



# PRTR5V0U4D

Ultra low capacitance quadruple rail-to-rail ESD protection

Rev. 2 — 5 March 2012

Product data sheet

## 1. Product profile

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### 1.1 General description

Ultra low capacitance quadruple rail-to-rail ElectroStatic Discharge (ESD) protection device in an SOT457 (SC-74) small Surface-Mounted Device (SMD) plastic package.

The device is designed to protect four high-speed data lines or high-frequency signal lines from the damage caused by ESD and other transients.

PRTR5V0U4D integrates four ultra low capacitance rail-to-rail ESD protection channels and one additional ESD protection diode to ensure signal line protection even if no supply voltage is available.

### 1.2 Features and benefits

- ESD protection of four high-speed data lines or high-frequency signal lines
- Ultra low input/output to ground capacitance:  $C_{(I/O-GND)} = 1 \text{ pF}$
- ESD protection up to 8 kV
- IEC 61000-4-2, level 4 (ESD)
- Very low clamping voltage due to an integrated additional ESD protection diode
- Very low reverse current
- AEC-Q101 qualified
- Small SMD plastic package

### 1.3 Applications

- USB 2.0 interfaces
- Digital Video Interface (DVI)
- High-Definition Multimedia Interface (HDMI)
- Mobile phones
- Digital cameras
- WAN/LAN systems
- PC, notebooks, printers and other PC peripherals

## 1.4 Quick reference data

**Table 1. Quick reference data**

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

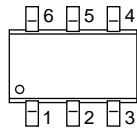
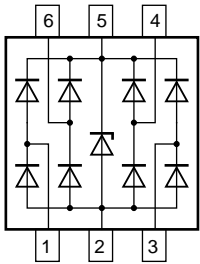
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per channel</b>						
$C_{(I/O-GND)}$	input/output to ground capacitance	$V_{(I/O-GND)} = 0\text{ V}$ ; $V_{CC} = 3\text{ V}$ ; $f = 1\text{ MHz}$	[1] -	1.0	-	pF
<b>Zener diode</b>						
$V_I$	input voltage		0	-	5.5	V
$C_{sup}$	supply pin to ground capacitance	$V_{(I/O-GND)} = 0\text{ V}$ ; $V_{CC} = 3\text{ V}$ ; $f = 1\text{ MHz}$	[2] -	40	-	pF

[1] Measured from pins 1, 3, 4 and 6 to pin 2.

[2] Measured from pin 5 to pin 2.

## 2. Pinning information

**Table 2. Pinning**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I/O1	input/output 1		
2	GND	ground		
3	I/O2	input/output 2		
4	I/O3	input/output 3		
5	$V_{CC}$	supply voltage		
6	I/O4	input/output 4		

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## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
PRTR5V0U4D	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457

## 4. Marking

**Table 4. Marking code**

Type number	Marking code
PRTR5V0U4D	4D

## 5. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per device</b>					
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-55	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

**Table 6. ESD maximum ratings**

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

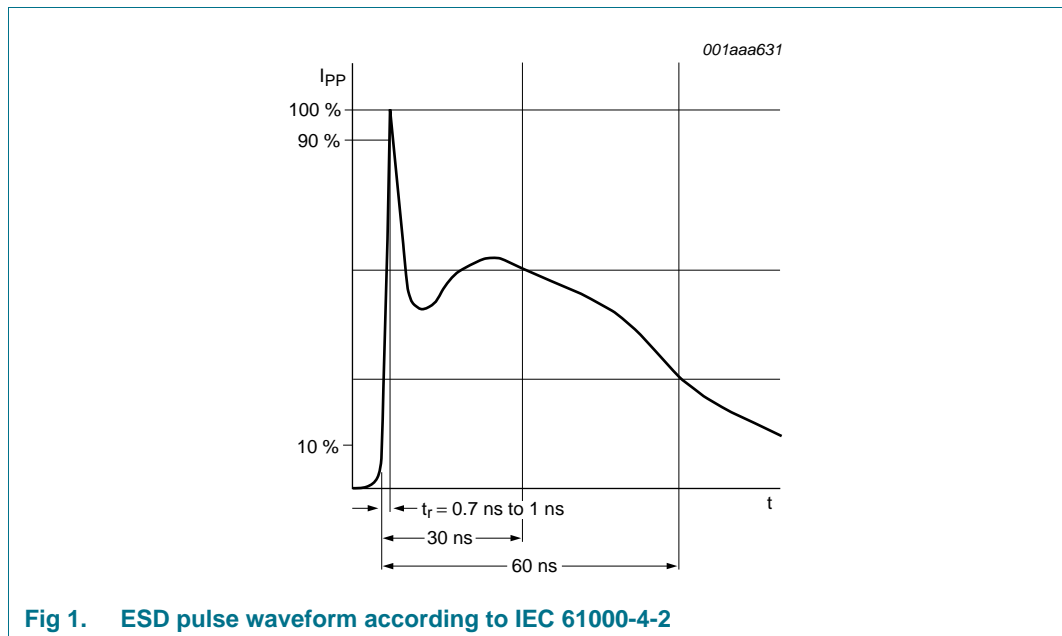
Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per channel</b>					
$V_{ESD}$	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1][2]	8	kV
		MIL-STD-883 (human body model)	-	8	kV

