

PESD5V0S1BA; PESD5V0S1BB; PESD5V0S1BL

Low capacitance bidirectional ESD protection diodes

Rev. 04 — 20 August 2009

Product data sheet

1. Product profile

1.1 General description

Low capacitance ElectroStatic Discharge (ESD) protection diodes in ultra small 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	
	NXP	JEITA
PESD5V0S1BA	SOD323	SC-76
PESD5V0S1BB	SOD523	SC-79
PESD5V0S1BL	SOD882	-

1.2 Features

- Bidirectional ESD protection of one line
- Max. peak pulse power: $P_{PP} = 130 \text{ W}$
- Low clamping voltage: $V_{(CL)R} = 14 \text{ V}$
- Ultra low leakage current: $I_{RM} = 5 \text{ nA}$
- ESD protection > 30 kV
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 12 \text{ A}$
- Ultra small SMD plastic packages

1.3 Applications

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


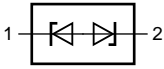

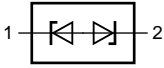
1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse stand-off voltage		-	-	5	V
C_d	diode capacitance	$V_R = 0 \text{ V};$ $f = 1 \text{ MHz}$	-	35	45	pF

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
SOD323, SOD523			
1	cathode 1	 001aab540	 sym045
2	cathode 2		
SOD882			
1	cathode 1	 Transparent top view	 sym045
2	cathode 2		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0S1BA	SC-76	plastic surface mounted package; 2 leads	SOD323
PESD5V0S1BB	SC-79	plastic surface mounted package; 2 leads	SOD523
PESD5V0S1BL	-	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
PESD5V0S1BA	E6
PESD5V0S1BB	L7
PESD5V0S1BL	F1

5. Limiting values

Table 6. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
P _{PP}	peak pulse power	8/20 μs	[1][2] -	130	W
I _{PP}	peak pulse current	8/20 μs	[1][2] -	12	A
T _j	junction temperature		-	150	°C
T _{amb}	ambient temperature		-65	+150	°C
T _{stg}	storage temperature		-65	+150	°C

[1] Non-repetitive current pulse 8/20 μs exponentially decaying waveform according to IEC61000-4-5; see [Figure 1](#).

[2] Measured from pin 1 to pin 2.

Table 7. ESD maximum ratings

Symbol	Parameter	Conditions	Min	Max	Unit
ESD	electrostatic discharge capability	IEC 61000-4-2 (contact discharge)	[1][2] -	30	kV
		HBM MIL-Std 883	-	10	kV

[1] Measured from pin 1 to pin 2.

[2] Device stressed with ten non-repetitive ElectroStatic Discharge (ESD) pulses; see [Figure 2](#).

Table 8. ESD standards compliance

Standard	Conditions
IEC 61000-4-2, level 4 (ESD); Figure 2	> 15 kV (air); > 8 kV (contact)
HBM MIL-STD 883; class 3	> 4 kV

