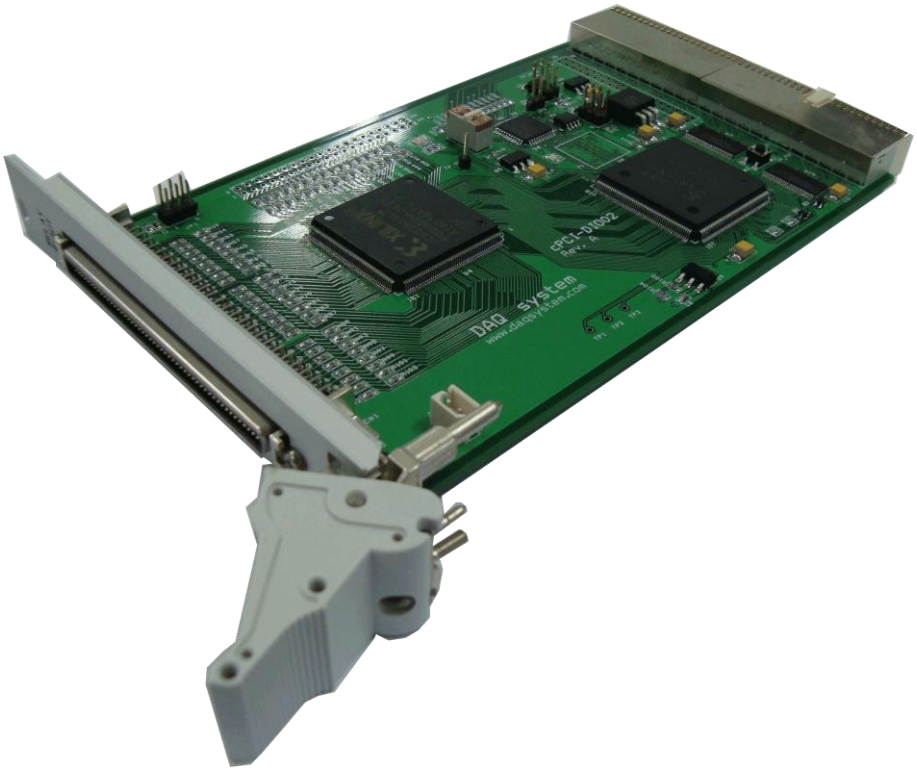
cPCI-DIO02

User Manual

Version 1.0



DAQ SYSTEM
Measurement & Automation

Contents

1. Introduction

cPCI-DIO02 is a 128-bit digital input/output board that is perfectly compatible with industrial PCs and uses a 33bits, 33MHz PCI interface. All control of this board is designed with FPGA (Field Programmable Gate Array), so function enhancement or modification is free, and it can be easily upgraded according to the user's needs.

1-1 Product Features

Items	Description	Remark
Hardware		
PC Interface	Compact PCI	32bit/33Mhz
Operation Power	+5VDC/ Max 1A	
I/O Port	MDR 100pin	MINI MDR Type
Feature	128bit Digital I/O	Programmed I/O : Direction control grouped by 16bit Maximum Transfer Speed : 8Mbytes/sec
I/O level	CMOS, TTL level	
Output Type	CMOS level	
Simultaneous use of boards	Max. 4	
Operating temperature range	0 ~ 60℃	
Storage temperature range	-20 ~ 80℃	
Humidity range	5 ~ 95%	Non-condensing
Board size	3U Size	Compact PCI
Software		
OS	Windows 2000/XP/7/8/10 (32/64bit)	
API	Windows Client DLL API	
Support	Sample Program	VC++

