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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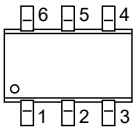
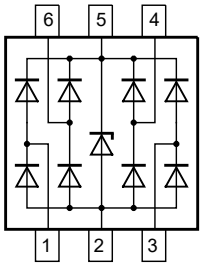
5. Pinning information

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

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.

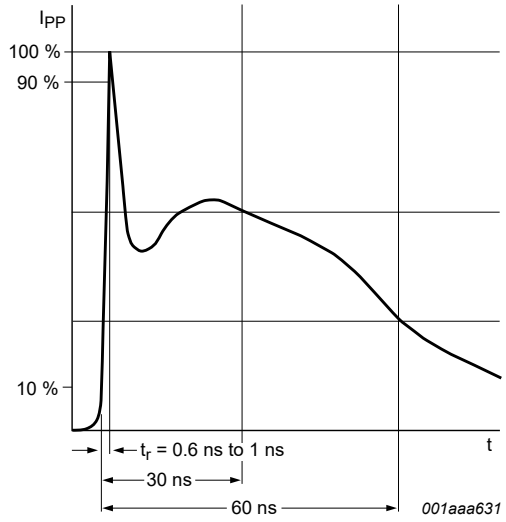


Fig. 1. ESD pulse waveform according to IEC 61000-4-2

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.

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.

