IP4223CZ6

Dual USB 2.0 integrated ESD protection

Rev. 1 — 17 October 2011 Product data sheet

1. Product profile

1.1 General description

The IP4223CZ6 is designed to protect I/O lines sensitive to capacitive load, such as USB 2.0, ethernet, Digital Video Interface (DVI) and so on, from damage due to ElectroStatic Discharge (ESD). It incorporates four pairs of ultra low capacitance rail-to-rail ESD protection diodes plus a Zener diode to provide protection to signal and supply components from ESD voltages up to ±8 kV contact discharge. Protection is supply voltage independent due to the rail-to-rail diodes being connected to the Zener diode. The device is encapsulated in a small 6-lead SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

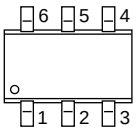
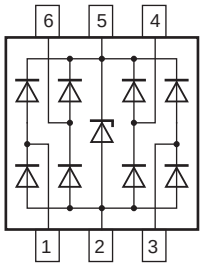
- Pb-free, Restriction of Hazardous Substances (RoHS) compliant and free of halogen and antimony (Dark Green compliant)
- ESD protection up to ±8 kV contact discharge; IEC 61000-4-2, level 4 compliant
- Four pairs of ultra low input capacitance ($C_{(I/O-GND)}$ = 1.5 pF) ESD rail-to-rail protection diodes
- Low voltage clamping due to integrated Zener diode
- Small 6-lead TSOP6 (SOT457) SMD package

1.3 Applications

- General-purpose downstream ESD protection for high-frequency analog signal ports and high-speed serial data transmission ports in:
  - Cellular phone and Personal Communication System (PCS) mobile handsets
  - PC/notebook USB 2.0/IEEE1394 ports
  - DVI
  - Cordless telephones
  - Wireless data (WAN/LAN) systems
  - Mobile Internet Devices (MID)
  - Portable Media Players (PMP)
  - High-Definition Multimedia Interface (HDMI)

2. Pinning information

Table 1. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I/O 1	ESD protection		
2	GND	ground		
3	I/O 2	ESD protection		
4	I/O 3	ESD protection		
5	V_P	supply voltage		
6	I/O 4	ESD protection		

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3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
IP4223CZ6	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457

4. Marking

Table 3. Marking codes

Type number	Marking code
IP4223CZ6	21

5. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_I	input voltage		0	5.5	V
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2, level 4, contact; all pins	–8	+8	kV
T_{stg}	storage temperature		–55	+125	°C

6. Recommended operating conditions

Table 5. Operating conditions

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

7. Characteristics

Table 6. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$C_{(I/O-GND)}$	input/output to ground capacitance	V_I = 0 V; f = 1 MHz; V_P = 3 V	[1]	-	-	1.5	pF
$C_{(zd-GND)}$	Zener diode to ground capacitance	V_I = 0 V; f = 1 MHz; V_P = 3 V	[2]	-	40	-	pF
I_{RM}	reverse leakage current	V_I = 3 V	[3]	-	-	100	nA
V_{BRzd}	Zener diode breakdown voltage	I = 1 mA	[2]	6	-	9	V
V_F	forward voltage			-	0.7	-	V

[1] Pins 1, 3, 4 and 6.

[2] Pin 5 to pin 2.

[3] Pins 1, 3, 4 and 6 to ground.

8. Application information

8.1 Universal serial bus 2.0 protection

The device is optimized to protect, for example, two USB 2.0 ports from ESD. Each device can protect both USB data lines and the V_{BUS} supply line. A typical application is shown in Figure 1.

