PCI2322

User's Manual

Beijing ART Technology Development Co., Ltd.

Contents

Chapter 1 Overview

The PCI2322 is a 48/96-bit parallel digital input/output (DIO) card designed for industrial applications. The plug and play feature of PCI-bus architecture make it easy for users to install their systems quickly.

The PCI2322 emulates four 8255 Programmable Peripheral Interface (PPI) chips. Each PPI offers 3 8-bit DIO ports which can be accessed simultaneously. The total 12 ports can be programmed as input or output independently.

PCI2322 mainly used for industrial control and related fields:
- ◆ Programmable digital input/output
  - ◆ Industrial Monitoring
  - ◆ LED display driver
  - ◆ parallel data transmission
  - ◆ TTL, DTL, CMOS logic circuits

Unpacking Checklist

Check the shipping carton for any damage. If the shipping carton and contents are damaged, notify the local dealer or sales for a replacement. Retain the shipping carton and packing material for inspection by the dealer.

Check for the following items in the package. If there are any missing items, contact your local dealer or sales.
- PCI2322 Data Acquisition Board
- ART Disk
  a) user's manual (pdf)
  b) drive
  c) catalog
- Warranty Card

FEATURES

Digital Input/Output

- Input/Output Type: TTL digital input / output
- Input Level: High-level: 2 ~ 5.25V
  - Low-level: 0 ~ 0.8V
- Output Level: High-level: 2.4V minimum
  - Low-level: 0.5V maximum
- Port Power-on Status: digital input
- Output Drive Capability: Source Current: 15mA
  - Sink Current: 48mA
- Digital input signal can use external latch signal
- Data Transfer: program I/O
- Support the COS interrupt
- Operating Temperature: 0℃ ~ +50℃

- ➢ Storage Temperature: - 20℃～+70℃
- ➢ Relative Humidity: 5 ~ 95%, non-condensing

Interrupt Function

- ➢ COS interrupt
- ➢ Interrupt Source INT1: P1C0, P1C3, 32-bit event counter
    INT1 Interrupt Mode: P1C0 falling edge

    P1C0 and P1C3

    External interrupt counter

    change the any unit status of the PPI 1 & PPI 2
- ➢ Interrupt Source INT2: P2C0, P2C3, 32-bit timer (based on the 2MHz internal clock frequency)
    INT1 Interrupt Mode: P2C0 falling edge

    P2C0 and P2C3

    Internal interrupt counter

    change the any unit status of the PPI 3 & PPI 4

Timer/Counter Function

- ➢ A programmable 32-bit event counter to generate event interrupt (EVENT)
- ➢ A programmable 32-bit timer to generate timer interrupt (internal timer)

Board Dimension: 134mm (L)*106mm (W)