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

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

**Table 7. ESD standards compliance**

Standard	Conditions
<b>Per channel</b>	
IEC 61000-4-2; level 4 (ESD)	> 8 kV (contact)
MIL-STD-883; class 3B (human body model)	> 8 kV



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

## 6. Characteristics

**Table 8. Characteristics**

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

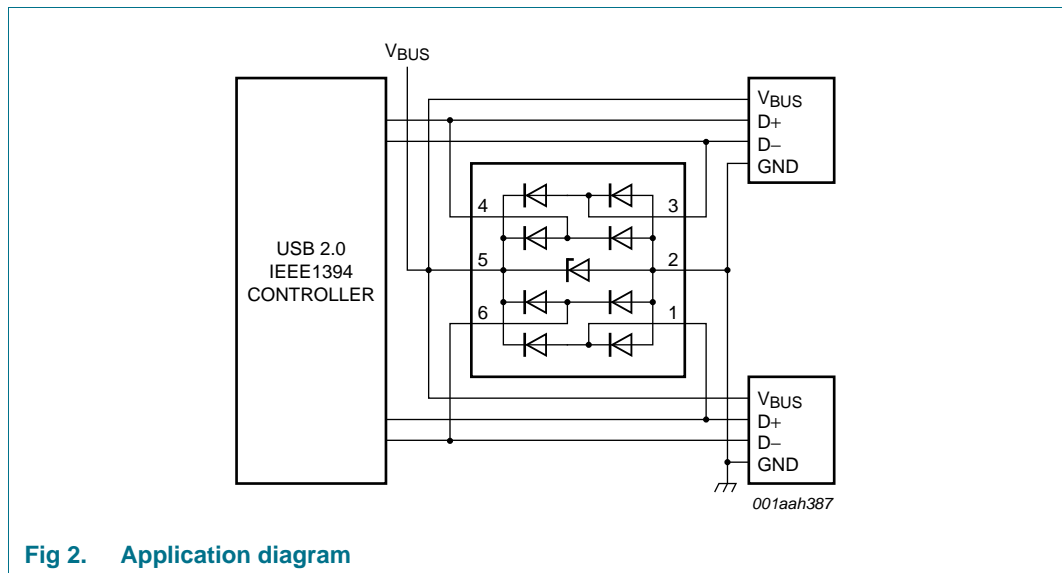
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per channel</b>						
$I_{RM}$	reverse leakage current	$V_R = 3\text{ V}$	[1] -	-	100	nA
$C_{(I/O-GND)}$	input/output to ground capacitance	$V_{(I/O-GND)} = 0\text{ V}$ ; $V_{CC} = 3\text{ V}$ ; $f = 1\text{ MHz}$	[1] -	1.0	-	pF
$V_F$	forward voltage		-	0.7	-	V
<b>Zener diode</b>						
$V_I$	input voltage		0	-	5.5	V
$V_{BR}$	breakdown voltage	$I_I = 1\text{ mA}$	6	-	9	V
$C_{sup}$	supply pin to ground capacitance	$V_{(I/O-GND)} = 0\text{ V}$ ; $V_{CC} = 3\text{ V}$ ; $f = 1\text{ MHz}$	[2] -	40	-	pF

[1] Measured from pins 1, 3, 4 and 6 to pin 2.