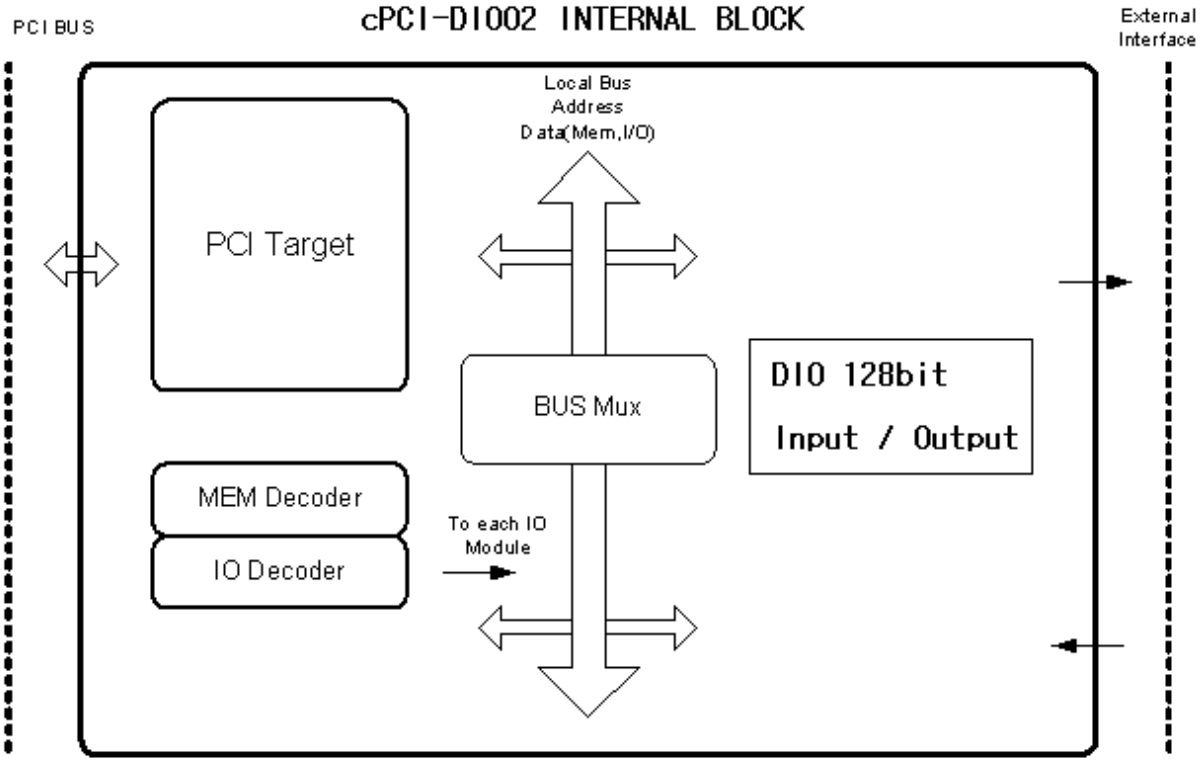
➢ DAQ System Digital I/O Products

Product	No. In/Out	Timer/Counter	Specification
cPCI-DIO6400	32/32		Isolated Input/Output
cPCI-DIO02	128 channels Software Configurable		Read/Write in 8 Groups in 16-bit Units
PCI(e)-DIO6400	32/32		Isolated Input/Output
PCI-DIO6401	64/None		Isolated Input
PCI-DIO6402	None/64		Isolated Output
PCI-DIO01	32/32 Software Configurable	1/1	TTL Level Input/Output 32bit Counter/Timer
PCI-DIO02	128 channels Software Configurable	1/1	Read/Write in 8 Groups in 16-bit Units
PCI-DIO12	16/16 or 32/32 Software Configurable		128Mbyte DDR SDRAM Data transfer rate up to 400Mb/s
PCI-MOT01	24/24 (Isolated)		1 Channel PWM, 2 Channel Encoder, 1 Channel ADC
PCI-PWM02	6/12(Isolated)		4 Channel Triggered PWM outputs
PCI(e)-TC03	16/16	8/8	32bit resolution Differential Counter/Timer
PCI-EK01	24(shared)	1/1(32bit)	12bit 8 Channel A/D Input 12bit 8 Channel D/A Output
PCIe-DIO05	32/32		TTL Level Input/Output
USB-AIO10	24/24(Isolated)		4-Ch Analog Input and Output RS-232 115,200bps Interface
USB-DIO12800	128 channels Software Configurable		Read/Write in 8 Groups in 16-bit Units
USB-DIO6400	32/32		Isolated Input/Output 12Mbps
USB-MULTI	2/None		Isolated Input/Output 16bit Counter In & Timer Out
USB-PWM10	6/8(Isolated)		4 Channel Triggered PWM outputs

2. cPCI-DIO02 Block Diagram

In the case of cPCI-DIO02, as shown in [Figure 2-1], it has 128 IO ports and is configured to interface with the outside. (Input/output can be selected and used in the program)

It is possible to select Read / Write in 8 groups of 16 bits.
- I/O level is compatible with Input CMOS / TTL level / Output is output with CMOS level.



[Figure 2-1. PCI-DIO01 Internal Block Diagram]

