

PRTR5V0U8S

Integrated octal low-capacity ESD protection to IEC 61000-4-2 level 4

Rev. 02 — 7 May 2010

Product data sheet

1. Product profile

1.1 General description

The PRTR5V0U8S is designed to protect Input/Output (I/O) ports that are sensitive concerning capacitive load, such as USB 2.0, Ethernet, Digital Video Interface (DVI), etc. from destruction by ElectroStatic Discharges (ESD).

Therefore, the PRTR5V0U8S incorporates eight pairs of ultra low capacity rail-to-rail diodes plus an additional Zener diode to provide protection to downstream signal and supply components from ESD voltages as high as ± 8 kV contact discharge.

Due to the rail-to-rail diodes being connected to the Zener diode, the protection is working independently from the availability of a supply voltage.

The PRTR5V0U8S is fabricated using thin film-on-silicon technology and integrates eight pairs of ultra low capacity rail-to-rail ESD protection diodes in a miniature 10-lead TSSOP10 package.

1.2 Features and benefits

- Pb-free and Restriction of Hazardous Substances (RoHS) compliant, dark green
- ESD protection of up to eight Hi-Speed data lines or high-frequency signal lines
- Eight pairs of ESD rail-to-rail protection diodes
- ultra low input capacitance: $C_{(I/O-GND)} = 1$ pF
- ESD protection up to 8 kV (contact discharge compliant)
- IEC 61000-4-2, level 4 (ESD)
- Low voltage clamping due to an integrated protection Zener diode
- Small TSSOP10 (SOT552-1) package

1.3 Applications

- General-purpose downstream ESD protection high-frequency analog signals and high-speed serial data transmission for ports inside:
 - ◆ Cellular and Personal Communication System (PCS) mobile handsets
 - ◆ USB 2.0 ports in PC or notebook
 - ◆ IEEE 1394 ports
 - ◆ Digital Video Interface (DVI) and High Definition Multimedia Interface (HDMI)
 - ◆ Cordless telephones
 - ◆ Wireless data: Wide Area Network (WAN) and Local Area Network (LAN) systems
 - ◆ Personal Digital Assistants (PDAs)



2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	ESD protection I/O 1		
2	ESD protection I/O 2		
3	ground (GND)		
4	ESD protection I/O 3		
5	ESD protection I/O 4		
6	ESD protection I/O 5		
7	ESD protection I/O 6		
8	supply voltage (V _{CC})		
9	ESD protection I/O 7		
10	ESD protection I/O 8		

3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
PRTR5V0U8S	TSSOP10	plastic thin shrink small outline package; 10 leads; body width 3 mm	SOT552-1

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/O-GND)	input/output to ground voltage		0	5.5	V
V _{ESD}	electrostatic discharge voltage	all pins; IEC 61000-4-2, level 4; contact discharge	-	±8	kV
T _{stg}	storage temperature		-55	+125	°C

5. Recommended operating conditions

Table 4. Operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T _{amb}	ambient temperature		-40	-	+85	°C

6. Characteristics

Table 5. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Protection diodes						
$C_{(I/O-GND)}$	input/output to ground capacitance	$V_I = 0\text{ V}$; $f = 1\text{ MHz}$; $V_{CC} = 3\text{ V}$	[1] -	1.0	-	pF
I_{LR}	reverse leakage current	$V_I = 3\text{ V}$	[1] -	-	100	nA
Zener diode						
V_{BR}	breakdown voltage	$I_I = 1\text{ mA}$	[2] 6	-	9	V
C_{sup}	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

[1] Measured from pin 1, 2, 4, 5, 6, 7, 9 and 10 to ground.

[2] Measured from pin 8 to ground.

