1][2]				
		$I_{PP} = 1\text{ A}$	-	-	9	V
		$I_{PP} = 3.5\text{ A}$	-	-	12	V
$r_{dif}$	differential resistance	$I_R = 5\text{ mA}$	-	-	30	$\Omega$
$V_F$	forward voltage	$I_F = 200\text{ mA}$	-	-	1.2	V

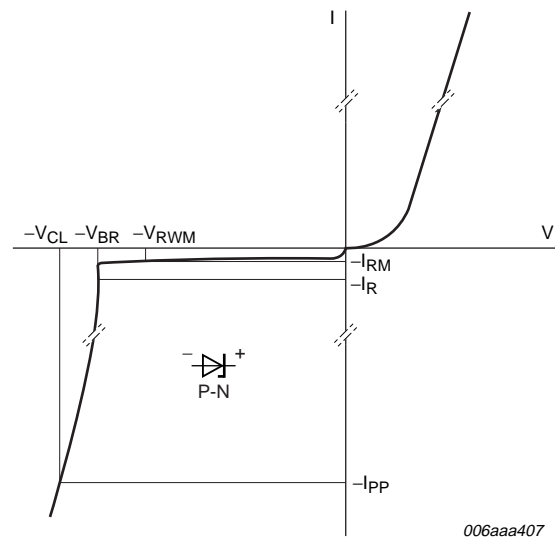
[1] Non-repetitive current pulse 8/20  $\mu$ s exponential decay waveform according to IEC 61000-4-5.

[2] Measured from pin 1 to pin 2.



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

**Fig 3.** Diode capacitance as a function of reverse voltage; typical values



**Fig 4.** V-I characteristics for a unidirectional ESD protection diode

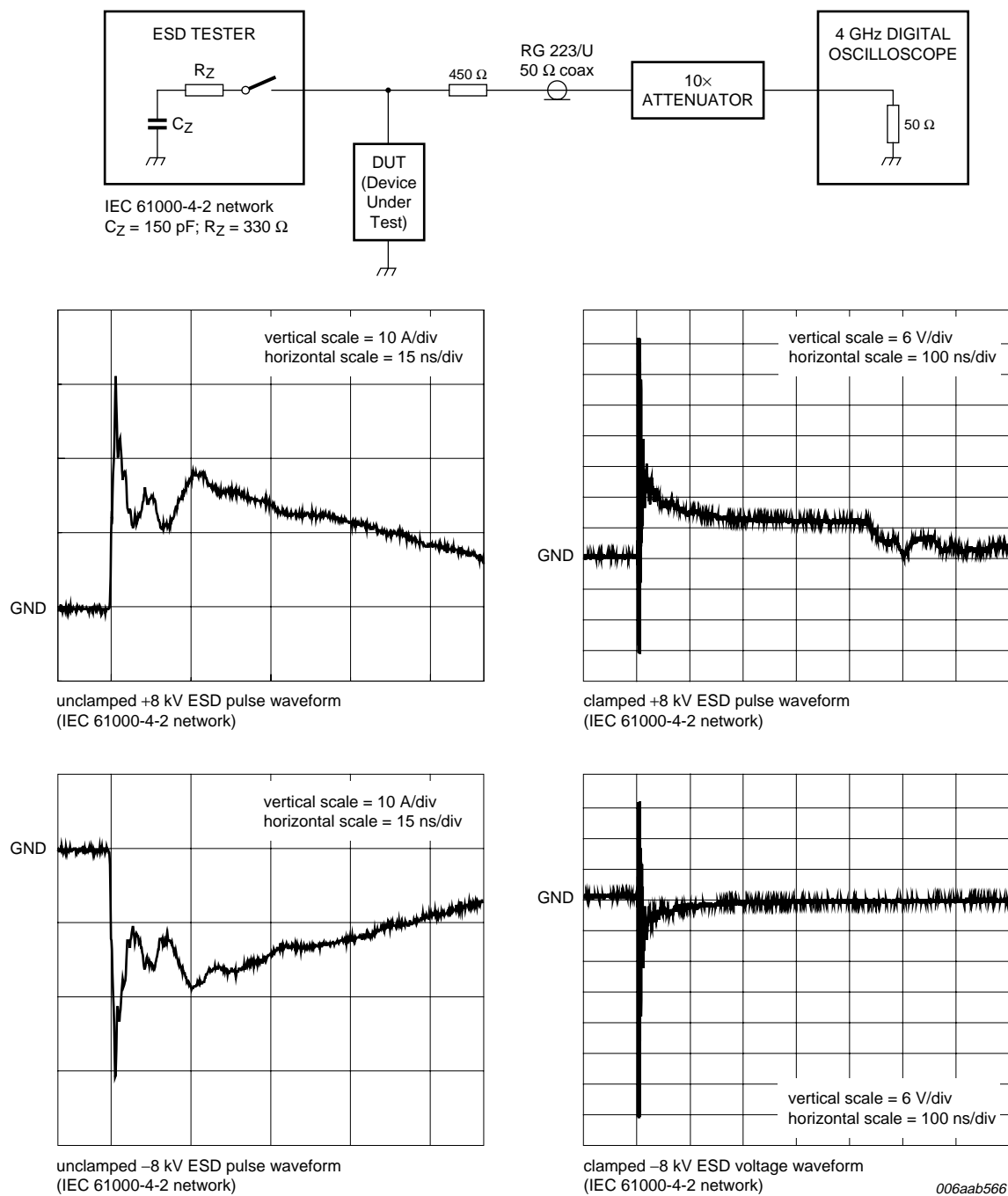
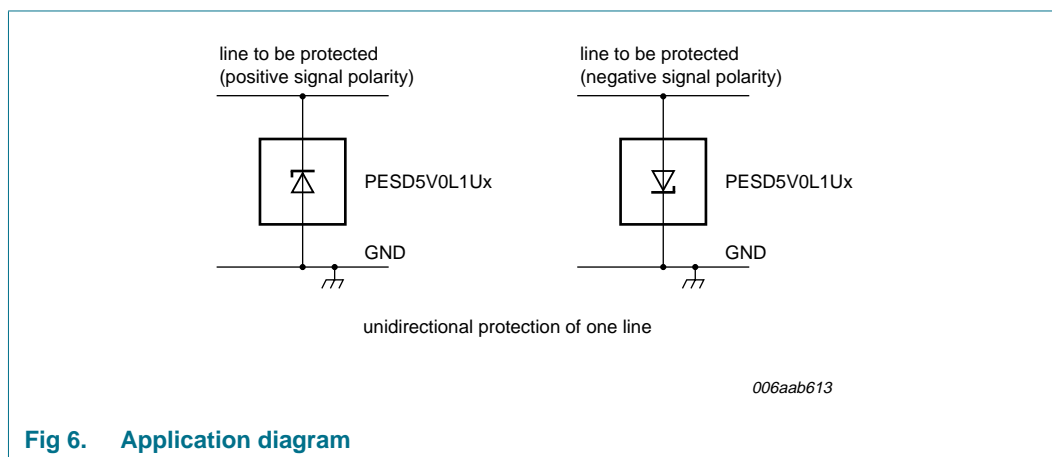