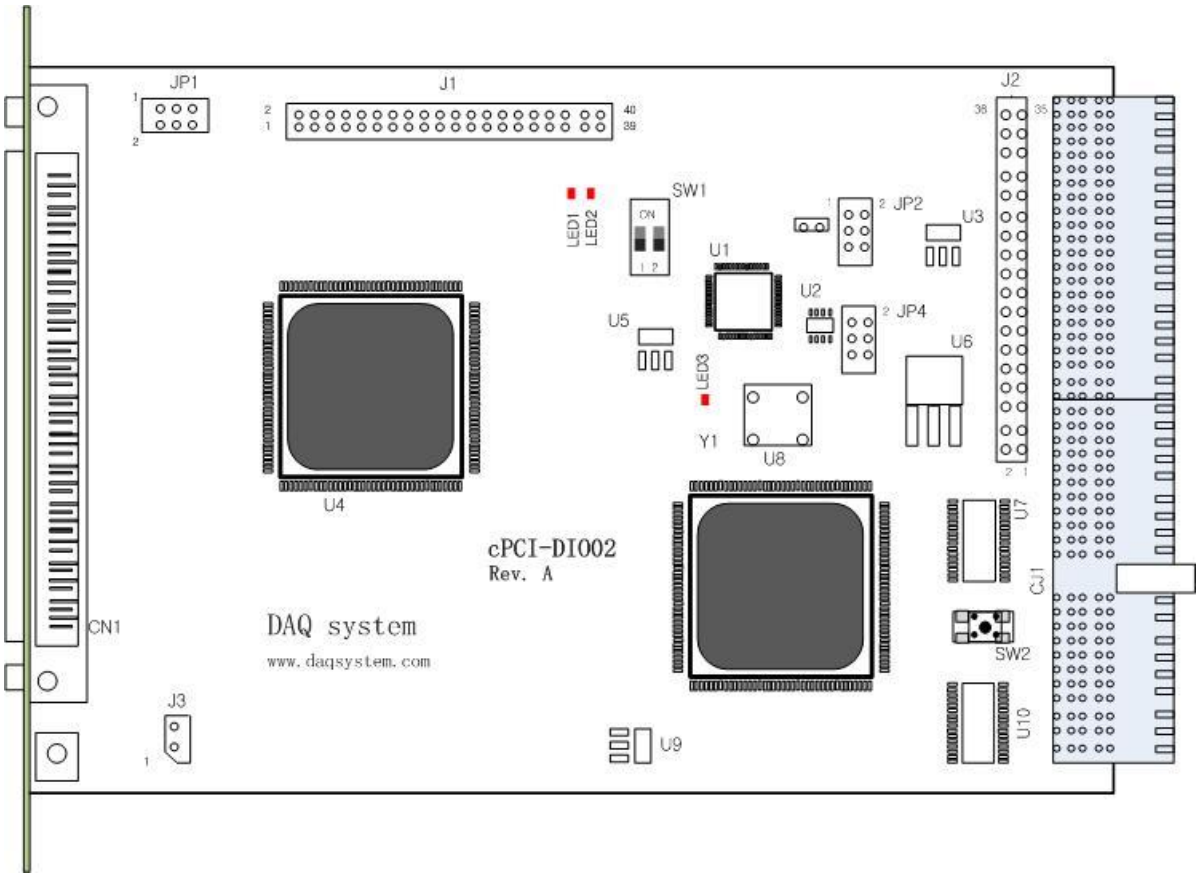
GENERAL DESCRIPTION

- PCI Specification V2.2 32bit 33MHz 5V/3.3V Compatible
- Full 33Mhz burst read/write operation
- 128bit general purpose I/O, Direction control grouped by 16bit.
- Average data rate is 30Mb data to, 8Mb data from the board without DMA
- Very flexible to upgrade because FPGA is used as PCI bridge.
- 3U size Compact PCI

3. cPCI-DIO01 Board Description

Each important board function is briefly described. For detailed function information, please refer to the parts specification.

3-1 Board Layout



[Figure 3-1. cPCI-DIO02 Layout]

There are 3 LEDs on the board, and the description of each is as follows.

LED1 : Lights up when U5 FPGA Chip is selected. (for testing)

LED2: (for testing)

LED3 : Lights up when the board finishes configuration and ready for operation.

3-2 Device Features

(1) MDR 100 pin connector: CN1

External interface (I/O 0~95)

(2) Box Header 2x20 : J1

External interface (I/O 96~127)

(3) EPLD: U1

128bit Digital I/O Expansion

(4) FPGA : U5

All functions of the board are controlled through this FPGA Logic.

(5) EPLD : U8

Serial Flash program EPLD.

(6) PCI Chipset : U4, U6

PCI Signal Control

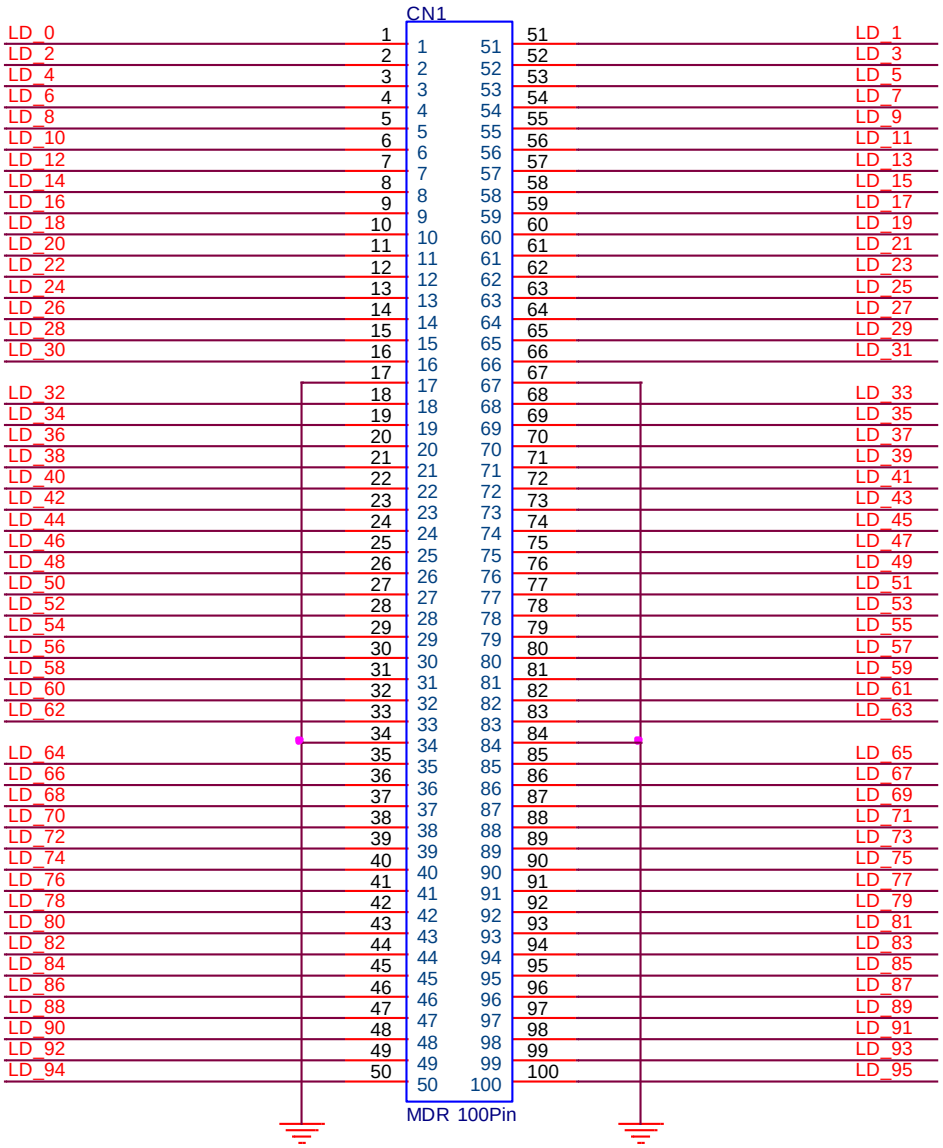
(7) Regulator : U2, U3, U7, U10

It supplies the power used by the board.

