

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 | |
|-------------|----------|-------|
| | Nexperia | 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


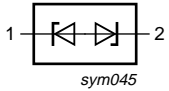

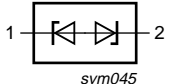
Table 2. Quick reference data

| 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 |

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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 μ s | [1][2] - | 130 | W |
| I_{PP} | peak pulse current | 8/20 μ s | [1][2] - | 12 | A |
| T_j | junction temperature | | - | 150 | $^{\circ}$ C |
| T_{amb} | ambient temperature | | -65 | +150 | $^{\circ}$ C |
| T_{stg} | storage temperature | | -65 | +150 | $^{\circ}$ C |

[1] Non-repetitive current pulse 8/20 μ s 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 |

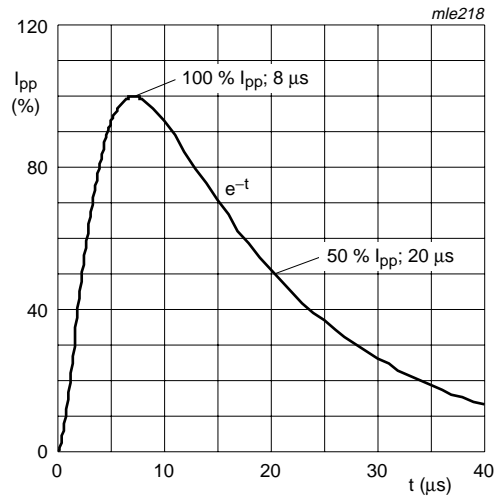


Fig 1. 8/20 μ s pulse waveform according to IEC 61000-4-5

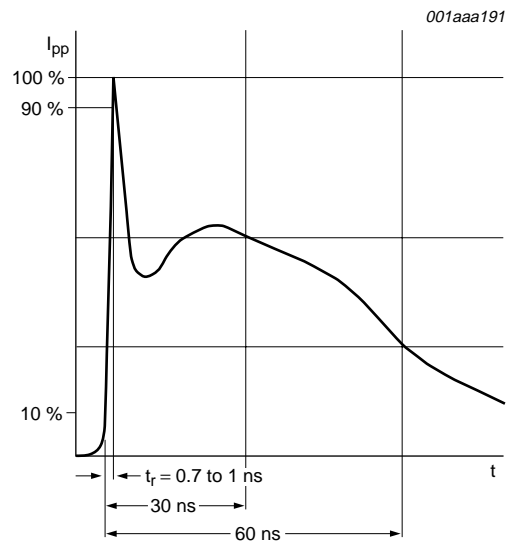


Fig 2. ElectroStatic Discharge (ESD) pulse waveform according to IEC 61000-4-2

6. Characteristics

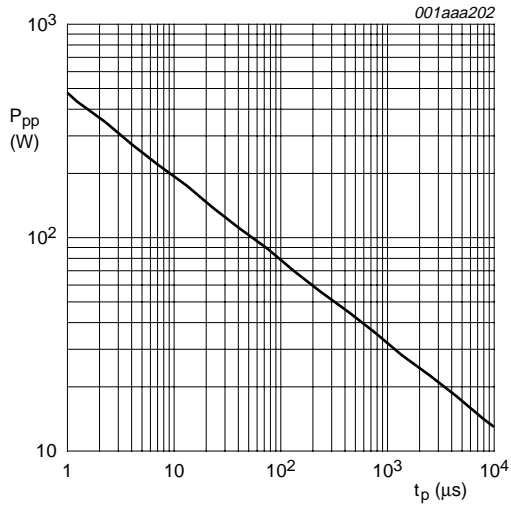
Table 9. Characteristics

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

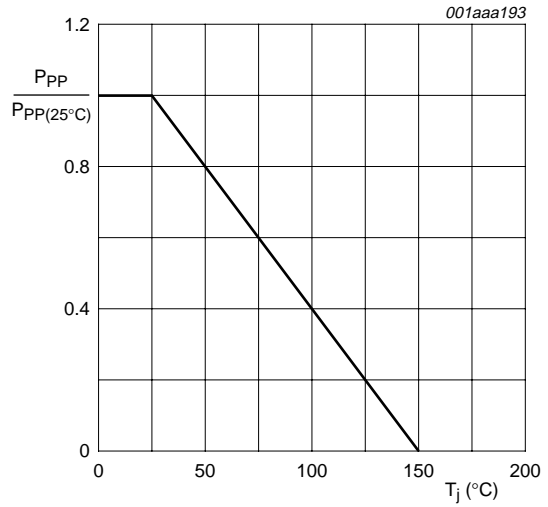
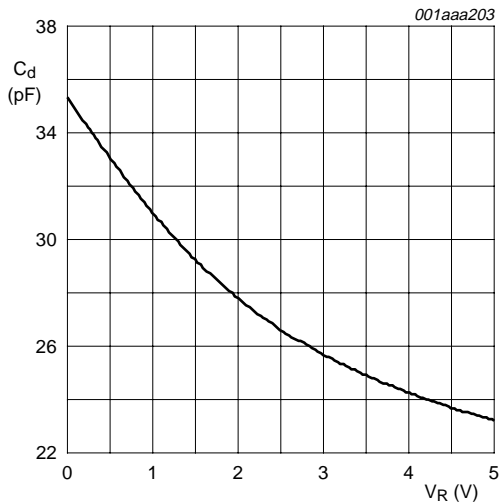


