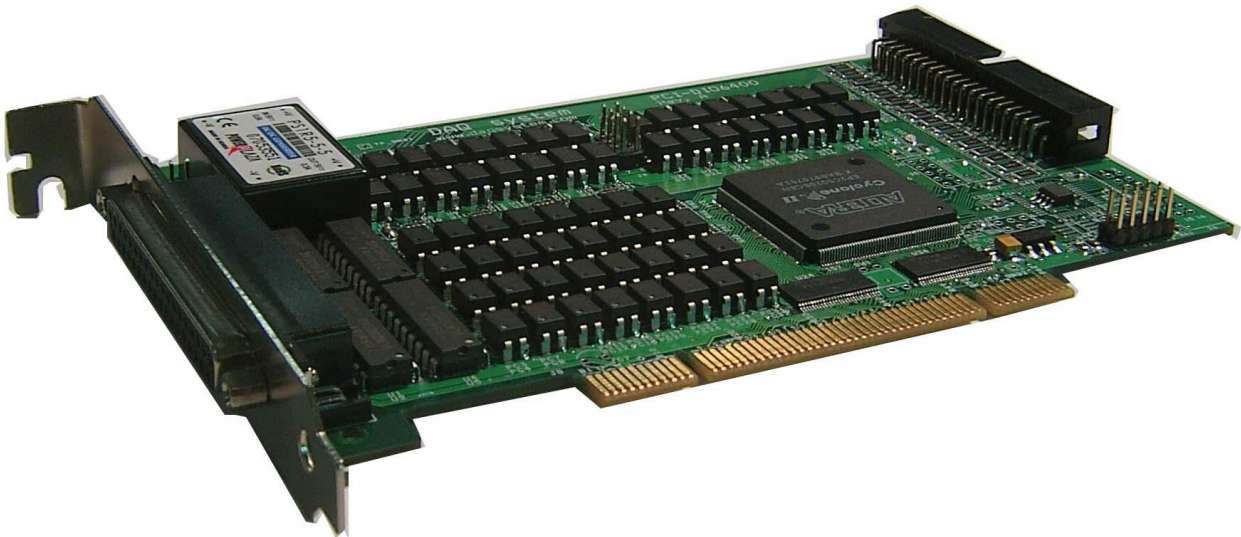


PCI-DIO64xx

PCI-DIO6400 I/O Board
PCI-DIO6401 Input Board
PCI-DIO6402 Output Board
cPCI-DIO6400 I/O Board

User Manual

Version 1.0



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1. Introduction

The PCI-DIO6400 series board is a 32/64 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.

MODELS SUMMARY

[Table 1. DAQ PCI-64xx Series Models]

<i>Model</i>	<i>Connector</i>	<i>Digital I/O</i>
PCI-DIO6400	<ul style="list-style-type: none"> ▪ Input Connector : Box-shaped Ribbon cable (Hirose HIF3F-40PA-2.54DS) ▪ Output Connector : Dsub-37pin female Type 	32/32
PCI-DIO6401	<ul style="list-style-type: none"> ▪ Input Connector : Box-shaped Ribbon cable (Hirose HIF3F-40PA-2.54DS), Dsub-37pin Female Type 	64/None
PCI-DIO6402	<ul style="list-style-type: none"> ▪ Output Connector : 40 Pin Box-Header (Hirose HIF3F-40PA-2.54DS), Dsub-37pin Female Type 	None/64
cPCI-DIO6400	<ul style="list-style-type: none"> ▪ Front Panel : Indication LED ▪ I/O Connector : Compact PCI Female(Emi 064785) Type ▪ External panel Connector : Dsub-37pin female Type 	32/32

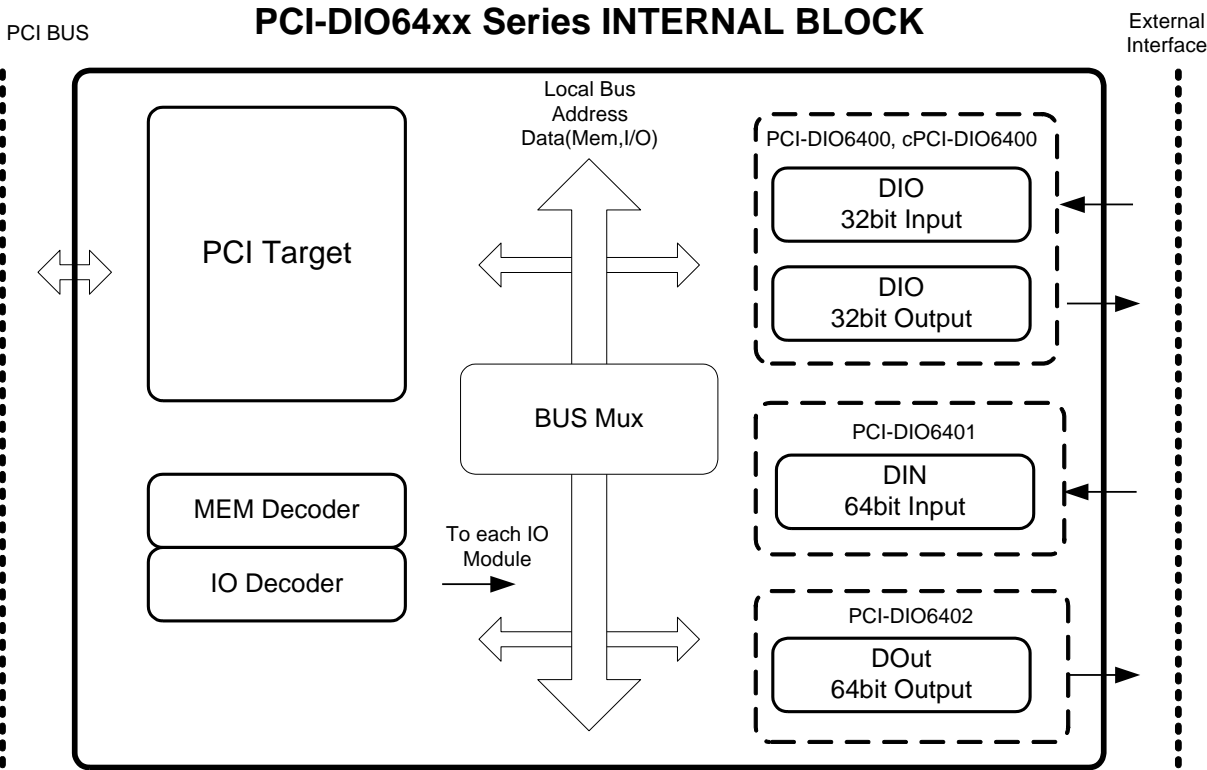
➤ DAQ System Digital I/O Products

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. PCI-DIOxx Series Configuration

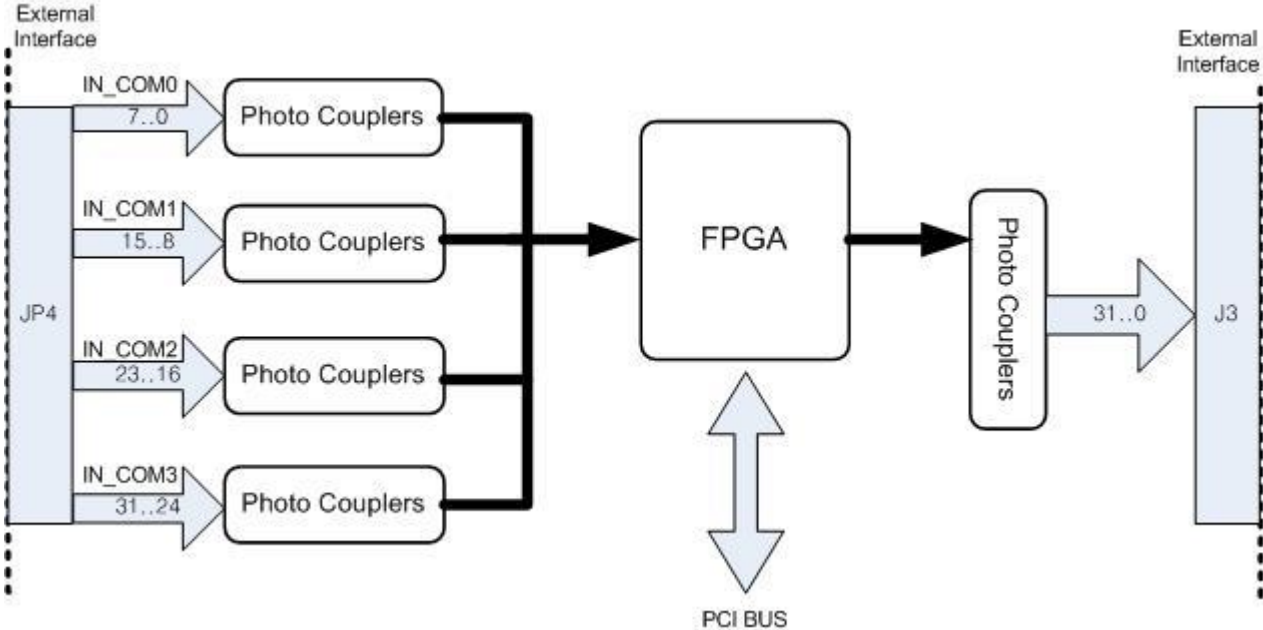
This chapter provides detailed description of PCI-DIO64xx (PCI-DIO6400, PCI-DIO6401, PCI-DIO6402 with cPCI-DIO6400) series boards. It processes digital data of 32/32 bit In/Out, 64 bit In, and 64 bit Out according to each board and uses PCI and Compact PCI interfaces.

PCI-64xx series boards use a high reliability photo coupler to increase the reliability and execution of signals with isolated lines, and do not require an external circuit for initial state and a separate mechanism for interrupt. Since the main interface is designed with FPGA, it is free to enhance or modify functions, and it can be easily upgraded according to the user's needs.



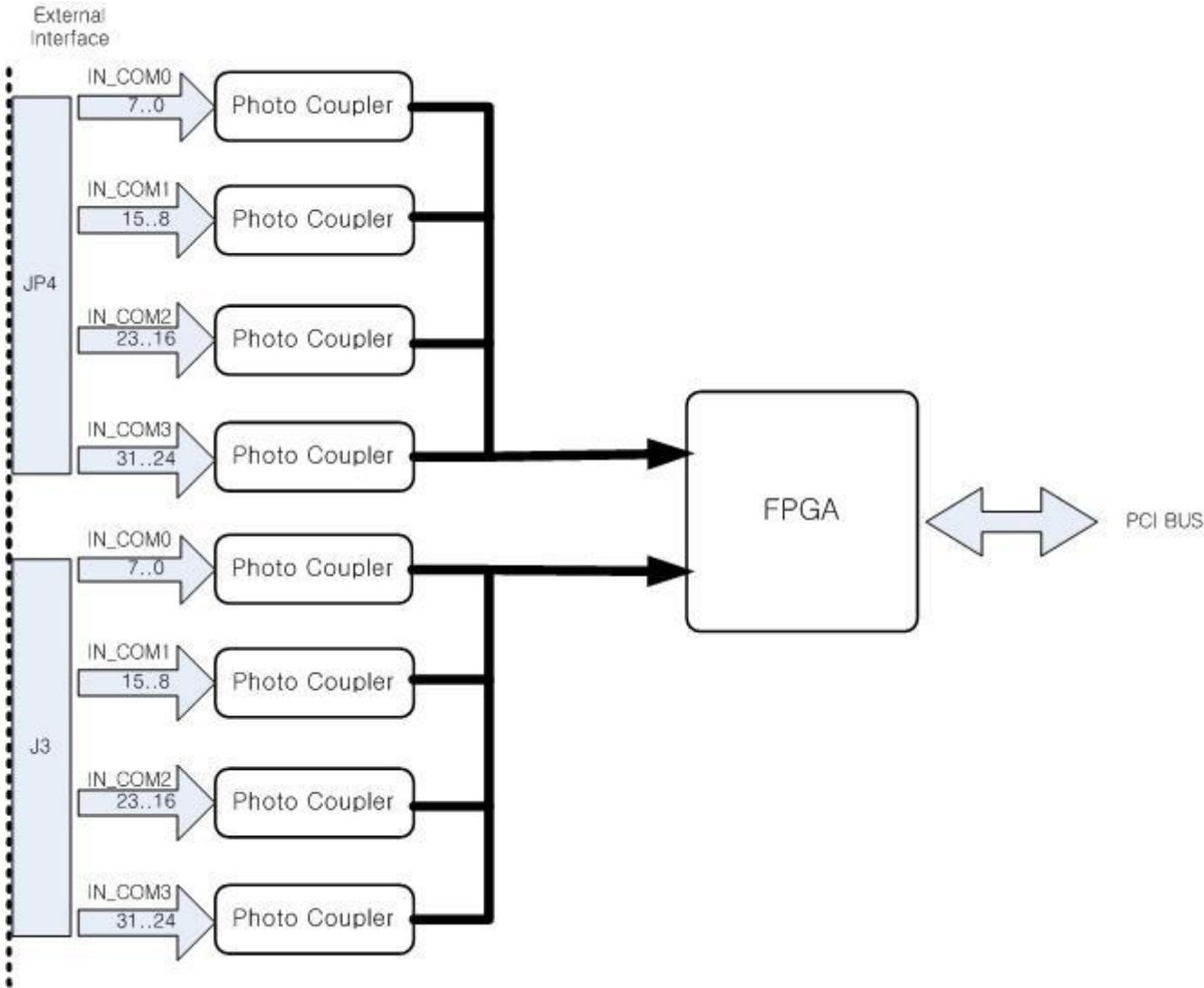
[Figure 2-1. PCI-DIO64xx Series Block Diagram]