4. Connector Pin Map

This section describes the connectors and jumpers used in cPCI-DIO02. The main connectors are the MDR 100pin connector CN1 for external digital input/output connection and the expansion connector J1 connector.

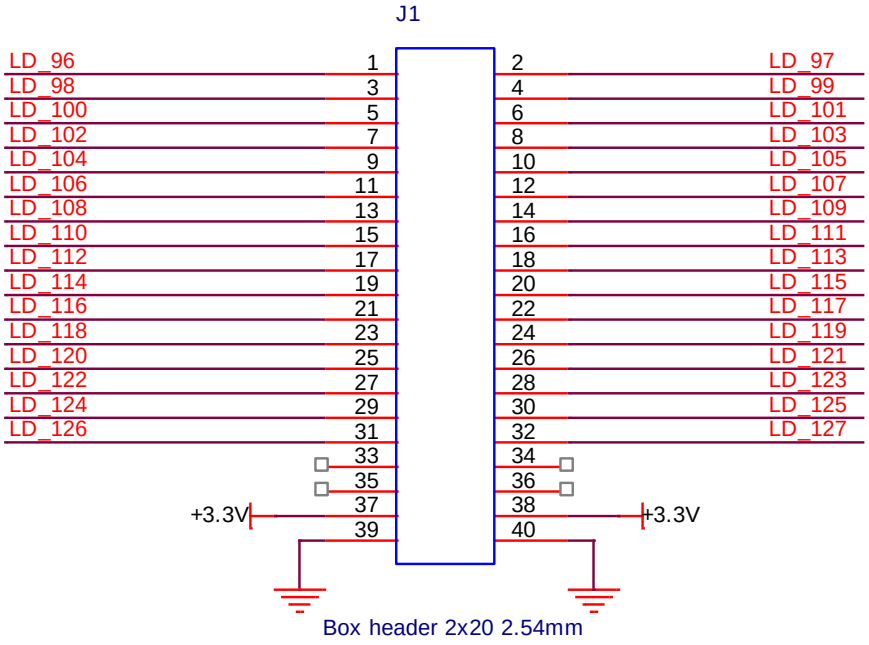
4-1 Front Panel (CN1)



[Figure 4-1. cPCI-DIO02 Front Panel – MDR 100pin]

The front panel of cPCI-DIO02 has MDR 100PIN connector, and there are a total of 96 I/O ports. The Pin Map is like the picture above.

4-2 Box Header (J1)



[Figure 4-2. cPCI-DIO02 'J2' Box-header]

32 I/O can be used as 'J1' Box header connector of cPCI-DIO02.
The PIN Map is like the picture above.

4-3 J3 Connector (2Pin Header, 2.54mm)

This is a 3.3V external DC power connector. Power used when installing CPLD or FPGA and is not normally used.

4-4 JP1 Connector

JP1 is a JTAG (Joint Test Action Group) connector and is used to update the U1 CPLD (XC95288XL) program of the board. Do not use when operating the board normally.

4-5 JP2 Connector

JP2 is a JTAG (Joint Test Action Group) connector and is used to update the FPGA program on the board. Do not use when operating the board normally.

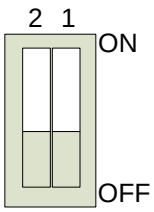
4-6 JP4 Connector

JP4 is a JTAG (Joint Test Action Group) connector and is used to update the U8 CPLD (XC9536) program of the board. Do not use when operating the board normally.

4-7 SW1

In a system that requires many I/O ports, if several DIO02 series boards are installed in one system, each board address must be used separately. At this time, each board classification uses the dip switch (SW1) on the board.
The total number of boards installed in one system is four.

SW1 Setup



1	2	Board No.
OFF	OFF	0
ON	OFF	1
OFF	ON	2
ON	ON	3

[Figure 4-3. Board Address Setup]

4-8 I/O Register Map

VENDOR ID : 0x0303 DEVICE ID : 0x7040

<IO MAP>

IO-offset	NAME	BIT 할당	DESC
0x00	Local Data #0	bit15~0	LD00~LD15 Data
0x04	Local Data #1		LD16~LD31 Data
0x08	Local Data #2		LD32~LD47 Data
0x0C	Local Data #3		LD48~LD63 Data
0x10	Local Data #4		LD64~LD79 Data
0x14	Local Data #5		LD80~LD95 Data
0x18	Local Data #6		LD96~LD111 Data
0x1C	Local Data #7		LD112~LD127 Data
0x20	Data Direction	bit7~0	Group Data Direction 'H' : output, 'L' : input bit0 : Local Data #0 bit1 : Local Data #1 bit2 : Local Data #2 bit3 : Local Data #3 bit4 : Local Data #4 bit5 : Local Data #5 bit6 : Local Data #6 bit7 : Local Data #7
0xF0	Board Number	bit1~0	Board Number Selection

5. Installation

Before installing the board, check that the contents of the package are intact.

5-1 Hardware Installation

5-1-1 Product Contents

1. cPCI-DIO02 Board
2. CD (Driver/Manual/API/Sample Source etc.)

