# PESD5V0U5BF; PESD5V0U5BV

## Ultra low capacitance bidirectional fivefold ESD protection arrays

Rev. 01 — 15 August 2008 Product data sheet

## 1. Product profile

### 1.1 General description

Ultra low capacitance bidirectional fivefold ElectroStatic Discharge (ESD) protection arrays in ultra small Surface-Mounted Device (SMD) plastic packages designed to protect up to five signal lines from the damage caused by ESD and other transients.

**Table 1. Product overview**

| Type number | Package | | Package configuration |
|---|---|---|---|
| | Nexperia | JEDEC | |
| PESD5V0U5BF | SOT886 | MO-252 | leadless ultra small |
| PESD5V0U5BV | SOT666 | - | ultra small and flat lead |

### 1.2 Features

- Bidirectional ESD protection of up to five lines
- Ultra low diode capacitance: $C_d$ = 2.9 pF
- Ultra low leakage current: $I_{RM}$ = 5 nA
- ESD protection up to 10 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
- 10/100/1000 Mbit/s Ethernet
- Communication systems
- Portable electronics
- Subscriber Identity Module (SIM) card protection
- FireWire
- High-speed data lines

### 1.4 Quick reference data

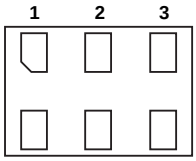
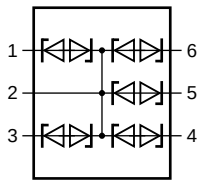
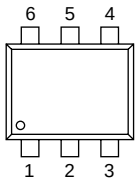
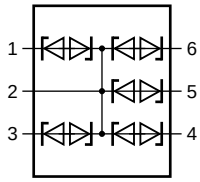
**Table 2. Quick reference data**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Per diode** | | | | | | |
| $V_{RWM}$ | reverse standoff voltage | | - | - | 5 | V |
| $C_d$ | diode capacitance | f = 1 MHz; $V_R$ = 0 V | - | 2.9 | 3.5 | pF |

## 2. Pinning information

**Table 3. Pinning**

| Pin | Description | Simplified outline | Graphic symbol |
|---|---|---|---|
| **PESD5V0U5BF** | | | |
| 1 | cathode (diode 1) |  bottom view |  006aab346 |
| 2 | common cathode | | |
| 3 | cathode (diode 2) | | |
| 4 | cathode (diode 3) | | |
| 5 | cathode (diode 4) | | |
| 6 | cathode (diode 5) | | |
| **PESD5V0U5BV** | | | |
| 1 | cathode (diode 1) |  |  006aab346 |
| 2 | common cathode | | |
| 3 | cathode (diode 2) | | |
| 4 | cathode (diode 3) | | |
| 5 | cathode (diode 4) | | |
| 6 | cathode (diode 5) | | |

## 3. Ordering information

**Table 4. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PESD5V0U5BF | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |
| PESD5V0U5BV | - | plastic surface-mounted package; 6 leads | SOT666 |


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## 4. Marking

**Table 5. Marking codes**

| Type number | Marking code |
|---|---|
| PESD5V0U5BF | B2 |
| PESD5V0U5BV | G7 |

## 5. Limiting values

**Table 6. Limiting values**

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| **Per device** | | | | | |
| $T_j$ | junction temperature | | - | 150 | °C |
| $T_{amb}$ | ambient temperature | | –55 | +150 | °C |
| $T_{stg}$ | storage temperature | | –65 | +150 | °C |

**Table 7. ESD maximum ratings**

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| **Per diode** | | | | | | |
| $V_{ESD}$ | electrostatic discharge voltage | | [1][2] | | | |
| | | IEC 61000-4-2 (contact discharge) | | - | 10 | kV |
| | | MIL-STD-883 (human body model) | | - | 8 | kV |

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

[2] Measured from pin 1, 3, 4, 5 or 6 to pin 2.


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**Table 8. ESD standards compliance**

