IP4303CX4 (/P)

Dual back-to-back diode array with ESD protection to IEC61000-4-2, level4

15 May 2009 **Product data sheet**

1. Product profile

1.1 General description

IP4303CX4 (/P) is a diode array, which is designed to provide protection to downstream components from Electrostatic Discharge (ESD) voltages as high as ±15 kV contact, far exceeding the IEC61000-4-2, level4.
IP4303CX4 (/P) is fabricated by using monolithic silicon semiconductor technology and integrates four pseudo back-to-back diodes in a single W*afer-Level* chip-scale package. These features make IP4303CX4 (/P) ideal for use in applications requiring component miniaturization, such as mobile phone handsets, cordless telephones and personal digital devices. For mechanically demanding applications the option /P as IP4303CX4/P is offering improved mechanical stability by using advanced solder balls.

1.2 Features

- Pb-free, RoHS compliant and free of Halogen and Antimony (dark green compliant)
- 2 back-to-back diodes with common ground
- Back to back diodes to provide downstream ESD protection up to ±15 kV (contact)
- Wafer-Level chip-scale package with 0.4 mm pitch only

1.3 Applications

General purpose ESD-protection in mobile appliances such as but not limited to:

- Cellular and PCS mobile handsets
- Wireless data (WAN/LAN) systems

2. Pinning Information

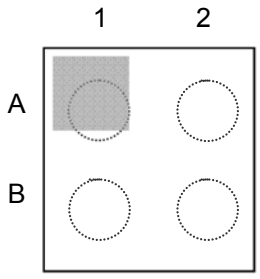


Fig 1. Transparent package top view, balls facing down

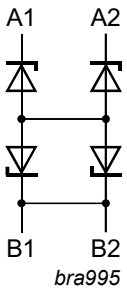


Fig 2. IP4303CX4 (/P) schematic diagram

founded by Philips

3. Limiting values

Table 1. Limiting values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage Range		-12.0	+12.0	V
ESD	Electrostatic Discharge, all pins	IEC 61000-4-2, Level 4,			
		Contact Discharge	-8(-15)[1]	+8(+15)[1]	kV
		Air Discharge	-15	+15	kV
T_{stg}	storage temperature range		-55	+150	°C
T_{pk}	Peak solder reflow temperature	10 seconds max.		+260	°C
T_{amb}	Ambient operating temperature		-30	+85	°C

4. Electrical Characteristics

Table 2. Electrical characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR+)}$	Diode breakdown voltage, positive voltages	I_{test} = 1 mA	14	16.5	-	V
$V_{(BR-)}$	Diode breakdown voltage, negative voltages	I_{test} = 1 mA	-	-16.5	-14	V
I_{lkg+}	Diode reverse leakage current, per diode pair	V = +5 V	-	-	100	nA
I_{lkg-}	Diode reverse leakage current, per diode pair	V = -5 V	-	-	100	nA
C_d	Diode capacitance value Pin A to ground (Pin B)	V = 0 V; f = 1 MHz	-	-	15	pF

[1] Device is tested with 1000 pulses of ±15kV contact discharges each, according the IEC61000-4-2 model and far exceeds the specified level 4 (8kV contact discharge)

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5. Design/Assembly Recommendations