5-1-2 Installation Process

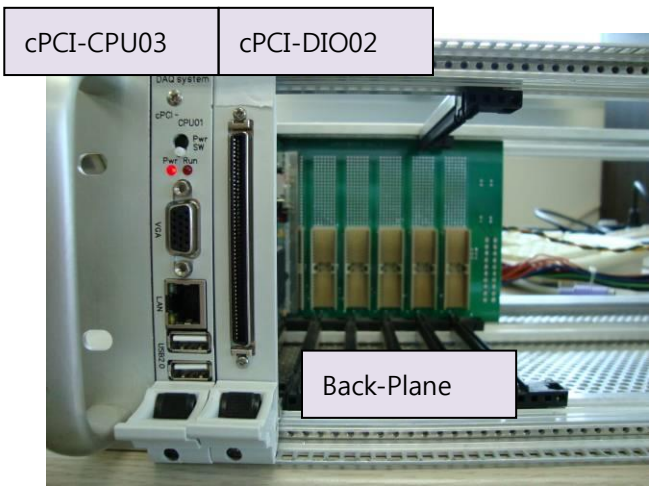
① Turn off the computer.

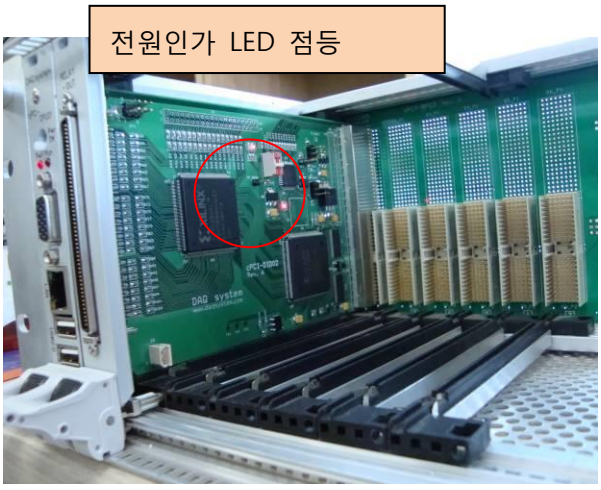
② Remove the computer cover according to the computer manual.

③ After removing the blocked part at the back of the computer case in the slot where the board is inserted, tightly fasten the screws between the bracket of the board and the case.

④ In case of multi-board, repeat from step 2.

⑤ When the power is off, plug the cPCI-DIO02 board into the PCI SLOT and apply power, LED3 turns on, and LEDs 1 and 2 repeat On/Off.





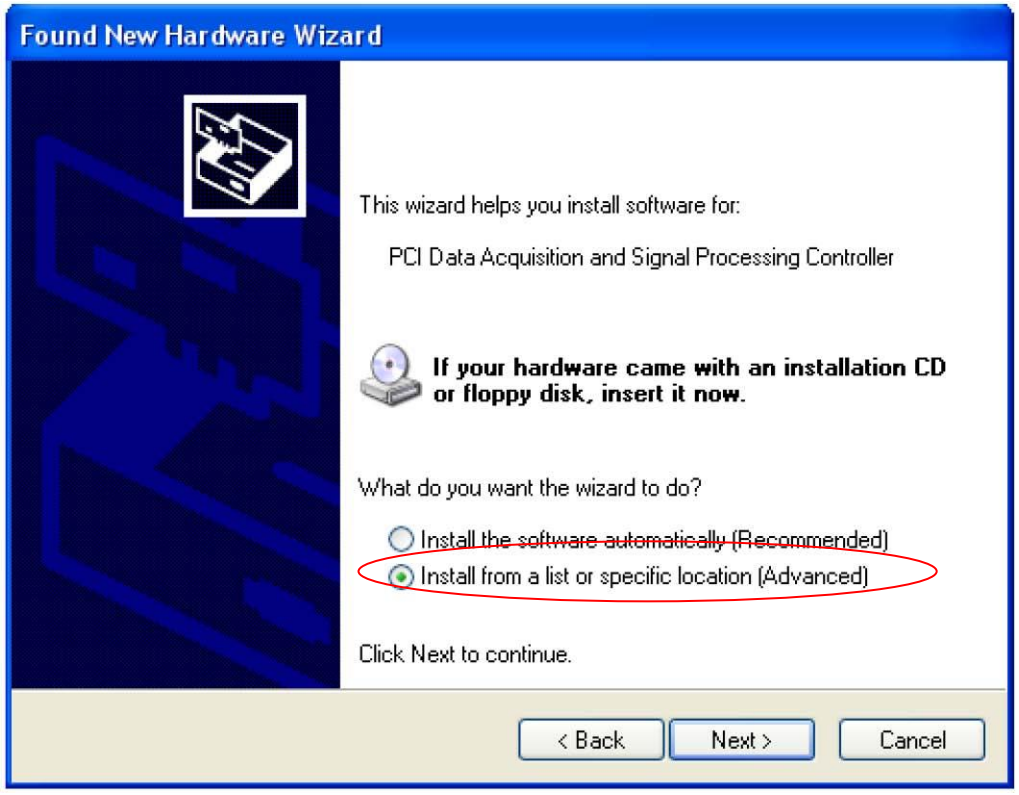
5-2 Driver Installation

After installing the board, install the driver and sample application to run the board on your PC. For installation, use the supplied CD.