Fig 5. ESD clamping test setup and waveforms

## 7. Application information

The PESD5V0L1Ux series is designed for the protection of one unidirectional 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 either positive or negative with respect to ground. The PESD5V0L1Ux series provides a surge capability up to 42 W per line for an 8/20  $\mu$ s waveform.



**Fig 6. Application diagram**

### Circuit board layout and protection device placement

Circuit board layout is critical for the suppression of ESD and Electrical Fast Transient (EFT). The following guidelines are recommended:

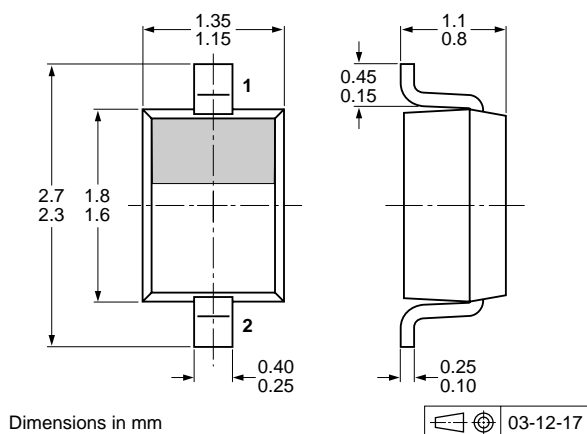
1. Place the device as close to the input terminal or connector as possible.
2. The path length between the device and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit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

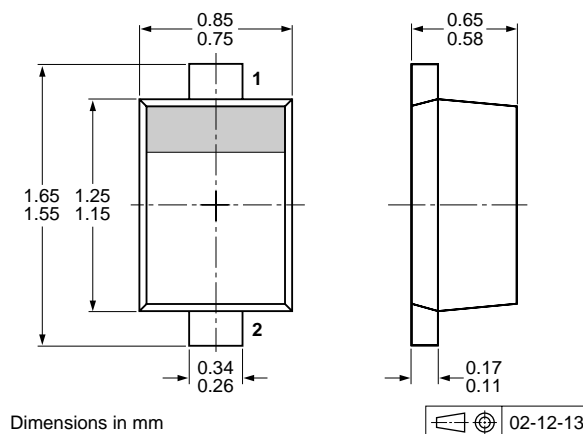
### 8.1 Quality information

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.