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

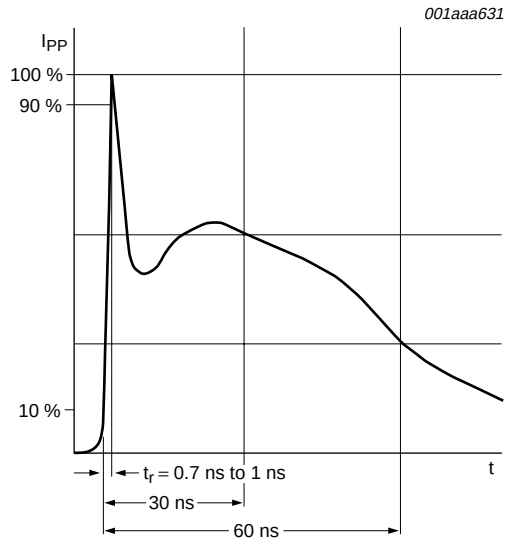



**Fig 1. ESD pulse waveform according to IEC 61000-4-2**

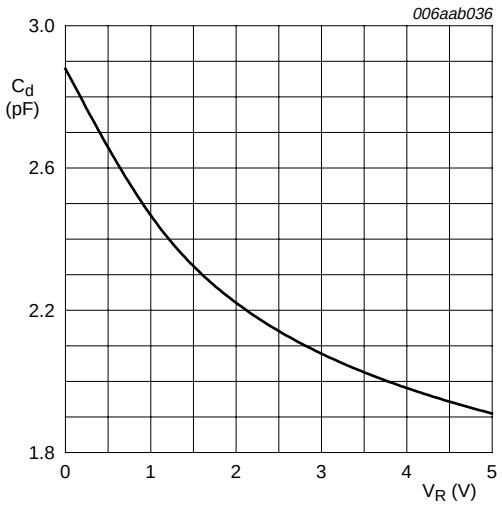

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## 6. Characteristics

**Table 9. Characteristics**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Per diode** | | | | | | |
| $V_{RWM}$ | reverse standoff voltage | | - | - | 5 | V |
| $I_{RM}$ | reverse leakage current | $V_{RWM}$ = 5 V | - | 5 | 100 | nA |
| $V_{BR}$ | breakdown voltage | $I_R$ = 5 mA | 5.5 | 6.5 | 9.5 | V |
| $C_d$ | diode capacitance | f = 1 MHz | | | | |
| | | $V_R$ = 0 V | - | 2.9 | 3.5 | pF |
| | | $V_R$ = 5 V | - | 1.9 | - | pF |
| $r_{dif}$ | differential resistance | $I_R$ = 1 mA | - | - | 100 | Ω |