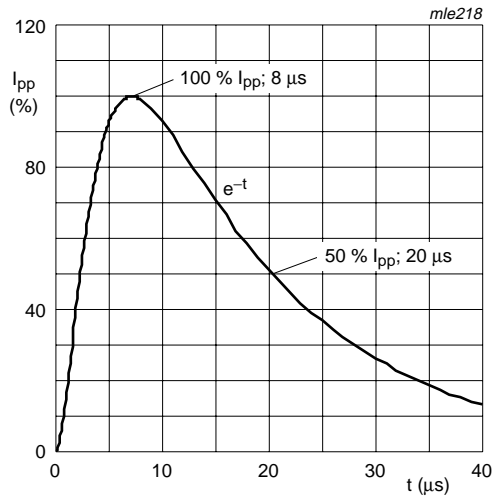


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5

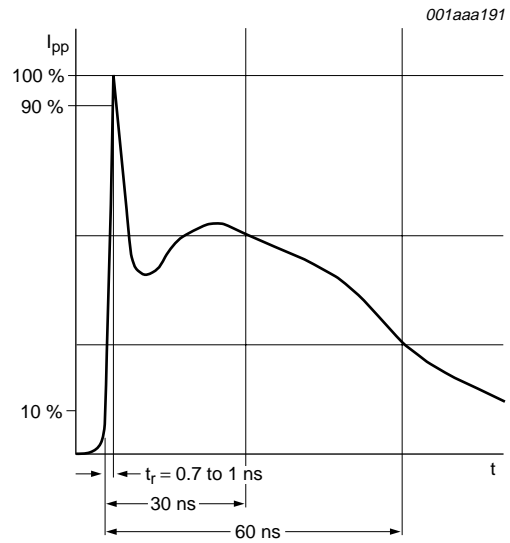


Fig 2. ElectroStatic Discharge (ESD) pulse waveform according to IEC 61000-4-2

6. Characteristics

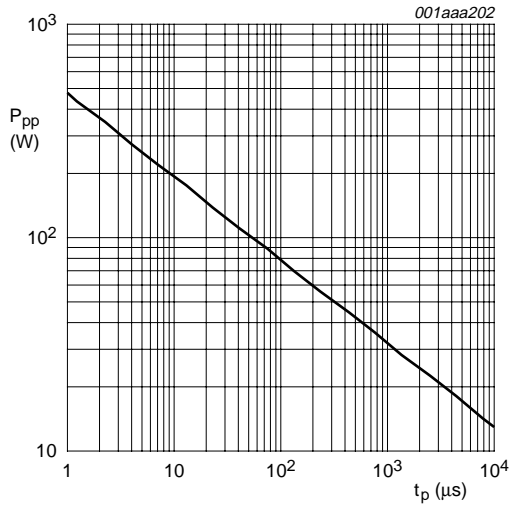
Table 9. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_{RWM}	reverse stand-off voltage		-	-	5	V
I_{RM}	reverse leakage current	$V_{RWM} = 5\text{ V}$; see Figure 6	-	5	100	nA
$V_{(CL)R}$	clamping voltage	$I_{PP} = 1\text{ A}$	[1][2] -	-	10	V
		$I_{PP} = 12\text{ A}$	[1][2] -	-	14	V
$V_{(BR)}$	breakdown voltage	$I_R = 1\text{ mA}$	5.5	-	9.5	V
r_{dif}	differential resistance	$I_R = 1\text{ mA}$	-	-	50	Ω
C_d	diode capacitance	$V_R = 0\text{ V}$; $f = 1\text{ MHz}$; see Figure 5	-	35	45	pF

[1] Non-repetitive current pulse 8/20 μs exponentially decaying waveform according to IEC61000-4-5; see [Figure 1](#).

[2] Measures from pin 1 to pin 2.



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

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

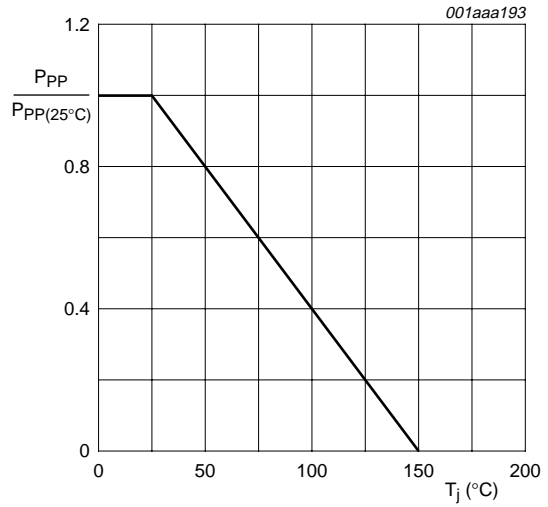
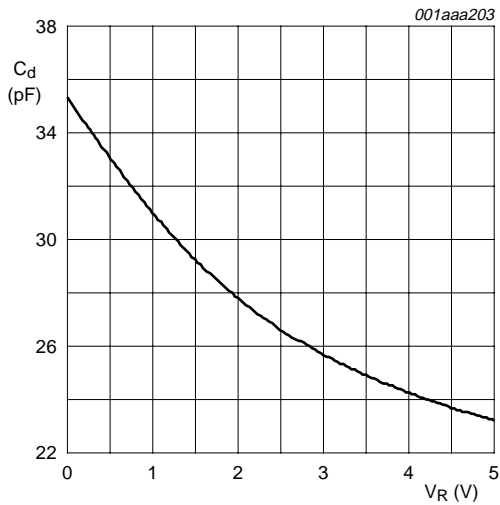


