PRTR5V0U4D-Q

Ultra low capacitance quadruple rail-to-rail ESD protection

8 July 2022 **Product data sheet**

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.

2. Features and benefits

- ESD protection of four high-speed data lines or high-frequency signal lines
- Ultra low input/output to ground capacitance: $C_{(I/O\text{-}GND)}$ = 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
- Small SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_I	input voltage	T_{amb} = 25 °C		0	-	5.5	V
$C_{(I/O\text{-}GND)}$	input/output to ground capacitance	$V_{(I/O\text{-}GND)}$ = 0 V; V_{CC} = 3 V; f = 1 MHz; T_{amb} = 25 °C	[1]	-	1	-	pF
C_{sup}	supply pin to ground capacitance	$V_{(I/O\text{-}GND)}$ = 0 V; V_{CC} = 3 V; f = 1 MHz; T_{amb} = 25 °C	[2]	-	40	-	pF

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

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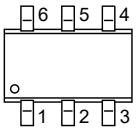
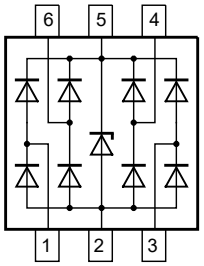
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I/O1	input/output 1	 SC-74; TSOP6 (SOT457)	
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		

6. Ordering information

Table 3. Ordering information

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

7. Marking

Table 4. Marking codes

Type number	Marking code
PRTR5V0U4D-Q	4D

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8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C
ESD maximum ratings						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge); T_{amb} = 25 °C	[1] [2]	-	8	kV
		MIL-STD-883 (human body model); T_{amb} = 25 °C		-	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.

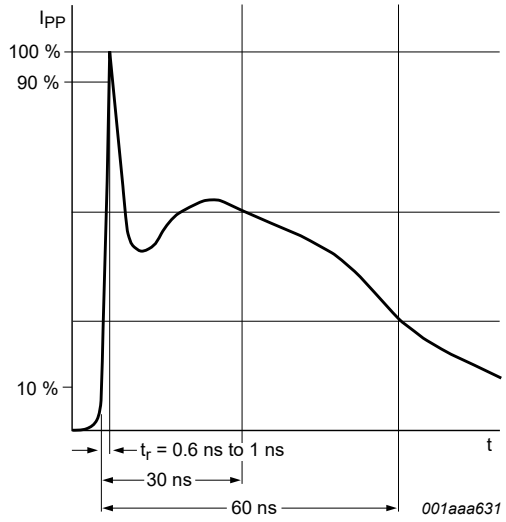

Fig. 1. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	T_{amb} = 25 °C		-	0.7	-	V
V_I	input voltage	T_{amb} = 25 °C		0	-	5.5	V
V_{BR}	breakdown voltage	I_I = 1 mA; T_{amb} = 25 °C		6	-	9	V
I_{RM}	reverse leakage current	V_R = 3 V; T_{amb} = 25 °C	[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; T_{amb} = 25 °C	[1]	-	1	-	pF
C_{sup}	supply pin to ground capacitance	$V_{(I/O-GND)}$ = 0 V; V_{CC} = 3 V; f = 1 MHz; T_{amb} = 25 °C	[2]	-	40	-	pF

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

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10. 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.