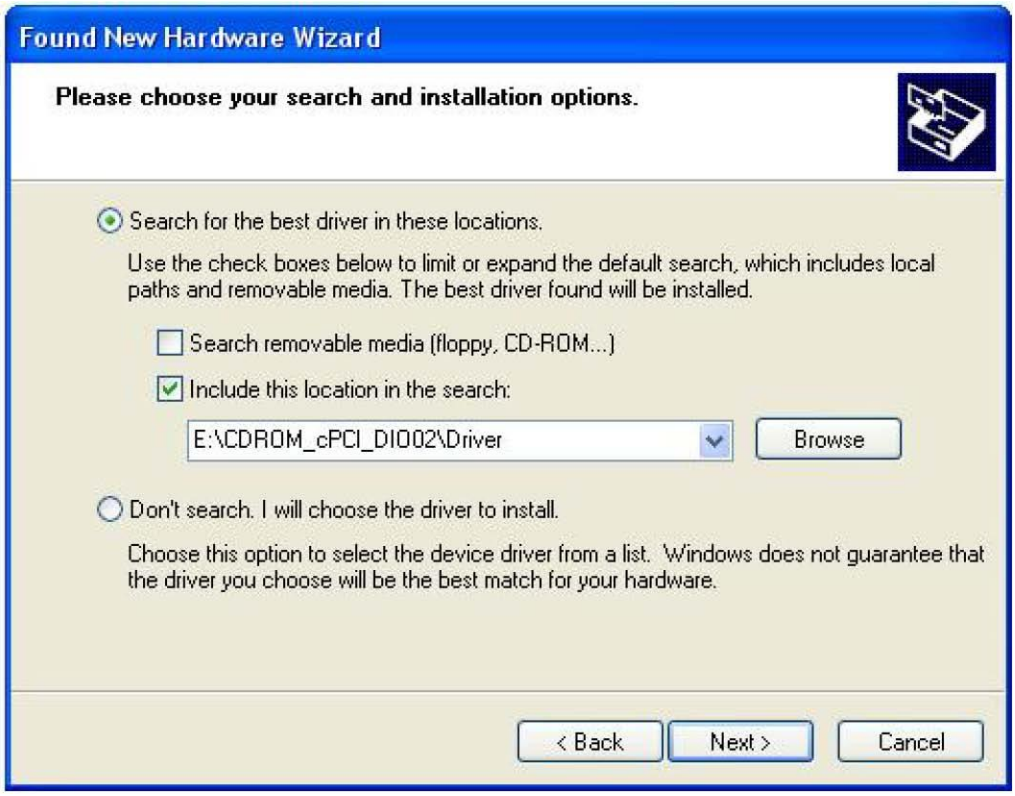
The installation procedure is as follows, and unless otherwise specified, it is explained based on Windows XP.

The board environment must be Windows 2000 SP4 or higher and Windows XP SP1 or higher. First, turn off the PC's power, plug the cPCI-DIO02 board into the Compact PCI Slot, and turn on the PC's power. When the "Start New Hardware Wizard" window opens as shown below, selects it as shown below and click the Next button.

1. Select as below and click the Next button

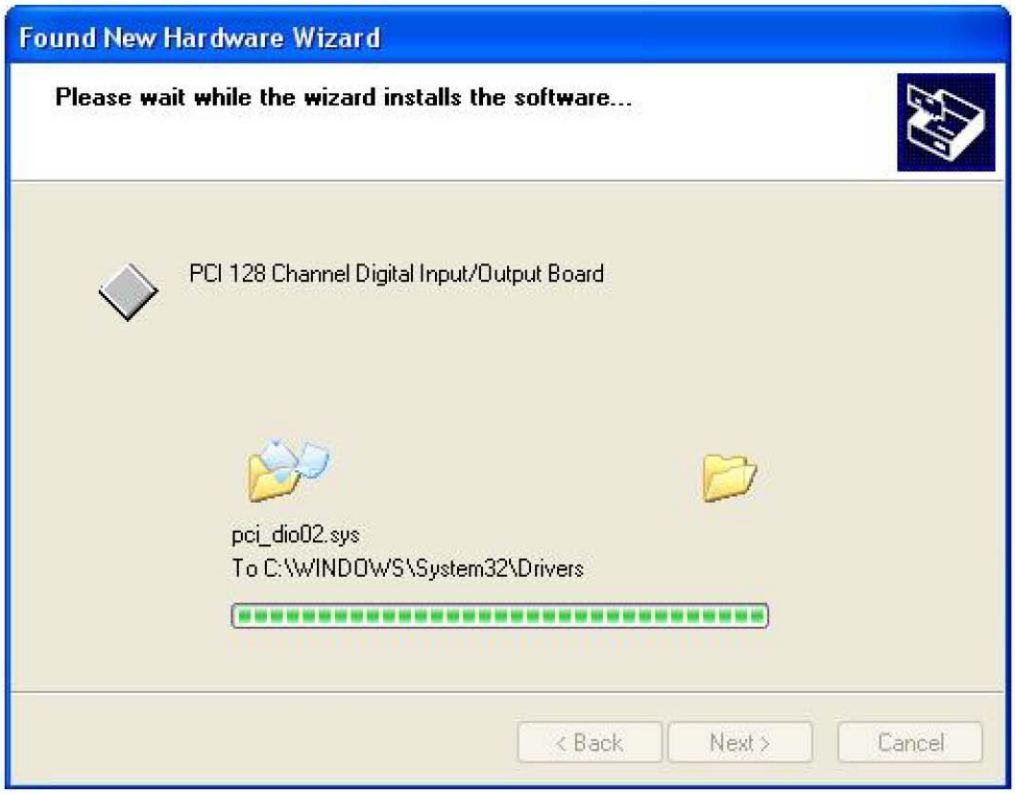


2. Select Driver from the enclosed CD and click the Next button.



3. Click the Next button.

The driver folder contains **"pci_di02.inf"** and **"pci_dio02.sys"** files required for driver installation. Click Next to install the driver files.