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values



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

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

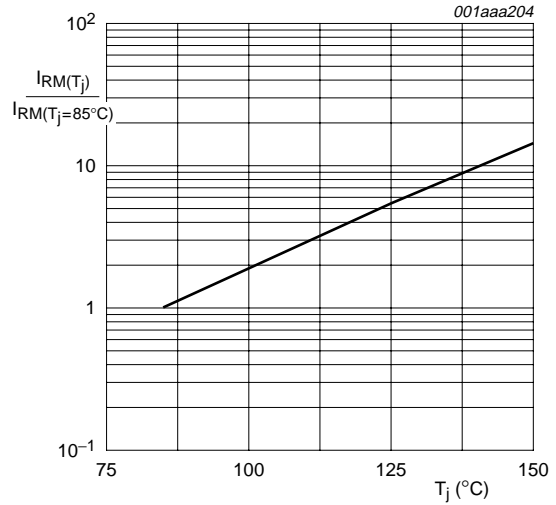


Fig 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

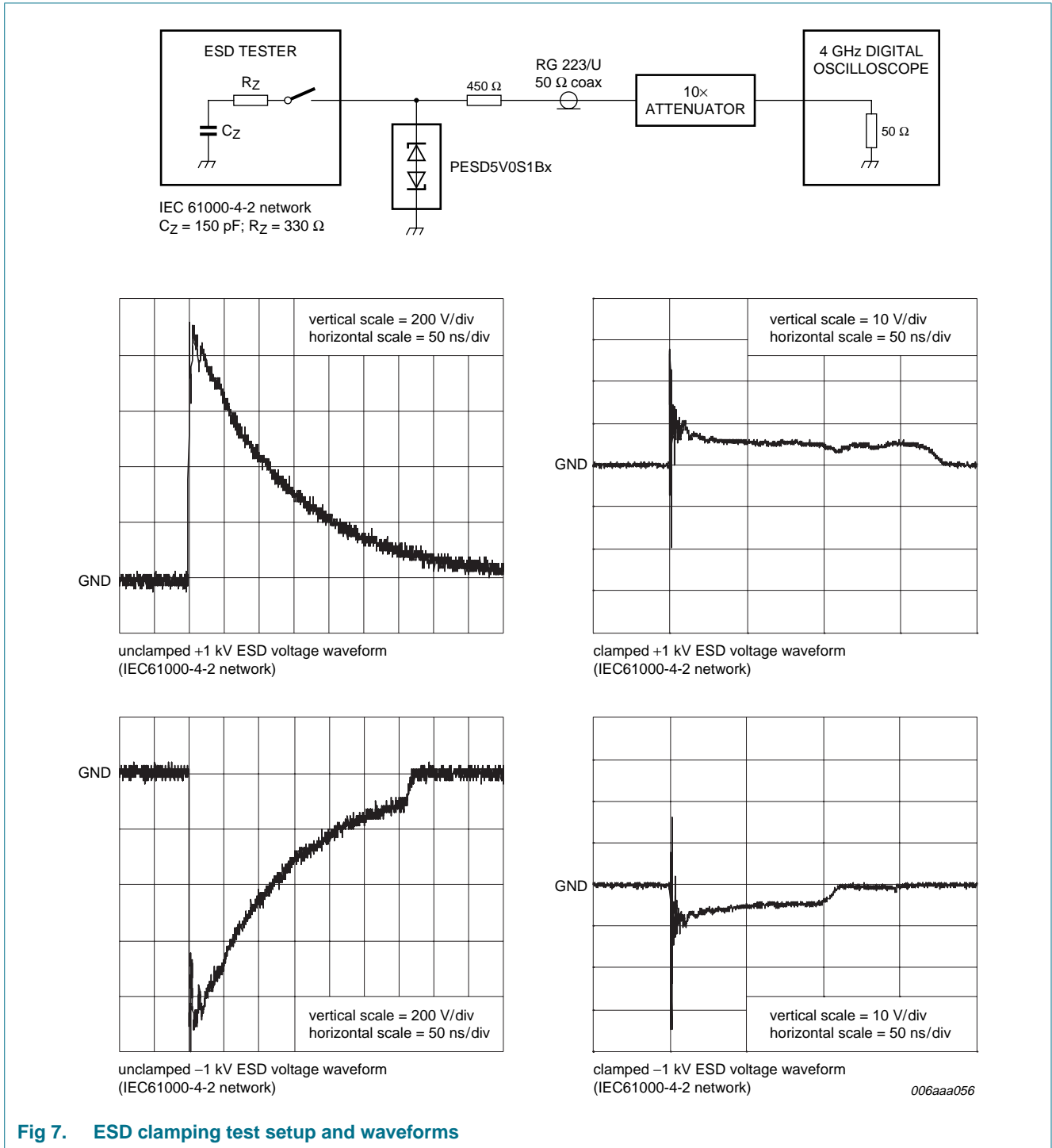


Fig 7. ESD clamping test setup and waveforms

7. Application information

PESD5V0S1Bx series is designed for the protection of one bidirectional signal line from the damage caused by ElectroStatic Discharge (ESD) and surge pulses. The devices may be used on lines where the signal polarities are above and below ground. They provide a surge capability of up to 130 W per line for a 8/20 μ s waveform.