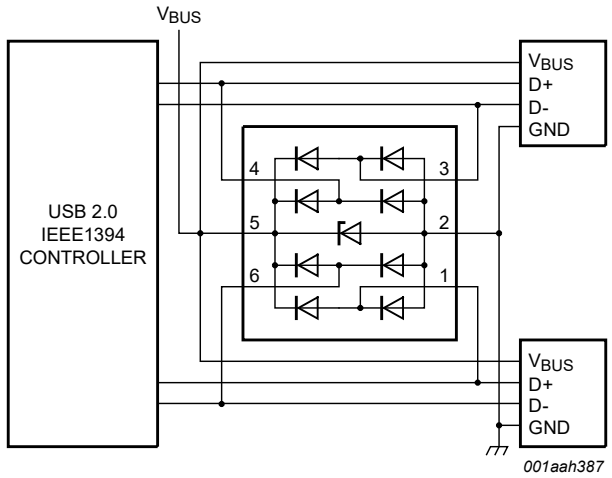


Fig. 2. Application diagram

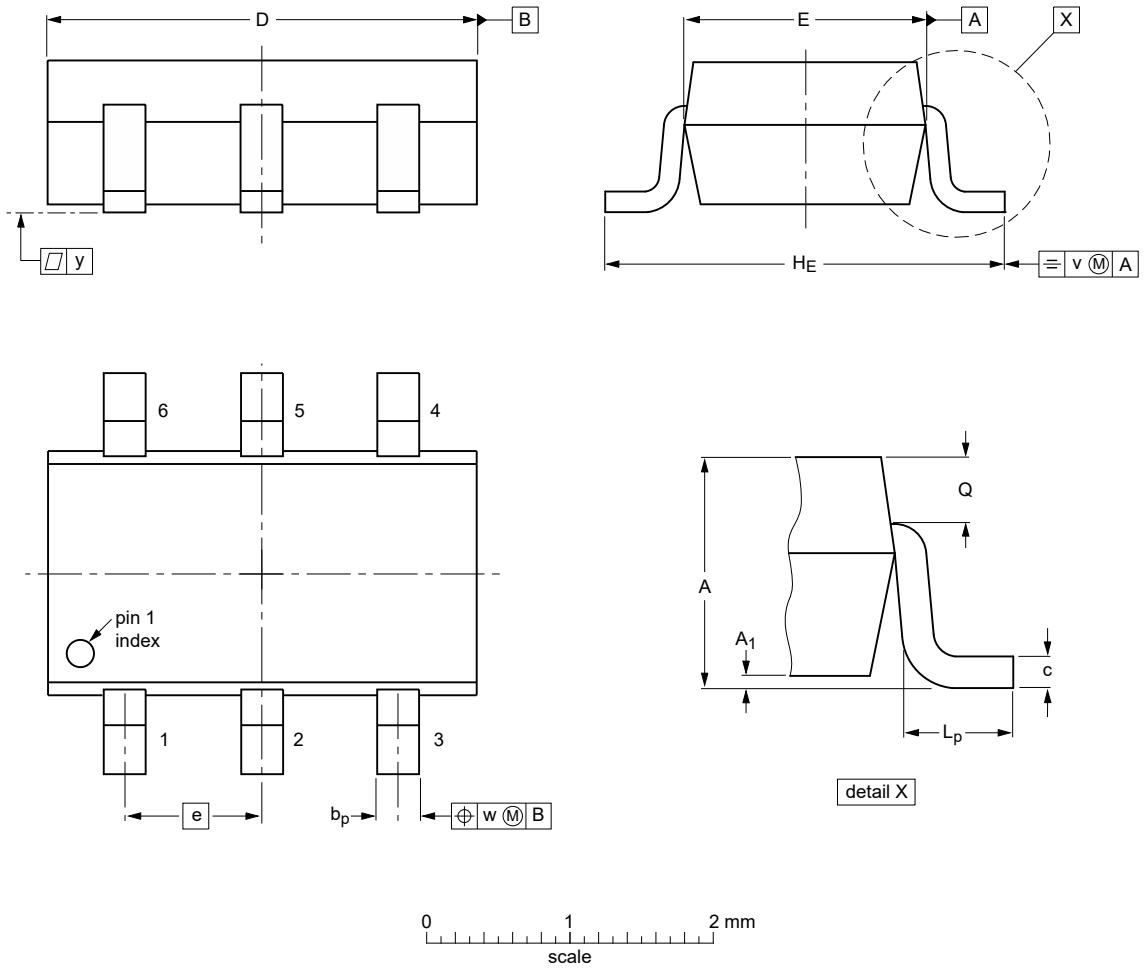
11. Test information

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.

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)

13. Soldering

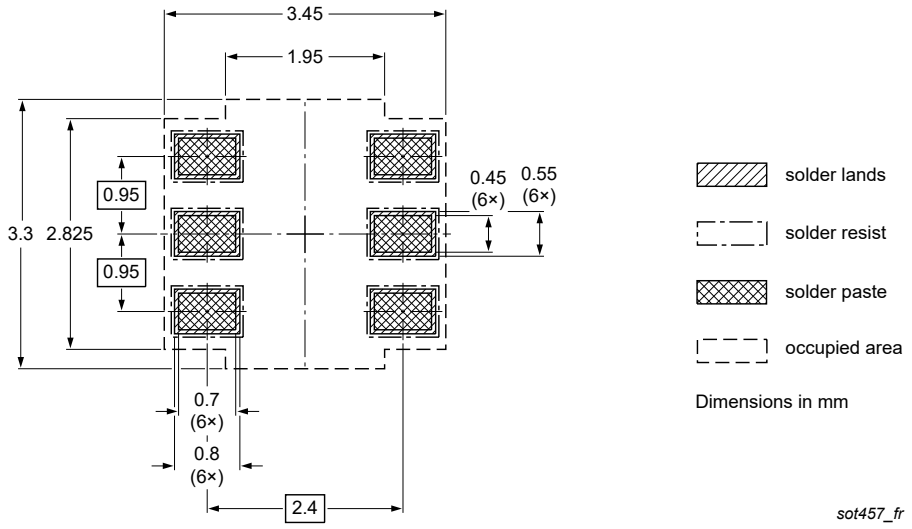


Fig. 4. Reflow soldering footprint for SC-74; TSOP6 (SOT457)

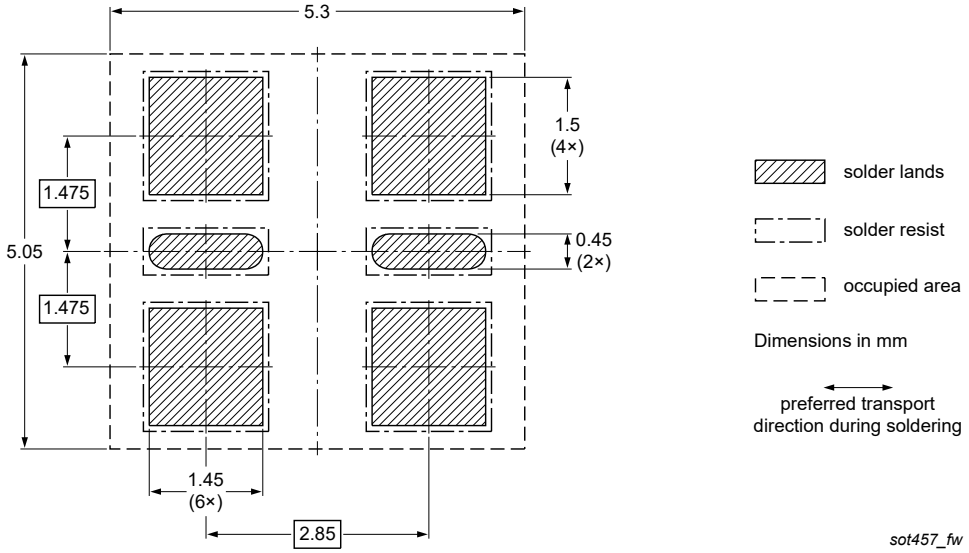


Fig. 5. Wave soldering footprint for SC-74; TSOP6 (SOT457)

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	-	-

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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