Chapter 2 Components Layout Diagram and a Brief Description

2.1 The Main Component Layout Diagram
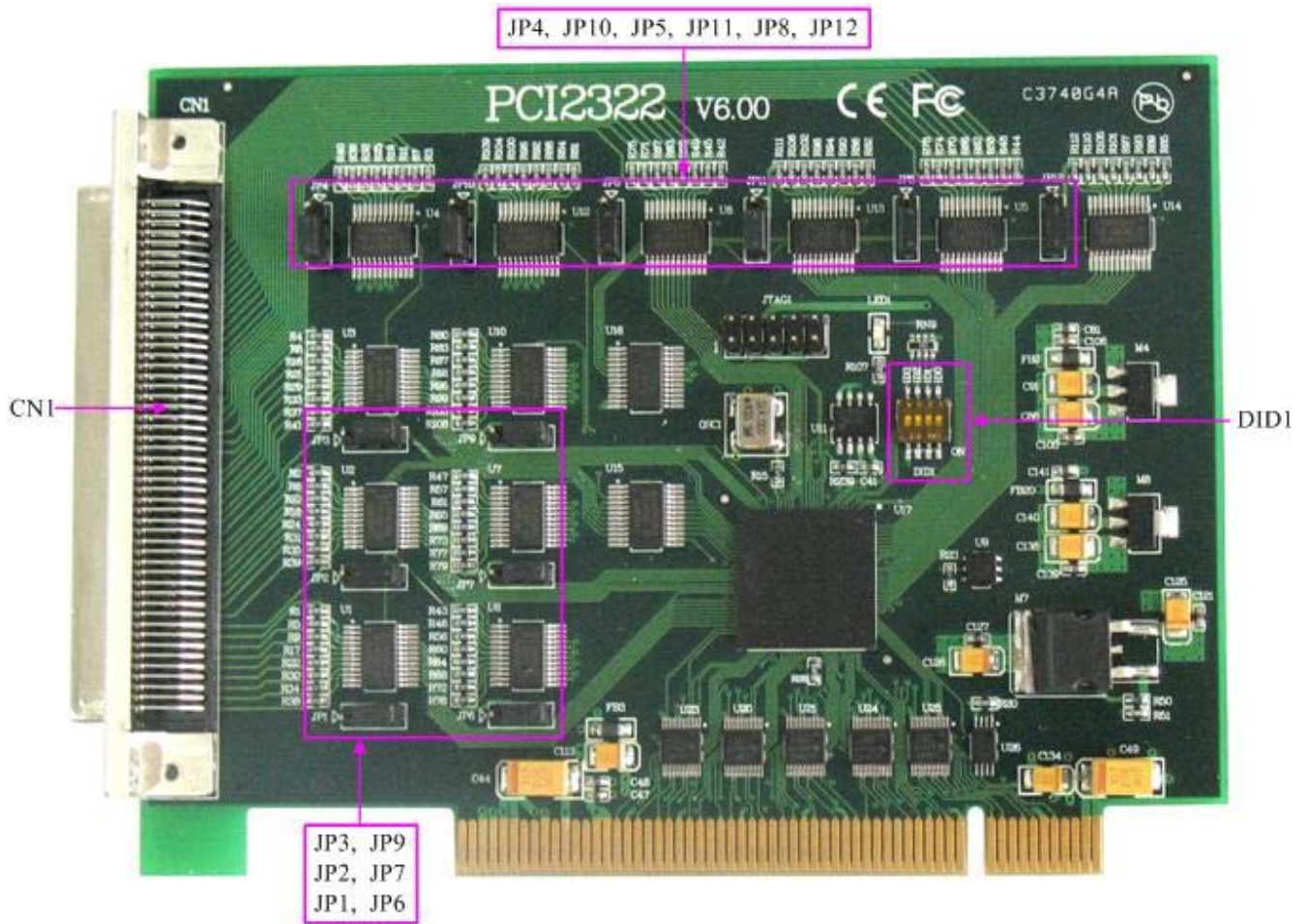
2.2 Interface Description

Please refer to the first section of the main component layout diagram, to understand the general function of the following main components.

2.2.1 Signal Connector

CN1: signal input and output connector

2.2.2 Physical ID of DIP Switch

DID1: Set physical ID number. When the PC is installed more than one PCI2322 , you can use the DIP switch to set a physical ID number for each board, which makes it very convenient for users to distinguish and visit each board in the progress of the hardware configuration and software programming. The following four-place numbers are expressed by the binary system: When DIP switch points to "ON", that means "1", and when it points to the other side, that means "0." As they are shown in the following diagrams: place "ID3" is the high bit."ID0" is the low bit, and the black part in the diagram represents the location of the switch. (Test software of the company often use the logic ID management equipments and at this moment the physical ID DIP switch is invalid. If you want to use more than one kind of the equipments in one and the same system at the same time, please use the physical ID as much as possible.).
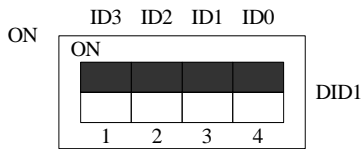
The above chart shows"1111", so it means that the physical ID is 15.
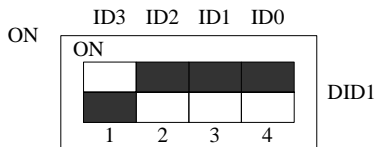
The above chart shows"0111", so it means that the physical ID is 7.
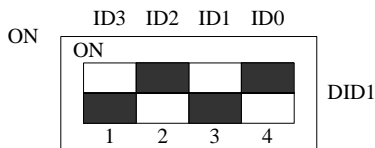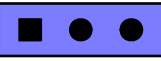
The above chart shows"0101", so it means that the physical ID is 5.