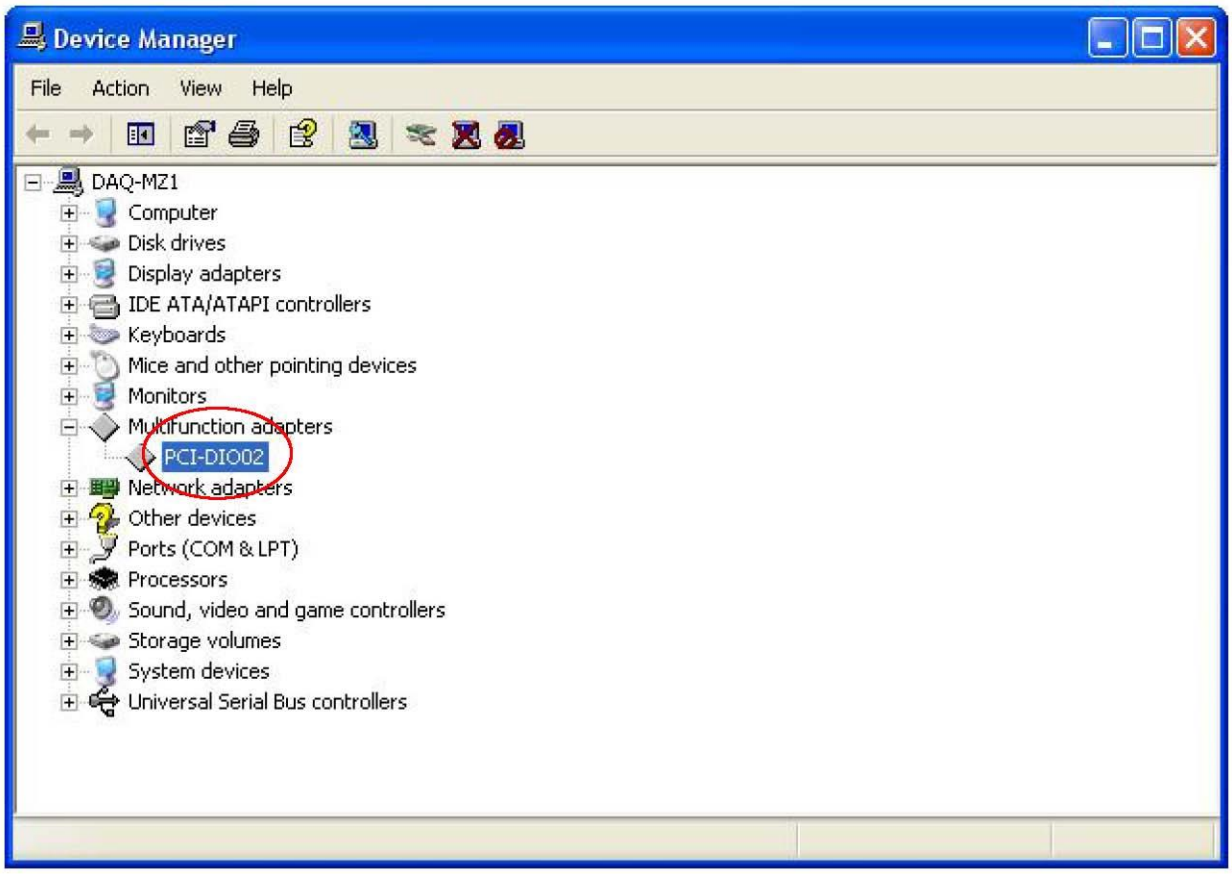


4. When the installation is completed normally, it is shown in the figure below.

5. When the installation is complete, check whether the driver is installed normally in the following way.

6. My Computer -> Properties -> Hardware -> Device Manager
   Check if **multifunction adapter -> "cPCI-DIO02"** is installed. If it appears as shown in the figure below, the installation has been completed normally.

7. If it appears as shown in the figure below, the installation has been completed normally.



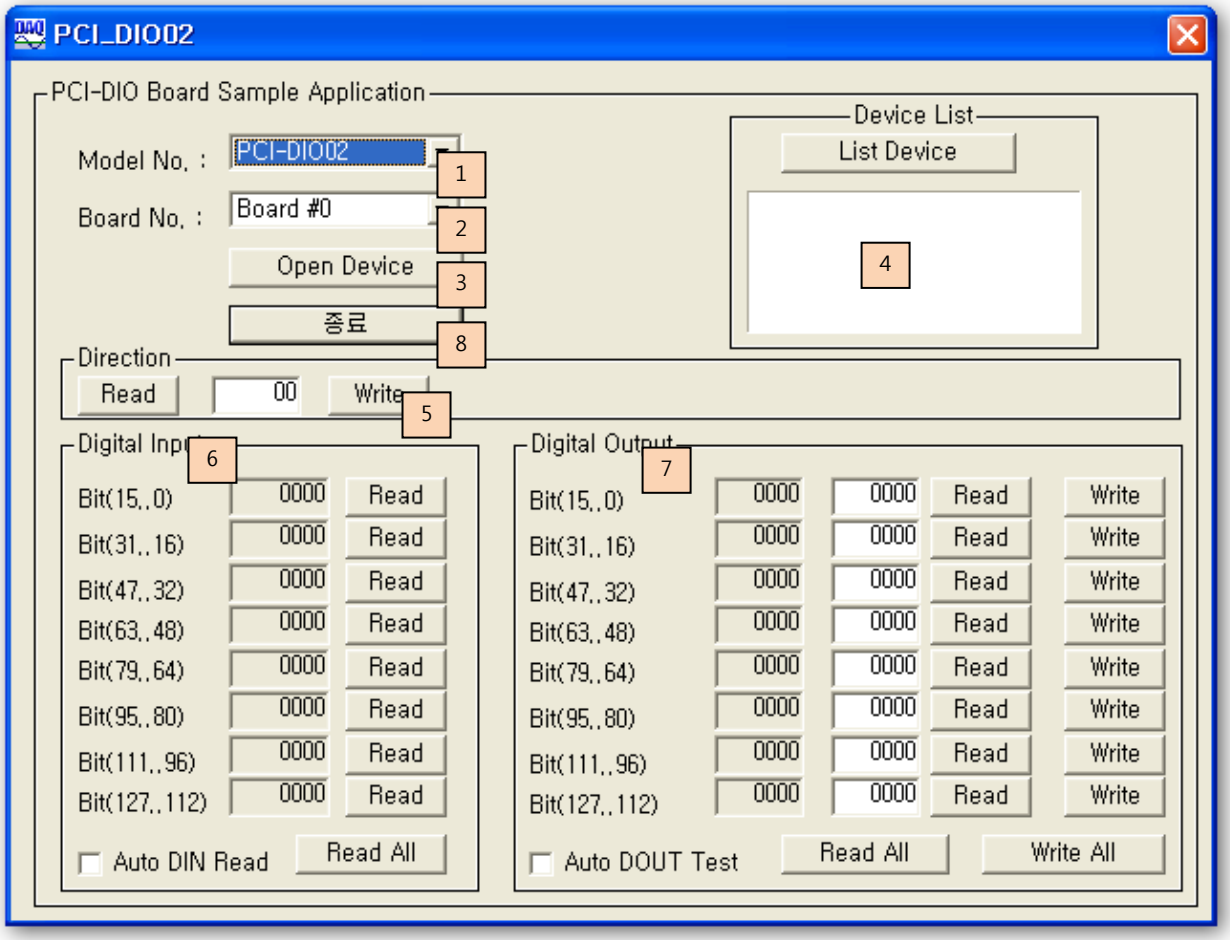
The above picture shows the screen where the PCI-DIO02" (*The cPCI-DIO02 uses a same driver with PCI-DIO02 because of compatibility.*) product is normally installed in the PC.
(Check the red circle)