5.1 PCB Design Guidelines

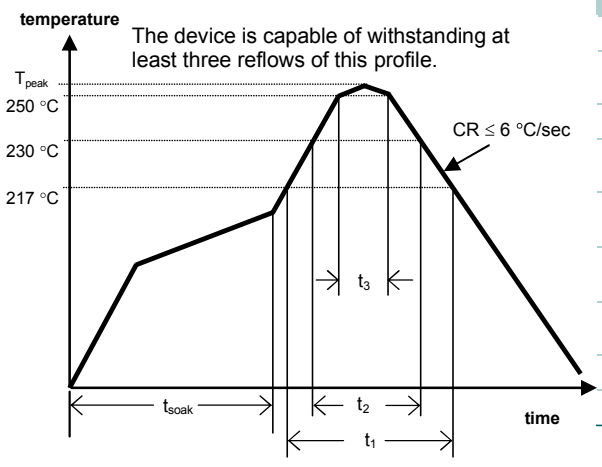
For the optimum performance, a Non-Solder Mask PCB design (NSMD), also known as a copper-defined design, incorporating laser-drilled micro-vias connecting the ground pads to a buried ground-plane layer is recommended. This results in the lowest possible ground inductance and provides the best high frequency and ESD performance. For this case, the following are the recommended PCB design parameters:

- PCB pad size: 0.20 mm diameter
- Micro-Via diameter: 0.1 mm (0.004")
- Solder Mask opening: 0.37 mm diameter
- Copper thickness: 20-40 µm
- Copper finish: AuNi
- PCB material: FR4

5.2 PCB Assembly Guidelines for Pb-free soldering

The following are recommendations for the assembly of this device:

- Solder Screen Aperture size: 0.33 mm diameter
- Solder Screen thickness: 100 µm (0.004")
- Solder Paste: Pb-free: Sn Ag(3-4) Cu(0.5-0.9)
- Solder/Flux ratio: 50 / 50
- Solder Reflow Profile: see below



SYMBOL	PARAMETER	REQUIREMENTS	
		Minimum	Maximum
$\Delta T/\Delta t$	Average temperature gradient in pre-heating	2.5 °C/s	4.0 °C/s
t_{soak}	Soak time	60 s	180 s
t_1	Time at temperature >217°C	30 s	150 s
t_2	Time at temperature ≥230°C	10 s	50 s
t_3	Time at temperature ≥250°C	----	30 s
T_{peak}	Peak temperature in reflow	230 °C	260 °C
CR	Cooling rate	-----	-6 °C/s
t_{total}	Total length of profile	-----	540 s