ID3	ID2	ID1	ID0	Physical ID（Hex）	Physical ID（Dec）
OFF（0）	OFF（0）	OFF（0）	OFF（0）	0	0
OFF（0）	OFF（0）	OFF（0）	ON（1）	1	1
OFF（0）	OFF（0）	ON（1）	OFF（0）	2	2
OFF（0）	OFF（0）	ON（1）	ON（1）	3	3
OFF（0）	ON（1）	OFF（0）	OFF（0）	4	4
OFF（0）	ON（1）	OFF（0）	ON（1）	5	5
OFF（0）	ON（1）	ON（1）	OFF（0）	6	6
OFF（0）	ON（1）	ON（1）	ON（1）	7	7
ON（1）	OFF（0）	OFF（0）	OFF（0）	8	8
ON（1）	OFF（0）	OFF（0）	ON（1）	9	9
ON（1）	OFF（0）	ON（1）	OFF（0）	A	10
ON（1）	OFF（0）	ON（1）	ON（1）	B	11
ON（1）	ON（1）	OFF（0）	OFF（0）	C	12
ON（1）	ON（1）	OFF（0）	ON（1）	D	13
ON（1）	ON（1）	ON（1）	OFF（0）	E	14
ON（1）	ON（1）	ON（1）	ON（1）	F	15

2.2.3 Jumper

JP1~ JP12: the power-on status selection of the P1A ~ P4C, can be set to pull-up, drop-down or Null.

Jumpers for each port can be controlled independently, the default status is drop-down, the specific setting, please refer to the following table:

Power-on Status Selection	JP1(P1A) JP2(P1B) JP3(P1C) JP4(P2A) JP5(P2B) JP8(P2C) JP7(P3A) JP6(P3B) JP9(P3C) JP10(P4A) JP11(P4B) JP12(P4C)
Pull-up	
Drop-down	
Null	

Chapter 3 Signal Connectors

3.1 The Definition of DI/DO Connectors

CN1: 100- pin definition

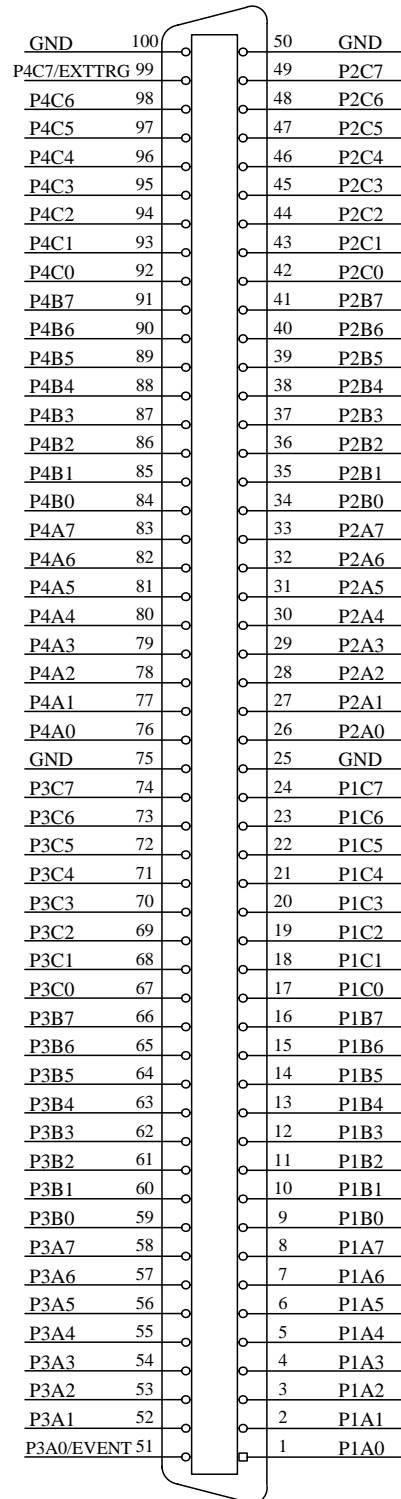|					
GND	100		50	GND	
P4C7/EXTTRG	99		49	P2C7	
P4C6	98		48	P2C6	
P4C5	97		47	P2C5	
P4C4	96		46	P2C4	
P4C3	95		45	P2C3	
P4C2	94		44	P2C2	
P4C1	93		43	P2C1	
P4C0	92		42	P2C0	
P4B7	91		41	P2B7	
P4B6	90		40	P2B6	
P4B5	89		39	P2B5	
P4B4	88		38	P2B4	
P4B3	87		37	P2B3	
P4B2	86		36	P2B2	
P4B1	85		35	P2B1	
P4B0	84		34	P2B0	
P4A7	83		33	P2A7	
P4A6	82		32	P2A6	
P4A5	81		31	P2A5	
P4A4	80		30	P2A4	
P4A3	79		29	P2A3	
P4A2	78		28	P2A2	
P4A1	77		27	P2A1	
P4A0	76		26	P2A0	
GND	75		25	GND	
P3C7	74		24	P1C7	
P3C6	73		23	P1C6	
P3C5	72		22	P1C5	
P3C4	71		21	P1C4	
P3C3	70		20	P1C3	
P3C2	69		19	P1C2	
P3C1	68		18	P1C1	
P3C0	67		17	P1C0	
P3B7	66		16	P1B7	
P3B6	65		15	P1B6	
P3B5	64		14	P1B5	
P3B4	63		13	P1B4	
P3B3	62		12	P1B3	
P3B2	61		11	P1B2	
P3B1	60		10	P1B1	
P3B0	59		9	P1B0	
P3A7	58		8	P1A7	
P3A6	57		7	P1A6	
P3A5	56		6	P1A5	
P3A4	55		5	P1A4	
P3A3	54		4	P1A3	
P3A2	53		3	P1A2	
P3A1	52		2	P1A1	
P3A0/EVENT	51		1	P1A0	