- In the case of **PCI-DIO6400** and **cPCI-DIO6400**, as shown in [Figure 2-2], it has 32 isolated digital input ports and 32 digital output ports to interface with the outside.



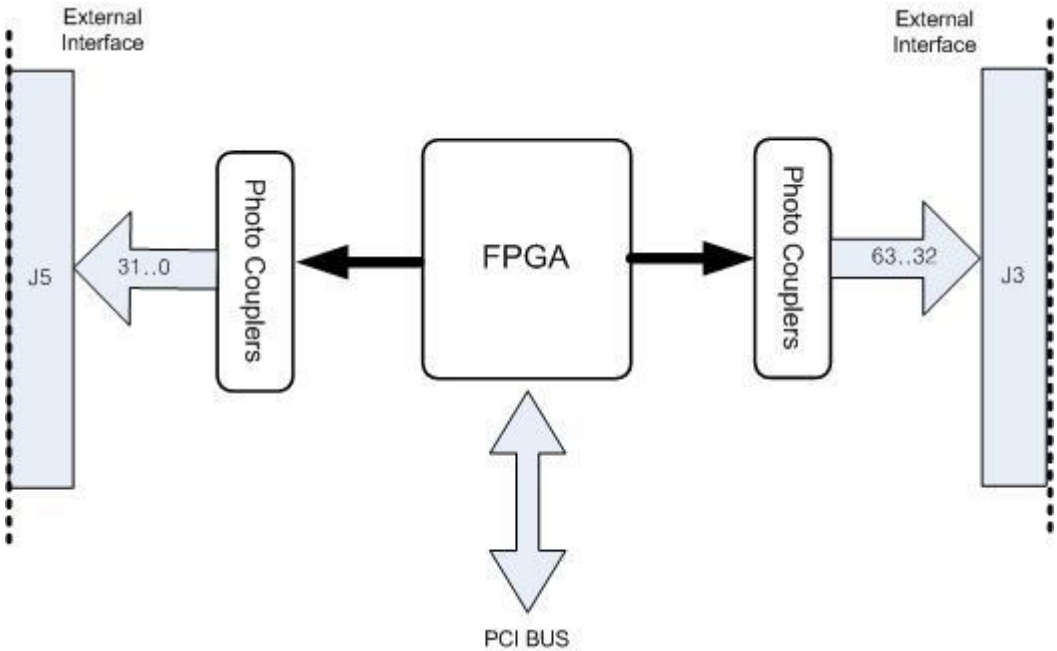
[Figure 2-2. PCI-DIO6400 & cPCI-DIO6400 Internal Block Diagram]

- **PCI-DIO6401** has 64 isolated digital input ports as shown in [Figure 2-3] and is configured to interface with the outside.



[Figure 2-3. PCI-DIO6401 Internal Block Diagram]

- In the case of **PCI-DIO6402**, as shown in [Figure 2-4], it has 64 isolated digital output ports and is configured to interface with the outside.

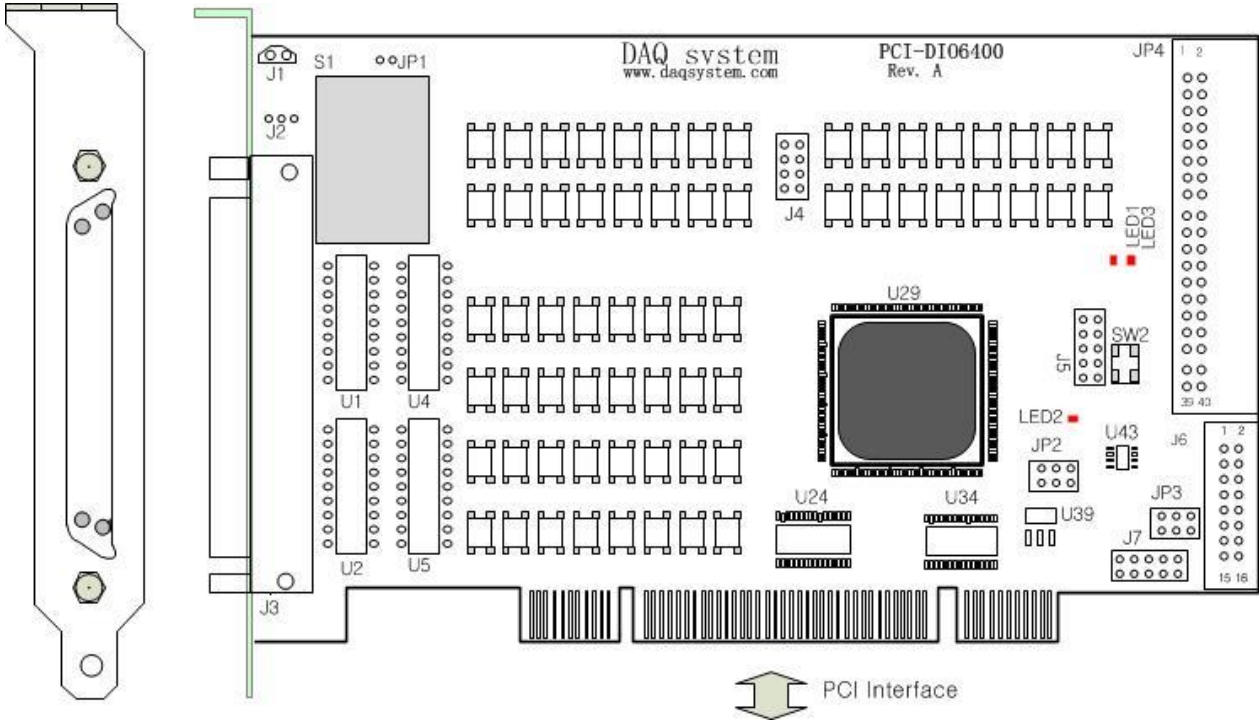


[Figure 2-4. PCI-DIO6402 Internal Block Diagram]

3. PCI-DIO64xx Series connector Pin Map

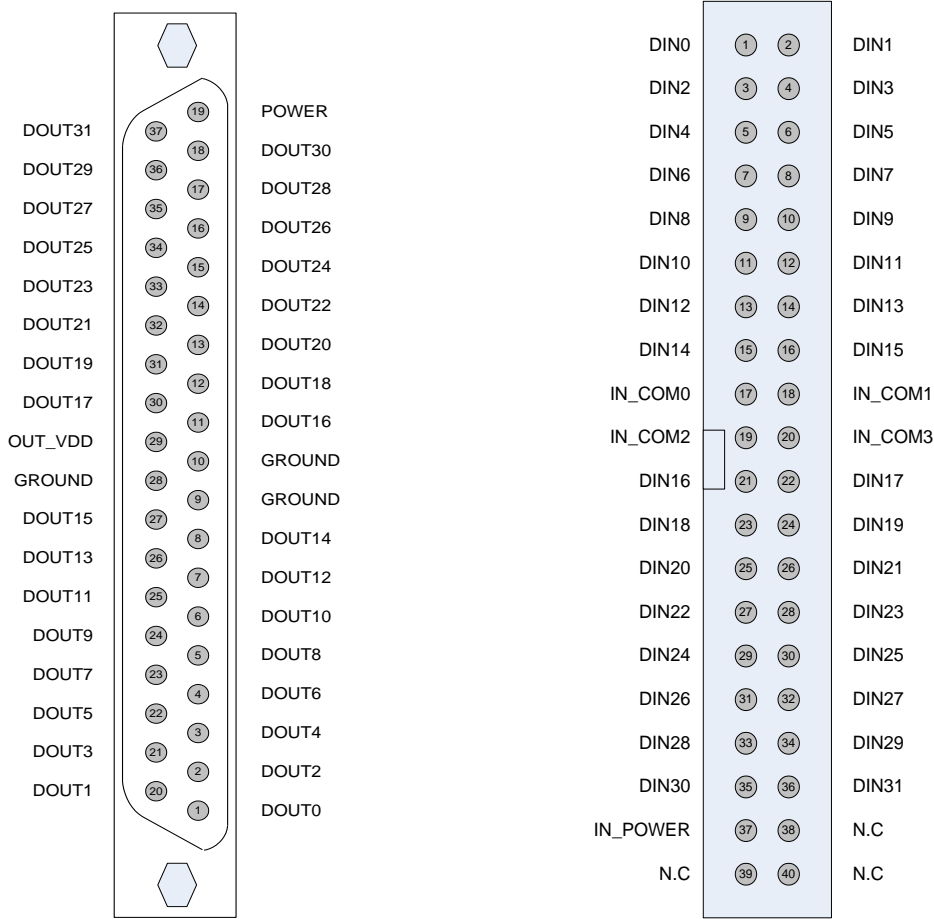
Each important board function is briefly described. For detailed function information, please refer to the parts specification.

3-1 PCI-DIO6400



[Figure 3-1. PCI-DIO6400 Bracket & Board Layout]

The 37-pin D-SUB connector fixed to the standard PCI bracket is used to connect the external interface for digital output, and the digital input uses a 40-pin (20x2, 2.54mm pitch) right-angle header connector (JP4) on the PCB. The signals assigned to each pin are as follows [Table 2.] and [Table 3.].