f = 1 MHz; $T_{amb}$ = 25 °C

**Fig 2. Diode capacitance as a function of reverse voltage; typical values**

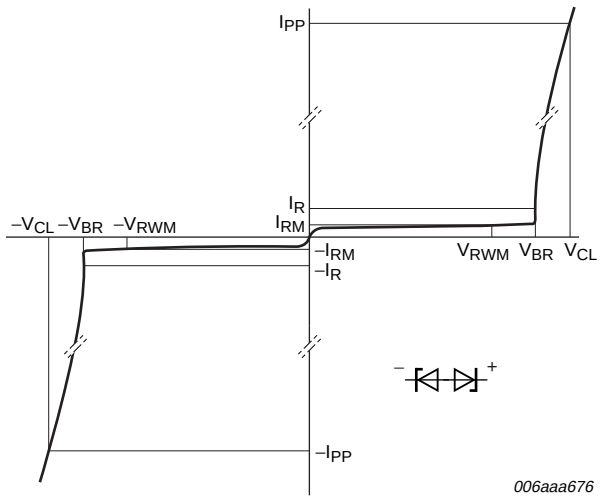



**Fig 3. V-I characteristics for a bidirectional ESD protection diode**


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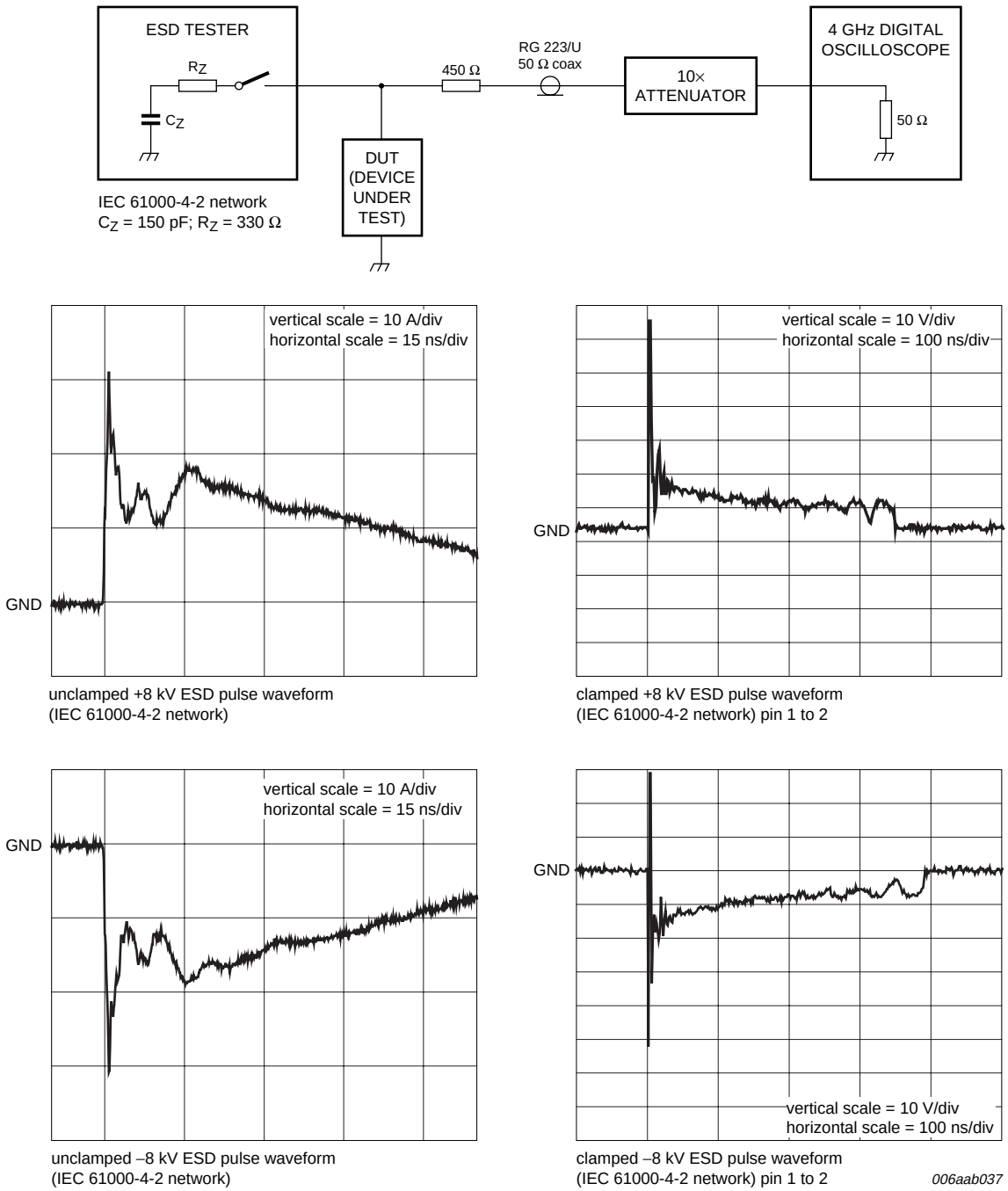



**Fig 4. ESD clamping test setup and waveforms**


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# 7. Application information

The PESD5V0U5BF and the PESD5V0U5BV are designed for the protection of up to five bidirectional data or signal lines from the damage caused by ESD and surge pulses. The devices may be used on lines where the signal polarities are both, positive and negative with respect to ground.

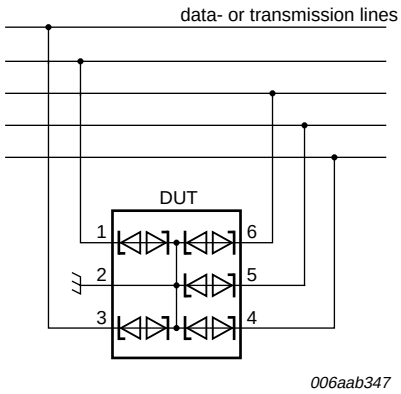



**Fig 5. Application diagram**

**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. 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.


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## 9. Package outline

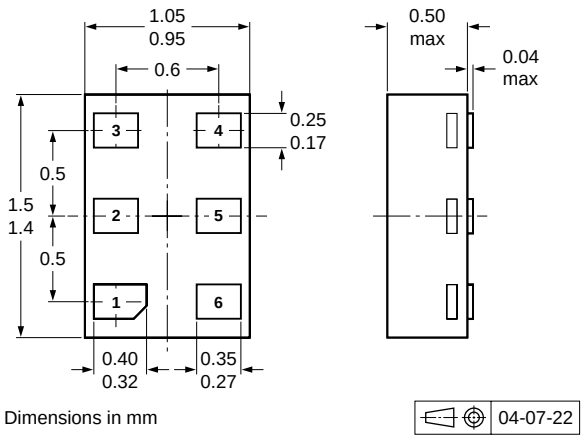



Fig 6. Package outline PESD5V0U5BF (SOT886)