Pin definition

Signal Name	Type	Definition
P1A0～P1A7	Input/Output	8 digital inputs/outputs of the P1A port.
P1B0～P1B7	Input/Output	8 digital inputs/outputs of the P1B port.
P1C0～P1C7	Input/Output	8 digital inputs/outputs of the P1C port.
P2A0～P2A7	Input/Output	8 digital inputs/outputs of the P2A port.
P2B0～P2B7	Input/Output	8 digital inputs/outputs of the P2B port.
P2C0～P2C7	Input/Output	8 digital inputs/outputs of the P2C port.
P3A0～P3A7	Input/Output	8 digital inputs/outputs of the P3A port.
P3B0～P3B7	Input/Output	8 digital inputs/outputs of the P3B port.
P3C0～P3C7	Input/Output	8 digital inputs/outputs of the P3C port.
P4A0～P4A7	Input/Output	8 digital inputs/outputs of the P4A port.
P4B0～P4B7	Input/Output	8 digital inputs/outputs of the P4B port.
P4C0～P4C7	Input/Output	8 digital inputs/outputs of the P4C port.
EVENT	Input	Multiplexed pin with P3A0, the clock of external counter input port.
EXTTRG	Input	Multiplexed pin with P4C7, the external trigger signal input port.
GND	GND	Digital ground.

3.2 Digital Signal Connection

12 ports can be independently configured as input or output port.
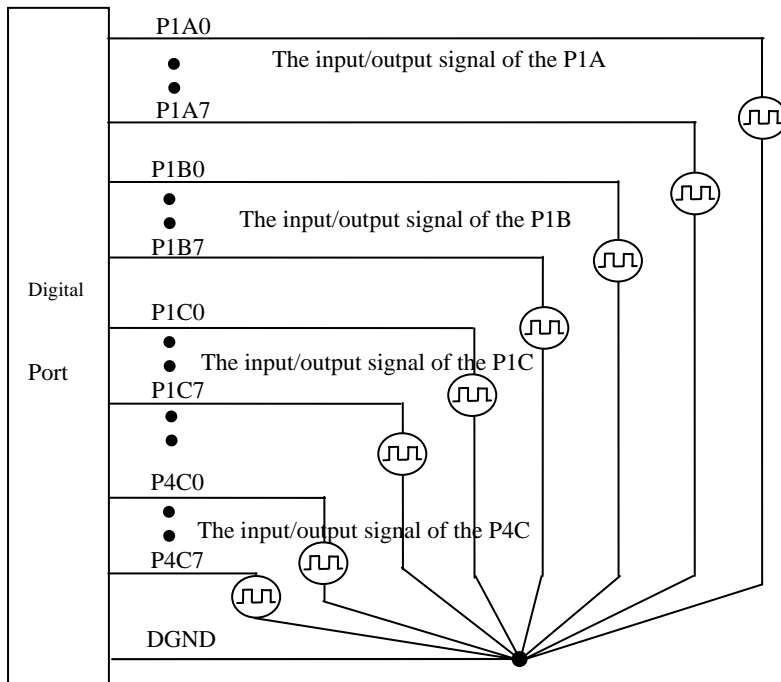
Chapter 4 Operation Principle