[Figure 3-2. PCI-DIO6400 D-SUB 37, BOX 40 Pin Connector J3, JP4]

[Table 2. PCI-DIO6400 D-SUB37 Digital OUT Connector]

Pin No.	Name	Description	Remark
1	DOUT0	Isolated Digital Output 0	
2	DOUT2	Isolated Digital Output 2	
3	DOUT4	Isolated Digital Output 4	
4	DOUT6	Isolated Digital Output 6	
5	DOUT8	Isolated Digital Output 8	
6	DOUT10	Isolated Digital Output 10	
7	DOUT12	Isolated Digital Output 12	
8	DOUT14	Isolated Digital Output 14	
9	GROUND	External Ground	
10	GROUND	External Ground	
11	DOUT16	Isolated Digital Output 16	
12	DOUT18	Isolated Digital Output 18	
13	DOUT20	Isolated Digital Output 20	
14	DOUT22	Isolated Digital Output 22	
15	DOUT24	Isolated Digital Output 24	
16	DOUT26	Isolated Digital Output 23	

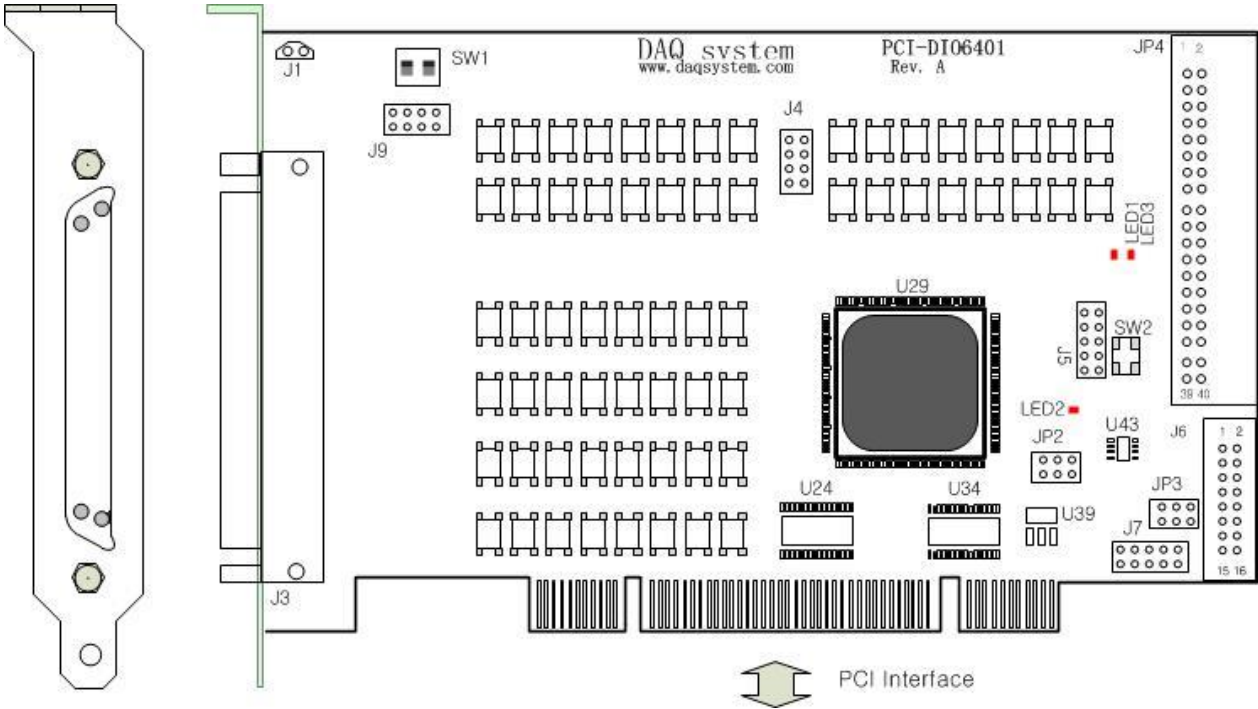
17	DOUT28	Isolated Digital Output 28	
18	DOUT30	Isolated Digital Output 30	
19	POWER	Board Power Output	
20	DOUT1	Isolated Digital Output 1	
21	DOUT3	Isolated Digital Output 3	
22	DOUT5	Isolated Digital Output 5	
23	DOUT7	Isolated Digital Output 7	
24	DOUT9	Isolated Digital Output 9	
25	DOUT11	Isolated Digital Output 11	
26	DOUT13	Isolated Digital Output 13	
27	DOUT15	Isolated Digital Output 15	
28	GROUND	External Ground	
29	OUT_VDD	Clamp Diode Common Output Pin	
30	DOUT17	Isolated Digital Output 17	
31	DOUT19	Isolated Digital Output 19	
32	DOUT21	Isolated Digital Output 21	
33	DOUT23	Isolated Digital Output 23	
34	DOUT25	Isolated Digital Output 25	
35	DOUT27	Isolated Digital Output 27	
36	DOUT29	Isolated Digital Output 29	
37	DOUT31	Isolated Digital Output 31	

[Table 3. PCI-DIO6400 DIN Connector (HIROSE HIF3F-40PA-2.54DS)]

Pin No.	Name	Description	Remark
1	DIN0	Isolated Digital Input 0	
2	DIN1	Isolated Digital Input 1	
3	DIN2	Isolated Digital Input 2	
4	DIN3	Isolated Digital Input 3	
5	DIN4	Isolated Digital Input 4	
6	DIN5	Isolated Digital Input 5	
7	DIN6	Isolated Digital Input 6	
8	DIN7	Isolated Digital Input 7	
9	DIN8	Isolated Digital Input 8	
10	DIN9	Isolated Digital Input 9	
11	DIN10	Isolated Digital Input 10	
12	DIN11	Isolated Digital Input 11	
13	DIN12	Isolated Digital Input 12	
14	DIN13	Isolated Digital Input 13	
15	DIN14	Isolated Digital Input 14	

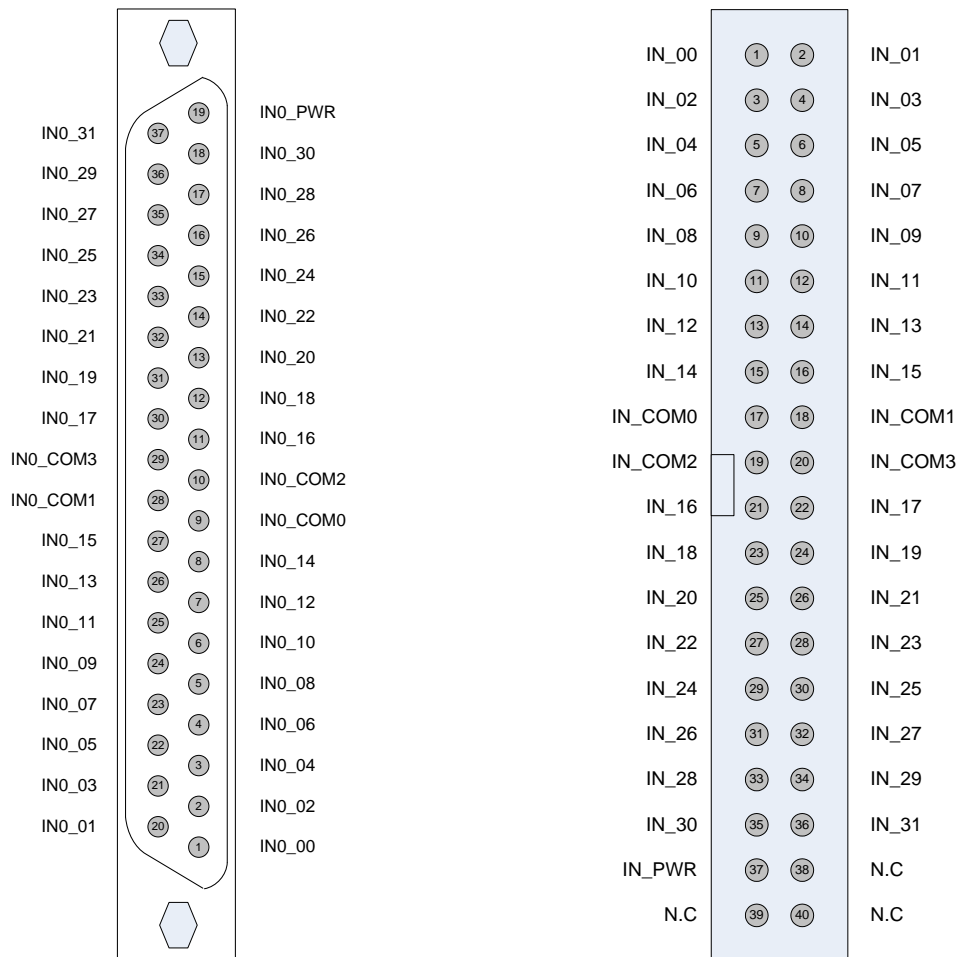
16	DIN15	Isolated Digital Input 15	
17	IN_COM0	Isolated Digital Input Common 0	DIN0~7 Common Input
18	IN_COM1	Isolated Digital Input Common 1	DIN8~15 Common Input
19	IN_COM2	Isolated Digital Input Common 2	DIN16~23 Common Input
20	IN_COM3	Isolated Digital Input Common 3	DIN24~31 Common Input
21	DIN16	Isolated Digital Input 16	
22	DIN17	Isolated Digital Input 17	
23	DIN18	Isolated Digital Input 18	
24	DIN19	Isolated Digital Input 19	
25	DIN20	Isolated Digital Input 20	
26	DIN21	Isolated Digital Input 21	
27	DIN22	Isolated Digital Input 22	
28	DIN23	Isolated Digital Input 23	
29	DIN24	Isolated Digital Input 24	
30	DIN25	Isolated Digital Input 25	
31	DIN26	Isolated Digital Input 26	
32	DIN27	Isolated Digital Input 27	
33	DIN28	Isolated Digital Input 28	
34	DIN29	Isolated Digital Input 29	
35	DIN30	Isolated Digital Input 30	
36	DIN31	Isolated Digital Input 31	
37	N.C	NO CONNECTION	
38	N.C	NO CONNECTION	
39	N.C	NO CONNECTION	
40	N.C	NO CONNECTION	

3-2 PCI-DIO6401



[Figure 3-3. PCI-DIO6401 Bracket & Board Layout]

The 37-pin D-SUB connector fixed to the standard PCI bracket is used for the first digital input (32-bit) external interface connection, and the remaining digital inputs (32-bit) are 40-pin (20x2, 2.54mm pitch) Right- Angle type header connector (JP4) was used. The signals assigned to each pin are as follows [Table 4.] and [Table 5.].



[Figure 3-4. PCI-DIO6401 D-SUB 37, BOX 40 Pin Connector J3, JP4]

[Table 4. PCI-DIO6401 D-Sub 37 Pin Connector]

Pin No.	Name	Description	Remark
1	IN0_00	Isolated Digital Input 0	
2	IN0_02	Isolated Digital Input 2	
3	IN0_04	Isolated Digital Input 4	
4	IN0_06	Isolated Digital Input 6	
5	IN0_08	Isolated Digital Input 8	
6	IN0_10	Isolated Digital Input 10	
7	IN0_12	Isolated Digital Input 12	
8	IN0_14	Isolated Digital Input 14	
9	IN0_COM0	Isolated Digital Input Common 0	IN0_00~07 Common Input
10	IN0_COM2	Isolated Digital Input Common 2	IN0_16~23 Common Input
11	IN0_16	Isolated Digital Input 16	
12	IN0_18	Isolated Digital Input 18	
13	IN0_20	Isolated Digital Input 20	
14	IN0_22	Isolated Digital Input 22	