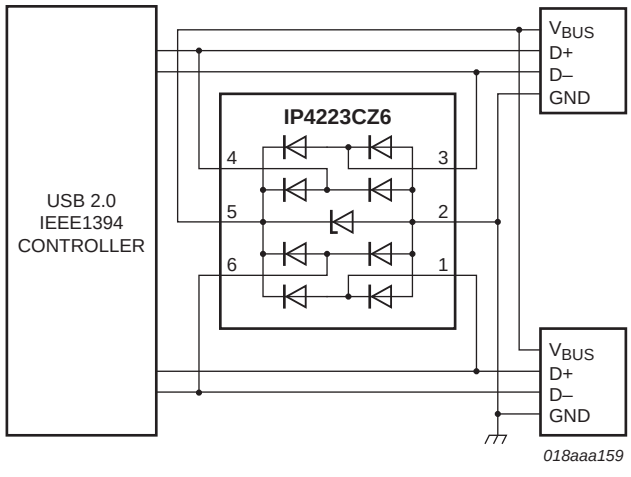
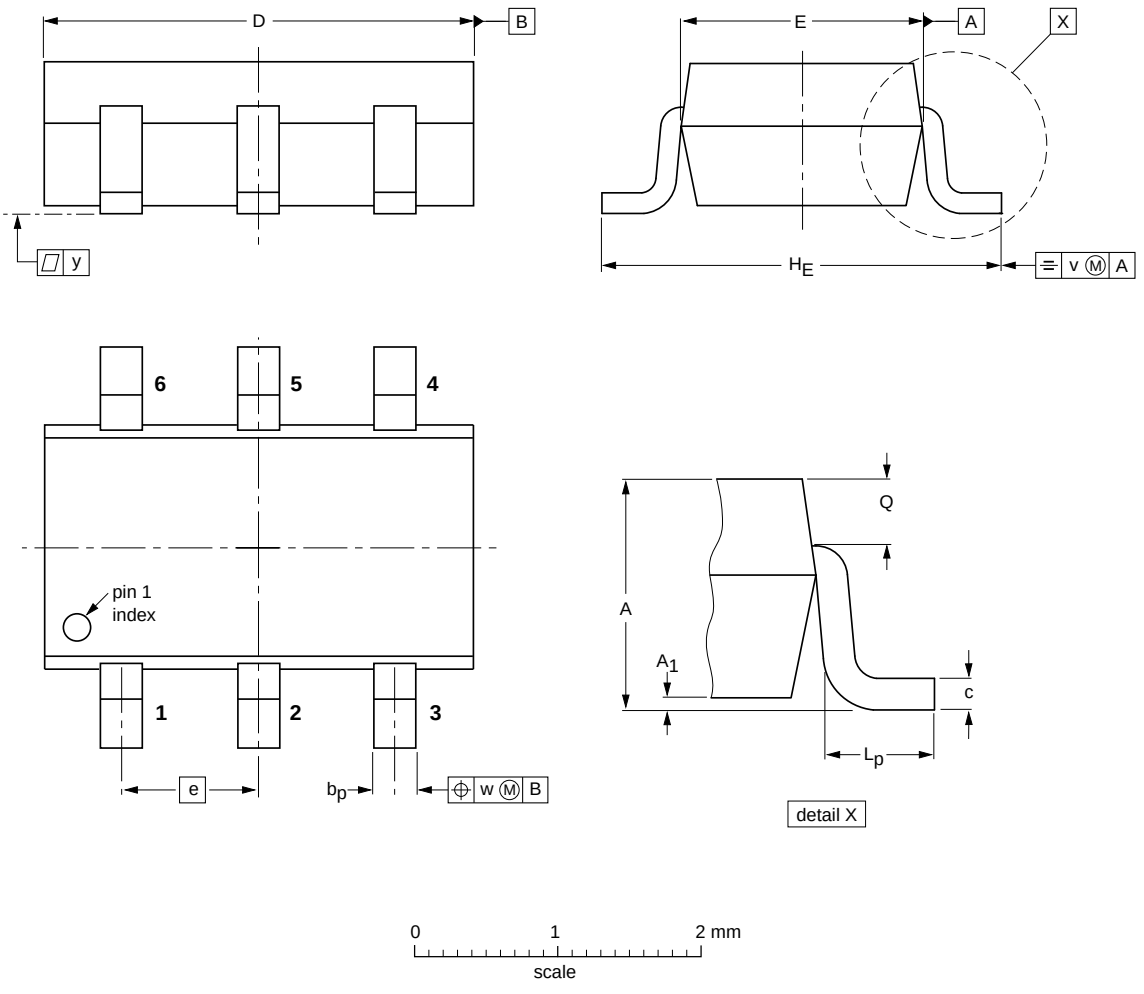