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values



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

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

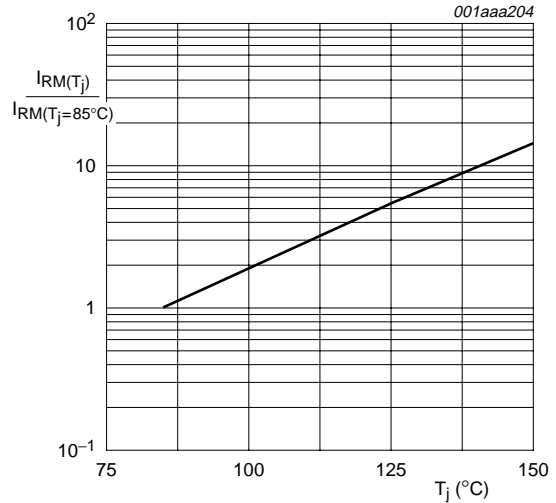


Fig 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

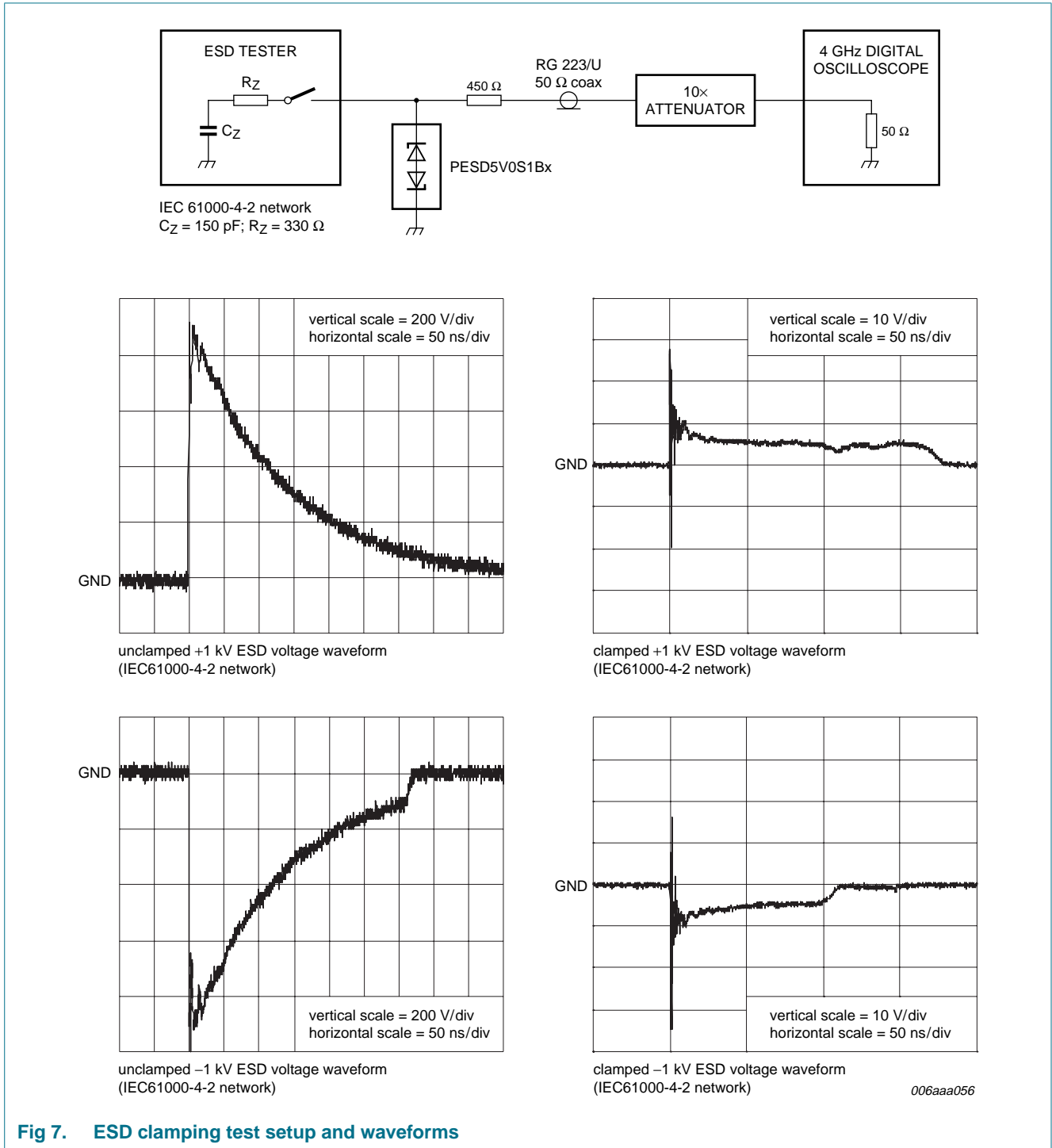
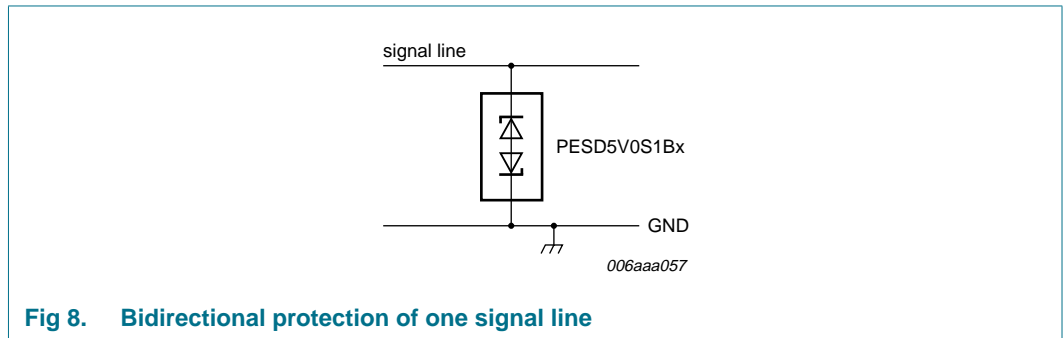