4.1 Digital Port

The PCI2322 emulates four 8255 Programmable Peripheral Interface (PPI) chips. Each PPI offers 3 8-bit DIO ports (A, B, C) which can be accessed simultaneously. The total 12 ports can be programmed as input or output independently.
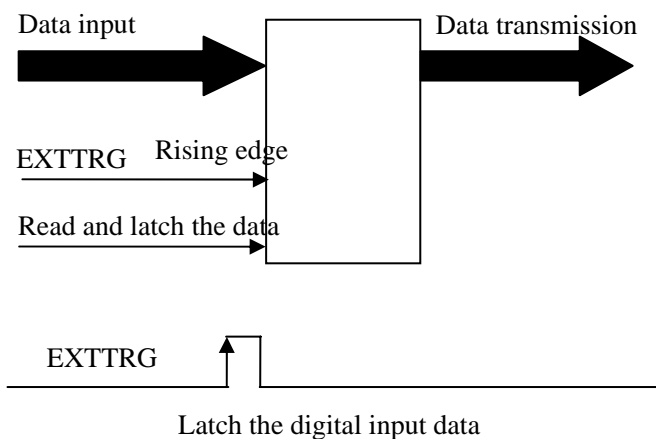
4.1.1 Configure the Port to Digital Input

When the 99-pin (P4C7/EXTTRG) of CN1is used for external trigger input, the rising edge is active, the user can receive the external trigger signal to latch input data.

When select the port as input, and click the "P1/P2/P3/P4 enable the external trigger function" box, the A, B, C port of the P1, P2, P3 or P4 will read the input status and latch in the rising edge of the EXTTRG signal, and it will read again until the next rising edge of the EXTTRG signal.

If do not select the "P1/P2/P3/P4 enable the external trigger function", then the port is used as the general IO port, the change of the EXTTRG signal input state does not affect the reading of the input status, the change of the port input status according to the external signal .

4.1.2 Configure the Port to Digital Output

When select the port as output, the channels of the each port can be set to On or Off by the software, the corresponding output state will also change, can use multimeter to measure the output level.

Data input   Data transmission

EXTTRG   Rising edge

Read and latch the data

EXTTRG

Latch the digital input data

4.2 Interrupt

There are two sources of interrupt signals: INT1and INT2, the interrupt signal can be generated by digital input signal, timer/event counter interrupt signal, or the COS signal, and we can select the interrupt source by the software.
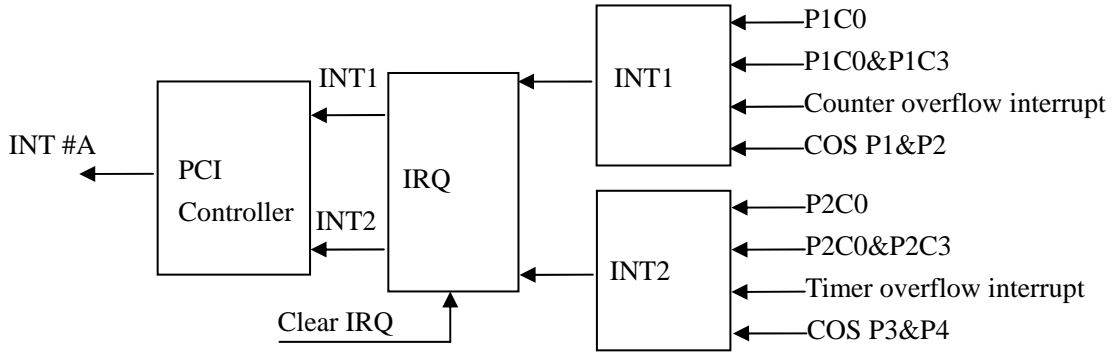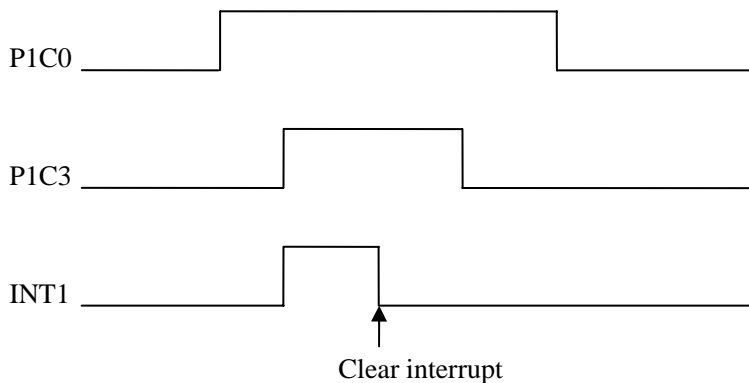

