PRTR5V0U4D

Ultra low capacitance quadruple rail-to-rail ESD protection

Rev. 2 — 5 March 2012 Product data sheet

1. Product profile

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 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 °C unless otherwise specified.

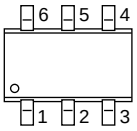
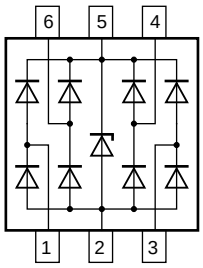
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per channel							
$C_{(I/O-GND)}$	input/output to ground capacitance	$V_{(I/O-GND)}$ = 0 V; V_{CC} = 3 V; f = 1 MHz	[1]	-	1.0	-	pF
Zener diode							
V_I	input voltage			0	-	5.5	V
C_{sup}	supply pin to ground capacitance	$V_{(I/O-GND)}$ = 0 V; V_{CC} = 3 V; f = 1 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
Per device					
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 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Max	Unit
Per channel						
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
Per channel	
IEC 61000-4-2; level 4 (ESD)	> 8 kV (contact)
MIL-STD-883; class 3B (human body model)	> 8 kV

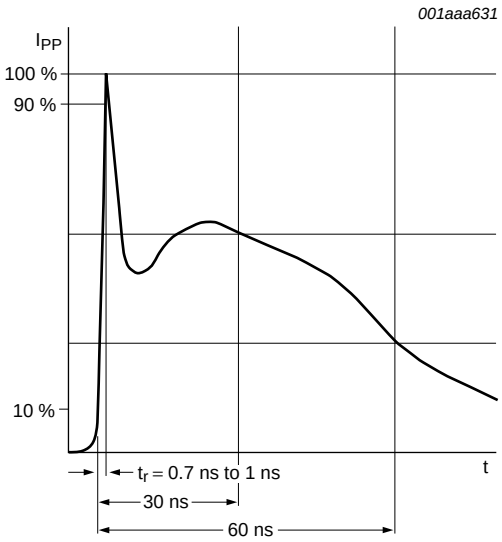

Fig 1. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

Table 8. Characteristics

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

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

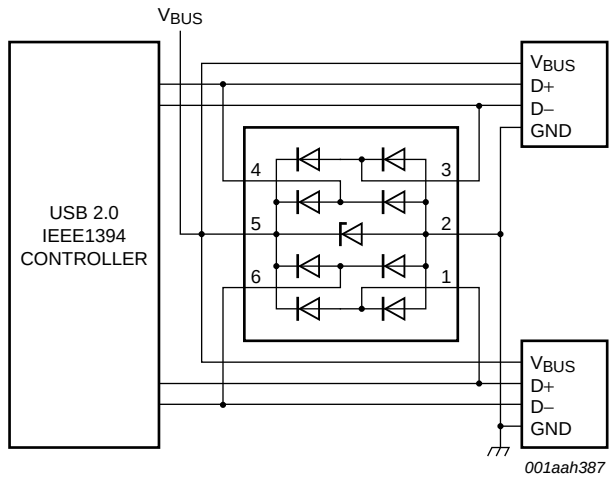

Fig 2. Application diagram

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

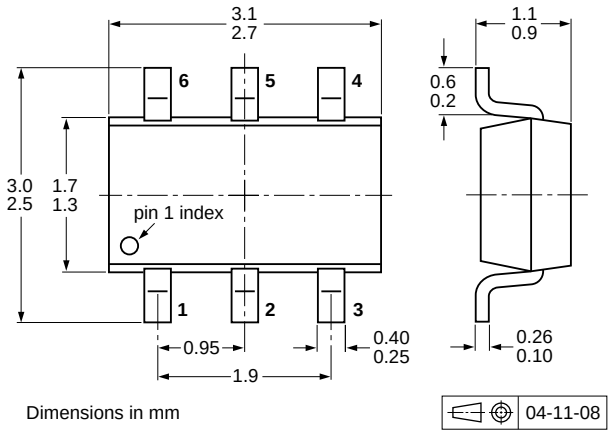

Fig 3. Package outline SOT457 (SC-74)

