

COSATEQ

CO-PCIA429

COSATEQ
CO-PCIA429 V0.4

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Technical summary

Important Information

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Patents

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COSATEQ is entitled to include the name of the customer and a short description of the adduced efforts into a list of reference addresses. No other actions of advertising will be taken without the customer's permission.

Special Handling and Cautions

In the handling of the CO-PCIA429 proper care should be used to ensure that the device will not be damaged by Electrical Static Discharge

(ESD), physical shock, or improper power surges and that precaution is taken to avoid electrocution. Ensure that standard ESD precautions are followed. As a minimum, one hand should be grounded to the power supply in order to equalize the static potential.

Introduction

About CO-PCIA429

The CO-PCIA429 enables you to connect a standard PC System to an ARINC429 bus system. The ARINC429 protocol is widely used in avionic application with safety critical background.

The CO-PCIA429 PCI interface card offers up to 16TX + 16RX ARINC429-channels. All channels are independent. Hardware, firmware and driver are optimized for operation in a real-time system, especially in COSATEQ's SCALE-RT. The card is also able to handle tasks in other areas of application, e.g. controlling or visualization.

There are three versions of the CO-PCIA429 available:

Model	TX channels	RX channels	Typ
CO-PCIA429/4	4	4	PCI
CO-PCIA429/8	8	8	PCI
CO-PCIA429/16	16	16	PCI

Features

- Up to 16TX and 16RX channels
- All channels may be configured independently
 - High speed / Low speed
 - Timestamp with a resolution of 60 μ s
 - TX queue with 24 slots per channel
 - RX queue with 36 slots per channel
- Parity ODD / EVEN / NONE
- Possibility to generate and protocol recognized errors
- PCI 32 bit, 33 MHz, 3.3 V/5 V, rev 2.1
- Low power: <750 mA (5 V) at 16TX/16RX
- 68 poles connector compatible to National Instruments' cable (NI SHC-68) and breakout box (NI SCB-68)

Installation

Requirements

- PC, 100% IBM compatible
- One free PCI slot according to PCI spec 2.1

Mechanical installation

1. Switch OFF power of the PC. Make sure that all peripherals are powered down, too.
2. Remove the housing cover of the PC (refer to the PC's manual for details).
3. Remove slot cover if necessary (refer to the PC's manual for details).
4. Plug the CO-PCIA429 interface card into a free PCI slot.
5. Fasten the bracket of the CO-PCIA429 with the enclosed screw.
6. Reassemble the housing of the PC.
7. Switch ON power of the PC.

Hardware description

Environmental conditions

- Temperature (operational): 0...55°C
- Temperature (storage): -10...75°C
- Maximum temperature drift: 3°/min
- Relative humidity (non condensing): 5...95%
- Power supplied by the PCI Interface +5V \pm 5% with max 750mA

Overview

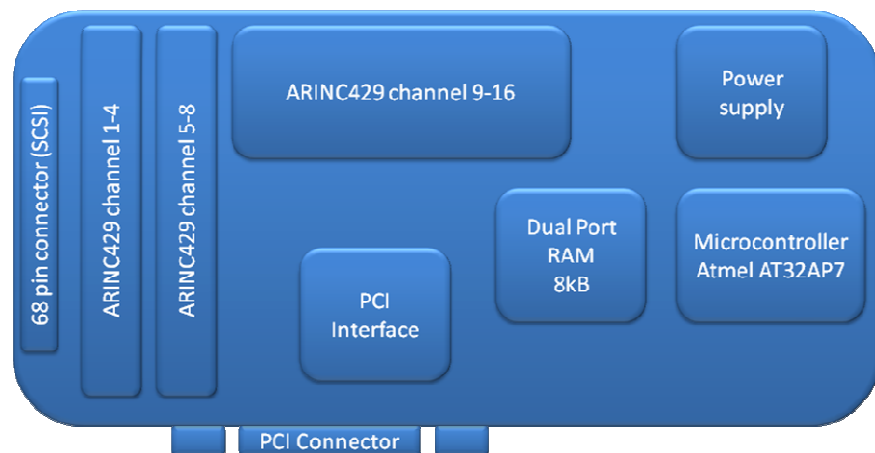


Illustration 1 block diagram of CO-PCIA429

The CO-PCIA429 card provides up to 16TX and 16RX channels for interfacing a standard PC to an ARINC429 bus system. The card is connected to the host via a PCI Interface (rev 2.1).