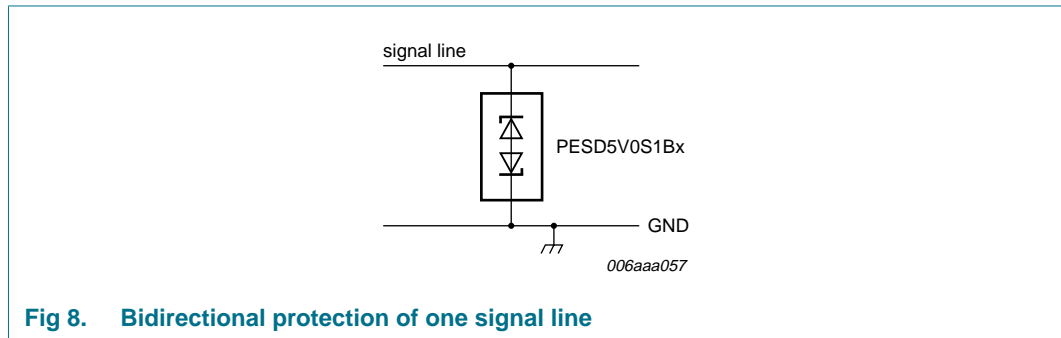


Fig 8. Bidirectional protection of one signal line

Circuit board layout and protection device placement:

Circuit board layout is critical for the suppression of ESD, EFT and surge transients. The following guidelines are recommended:

1. Place the protection device as close to the input terminal or connector as possible.
2. The path length between the protection device and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protection conductors in parallel with unprotected conductor.
5. Minimize all printed-circuit board 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 printed-circuit boards, use ground vias.