[2] Measured from pin 5 to pin 2.

## 7. Application information

The device is designed for the protection of for example, two USB 2.0 ports against ESD. Each device is capable to protect both, USB data lines and the  $V_{BUS}$  supply.

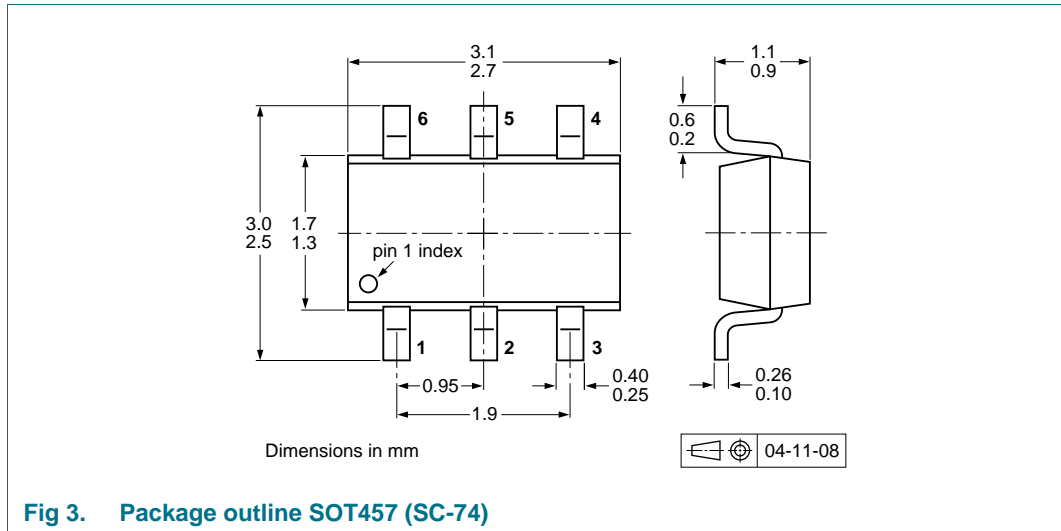


## 8. Test information

### 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.

## 9. Package outline



## 10. Packing information

**Table 9. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity	
			3000	10000
PRTR5V0U4D	SOT457	4 mm pitch, 8 mm tape and reel; T1	<sup>[2]</sup> -115	-135
		4 mm pitch, 8 mm tape and reel; T2	<sup>[3]</sup> -125	-165

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

[2] T1: normal taping

[3] T2: reverse taping

11. Soldering

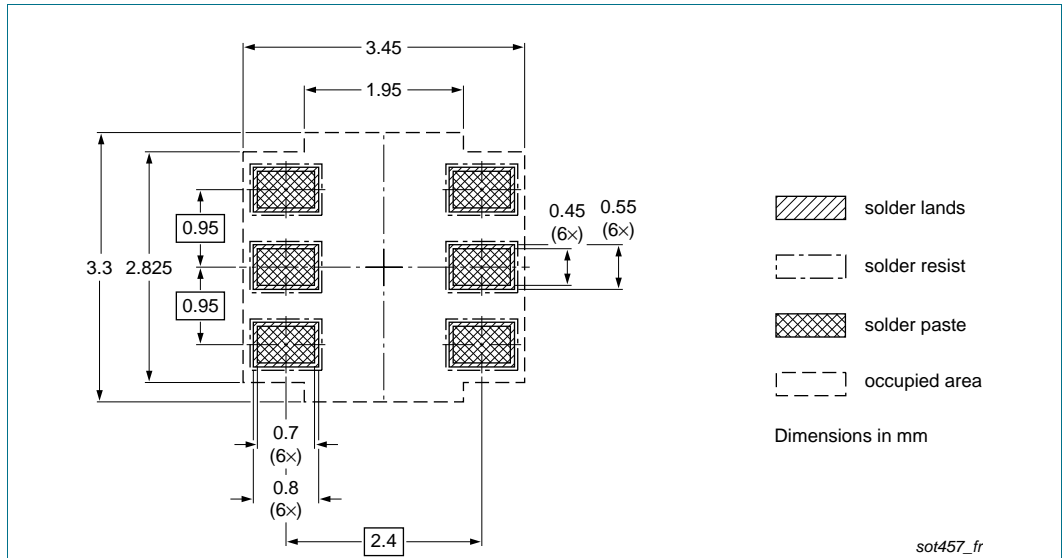


Fig 4. Reflow soldering footprint SOT457 (SC-74)