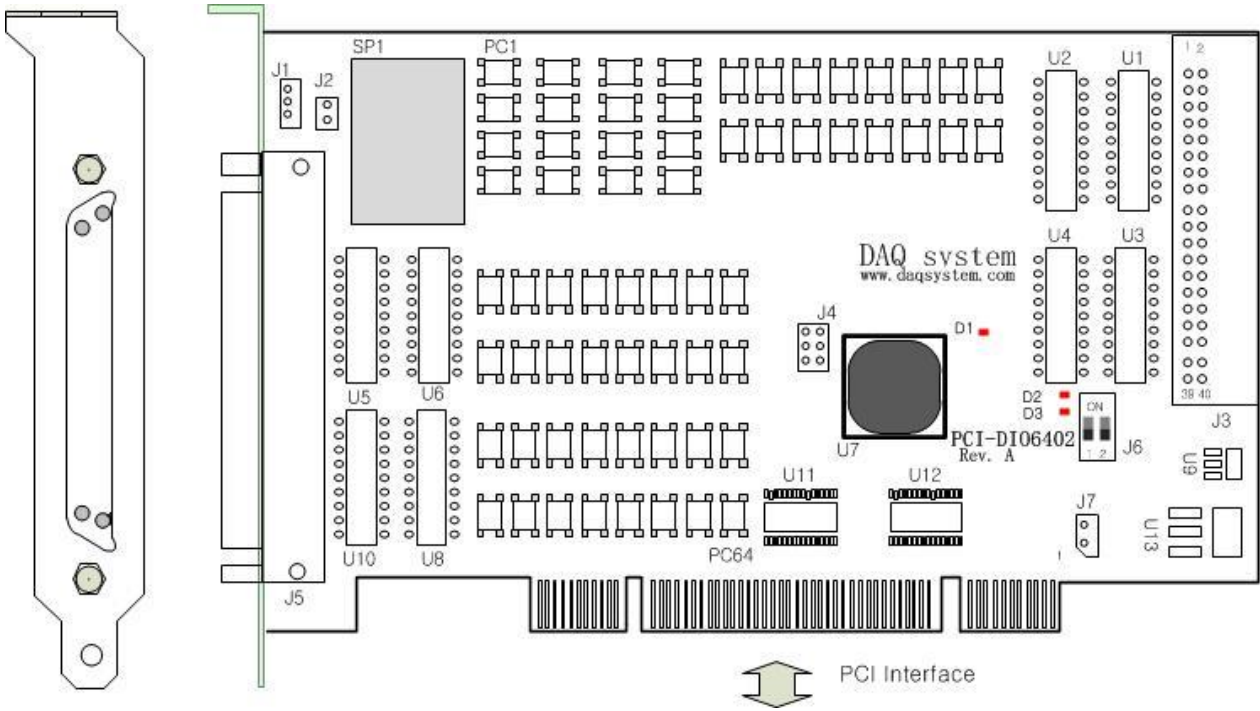
15	IN0_24	Isolated Digital Input 24	
16	IN0_26	Isolated Digital Input 26	
17	IN0_28	Isolated Digital Input 28	
18	IN0_30	Isolated Digital Input 30	
19	IN0_PWR	Isolated Digital Input Common0 ~ 3 Selection	Manufacturer's test
20	IN0_01	Isolated Digital Input 1	
21	IN0_03	Isolated Digital Input 3	
22	IN0_05	Isolated Digital Input 5	
23	IN0_07	Isolated Digital Input 7	
24	IN0_08	Isolated Digital Input 9	
25	IN0_11	Isolated Digital Input 11	
26	IN0_13	Isolated Digital Input 13	
27	IN0_15	Isolated Digital Input 15	
28	IN0_COM1	Isolated Digital Input Common 1	IN0_08~15 Common Input
29	IN0_COM3	Isolated Digital Input Common 3	IN0_24~31 Common Input
30	IN0_17	Isolated Digital Input 17	
31	IN0_19	Isolated Digital Input 19	
32	IN0_21	Isolated Digital Input 21	
33	IN0_23	Isolated Digital Input 23	
34	IN0_25	Isolated Digital Input 25	
35	IN0_27	Isolated Digital Input 27	
36	IN0_29	Isolated Digital Input 29	
37	IN0_31	Isolated Digital Input 31	

[Table 5. PCI-DIO6401 Digital Input Connector (HIROSE HIF3F-40PA-2.54DS)]

Pin No.	Name	Description	Remark
1	IN_00	Isolated Digital Input 0	
2	IN_01	Isolated Digital Input 1	
3	IN_02	Isolated Digital Input 2	
4	IN_03	Isolated Digital Input 3	
5	IN_04	Isolated Digital Input 4	
6	IN_05	Isolated Digital Input 5	
7	IN_06	Isolated Digital Input 6	
8	IN_07	Isolated Digital Input 7	
9	IN_08	Isolated Digital Input 8	
10	IN_9	Isolated Digital Input 9	
11	IN_10	Isolated Digital Input 10	
12	IN_11	Isolated Digital Input 11	

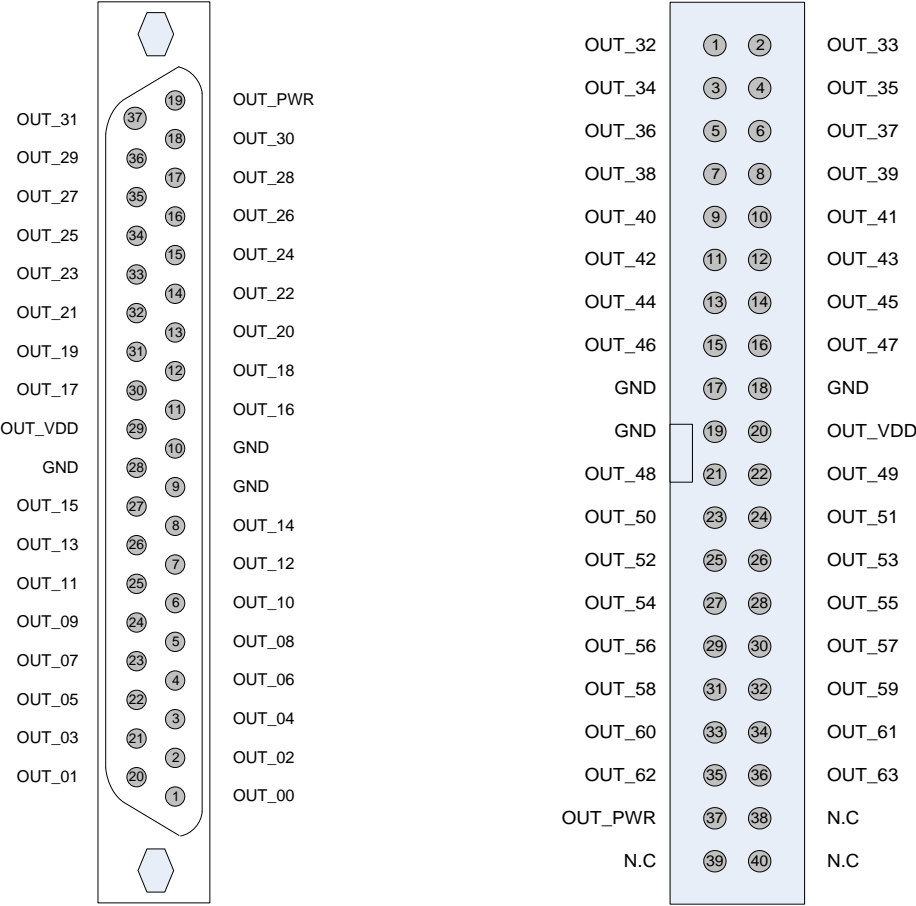
13	IN_12	Isolated Digital Input 12	
14	IN_13	Isolated Digital Input 13	
15	IN_14	Isolated Digital Input 14	
16	IN_15	Isolated Digital Input 15	
17	IN_COM0	Isolated Digital Input Common 0	IN_00~07 Common Input
18	IN_COM1	Isolated Digital Input Common 1	IN_08~15 Common Input
19	IN_COM2	Isolated Digital Input Common 2	IN_16~23 Common Input
20	IN_COM3	Isolated Digital Input Common 3	IN_24~31 Common Input
21	IN_16	Isolated Digital Input 16	
22	IN_17	Isolated Digital Input 17	
23	IN_18	Isolated Digital Input 18	
24	IN_19	Isolated Digital Input 19	
25	IN_20	Isolated Digital Input 20	
26	IN_21	Isolated Digital Input 21	
27	IN_22	Isolated Digital Input 22	
28	IN_23	Isolated Digital Input 23	
29	IN_24	Isolated Digital Input 24	
30	IN_25	Isolated Digital Input 25	
31	IN_26	Isolated Digital Input 26	
32	IN_27	Isolated Digital Input 27	
33	IN_28	Isolated Digital Input 28	
34	IN_29	Isolated Digital Input 29	
35	IN_30	Isolated Digital Input 30	
36	IN_31	Isolated Digital Input 31	
37	IN_PWR	Isolated Digital Input Common 0 ~ 3 Selection	Manufacturer's test
38	N.C	NO CONNECTION	
39	N.C	NO CONNECTION	
40	N.C	NO CONNECTION	

3-3 PCI-DIO6402



[Figure 3-5. PCI-DIO6402 Bracket & Board Layout]

The 37-pin D-SUB connector fixed to the standard PCI bracket is used for the first digital output (32-bit) external interface connection, and the remaining digital outputs (32-bit) are 40 pin (20x2, 2.54mm pitch) Right-angle on the PCB. Type header connector (J3) was used. The signals assigned to each pin are as follows [Table 6.] and [Table 7.].



[Figure 3-6. PCI-DIO6402 D-SUB 37, BOX 40 Pin Connector]

[Table 6. PCI-DIO6402 D-Sub 37 Pin J5 Connector]

Pin No.	Name	Description	Remark
1	OUT_00	Isolated Digital Output 0	
2	OUT_02	Isolated Digital Output 2	
3	OUT_04	Isolated Digital Output 4	
4	OUT_06	Isolated Digital Output 6	
5	OUT_08	Isolated Digital Output 8	
6	OUT_10	Isolated Digital Output 10	
7	OUT_12	Isolated Digital Output 12	
8	OUT_14	Isolated Digital Output 14	
9	GND	Ground	
10	GND	Ground	
11	OUT_16	Isolated Digital Output 16	
12	OUT_18	Isolated Digital Output 18	
13	OUT_20	Isolated Digital Output 20	
14	OUT_22	Isolated Digital Output 22	
15	OUT_24	Isolated Digital Output 24	

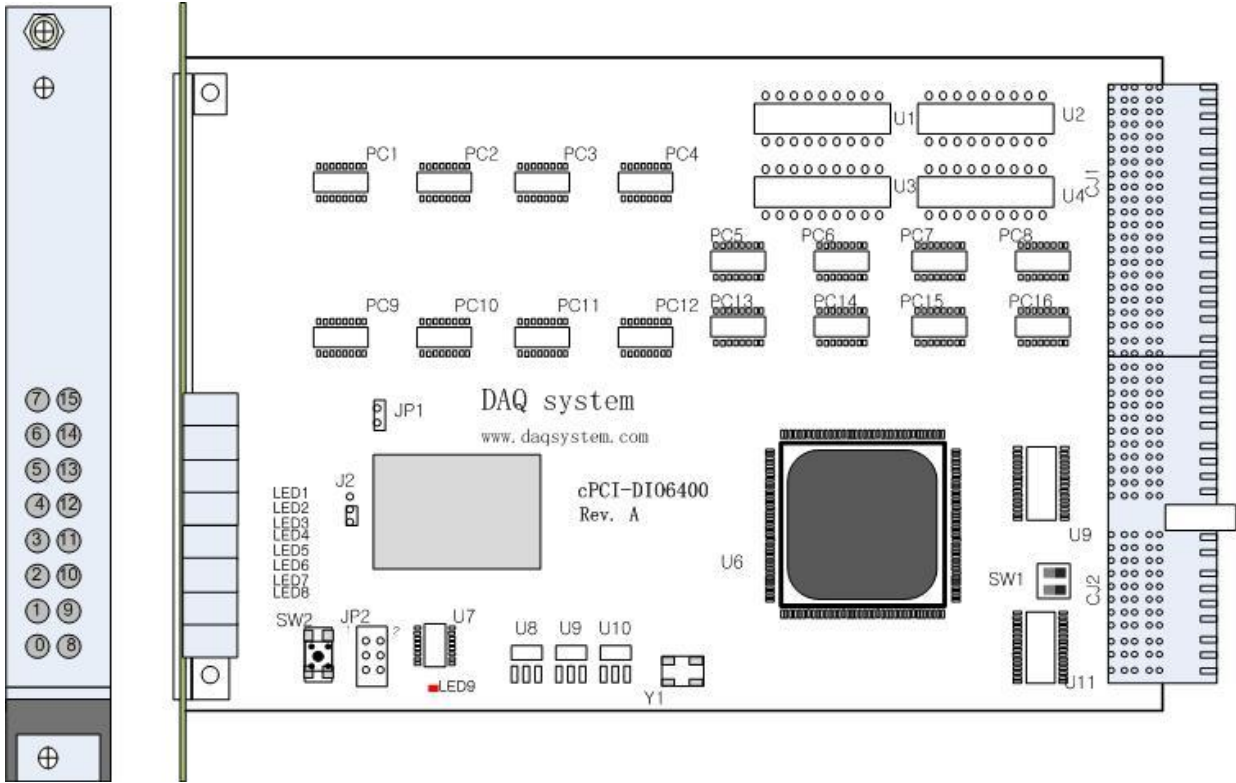
16	OUT_26	Isolated Digital Output 26	
17	OUT_28	Isolated Digital Output 28	
18	OUT_30	Isolated Digital Output 30	
19	OUT_PWR	+12VPCI or ISO_12V	
20	OUT_01	Isolated Digital Output 1	
21	OUT_03	Isolated Digital Output 3	
22	OUT_05	Isolated Digital Output 5	
23	OUT_07	Isolated Digital Output 7	
24	OUT_08	Isolated Digital Output 9	
25	OUT_11	Isolated Digital Output 11	
26	OUT_13	Isolated Digital Output 13	
27	OUT_15	Isolated Digital Output 15	
28	GND	Ground	
29	OUT_VDD	Clamp Diode Common Output Pin	
30	OUT_17	Isolated Digital Output 17	
31	OUT_19	Isolated Digital Output 19	
32	OUT_21	Isolated Digital Output 21	
33	OUT_23	Isolated Digital Output 23	
34	OUT_25	Isolated Digital Output 25	
35	OUT_27	Isolated Digital Output 27	
36	OUT_29	Isolated Digital Output 29	
37	OUT_31	Isolated Digital Output 31	