7. Package outline

TSSOP10: plastic thin shrink small outline package; 10 leads; body width 3 mm

SOT552-1

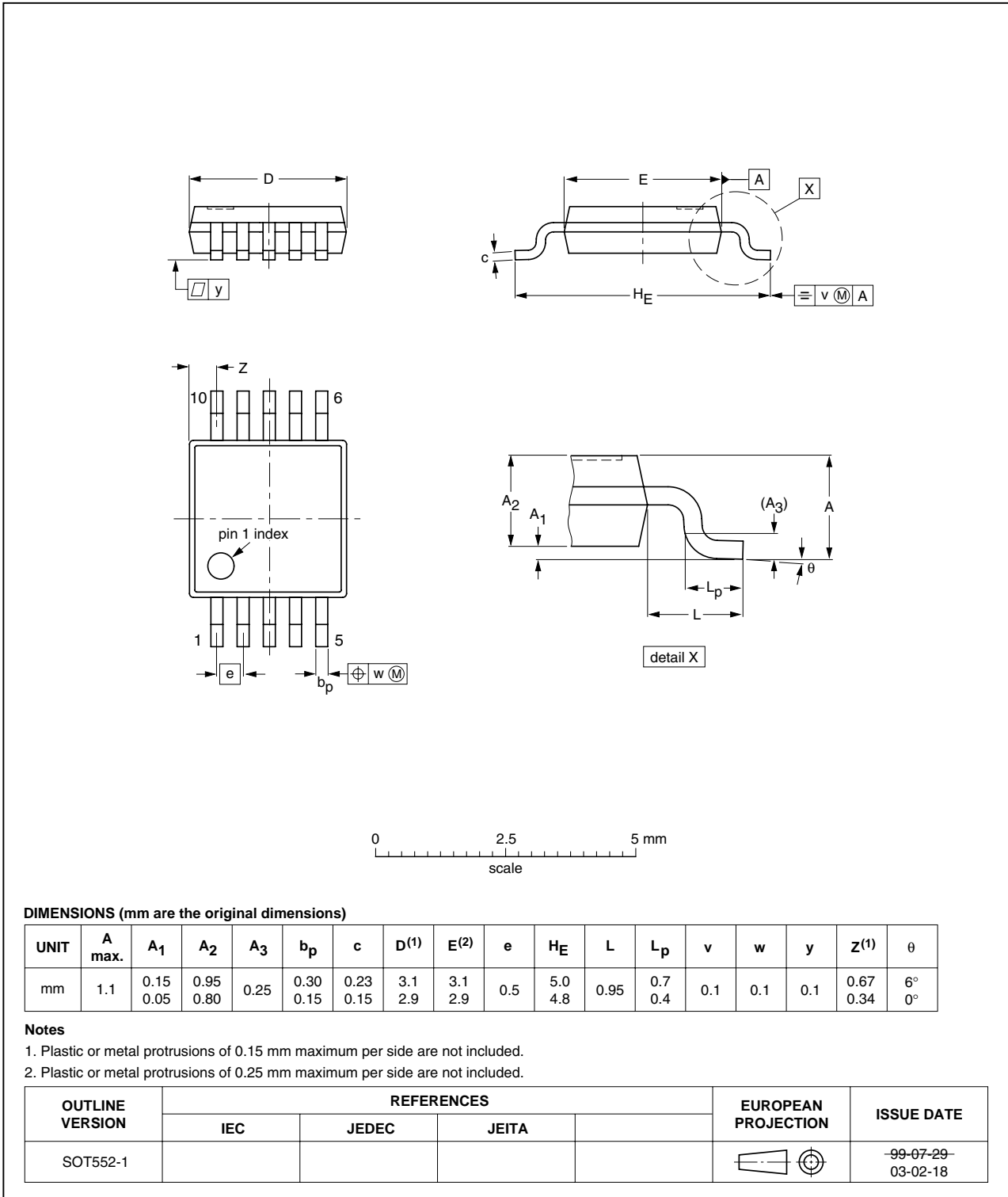


Fig 1. Package outline SOT552-1 (TSSOP10)

8. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PRTR5V0U8S v.2	20100507	Product data sheet	-	PRTR5V0U8S_1
Modifications:	<ul style="list-style-type: none">• Section 4 "Limiting values": amended• Section 9 "Legal information": updated			
PRTR5V0U8S_1	20080114	Preliminary data sheet	-	-

9. Legal information

9.1 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>.

9.2 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.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

9.3 Disclaimers

Limited warranty and liability — 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.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

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 life support, life-critical or safety-critical systems or 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.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial 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>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

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.

Non-automotive qualified products — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond

NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

9.4 Trademarks

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

10. Contact information

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

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

11. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
2	Pinning information	2
3	Ordering information	2
4	Limiting values	2
5	Recommended operating conditions	2
6	Characteristics	3
7	Package outline	4
8	Revision history	5
9	Legal information	6
9.1	Data sheet status	6
9.2	Definitions	6
9.3	Disclaimers	6
9.4	Trademarks	7
10	Contact information	7
11	Contents	8

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. 2010.

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: 7 May 2010

Document identifier: PRTR5V0U8S