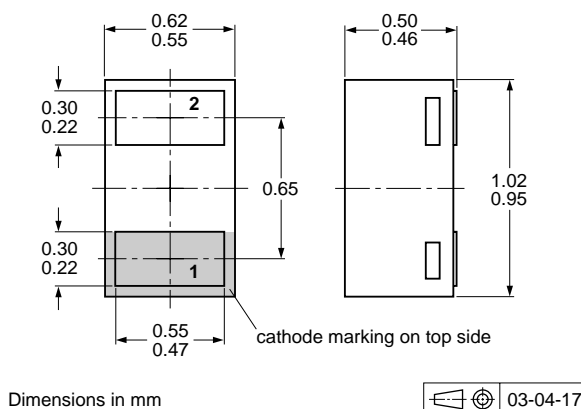
## 9. Package outline



**Fig 7. Package outline**  
**PESD5V0L1UA (SOD323/SC-76)**



**Fig 8. Package outline**  
**PESD5V0L1UB (SOD523/SC-79)**



**Fig 9. Package outline PESD5V0L1UL (SOD882)**

## 10. Packing information

**Table 10. Packing methods**

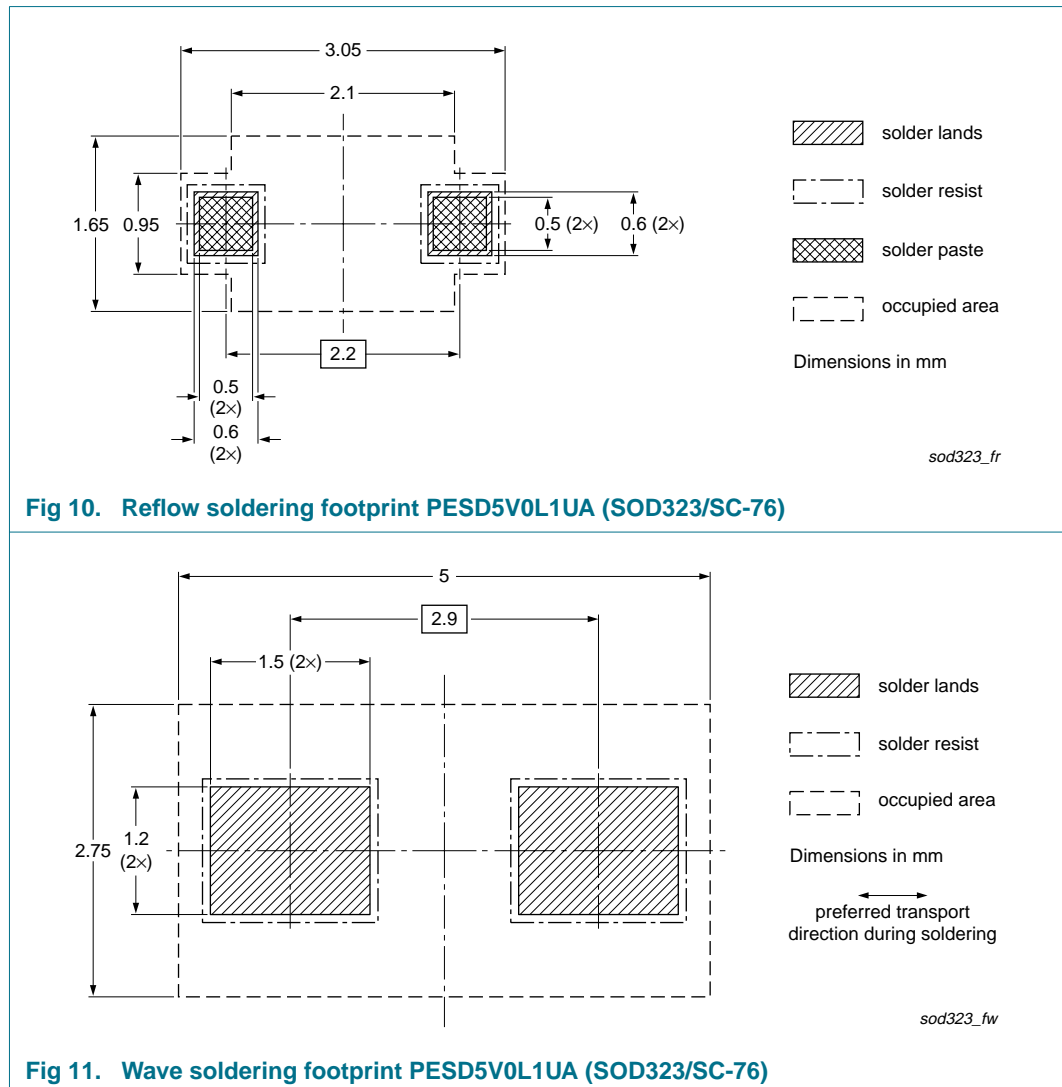
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