[Table 7. PCI-DIO6402 Digital Output Connector J3 (HIROSE HIF3F-40PA-2.54DS)]

Pin No.	Name	Description	Remark
1	OUT_32	Isolated Digital Output 32	
2	OUT_33	Isolated Digital Output 33	
3	OUT_34	Isolated Digital Output 34	
4	OUT_35	Isolated Digital Output 35	
5	OUT_36	Isolated Digital Output 36	
6	OUT_37	Isolated Digital Output 37	
7	OUT_38	Isolated Digital Output 38	
8	OUT_39	Isolated Digital Output 39	
9	OUT_40	Isolated Digital Output 40	
10	OUT_41	Isolated Digital Output 41	
11	OUT_42	Isolated Digital Output 42	
12	OUT_43	Isolated Digital Output 43	
13	OUT_44	Isolated Digital Output 44	
14	OUT_45	Isolated Digital Output 45	

15	OUT_46	Isolated Digital Output 46	
16	OUT_47	Isolated Digital Output 47	
17	GND	Ground	
18	GND	Ground	
19	GND	Ground	
20	OUT_VDD	Clamp Diode Common Output Pin	
21	OUT_48	Isolated Digital Output 46	
22	OUT_49	Isolated Digital Output 47	
23	OUT_50	Isolated Digital Output 48	
24	OUT_51	Isolated Digital Output 49	
25	OUT_52	Isolated Digital Output 50	
26	OUT_53	Isolated Digital Output 51	
27	OUT_54	Isolated Digital Output 52	
28	OUT_55	Isolated Digital Output 53	
29	OUT_56	Isolated Digital Output 54	
30	OUT_57	Isolated Digital Output 55	
31	OUT_58	Isolated Digital Output 56	
32	OUT_59	Isolated Digital Output 57	
33	OUT_60	Isolated Digital Output 58	
34	OUT_61	Isolated Digital Output 59	
35	OUT_62	Isolated Digital Output 60	
36	OUT_63	Isolated Digital Output 61	
37	OUT_PWR	+12VPCI or ISO_12V	
38	N.C	NO CONNECTION	
39	N.C	NO CONNECTION	
40	N.C	NO CONNECTION	

3-4 cPCI-DIO6400



[Figure 3-7. cPCI-DIO6400 Bracket & Board Layout]

The front panel of cPCI-DIO6400 has a total of 16 LEDs to indicate the current input port and output port. At this time, since the input and output are each 32 bits, the number that can be displayed is limited, which can be set with the API.

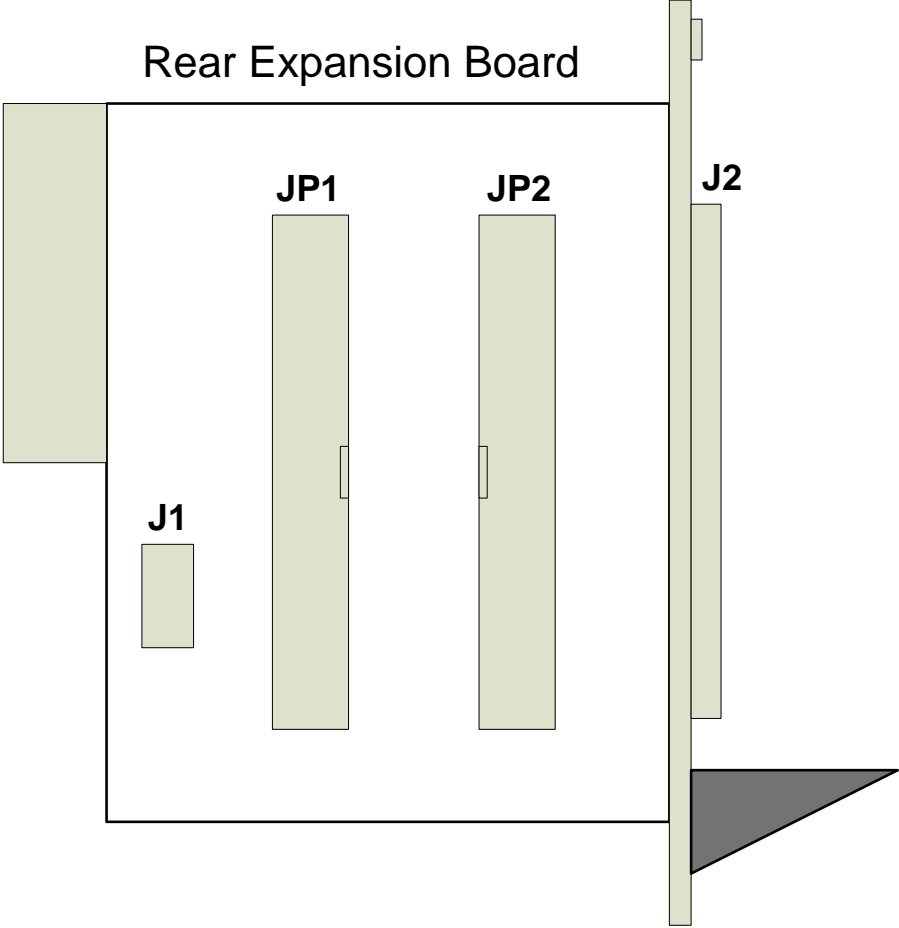
- The set range is as follows.
- Input port 15 to 0
- Input ports 31 to 16
- Output ports 15 to 0
- The output ports are from 31 to 16.

Each bit mapping is as follows.

LED No	Input 15 - 0	Input 31 - 16	Input 15 - 0	Input 31 - 16
0	0	16	0	16
1	1	17	1	17
2	2	18	2	18
3	3	19	3	19
4	4	20	4	20
5	5	21	5	21

6	6	22	6	22
7	7	23	7	23
8	8	24	8	24
9	9	25	9	25
10	10	26	10	26
11	11	27	11	27
12	12	28	12	28
13	13	29	13	29
14	14	30	14	30
15	15	31	15	31

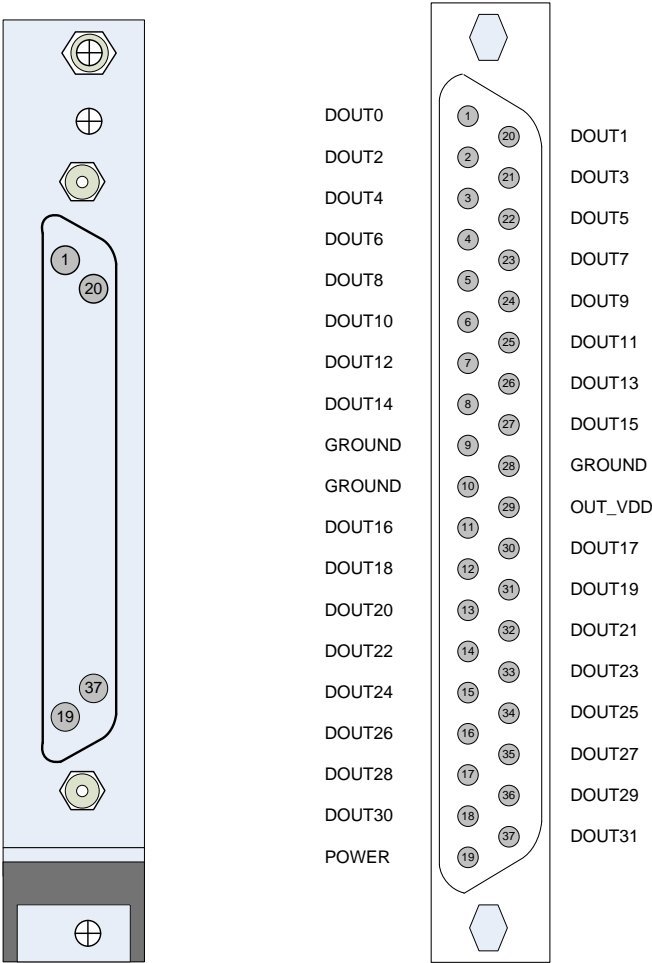
3-4-1 Rear Transition Board Panel



[Figure 3-8. cPCI-DIO6400 Rear Transition Board]

The external connection of cPCI-DIO6400 is made through the rear transition board. There are a total of 3 connectors on the rear transition board, one for internal use (J1, JP1, JP2) and one connector on the external panel (J2). For J1, it is used to set the common pin of the input port.

3-4-2 Rear Transition Board Panel (J2)



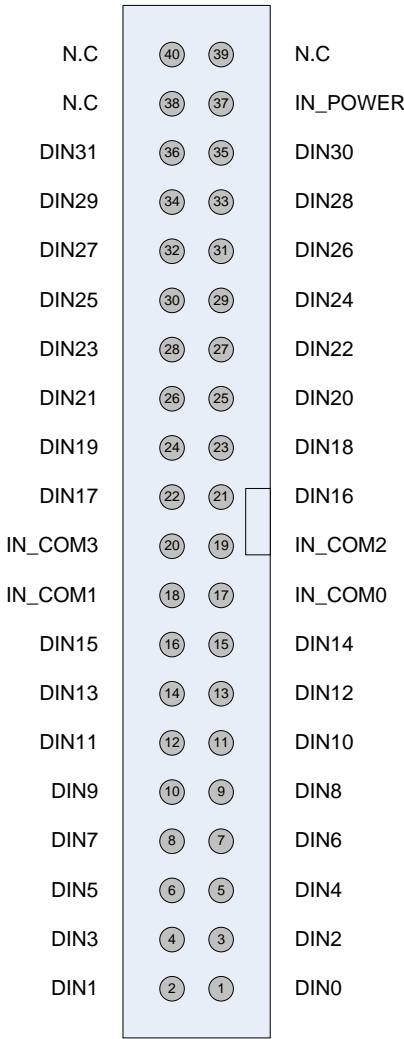
[Figure 3-9. cPCI-DIO6400 DSUB 37 Connector]

[Table 8. cPCI-DIO6400 DOUT Connector J2]

Pin No.	Name	Description	Remark
1	DOUT0	Isolated Digital Output 0	
2	DOUT2	Isolated Digital Output 2	
3	DOUT4	Isolated Digital Output 4	
4	DOUT6	Isolated Digital Output 6	
5	DOUT8	Isolated Digital Output 8	
6	DOUT10	Isolated Digital Output 10	
7	DOUT12	Isolated Digital Output 12	
8	DOUT14	Isolated Digital Output 14	
9	GROUND	External Ground	
10	GROUND	External Ground	
11	DOUT16	Isolated Digital Output 16	
12	DOUT18	Isolated Digital Output 18	
13	DOUT20	Isolated Digital Output 20	

