

High speed interface ESD protection to IEC 61000-4-2 level 4 Rev. 01 — 18 February 2008

Product data sheet

### **Product profile**

### 1.1 General description

The PRTR5V0U6AS is designed to protect Input/Output (I/O) ports that are sensitive to capacitive load, such as USB 2.0, Ethernet, DVI and HDMI from destruction by ElectroStatic Discharge (ESD). It provides protection to downstream signal and supply components from ESD voltages as high as ±8 kV (contact discharge).

The PRTR5V0U6AS incorporates six pairs of ultra-low capacitance rail-to-rail diodes plus a Zener diode. The rail-to-rail diodes are connected to the Zener diode which allows ESD protection to be independent of supply voltage with any ESD voltage discharged locally within the device. The PRTR5V0U6AS is fabricated using monolithic silicon technology integrating six ultra-low capacitance rail-to-rail ESD protection diodes in a miniature 8-lead SO8 (SOT96) package.

#### 1.2 Features

- Pb-free and RoHS compliant, dark green
- ESD protection compliant to IEC 61000-4-2 level 4, ±8 kV contact discharge
- Six ultra-low input capacitance (1 pF typical) ESD rail-to-rail ESD protection diodes
- Supply voltage independent clamping due to integrated Zener diode
- Small 8-lead SO8 (SOT96) package

#### 1.3 Applications

- General-purpose downstream ESD protection high frequency analog signals and high-speed serial data transmission for ports inside:
  - Cellular and PCS mobile handsets
  - PC/Notebook USB2.0/IEEE1394 ports
  - DVI/HDMI interfaces
  - Cordless telephones
  - Wireless data (WAN/LAN) systems
  - PDAs



## 2. Pinning information

Table 1. Pinning

|     | <b>5</b>                          |                    |           |
|-----|-----------------------------------|--------------------|-----------|
| Pin | Description                       | Simplified outline | Symbol    |
| 1   | ESD protection I/O 1              |                    |           |
| 2   | ESD protection I/O 2              | 8月月月5              |           |
| 3   | ground (GND)                      |                    | 1   8     |
| 4   | ESD protection I/O 3              |                    | 2 7 7     |
| 5   | ESD protection I/O 4              | 1 1 1 1 1 4        |           |
| 6   | ESD protection I/O 5              |                    | 3 6       |
| 7   | supply voltage (V <sub>CC</sub> ) |                    | 4 4 15    |
| 8   | ESD protection I/O 6              |                    |           |
|     |                                   |                    | 001aah388 |

## 3. Ordering information

Table 2. Ordering information

| Type number | Package | Package   |         |  |  |  |  |
|-------------|---------|---|---------|--|--|--|--|
|             | Name    | Description   | Version |  |  |  |  |
| PRTR5V0U6AS | SO8     | plastic small outline package; 8 leads; body width 3.9 mm | SOT96-1 |  |  |  |  |

## 4. Limiting values

Table 3. Limiting values

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

| Symbol           | Parameter                       | Conditions                       | Min        | Max  | Unit |
|------------------|---------------------------------|----------------------------------|------------|------|------|
| $V_{I}$          | input voltage                   |                                  | 0          | 5.5  | V    |
| $V_{\text{esd}}$ | electrostatic discharge voltage | all pins; IEC 61000-4-2; level 4 |            |      |      |
|                  |                                 | contact discharge                | -8         | +8   | kV   |
| T <sub>stg</sub> | storage temperature             |                                  | <b>-55</b> | +125 | °C   |

## 5. Recommended operating conditions

Table 4. Operating conditions

| Symbol    | Parameter           | Conditions | Min | Тур | Max | Unit |
|-----------|---------------------|------------|-----|-----|-----|------|
| $T_{amb}$ | ambient temperature |            | -40 | -   | +85 | °C   |

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### 6. Characteristics

Table 5. Characteristics

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

| Symbol                 | Parameter                          | Conditions   | Min          | Тур | Max | Unit |
|------------------------|------------------------------------|--|--------------|-----|-----|------|
| $C_{\text{(I/O-GND)}}$ | input/output to ground capacitance | $V_1 = 0 \text{ V}; f = 1 \text{ MHz}; V_{CC} = 3 \text{ V}$   | [1] -        | 1.0 | -   | pF   |
| I <sub>LR</sub>        | reverse leakage current            | V <sub>I</sub> = 3 V   | <u>[1]</u> - | -   | 100 | nA   |
| $V_{BR}$               | breakdown voltage                  | Zener diode; I <sub>I</sub> = 1 mA                             | <u>[2]</u> 6 | -   | 9   | V    |
| C <sub>sup</sub>       | supply pin to ground capacitance   | $V_{I} = 0 \text{ V}; f = 1 \text{ MHz}; V_{CC} = 3 \text{ V}$ | [2] _        | 30  | -   | pF   |
| $V_{F}$                | forward voltage                    |  | -            | 0.7 | -   | V    |