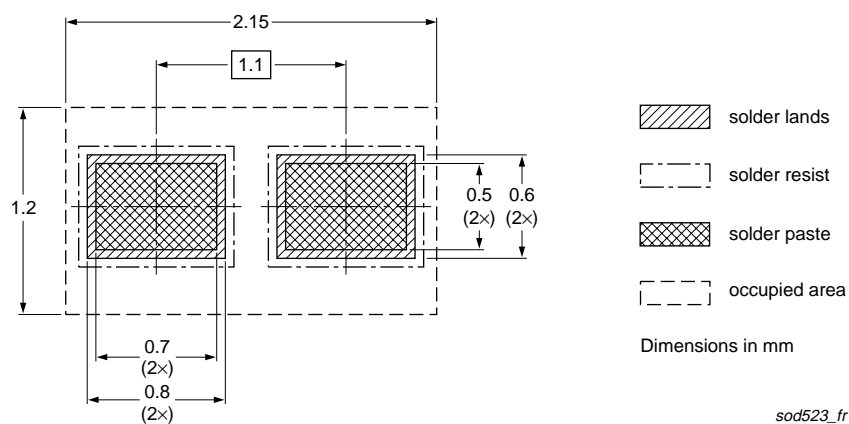
Type number	Package	Description	Packing quantity		
			3000	8000	10000
PESD5V0L1UA	SOD323	4 mm pitch, 8 mm tape and reel	-115	-	-135
PESD5V0L1UB	SOD523	2 mm pitch, 8 mm tape and reel	-	-315	-
		4 mm pitch, 8 mm tape and reel	-115	-	-135
PESD5V0L1UL	SOD882	2 mm pitch, 8 mm tape and reel	-	-	-315

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



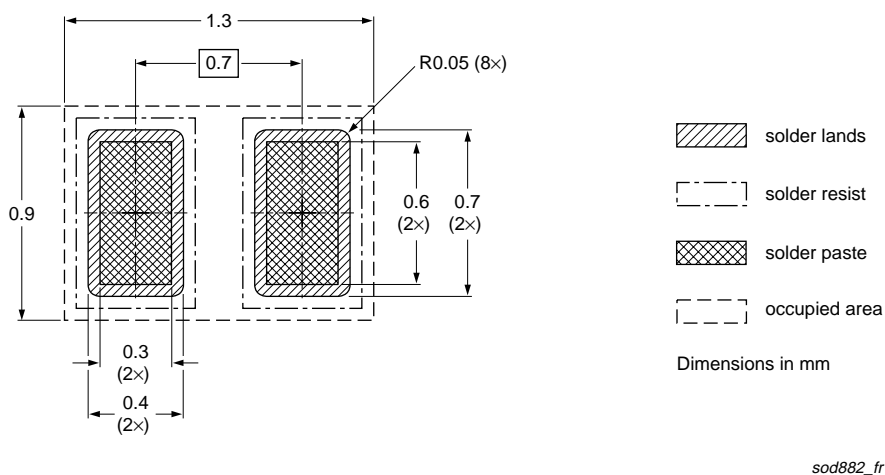
## 11. Soldering





Reflow soldering is the only recommended soldering method.

**Fig 12. Reflow soldering footprint PESD5V0L1UB (SOD523/SC-79)**



Reflow soldering is the only recommended soldering method.

**Fig 13. Reflow soldering footprint PESD5V0L1UL (SOD882)**

## 12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0L1UA_UB_UL_1	20090617	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.

[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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