Fig 1. Typical application of IP4223CZ6

9. Package outline

Plastic surface-mounted package (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	1.1 0.9	0.1 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT457			SC-74			~~05-11-07~~ 06-03-16

Fig 2. Package outline SOT457 (SC-74)

10. Soldering

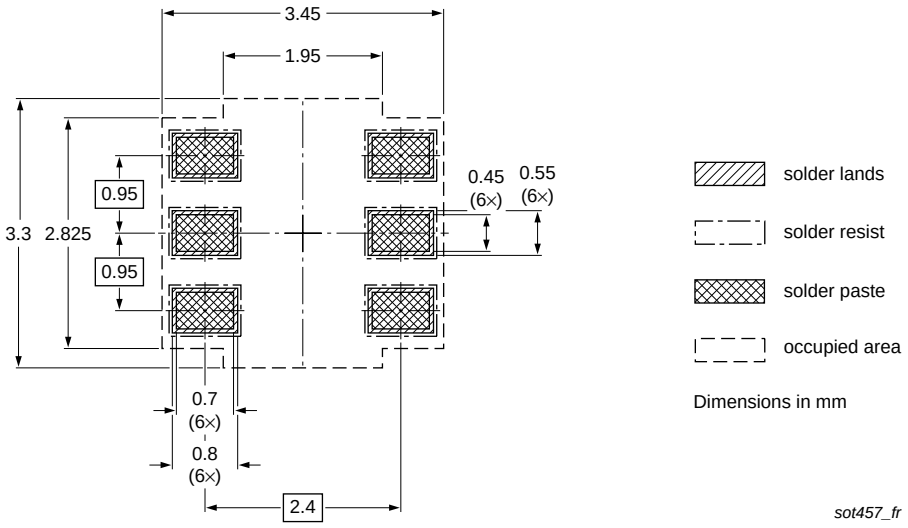


Fig 3. Reflow soldering footprint SOT457 (SC-74)

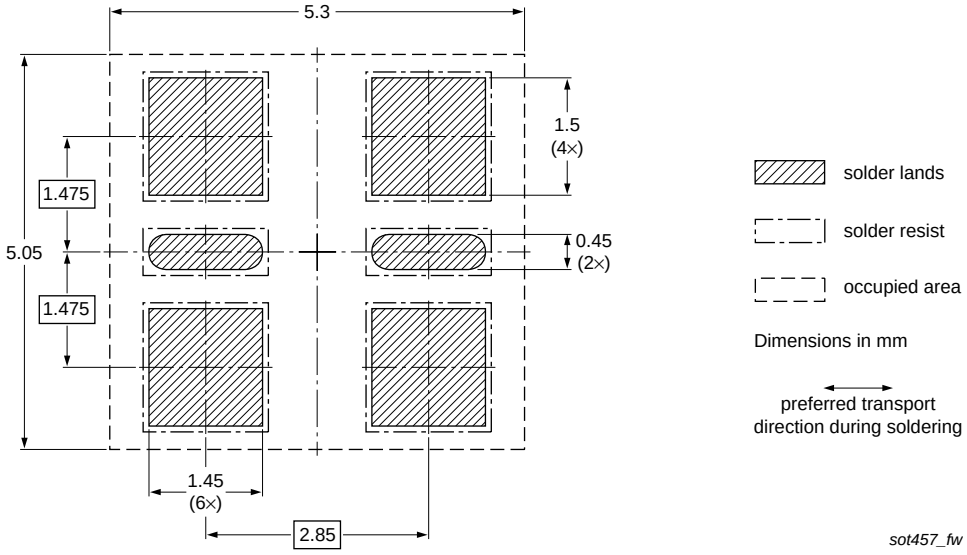


Fig 4. Wave soldering footprint SOT457 (SC-74)

11. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
IP4223CZ6 v.1	20111017	Product data sheet	-	-

12. Legal information

12.1 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".

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