4.2.1 INT1 Interrupt

(1) P1C0 falling edge interrupt

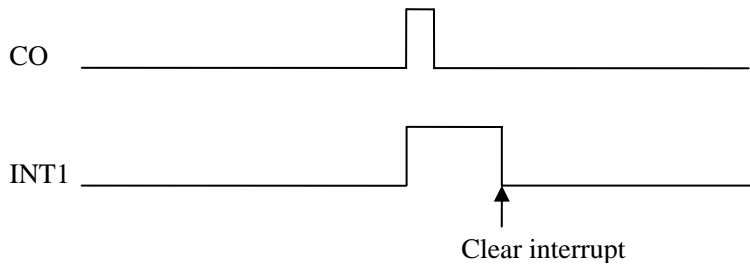When there is falling edge signal of the P1C0, it generates an interrupt signal.
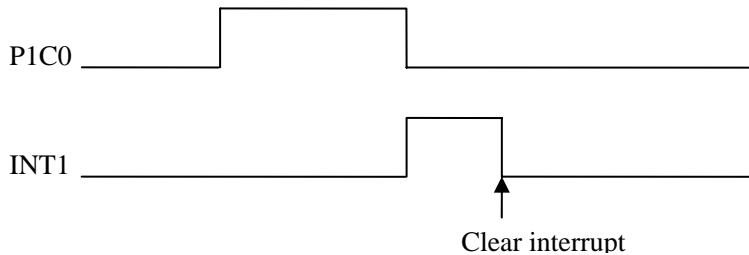
(2) P1C0 and P1C3 interrupt

When the signal of the P1C0 is high-level, if the P1C3 port has rising edge, then it will generate interrupt signal.
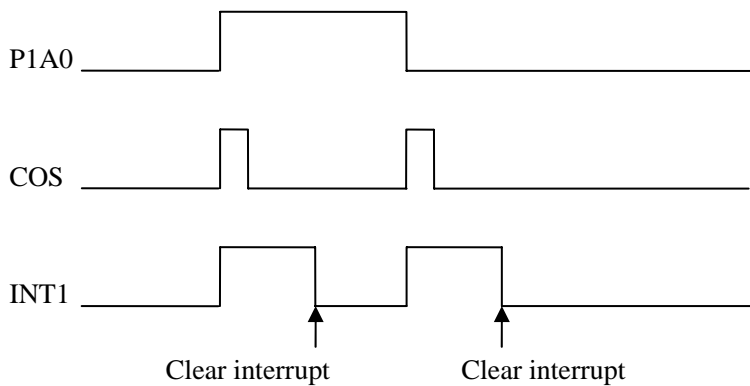

(3) External counter interrupt

The 51-pin (P3A0EVENT) of CN1 is the external counter clock input, after set the initial value, it starts to count, under the rising edge of the EVENT signal, it does the reducing the count, when the value reaches 0, the counter overflows, generates a pulse signal CO, and generates an interrupt signal.

CO _____⎡‾⎤_____

INT1 _____⎡‾‾‾⎤_____
                                          ↑
                                   Clear interrupt

(4) COS-P1 & P2 interrupt source

COS: the COS (Change of State) means when the input state (logic level) is changed from low to high, or from high to low. The COS detection circuit will detect the edge of level change. In the PCI2322 card, the COS detection circuit is applied to all the input channels of the P1&P2 port. When any channel changes its logic level, the COS detection circuit Generates an interrupt request to PCI controller.

P1A0 _____⎡‾‾‾‾‾‾‾‾‾‾⎤_____

COS _____⎡‾⎤_____⎡‾⎤_____

INT1 _____⎡‾‾‾⎤_____⎡‾‾‾⎤_____
                        ↑   ↑
                 Clear interrupt   Clear interrupt

4.2.2 INT2 Interrupt

(1) P2C0 falling edge interrupt

When there is falling edge signal of the P2C0, it generates an interrupt signal.