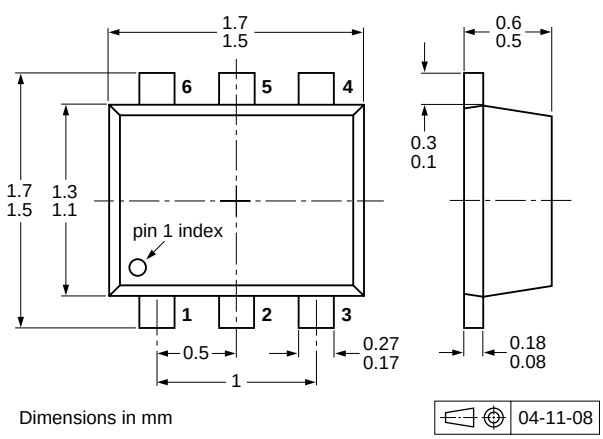



Fig 7. Package outline PESD5V0U5BV (SOT666)

## 10. 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 | | |
|---|---|---|---|---|---|---|
| | | | | 4000 | 5000 | 8000 |
| PESD5V0U5BF | SOT886 | 4 mm pitch, 8 mm tape and reel; T1 | [2] | - | -115 | - |
| | | 4 mm pitch, 8 mm tape and reel; T4 | [3] | - | -132 | - |
| PESD5V0U5BV | SOT666 | 2 mm pitch, 8 mm tape and reel | | - | - | -315 |
| | | 4 mm pitch, 8 mm tape and reel | | -115 | - | - |

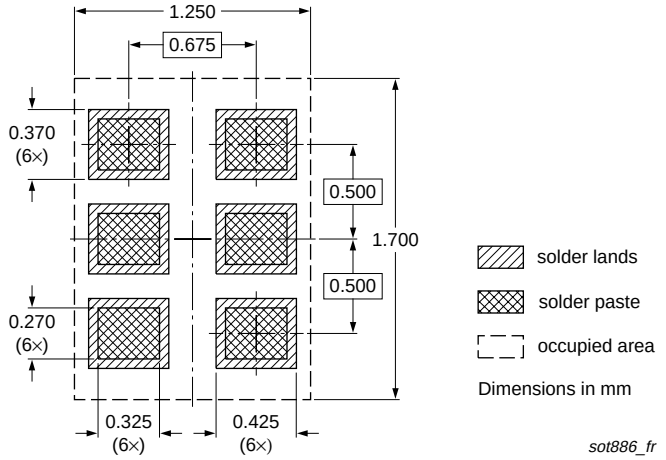
[1] For further information and the availability of packing methods, see Section 14.

[2] T1: normal taping

[3] T4: 90° rotated reverse taping

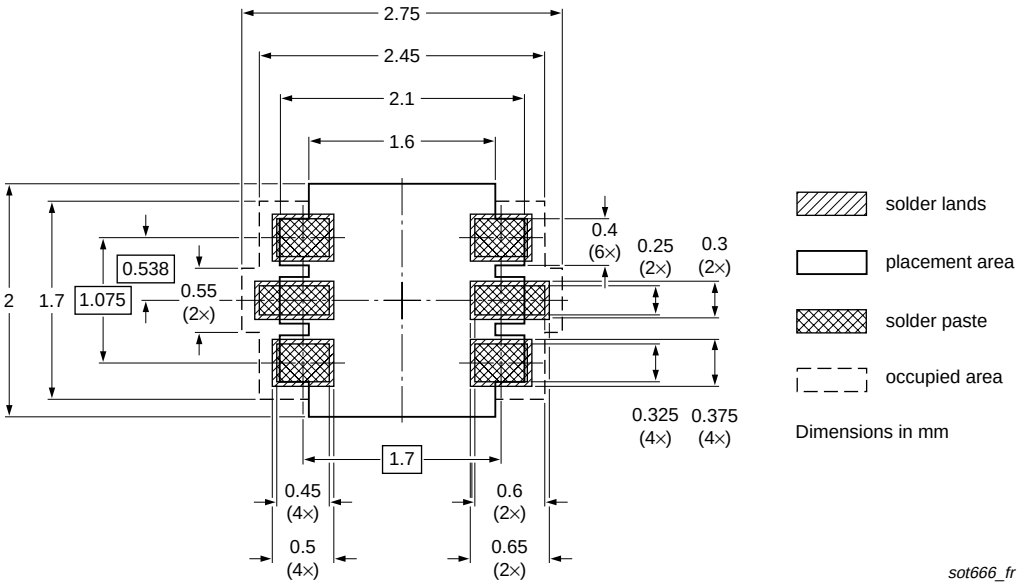

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## 11. Soldering




Reflow soldering is the only recommended soldering method.

**Fig 8. Reflow soldering footprint PESD5V0U5BF (SOT886)**




Reflow soldering is the only recommended soldering method.

**Fig 9. Reflow soldering footprint PESD5V0U5BV (SOT666)**


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## 12. Revision history

**Table 11. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PESD5V0U5BF_PESD5V0U5BV_1 | 20080815 | Product data sheet | - | - |


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## 13.1 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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