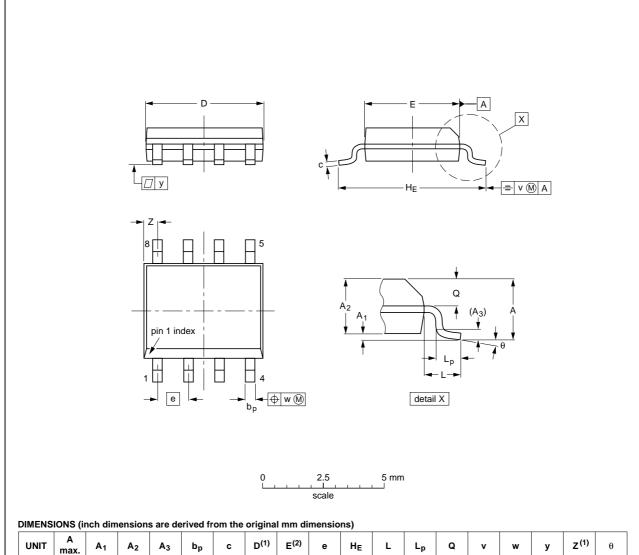
<sup>[1]</sup> Measured from pin 1, 2, 4, 5, 6 and 8 to ground.

<sup>[2]</sup> Measured from pin 7 to ground.

## 7. Package outline

### SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1



| UNIT   | A<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | bp           | С                | D <sup>(1)</sup> | E <sup>(2)</sup> | е    | HE             | L     | Lp             | Q          | v    | w    | у     | z <sup>(1)</sup> | θ  |
|--------|-----------|----------------|----------------|----------------|--------------|------------------|------------------|------------------|------|----------------|-------|----------------|------------|------|------|-------|------------------|----|
| mm     | 1.75      | 0.25<br>0.10   | 1.45<br>1.25   | 0.25           | 0.49<br>0.36 | 0.25<br>0.19     | 5.0<br>4.8       | 4.0<br>3.8       | 1.27 | 6.2<br>5.8     | 1.05  | 1.0<br>0.4     | 0.7<br>0.6 | 0.25 | 0.25 | 0.1   | 0.7<br>0.3       | 8° |
| inches | 0.069     | 0.010<br>0.004 | 0.057<br>0.049 | 0.01           |              | 0.0100<br>0.0075 | 0.20<br>0.19     | 0.16<br>0.15     | 0.05 | 0.244<br>0.228 | 0.041 | 0.039<br>0.016 |            | 0.01 | 0.01 | 0.004 | 0.028<br>0.012   | 0° |

#### Notes

- 1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.
- 2. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

|      |        |        | EUROPEAN  | ISSUE DATE     |                |                                 |  |
|------|--------|--------|-----------|----------------|----------------|---------------------------------|--|
| SION | IEC    | JEDEC  | JEITA     |                | PROJECTION     | ISSUE DATE                      |  |
| 96-1 | 076E03 | MS-012 |           |                |                | <del>99-12-27</del><br>03-02-18 |  |
|      |        | IEC    | IEC JEDEC | IEC JEDEC JEHA | IEC JEDEC JEHA | IEC JEDEC JEHA                  |  |

Fig 1. Package outline SOT96-1 (SO8)

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## 8. Abbreviations

Table 6. Abbreviations

| Acronym | Description                          |
|---------|--------------------------------------|
| DVI     | Digital Video Interface              |
| ESD     | ElectroStatic Discharge              |
| HDMI    | High Definition Multimedia interface |
| LAN     | Local Area Network                   |
| PCS     | Personal Computing System            |
| PDA     | Personal Digital Assistant           |
| RoHS    | Restriction of Hazardous Substances  |
| USB     | Universal Serial Bus                 |
| WAN     | Wide Area Network                    |

# 9. Revision history

### Table 7. Revision history

| Document ID   | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| PRTR5V0U6AS_1 | 20080218     | Product data sheet | -             | -          |

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#### 10.1 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.                                     |

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- [2] The term 'short data sheet' is explained in section "Definitions"
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# PRTR5V0U6AS

### High speed interface ESD protection to IEC 61000-4-2 level 4

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