14	DOUT22	Isolated Digital Output 22	
15	DOUT24	Isolated Digital Output 24	
16	DOUT26	Isolated Digital Output 26	
17	DOUT28	Isolated Digital Output 28	
18	DOUT30	Isolated Digital Output 30	
19	OUT_POWER	Board Power Output	
20	DOUT 1	Isolated Digital Output 1	
21	DOUT 3	Isolated Digital Output 3	
22	DOUT 5	Isolated Digital Output 5	
23	DOUT 7	Isolated Digital Output 7	
24	DOUT 9	Isolated Digital Output 9	
25	DOUT 11	Isolated Digital Output 11	
26	DOUT 13	Isolated Digital Output 13	
27	DOUT 15	Isolated Digital Output 15	
28	GROUND	External Ground	
29	OUT_VDD	Clamp Diode Common Output Pin	
30	DOUT 17	Isolated Digital Output 17	
31	DOUT 19	Isolated Digital Output 19	
32	DOUT 21	Isolated Digital Output 21	
33	DOUT 23	Isolated Digital Output 23	
34	DOUT 25	Isolated Digital Output 25	
35	DOUT 27	Isolated Digital Output 27	
36	DOUT 29	Isolated Digital Output 29	
37	DOUT 31	Isolated Digital Output 31	

3-4-3 Rear Transition Board (JP1)



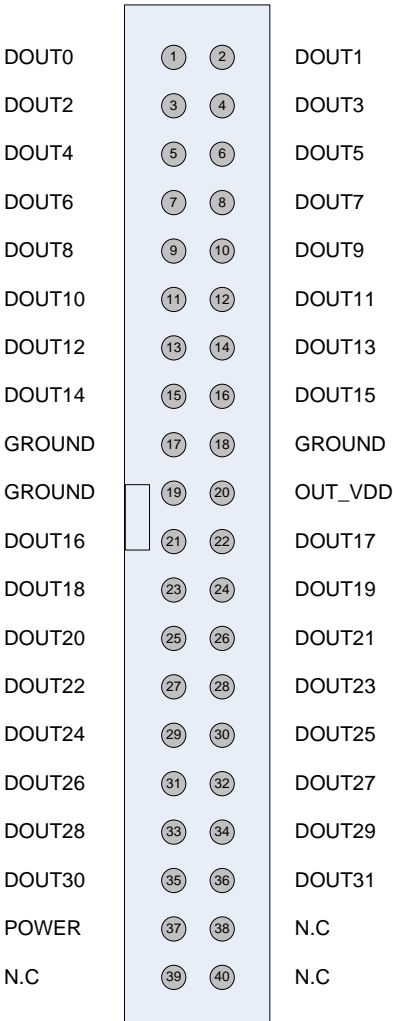
[Figure 3-10. cPCI-DIO6400 BOX 40Pin Connector]

[Table 9. cPCI-DIO6400 DIN Connector JP1]

Pin No.	Name	Description	Remark
1	DIN0	Isolated Digital Input 0	
2	DIN1	Isolated Digital Input 1	
3	DIN2	Isolated Digital Input 2	
4	DIN3	Isolated Digital Input 3	
5	DIN4	Isolated Digital Input 4	
6	DIN5	Isolated Digital Input 5	
7	DIN6	Isolated Digital Input 6	
8	DIN7	Isolated Digital Input 7	
9	DIN8	Isolated Digital Input 8	
10	DIN9	Isolated Digital Input 9	
11	DIN10	Isolated Digital Input 10	
12	DIN11	Isolated Digital Input 11	

13	DIN12	Isolated Digital Input 12	
14	DIN13	Isolated Digital Input 13	
15	DIN14	Isolated Digital Input 14	
16	DIN15	Isolated Digital Input 15	
17	IN_COM0	Isolated Digital Input Common 0	DIN0~7 Common Input
18	IN_COM1	Isolated Digital Input Common 1	DIN8~15 Common Input
19	IN_COM2	Isolated Digital Input Common 2	DIN16~23 Common Input
20	IN_COM3	Isolated Digital Input Common 3	DIN24~31 Common Input
21	DIN16	Isolated Digital Input 16	
22	DIN17	Isolated Digital Input 17	
23	DIN18	Isolated Digital Input 18	
24	DIN19	Isolated Digital Input 19	
25	DIN20	Isolated Digital Input 20	
26	DIN21	Isolated Digital Input 21	
27	DIN22	Isolated Digital Input 22	
28	DIN23	Isolated Digital Input 23	
29	DIN24	Isolated Digital Input 24	
30	DIN25	Isolated Digital Input 25	
31	DIN26	Isolated Digital Input 26	
32	DIN27	Isolated Digital Input 27	
33	DIN28	Isolated Digital Input 28	
34	DIN29	Isolated Digital Input 29	
35	DIN30	Isolated Digital Input 30	
36	DIN31	Isolated Digital Input 31	
37	N.C	NO CONNECTION	
38	N.C	NO CONNECTION	
39	N.C	NO CONNECTION	
40	N.C	NO CONNECTION	

3-4-4 Rear Transition Board (JP2)



[Figure 3-11. cPCI-DIO6400 Output BOX 40Pin Connectot]

[Table 10. cPCI-DIO6400 DOUT Connector JP2]

Pin No.	Name	Description	Remark
1	DOUT0	Isolated Digital Output 0	
2	DOUT1	Isolated Digital Output 1	
3	DOUT2	Isolated Digital Output 2	
4	DOUT3	Isolated Digital Output 3	
5	DOUT4	Isolated Digital Output 4	
6	DOUT5	Isolated Digital Output 5	
7	DOUT6	Isolated Digital Output 6	
8	DOUT7	Isolated Digital Output 7	
9	DOUT8	Isolated Digital Output 8	
10	DOUT9	Isolated Digital Output 9	
11	DOUT10	Isolated Digital Output 10	

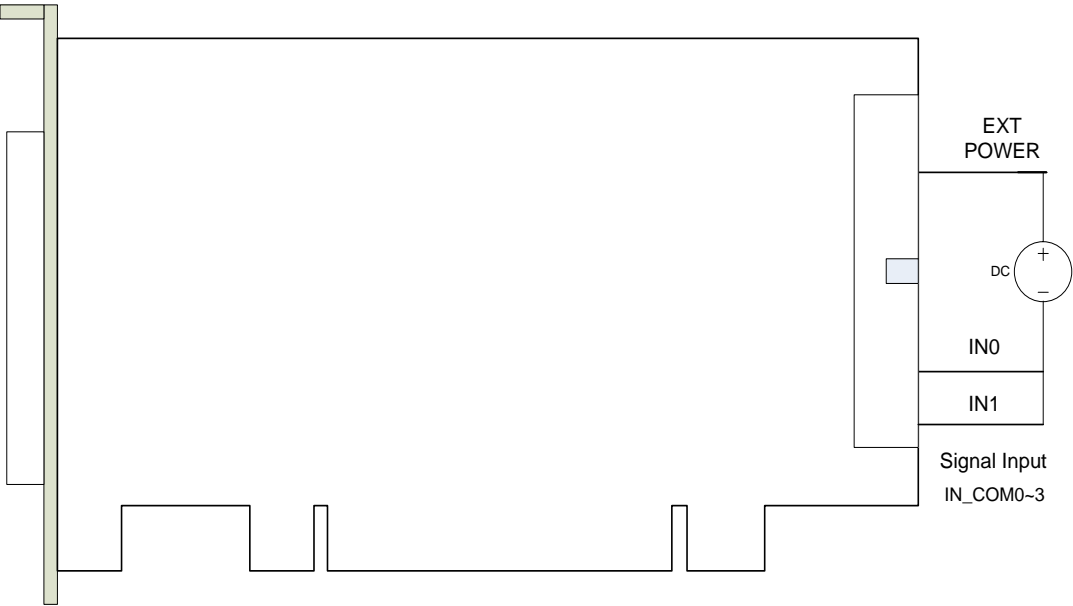
12	DOUT11	Isolated Digital Output 11	
13	DOUT12	Isolated Digital Output 12	
14	DOUT13	Isolated Digital Output 13	
15	DOUT14	Isolated Digital Output 14	
16	DOUT15	Isolated Digital Output 15	
17	GROUND	External Ground	
18	GROUND	External Ground	
19	GROUND	External Ground	
20	OUT_VDD	Clamp Diode Common Output Pin	
21	DOUT 16	Isolated Digital Output 16	
22	DOUT 17	Isolated Digital Output 17	
23	DOUT 18	Isolated Digital Output 18	
24	DOUT 19	Isolated Digital Output 19	
25	DOUT 20	Isolated Digital Output 20	
26	DOUT 21	Isolated Digital Output 21	
27	DOUT 22	Isolated Digital Output 22	
28	DOUT 23	Isolated Digital Output 23	
29	DOUT 24	Isolated Digital Output 24	
30	DOUT 25	Isolated Digital Output 25	
31	DOUT 26	Isolated Digital Output 26	
32	DOUT 27	Isolated Digital Output 27	
33	DOUT 28	Isolated Digital Output 28	
34	DOUT 29	Isolated Digital Output 29	
35	DOUT 30	Isolated Digital Output 30	
36	DOUT 31	Isolated Digital Output 31	
37	OUT_POWER	Board Power Output	
37	N.C	NO CONNECTION	
38	N.C	NO CONNECTION	
39	N.C	NO CONNECTION	
40	N.C	NO CONNECTION	

4. Digital Input

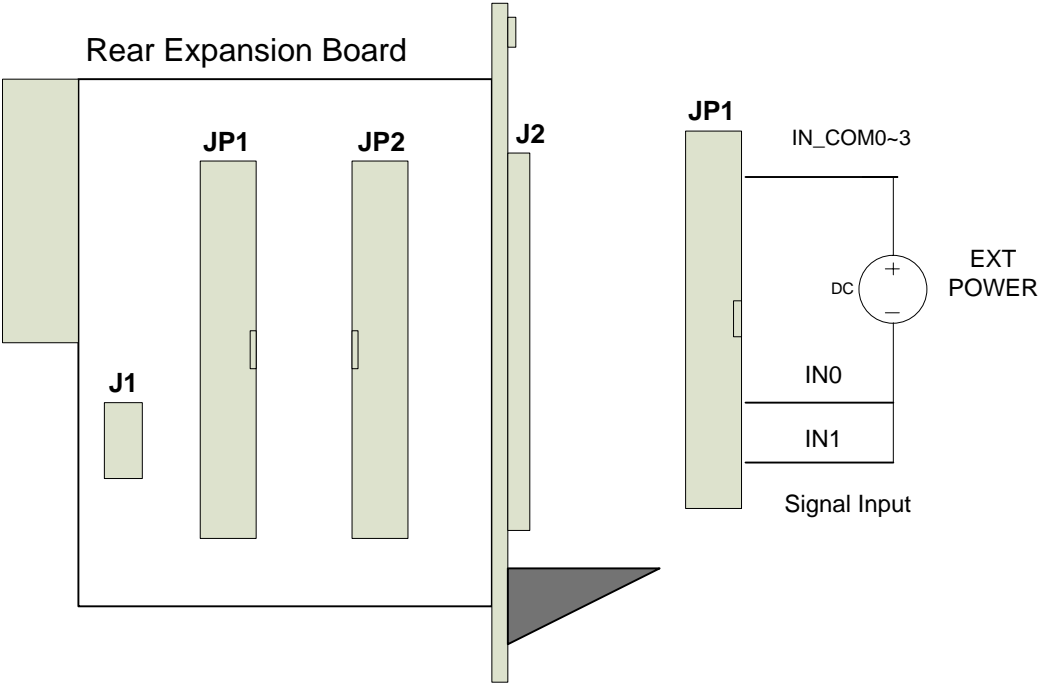
4-1 PCI-DIO6400, cPCI-DIO6400, PCI-DIO6401 Input Wiring

When industrial equipment is connected and operated, noise and common ground problems can usually occur. As a way to solve this problem, an electrically insulated connection method is used. The use of a photo coupler is a good example.