(2) P2C0 and P2C3 interrupt

When the signal of the P2C0 is high-level, if the P2C3 port has rising edge, then it will generate interrupt signal.

(3) Internal timer interrupt

Internal counter mode, the counter clock is 2M, after set the initial value, it starts to count, under the internal timing signal, it does the reducing the count, when the value reaches 0, the counter overflows, generates a pulse signal CO, and generates an interrupt signal. Counter automatically reload the initial value to start counting.

(4) COS-P3 & P4 interrupt source

COS: the COS (Change of State) means when the input state (logic level) is changed from low to high, or from high to low. The COS detection circuit will detect the edge of level change. In the PCI2322 card, the COS detection circuit is applied to all the input channels of the P3&P4 port. When any channel changes its logic level, the COS detection circuit Generates an interrupt request to PCI controller.

4.3 Counter/Timer

PCI2322 supports a programmable 32-bit event counter to generate event interrupt (EVENT) and a programmable 32-bit timer to generate timer interrupt (internal timer)

The EVENT pin of the CN1is used for the external counter clock input port, allows the counter does reducing count under the clock signal input from the EVENT pin, generate the interrupt if it counts to 0.

In internal counter mode, the counter clock is 2M, it allows the counter under the internal clock to count, generate the interrupt if it counts to 0, and the counter automatically reload the initial value to start the counting.

Chapter 5 Notes and Warranty Policy

5.1 Notes

In our products' packing, user can find a user manual, a PCI2322 module and a quality guarantee card. Users must keep quality guarantee card carefully, if the products have some problems and need repairing, please send products together with quality guarantee card to ART, we will provide good after-sale service and solve the problem as quickly as we can.

When using PCI2322, in order to prevent the IC (chip) from electrostatic harm, please do not touch IC (chip) in the front panel of PCI2322 module.

5.2 Warranty Policy

Thank you for choosing ART. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully.

1. Before using ART's products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: www.art-control.com.

2. All ART products come with a limited two-year warranty:

➢ The warranty period starts on the day the product is shipped from ART's factory

➢ For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ART is not responsible for any loss of data.

➢ Please ensure the use of properly licensed software with our systems. ART does not condone the use of pirated software and will not service systems using such software. ART will not be held legally responsible for products shipped with unlicensed software installed by the user.

3. Our repair service is not covered by ART's guarantee in the following situations:

➢ Damage caused by not following instructions in the User's Manual.

➢ Damage caused by carelessness on the user's part during product transportation.

➢ Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals).

➢ Damage from improper repair by unauthorized ART technicians.

➢ Products with altered and/or damaged serial numbers are not entitled to our service.

4. Customers are responsible for shipping costs to transport damaged products to our company or sales office.

5. To ensure the speed and quality of product repair, please download an RMA application form from our company website.

Products Rapid Installation and Self-check

Rapid Installation

Product-driven procedure is the operating system adaptive installation mode. After inserting the disc, you can select the appropriate board type on the pop-up interface, click the button【driver installation】; or select CD-ROM drive in Resource Explorer, locate the product catalog and enter into the APP folder, and implement Setup.exe file. After the installation, pop-up CD-ROM, shut off your computer, insert the PCI card. If it is a USB product, it can be directly inserted into the device. When the system prompts that it finds a new hardware, you do not specify a drive path, the operating system can automatically look up it from the system directory, and then you can complete the installation.

Self-check

At this moment, there should be installation information of the installed device in the Device Manager (when the device does not work, you can check this item.). Open "Start -> Programs -> ART Demonstration Monitoring and Control System -> Corresponding Board -> Advanced Testing Presentation System", the program is a standard testing procedure. Based on the specification of Pin definition, connect the signal acquisition data and test whether AD is normal or not. Connect the input pins to the corresponding output pins and use the testing procedure to test whether the switch is normal or not.

Delete Wrong Installation

When you select the wrong drive, or viruses lead to driver error, you can carry out the following operations: In Resource Explorer, open CD-ROM drive, run Others-> SUPPORT-> PCI.bat procedures, and delete the hardware information that relevant to our boards, and then carry out the process of section I all over again, we can complete the new installation.