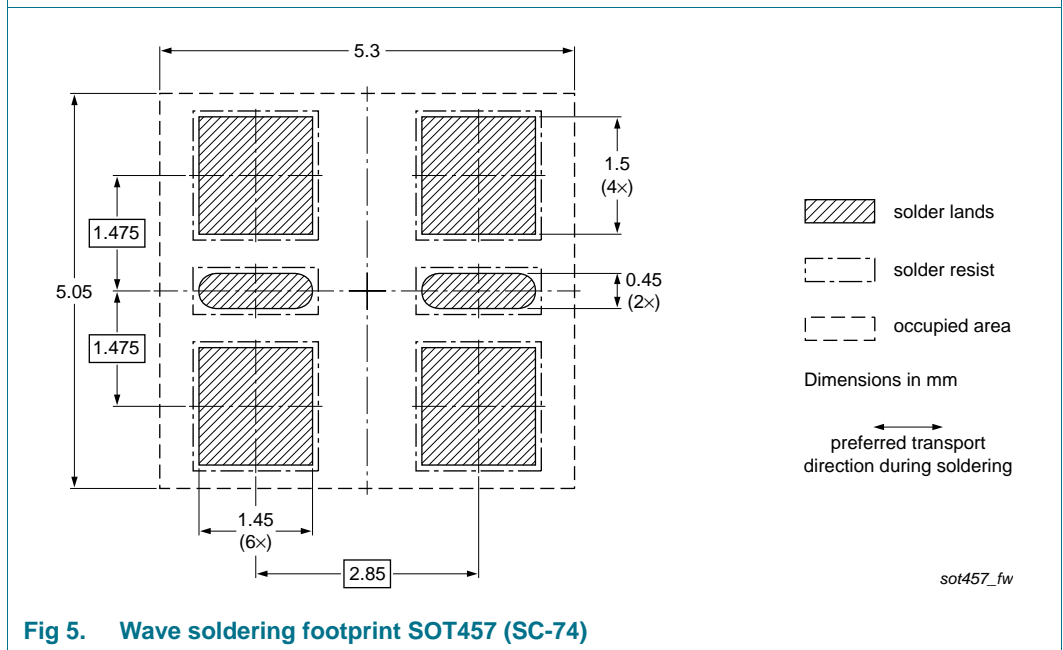


Fig 5. Wave soldering footprint SOT457 (SC-74)

## 12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PRTR5V0U4D v.2	20120305	Product data sheet	-	PRTR5V0U4D v.1
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 1 "Product profile"</a>: reshaped</li> <li>• <a href="#">Section 1.4 "Quick reference data"</a>: added</li> <li>• <a href="#">Section 2</a>: updated</li> <li>• <a href="#">Section 4 "Marking"</a>: added</li> <li>• <a href="#">Section 5 "Limiting values"</a>: reshaped and updated; junction temperature <math>T_j</math> added; <a href="#">Table 6</a>, <a href="#">Table 7</a> and <a href="#">Figure 1</a> added</li> <li>• <a href="#">Section 6 "Characteristics"</a>: reshaped; <math>I_{LR}</math> redefined to <math>I_{RM}</math></li> <li>• <a href="#">Section 8 "Test information"</a>: added</li> <li>• <a href="#">Figure 3</a>: replaced by minimized outline drawing</li> <li>• <a href="#">Section 10 "Packing information"</a>: added</li> <li>• <a href="#">Section 11 "Soldering"</a>: added</li> <li>• <a href="#">Section 13 "Legal information"</a>: updated</li> </ul>			
PRTR5V0U4D v.1	20080111	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.nexperia.com>.

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