Since the photo coupler exchanges signals with light (light) rather than electrical signals, it is possible to protect equipment from noise and overvoltage. At this time, when connecting the board and external equipment, an external power source must be used for complete insulation connection.



[Figure 4-1. PCI-DIO6400, PCI-DIO6401 Input Port External Wiring]

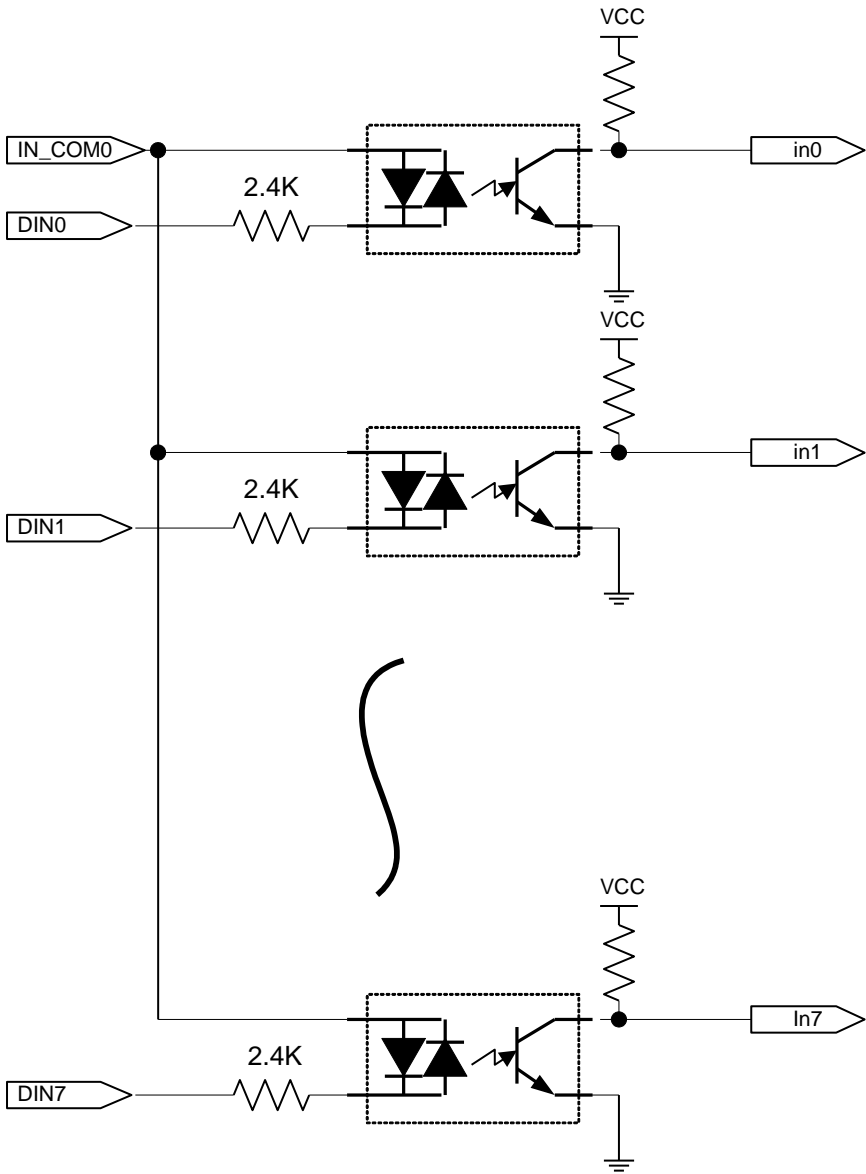


[Figure 4-2. cPCI-DIO6400 Input Port External Wiring]

The above figure is a wiring diagram of the input part of the PCI-DIO64xx series board. It is activated when external power is connected to IN_COM0 ~ IN_COM3 and negative power is applied to the signal input part.

- Note 1. In case of J4, the manufacturer uses it only for testing. (PCI-DIO6400)**
- 2. In case of J4 and J9, the manufacturer uses it only for testing. (PCI-DIO6401)**
- 3. In case of J1, the manufacturer uses it only for testing. (cPCI-DIO6400)**
- 4. The input power supply voltage range is 5 – 24V.**

4-2 PCI-DIO6400, cPCI-DIO6400 Input Circuit

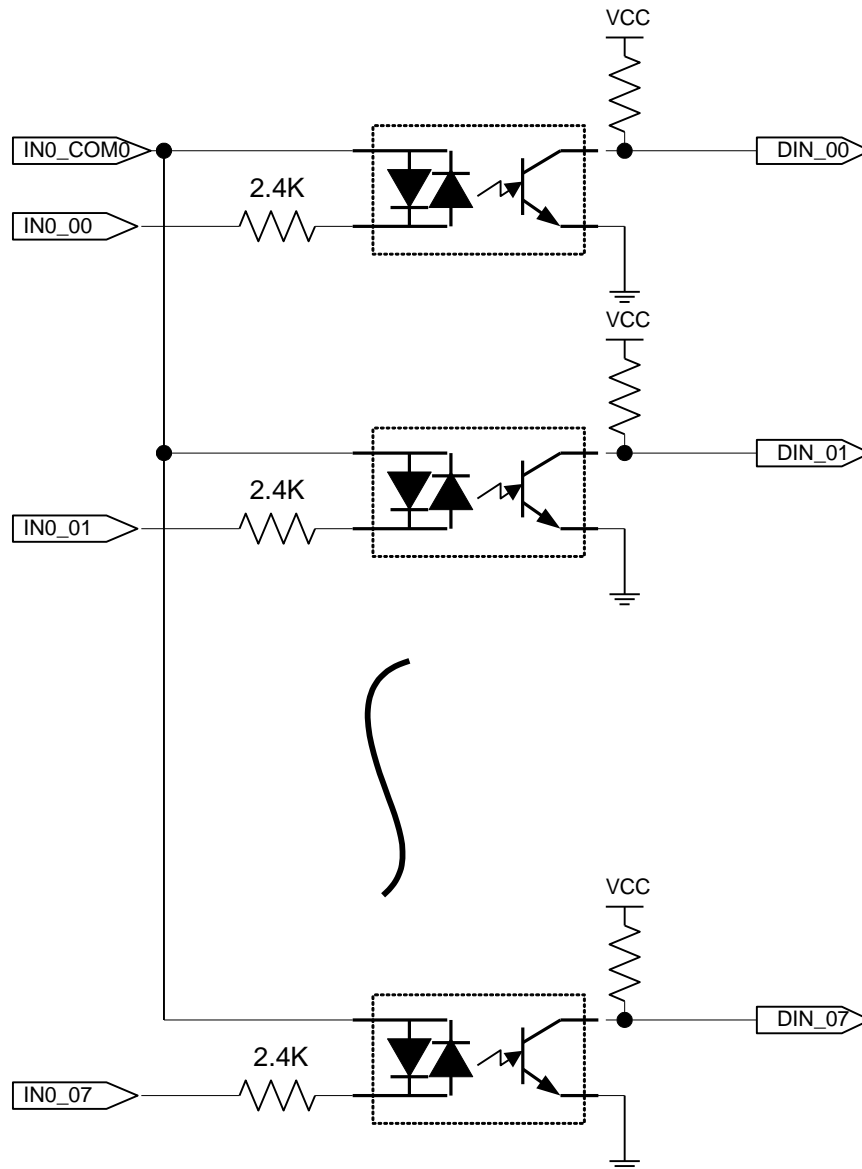


[Figure 4-3. PCI-DIO6400, cPCI-DIO6400 Digital Input Circuit]

In the figure above, the digital input circuit is insulated by a port coupler. When a positive voltage is applied to "DIN_COM" and a negative voltage is applied to the digital input, a current flows through the diode inside as a photo coupler, and the output transistor is energized according to the flowing current.

The board has 4 circuits as above. That is, DIN-COM for every 8 photocouplers. There are 4 total DIN-COMs. If you want a fully isolated circuit, don't use board power. It is recommended to use it using an external power supply.

4-3 PCI-DIO6401 Input Circuit



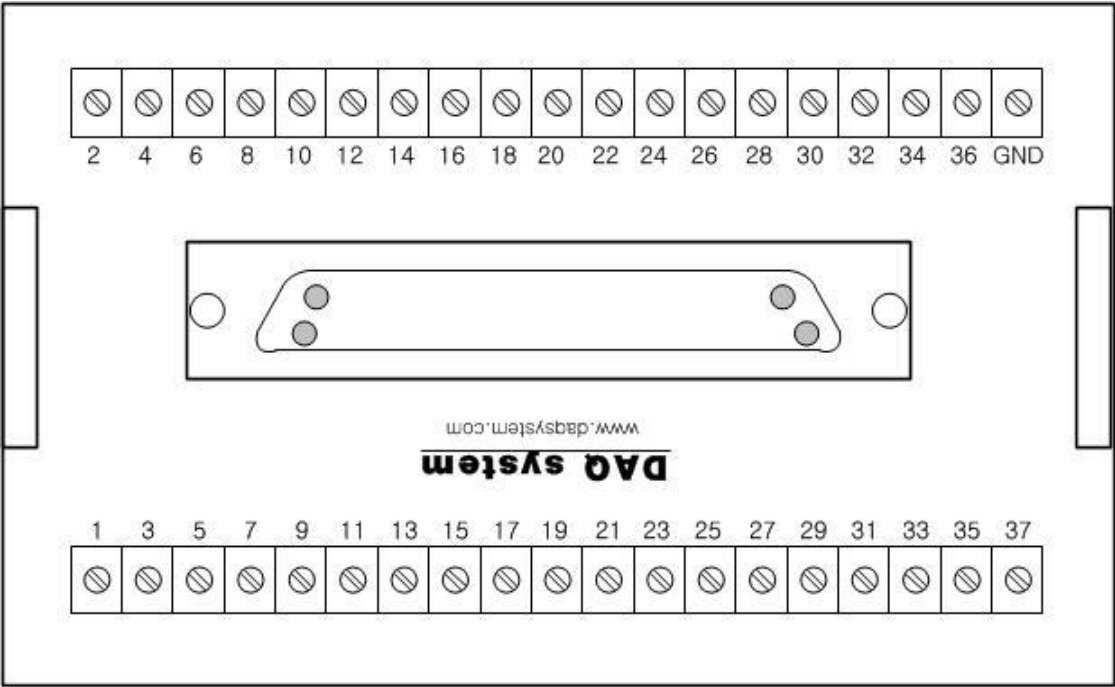
[Figure 4-4. Digital Input Circuit IN_00 ~ 07]

In [Figure 4-2], the digital input circuit is insulated by a port coupler. When a positive voltage is applied to "INO_COM0" and a negative voltage is applied to the digital input, a current flows through the diode inside as a photo coupler, and the output transistor becomes energized according to the flowing current.

The board has 8 circuits as above. That is, there are IN0-COM and IN_COM for every 8 photo couplers, so there are 8 total IN0_COMs (INO_COM0 ~ INO_COM7). If you want a completely isolated circuit, it is better to use an external power supply rather than using the board power supply.