8. Package outline

Plastic surface-mounted package; 2 leads

SOD323

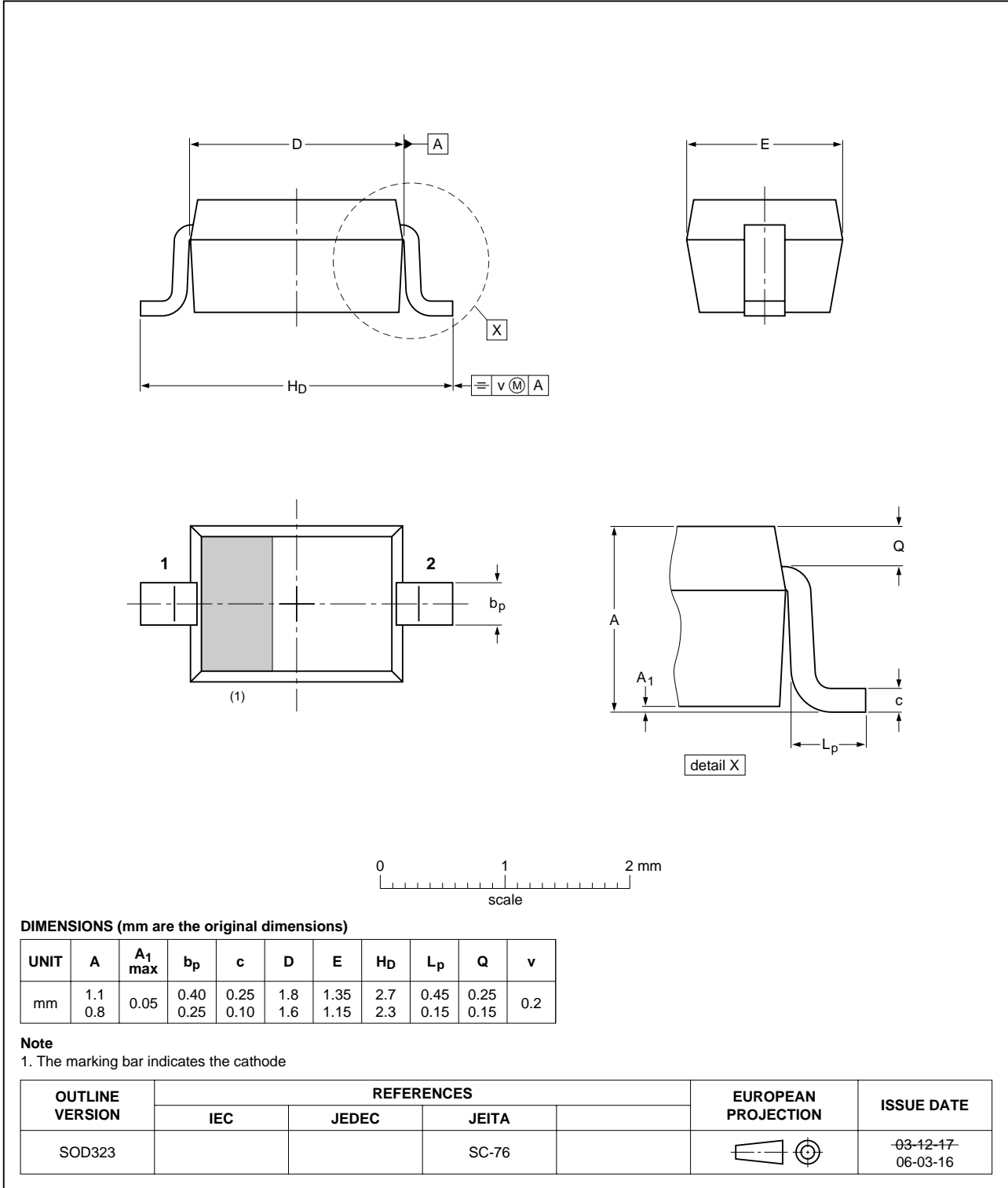


Fig 9. Package outline SOD323 (SC-76)