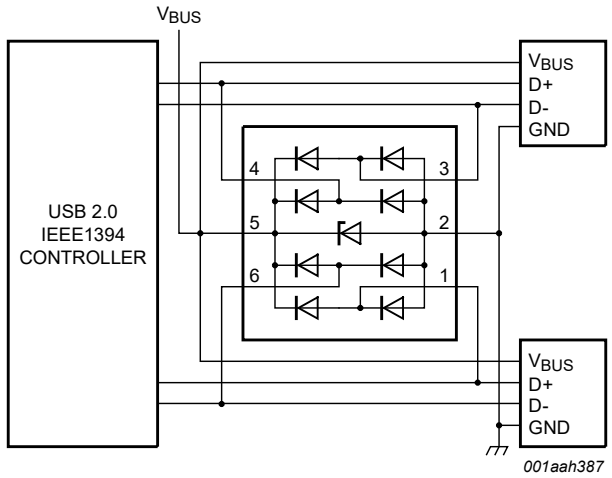

Fig. 2. Application diagram

11. Test information

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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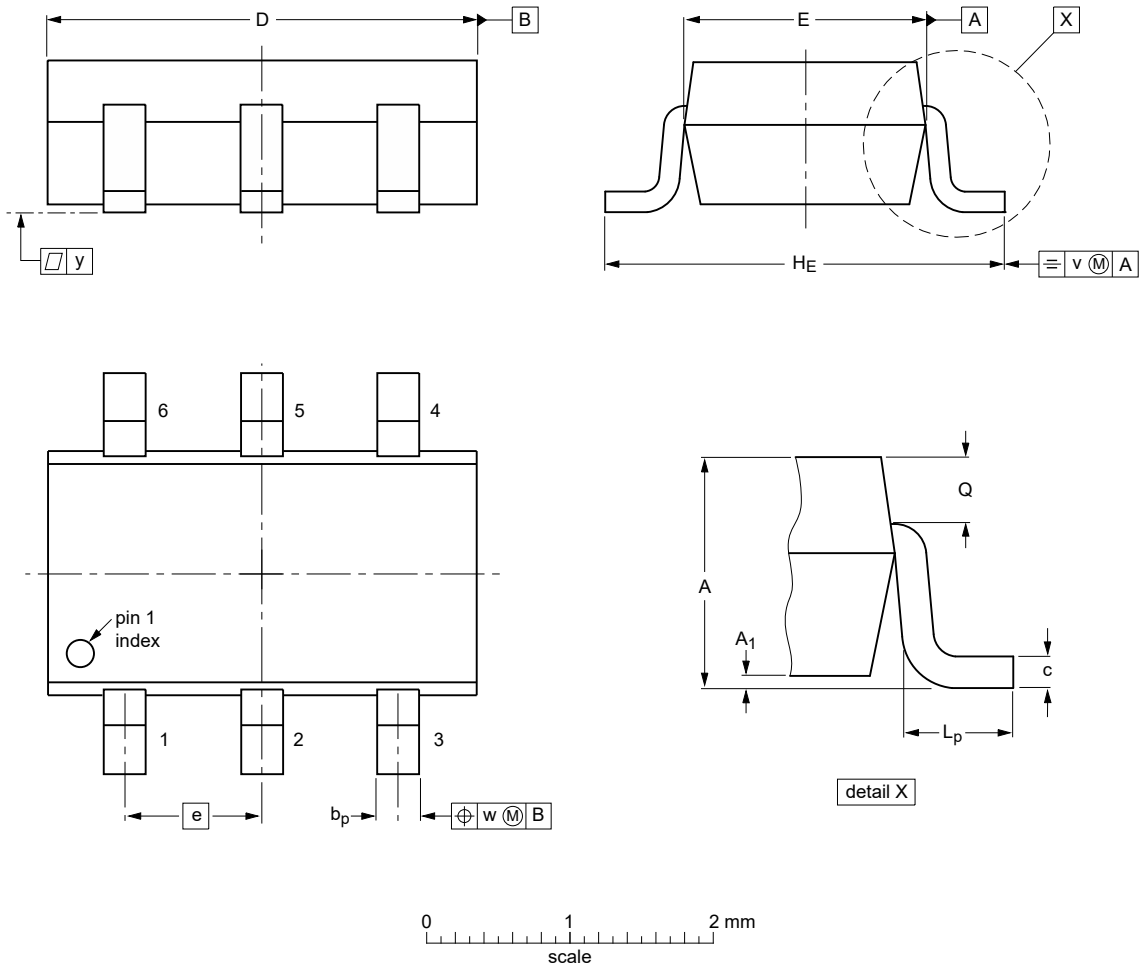
12. Package outline