Fig 3. Pb-free solder reflow profile

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6. Package outline

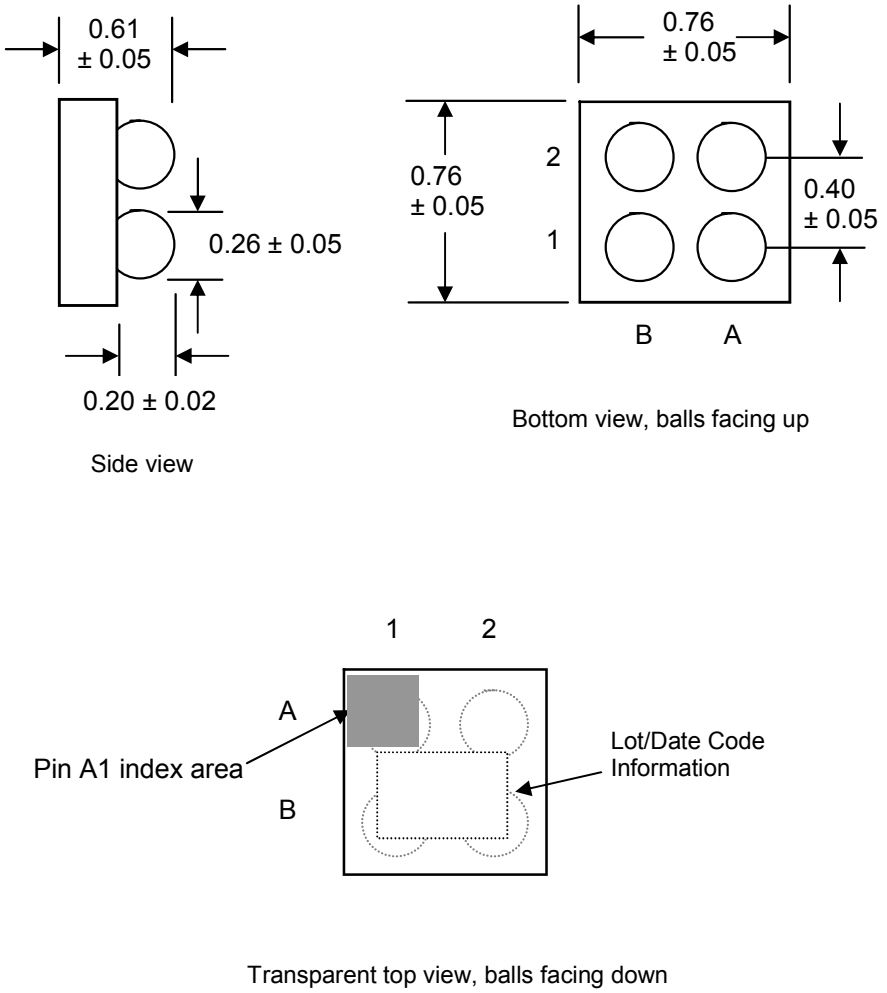
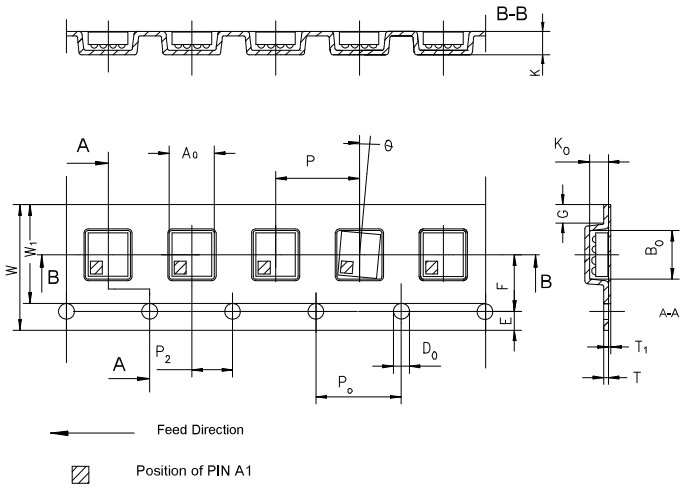


Fig 4. IP4303CX4 (/P) outline dimensions

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7. Tape & Reel information



ITEM		SYMBOL	SPECIFICATIONS		NOTE
			DIMENSION	TOLERANCE	
OVERALL DIMENSIONS	TAPE WIDTH	W	8.00	±0.1	
	THICKNESS	K	1.20	MAX	
	DISTANCE	G	0.75	MIN	
SPROCKET HOLES	DIAMETER	D_0	1.50	+0.1/-0.0	CUM. PITCH ERROR ±0.2 / 10 PITCHES
	DISTANCE	E	1.75	±0.1	
	PITCH	P_0	4.00	±0.1	
DISTANCE BETWEEN CENTRE LINES	LENGTH DIRECTION	P_2	2.00	±0.05	
	WIDTH DIRECTION	F	3.50	±0.05	
COMPARTMENTS	LENGTH	A_0	0.85	±0.05	
	WIDTH	B_0	0.85	±0.05	
	DEPTH	K_0	0.70	±0.05	
	PITCH	P	4.00	±0.1	
DEVICE	OUTLINE	IP4303CX4 (/P)			
	ROTATION	Θ	20°	MAX	
CARRIER TAPE ANTISTATIC	FILM THICKNESS	T	0.25	±0.07	CARBON LOADED POLYSTYRENE 100% RECYCLABLE
	BEND		0.25	±0.07	
COVER TAPE	WIDTH	W_1	5.75	MAX	
	FILM THICKNESS	T_1	0.1	MAX	
BENDING RAD	IN WINDING DIRECTION	R	30	MIN	

Fig 5. IP4303CX4 (/P) Tape & Reel information

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8. Legal information

8.1 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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