Plastic surface-mounted package; 2 leads

SOD523

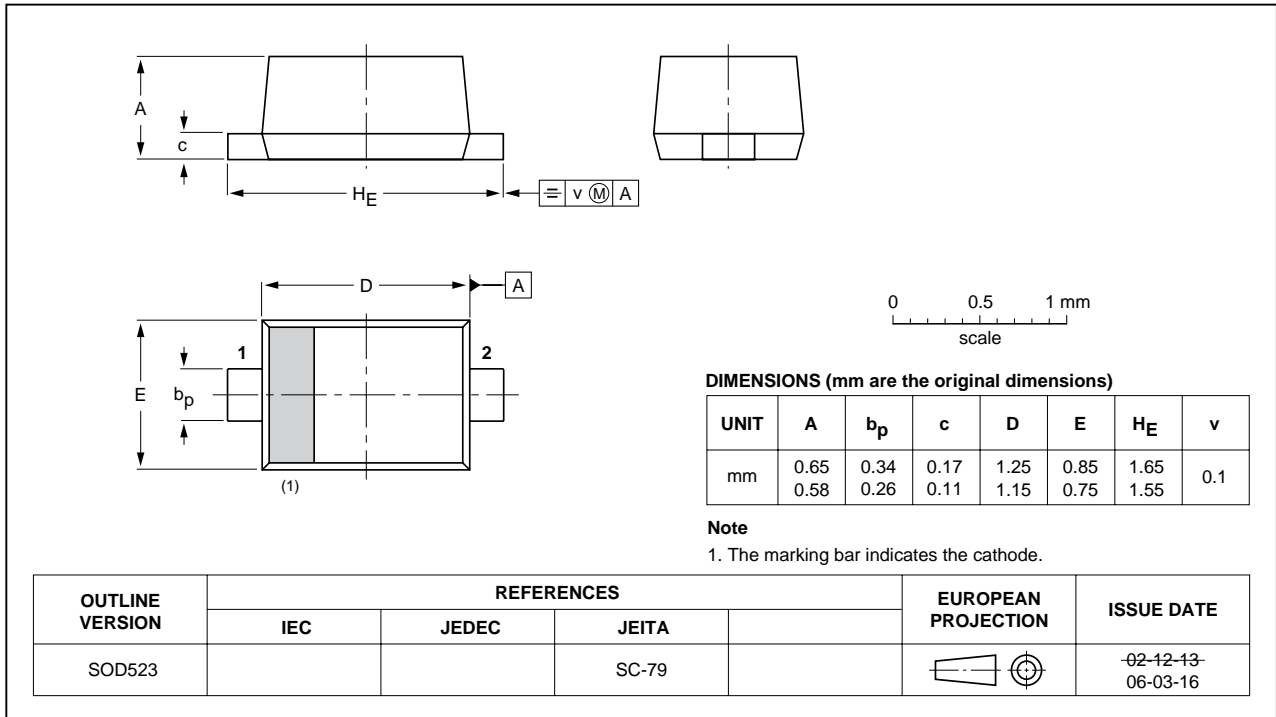


Fig 10. Package outline SOD523 (SC-79)