The host and the CO-PCIA429 may communicate via a dual ported RAM mounted on the PCI card.

A powerful 32bit microcontroller processes all request from the host or data from another ARINC429 bus unit.

To serve the ARINC429 specification the HI3585 ARINC429 terminal IC form Holt Integrated Circuits is used.

To connect other ARINC429 bus units a 68 poles connector is mounted. This connector is compatible with National Instruments' cable (SHC-68) and break-out box (SCB-68).

Pin Assignment

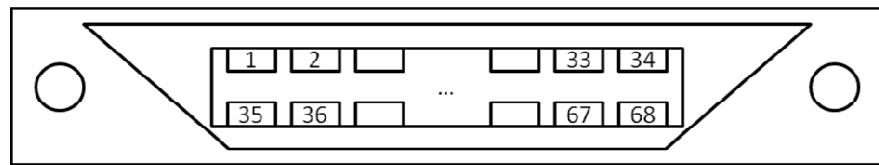


Illustration 2 Frontview of the connector on the PCB

On the CO-PCIA429 a 68 poles MDR Connector (SCSI-2 layout compatible) is mounted. The various versions of the CO-PCIA429 have different pinouts.

CO-PCIA429/4

Pin	Description	Pin	Description
1	open	35	AOUT_00
2	open	36	BOUT_00
3	AIN_00	37	open
4	BIN_00	38	open
5	open	39	BOUT_01
6	open	40	AOUT_01
7	open	41	open
8	open	42	open
9	open	43	open
10	open	44	open
11	open	45	open
12	open	46	open
13	open	47	open
14	open	48	open
15	AIN_01	49	open
16	BIN_01	50	open
17	open	51	open
18	open	52	open
19	open	53	open
20	open	54	open
21	open	55	open
22	open	56	open
23	open	57	open
24	open	58	open
25	BOUT_02	59	open
26	AOUT_02	60	open
27	AIN_02	61	open
28	BIN_02	62	open
29	BOUT_03	63	open
30	AOUT_03	64	open
31	open	65	AIN_03
32	open	66	BIN_03
33	GPIO_IN	67	GND
34	GPIO_OUT	68	GND

CO-PCIA429/8

Pin	Description	Pin	Description
1	BOUT_07	35	AOUT_00
2	AOUT_07	36	BOUT_00
3	AIN_00	37	AIN_07
4	BIN_00	38	BIN_07
5	open	39	BOUT_01
6	open	40	AOUT_01
7	open	41	open
8	open	42	open
9	open	43	open
10	open	44	open
11	open	45	open
12	open	46	open
13	BOUT_06	47	open
14	AOUT_06	48	open
15	AIN_01	49	AIN_06
16	BIN_01	50	BIN_06
17	open	51	open
18	open	52	open
19	open	53	open
20	open	54	open
21	open	55	open
22	open	56	open
23	open	57	open
24	open	58	open
25	BOUT_02	59	BOUT_05
26	AOUT_02	60	AOUT_05
27	AIN_02	61	AIN_05
28	BIN_02	62	BIN_05
29	BOUT_03	63	BOUT_04
30	AOUT_03	64	AOUT_04
31	AIN_04	65	AIN_03
32	BIN_04	66	BIN_03
33	GPIO_IN	67	GND
34	GPIO_OUT	68	GND