Fig 7. ESD clamping test setup and waveforms

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.



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

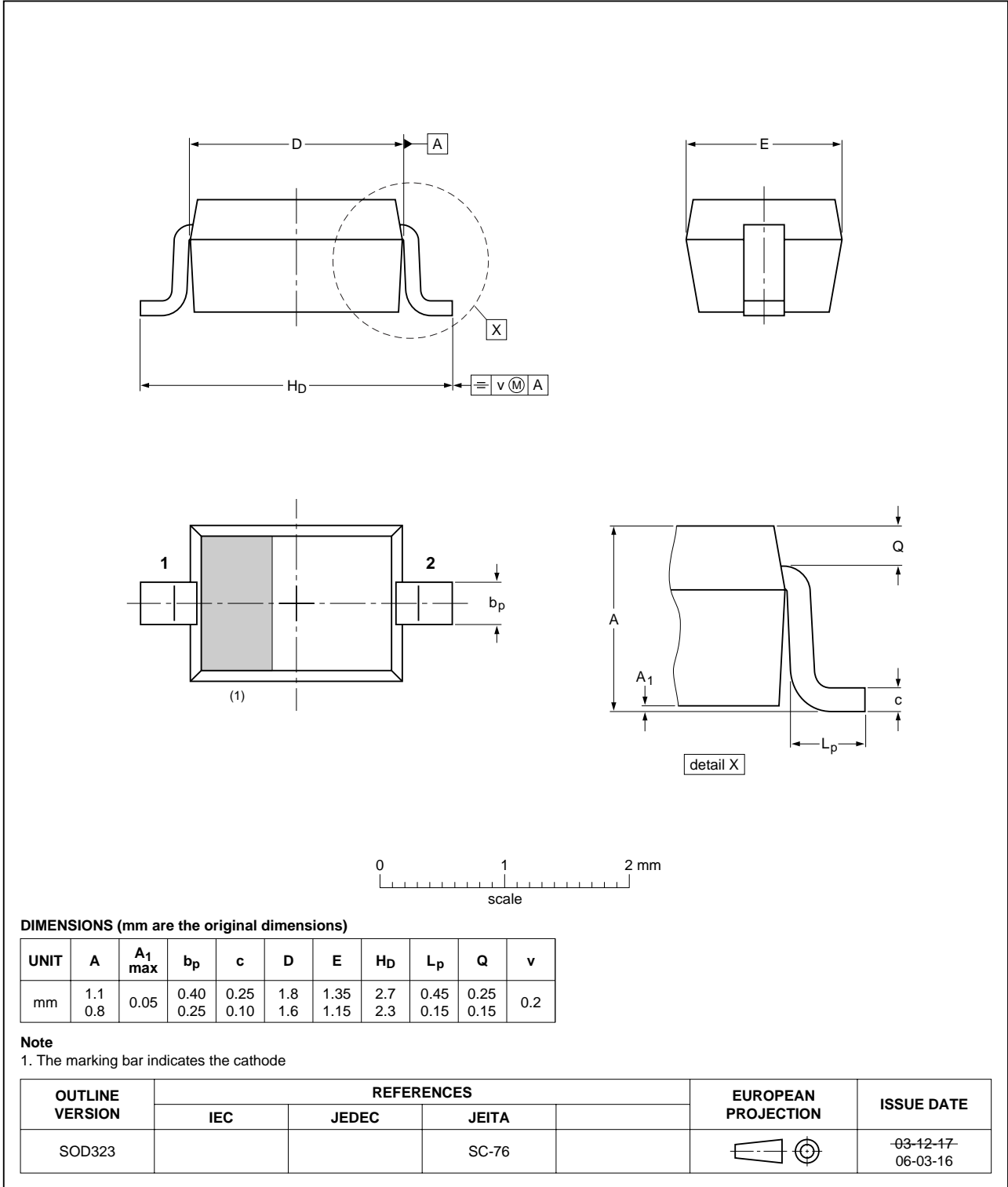