Leadless ultra small plastic package; 2 terminals; body 1.0 x 0.6 x 0.5 mm

SOD882

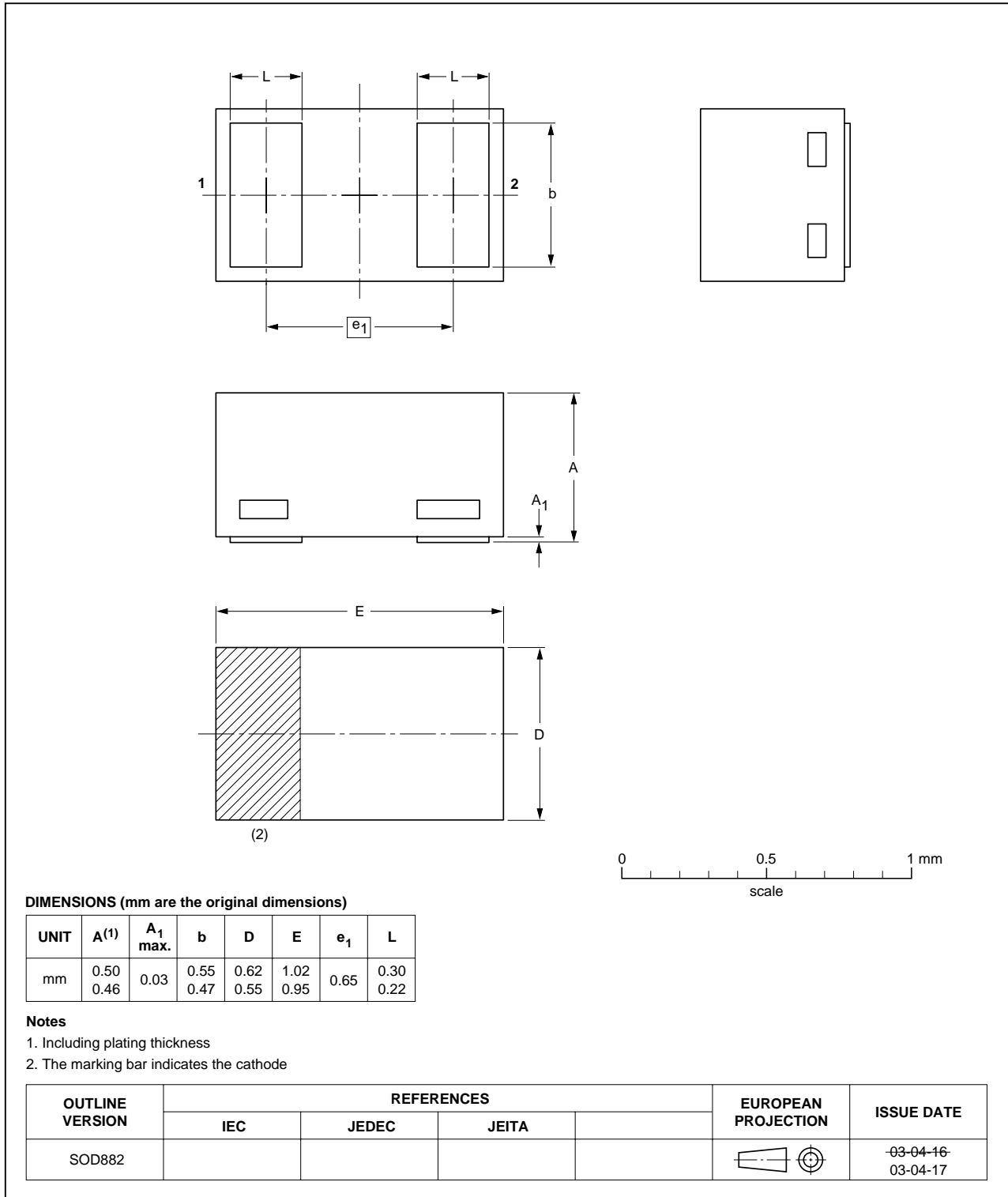


Fig 11. Package outline SOD882

9. Packing information

Table 10. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
PESD5V0S1BA	SOD323	4 mm pitch, 8 mm tape and reel	-115	-135
PESD5V0S1BB	SOD523	4 mm pitch, 8 mm tape and reel	-115	-135
PESD5V0S1BL	SOD882	4 mm pitch, 8 mm tape and reel	-	-315

[1] For further information and the availability of packing methods, see [Section 12](#).

10. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0S1BA_BB_BL_4	20090820	Product data sheet	-	PESD5V0S1BA_BB_BL_3
Modifications:	<ul style="list-style-type: none"> • This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. • Table 3 “Pinning”: amended • Figure 9 “Package outline SOD323 (SC-76)”: updated • Figure 10 “Package outline SOD523 (SC-79)”: updated 			
PESD5V0S1BA_BB_BL_3	20041217	Product data sheet	-	PESD5V0S1BA_BB_BL_2
PESD5V0S1BA_BB_BL_2	20040802	Product data sheet	-	PESD5V0S1BA_1 PESD5V0S1BB_1
PESD5V0S1BA_1	20040322	Product specification	-	-
PESD5V0S1BB_1	20040304	Product specification	-	-

11. Legal information

11.1 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".

[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>.

11.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

11.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental

damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

11.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

12. Contact information

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: salesaddresses@nxp.com

13. Contents

1 Product profile 1

1.1 General description 1

1.2 Features 1

1.3 Applications 1

1.4 Quick reference data 1

2 Pinning information 2

3 Ordering information 2

4 Marking 2

5 Limiting values 3

6 Characteristics 5

7 Application information 8

8 Package outline 9

9 Packing information 12

10 Revision history 13

11 Legal information 14

11.1 Data sheet status 14

11.2 Definitions 14

11.3 Disclaimers 14

11.4 Trademarks 14

12 Contact information 14

13 Contents 15

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.



© NXP B.V. 2009.

All rights reserved.

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 20 August 2009

Document identifier: PESD5V0S1BA_BB_BL_4