CO-PCIA429/16

Pin	Description	Pin	Description
1	BOUT_07	35	AOUT_00
2	AOUT_07	36	BOUT_00
3	AIN_00	37	AIN_07
4	BIN_00	38	BIN_07
5	BOUT_08	39	BOUT_01
6	BOUT_09	40	AOUT_01
7	AOUT_08	41	BOUT_10
8	AOUT_09	42	BOUT_11
9	BIN_10	43	AOUT_10
10	BIN_09	44	AOUT_11
11	BIN_11	45	BIN_08
12	AIN_08	46	AIN_11
13	BOUT_06	47	AIN_09
14	AOUT_06	48	AIN_10
15	AIN_01	49	AIN_06
16	BIN_01	50	BIN_06
17	BOUT_14	51	BOUT_12
18	BOUT_15	52	BOUT_13
19	AOUT_14	53	AOUT_12
20	AOUT_15	54	AOUT_13
21	BIN_13	55	BIN_15
22	AIN_12	56	BIN_14
23	AIN_13	57	AIN_15
24	BIN_12	58	AIN_14
25	BOUT_02	59	BOUT_05
26	AOUT_02	60	AOUT_05
27	AIN_02	61	AIN_05
28	BIN_02	62	BIN_05
29	BOUT_03	63	BOUT_04
30	AOUT_03	64	AOUT_04
31	AIN_04	65	AIN_03
32	BIN_04	66	BIN_03
33	GPIO_IN	67	GND
34	GPIO_OUT	68	GND

Details on the PCB

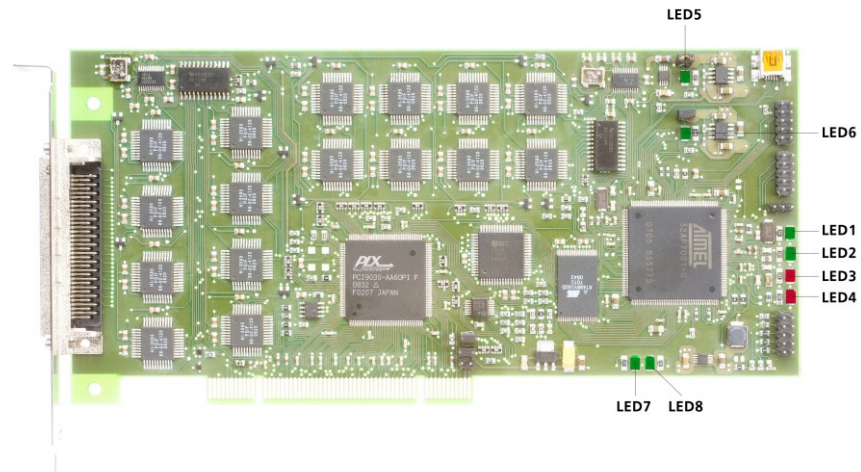


Illustration 3 View on CO-PCIA429 PCB

Optical control of operation

There are eight LEDs mounted on the PCB. With these LEDs the user can determine if the PCI card works the way it is intended to do.

If LED5...LED8 are glowing, then all necessary voltages should be present on the board. It is possible that not all LEDs, especially LED5 and LED6 are mounted for all versions of the CO-PCIA429/x.

For firmware operations the four LEDs on the right are of bigger interest. From top to bottom:

1. LED1 (green) glows when all initializations in the firmware have been executed successfully. The CO-PCIA429 is ready for interaction with the host.
2. LED2 (green) shows the actual mode the firmware is in. This may either be "config mode", the LED is off or "run mode", the LED is on.
3. LED3 (red) is currently related to no functionality.

4. LED4 (red) shows an error on the receiver side of some channel. This means, that the queue in the DPR is full and the controller is trying to send another ARINC429 data word to the host.

The two error LEDs (LED3 and LED4) will be turned on as soon as the first error occurs and they stay on until the moment a new "enter run mode"-command is present in the command queue.

NOTE: It is possible that you will get a RX error if you stop the application running on the host and another ARINC429 bus unit is still active and sending data

Technical summary

Unit	PCI PC Board
Memory	8kByte Dual Port RAM
Connector	68 poles MDR (SCSI-2 compatible)
PC connector	PCI connector rev 2.1, 32-bit, capable of 3.3V and 5V signaling environment
ARINC429 controller	HI3585
max number of TX	16
max number of RX	16
transfer rate	12.5 or 100kBaud
Power Supply	5V ($\pm 5\%$) max 750mA via the PCI Connector
Temperature (operational)	0...55°C
Temperature (storage)	-10...75°C
Relative humidity	5...95%