(Note) After initial installation, it is recommended to reboot the PC for normal operation.

6. Sample Program

In the APP folder of the CDROM provided with the board, a sample program "PCI_DIO02.exe" is provided for easy use of the board. In order to test the sample program, the driver of the board must be installed first.

The sample program is provided in the form of a source so that the API provided to use the board can be tested briefly, so the user can modify it and use it.



[Figure 6-1. Sample program "PCI_DIO02.exe" execution screen]

API (Application Programming Interface) is required to use the above sample program. API is provided in the form of "DLL", and import library and header file are required to compile. In order to run the sample program normally, the API DLL (PCI_DIO02.DLL) must be in the folder of the executable file, or in the Windows system folder or the folder specified by the Path environment variable.

(1) **'Model No' Button**

Select the motel name cPCI-DIO02.

(2) **'Board No' Button**

Select the selected board number (Board #0 ~ Board #3) when clicked. The board number is set to SW1 in the board and up to 4 units can be connected.

(3) **'Open Device' Button**

Open the selected board.

(4) **'List Device' Button**

Indicates the board numbers installed in the system. (Not applied)

(5) **'Direction' Button**

Select Read / Write. It can be selected in units of 16 bits.

8bit Each bit '0' Temporary Read

'1' Temporary Write

[Bit15..0] The least significant bit sets 0~15 group.

[Bit129..112] Highest bit sets 112~127 group.

(6) **'Digital Input' Window**

Check the corresponding bit (16bit) value for each group. When the Read button is clicked, the input value of the corresponding group is displayed.

When checking **'Auto DIN Read**', check the increased output port value in **'Auto DOUT Test'** or continuously show the input port input value.

'Read All' checks the input of all groups.

(7) **'Digital Output' Window**

Check the output value for each 16bit group.

When the **'Read'** button is clicked, the written value is displayed.

When the **'Write'** button is clicked, the value is written to the port.

When **'Auto DOUT Test'** is checked, data is written sequentially to the group set as Output.

'Read / Write All' checks the input/output of all groups.

(8) **'종료' Button**

Terminate the program.

Appendix

A-1 Repair Regulations

Thank you for purchasing DAQ SYSTEM's product. Please refer to the following regarding Customer Service stipulated by DAQ SYSTEM.

(1) Please read the user's manual and follow the instructions before using the DAQ SYSTEM product.

(2) When returning the product to be repaired, please send it to the head office with the symptoms of the malfunction as well.

(3) All DAQ SYSTEM products have a one-year warranty.
-. The warranty period is counted from the date the product is shipped from DAQ SYSTEM.
-. Peripherals and third-party products not manufactured by DAQ SYSTEM are covered by the manufacturer's warranty.
-. If repair is required, please contact the contact points below.

(4) Even during the free repair warranty period, paid repairs are made in the following cases.
① Failure or damage caused by not following the user's manual
② Failure or damage caused by customer negligence during product transportation after purchase
③ Natural phenomena such as fire, earthquake, flood, lightning, pollution, etc. or power supply exceeding the recommended range malfunction or damage
④ Failures caused by inappropriate storage environment (eg, high temperature, high humidity, volatile chemicals, etc.) damaged
⑤ Failure or damage due to unreasonable repair or modification
⑥ Products whose serial number has been changed or intentionally removed
⑦ In the event that DAQ SYSTEM determines that it is the customer's negligence for other reasons

(5) The customer must bear the shipping cost of returning the repaired product to DAQ SYSTEM.

(6) The manufacturer is not responsible for any problems caused by incorrect use regardless of our Warranty provisions.

References

1. PCI System Architecture

-- MindShare Inc.

2. PCI Local Bus Specification

-- PCI-SIG

3. AN201 How to build application using APIs

-- DAQ system

4. AN242 PCI-DIO02 API Programming

-- DAQ system

MEMO

Contact Point

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