Fig 9. Package outline SOD323 (SC-76)

Plastic surface-mounted package; 2 leads

SOD523

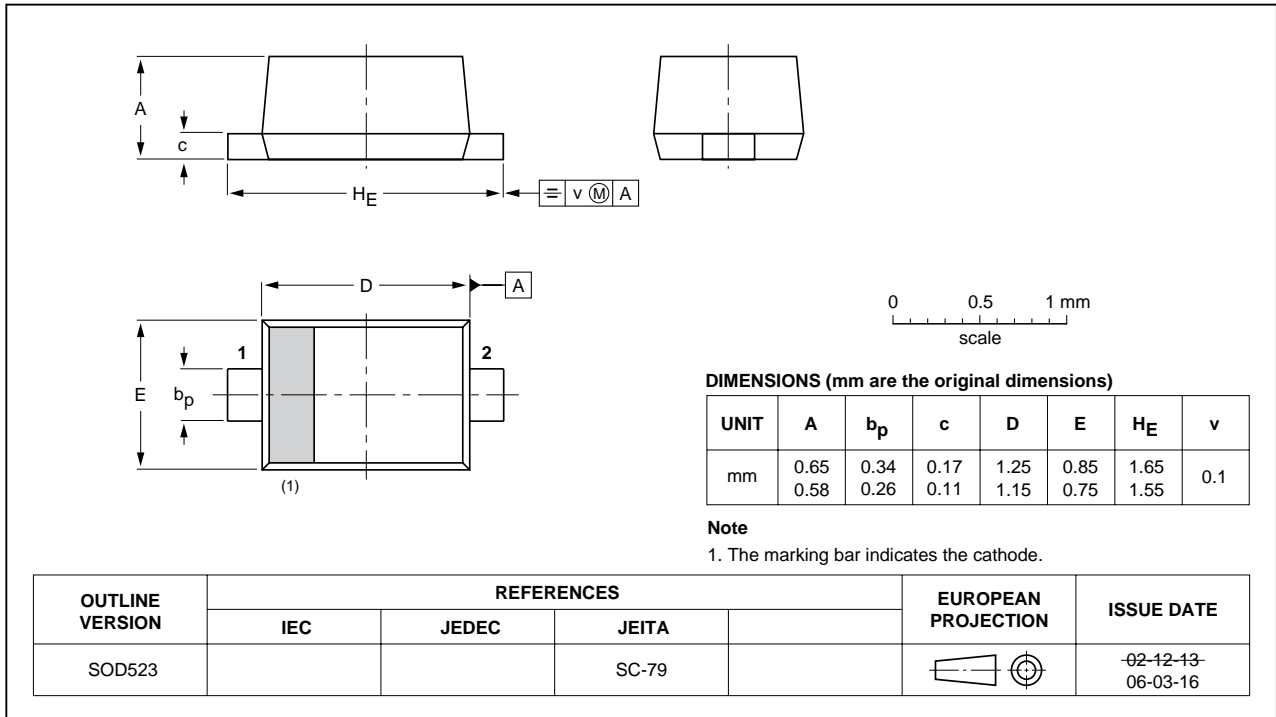


Fig 10. Package outline SOD523 (SC-79)