Plastic, surface-mounted package (SC-74; TSOP6); 6 leads **SOT457**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b_p	c	D	E	e	H_E	L_p	Q	v	w	y
mm	max	1.1	0.1	0.40	0.26	3.1	1.7		3.0	0.6	0.33	0.2	0.2	0.1
	nom							0.95						
	min	0.9	0.013	0.25	0.10	2.7	1.3		2.5	0.2	0.23			

sot457_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT457			SC-74			~~06-03-16~~ 18-11-27

Fig. 3. Package outline SC-74; TSOP6 (SOT457)

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13. Soldering

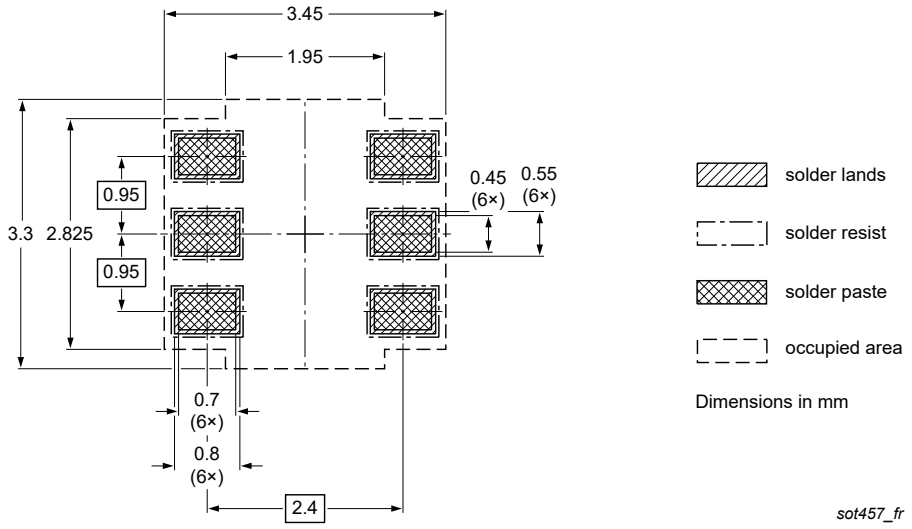

Fig. 4. Reflow soldering footprint for SC-74; TSOP6 (SOT457)

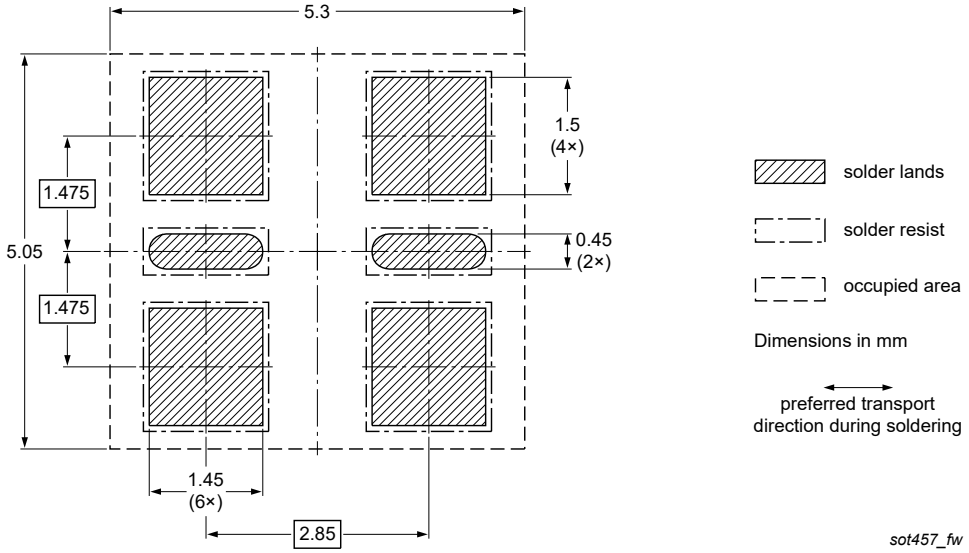

Fig. 5. Wave soldering footprint for SC-74; TSOP6 (SOT457)

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14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PRTR5V0U4D-Q v.1	20220708	Product data sheet	-	-

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15. Legal information

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".
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