10. Packing information

Table 9. Packing methods

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

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

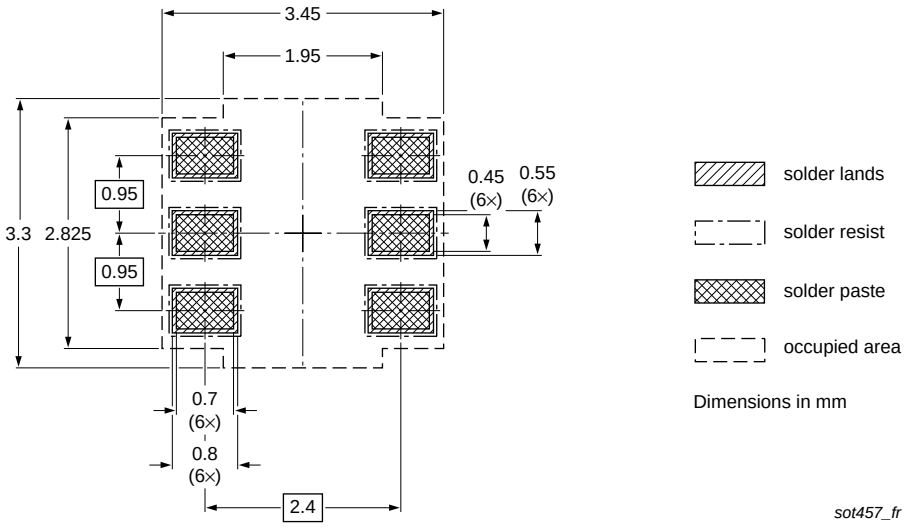

Fig 4. Reflow soldering footprint SOT457 (SC-74)

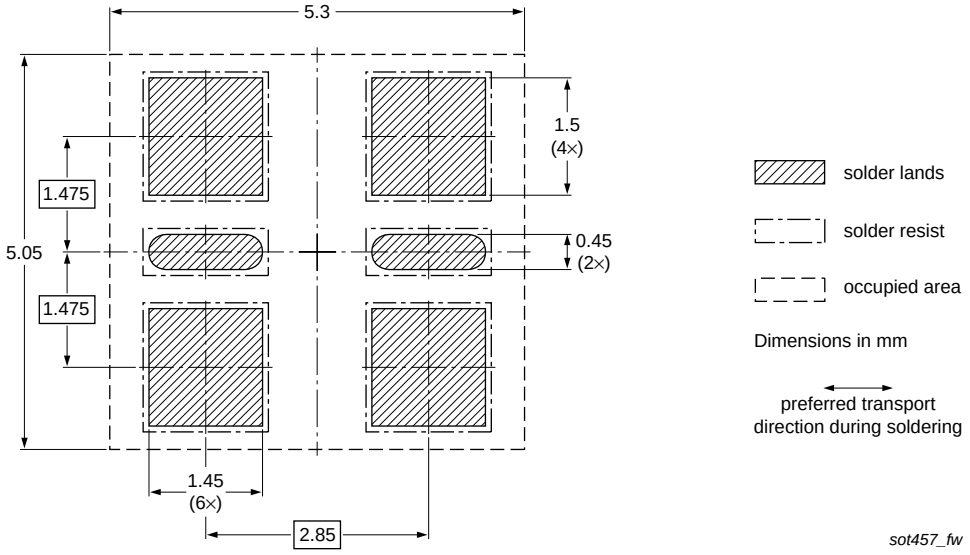

Fig 5. Wave soldering footprint SOT457 (SC-74)

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:	• Section 1 “Product profile”: reshaped • Section 1.4 “Quick reference data”: added • Section 2: updated • Section 4 “Marking”: added • Section 5 “Limiting values”: reshaped and updated; junction temperature T_j added; Table 6, Table 7 and Figure 1 added • Section 6 “Characteristics”: reshaped; I_{LR} redefined to I_{RM} • Section 8 “Test information”: added • Figure 3: replaced by minimized outline drawing • Section 10 “Packing information”: added • Section 11 “Soldering”: added • Section 13 “Legal information”: updated			
PRTR5V0U4D v.1	20080111	Product data sheet	-	-

13. Legal information

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.
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.

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15. Contents

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