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

SOD882

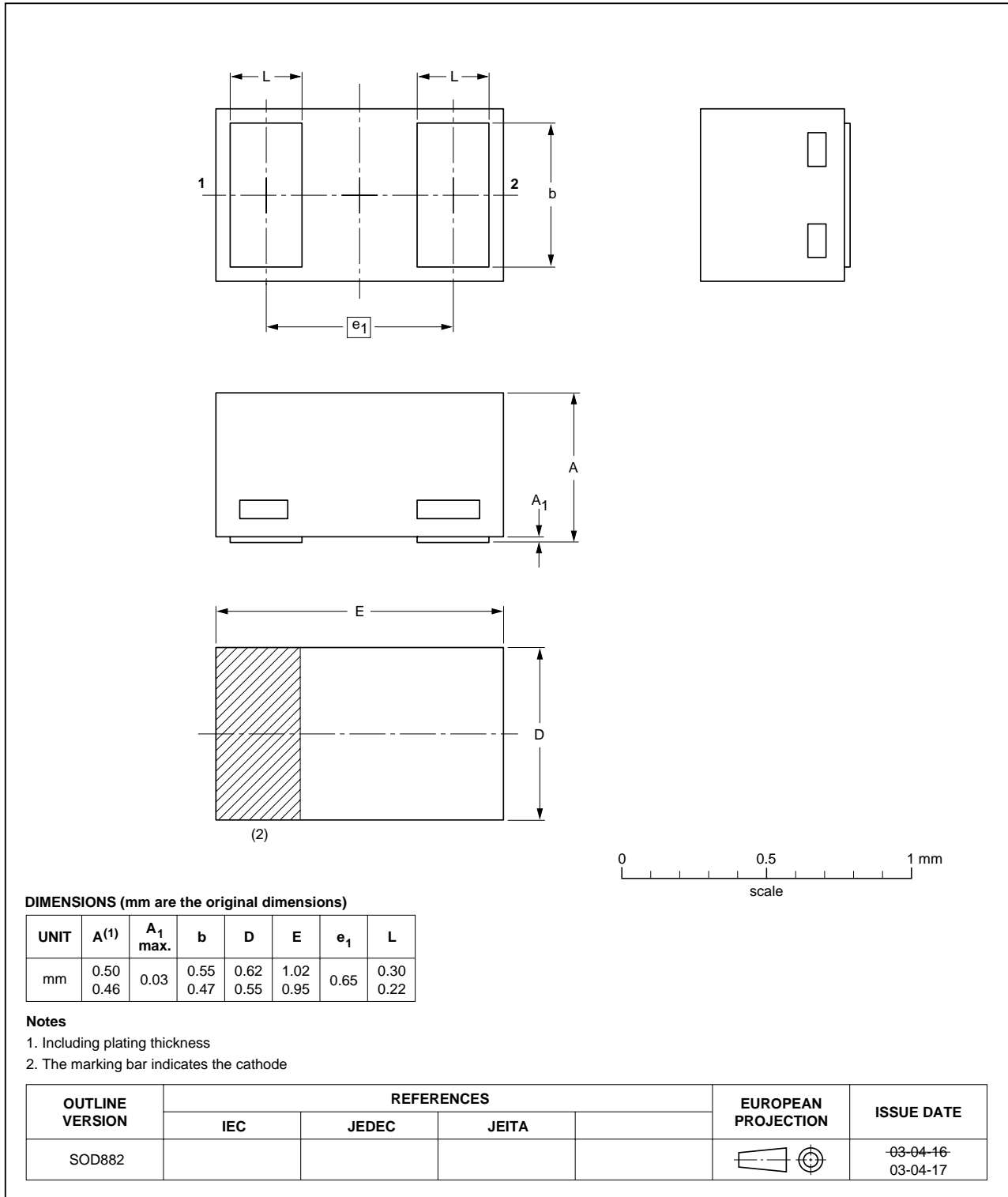


Fig 11. Package outline SOD882

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 Nexperia, 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. |
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| 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".

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

For sales office addresses, please send an email to: salesaddresses@nexperia.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 |