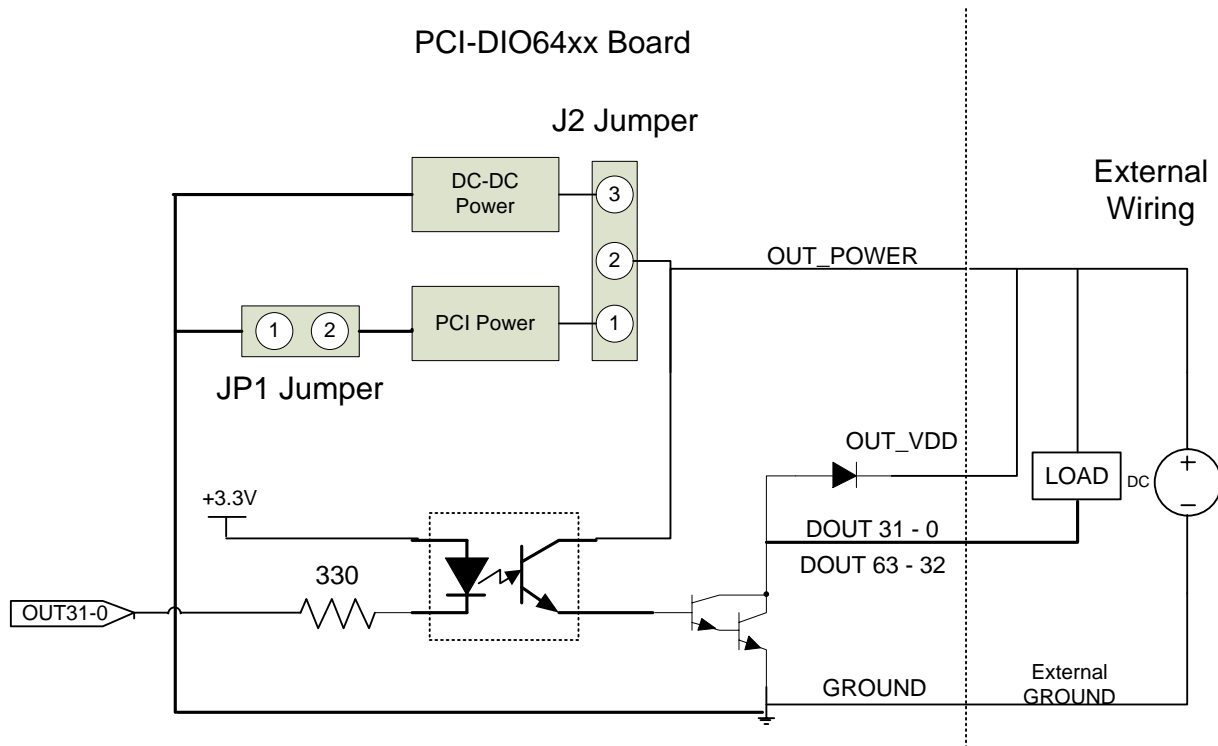
In the case of input, the 40-pin (20x2, 2.54mm pitch) right-angle header connector on the board is connected to the 37-pin terminal board, so the pin map should be used as follows. The

IN_COM part is 17, 18, 19, 20 in [Table 2.], and GND is used when inputting external power.



5. Digital Output

5-1 PCI-DIO6400, cPCI-DIO6400, PCI-DIO6402 External Wiring



[Figure 5-1. Output Port External Wiring]

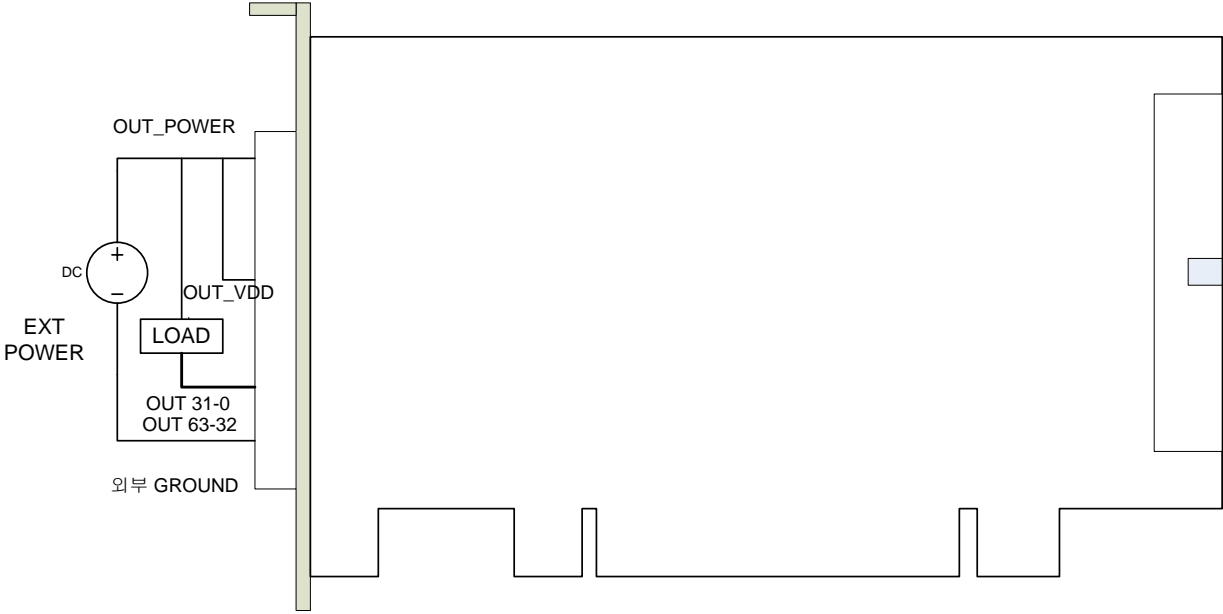
OUTPUT can be used by selecting external power or internal power. When using an external power source, the J2 and JP1 jumpers must not be connected to become a completely isolated input.

In case of internal power, you can select DC-DC converter or PCI 5V power. In case of using DC-DC converter, only J2 jumper is set (Short 3-2) JP1 does not have a jumper connection.

In case of using PCI 5V power, set J2 jumper (1-2 short) JP1 is used by shorting it with a jumper.

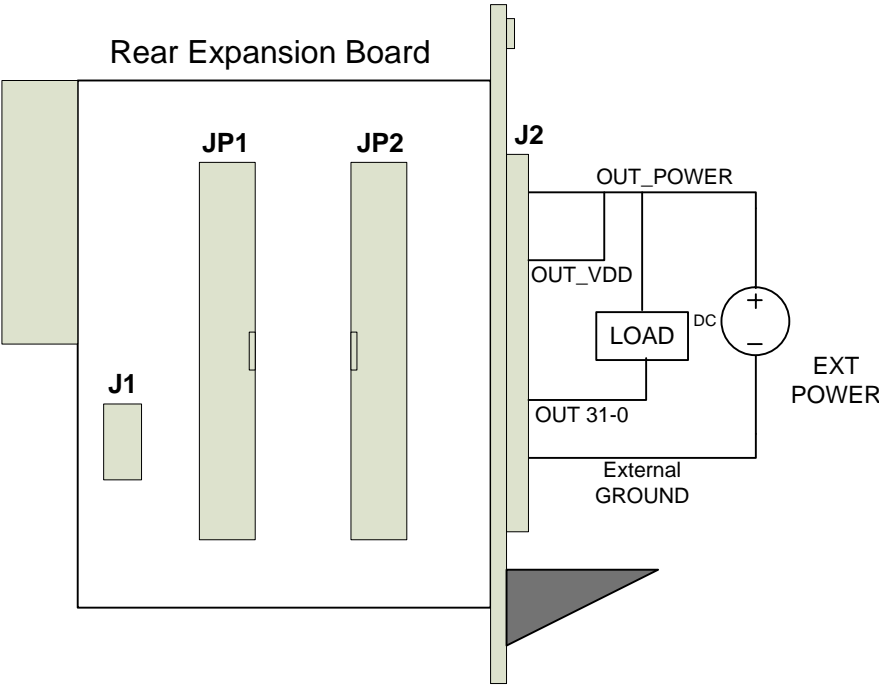
OUT_VDD is used by connecting to the + side of the power supply when the load is an inductive load (coil, solenoid, relay, etc.) in the figure above and generates counter electromotive force.

(Note) 1. The power supply voltage range for output use is 5 – 24V.

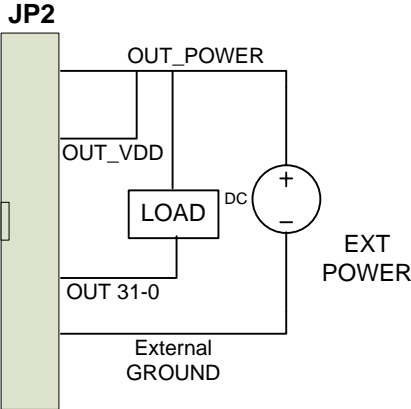


[Figure 5-2. PCI-DIO6400, PCI-DIO6402 External Wiring]

[Figure 5-2] shows the output port connection through the 37-pin D-sub connector.



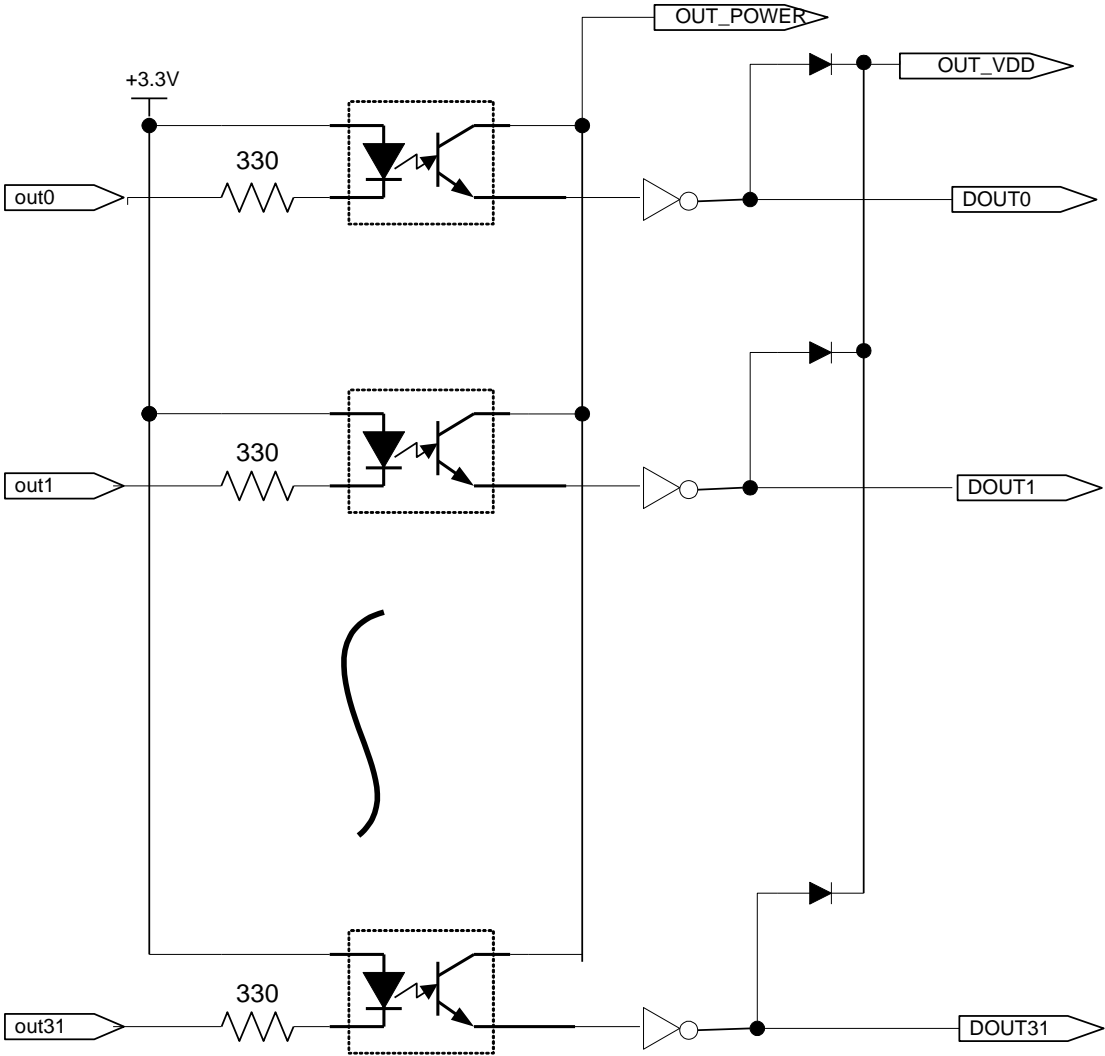
[Figure 5-3. cPCI-DIO6400 Output Port External Wiring (D-sub37 PIN)]



[Figure 5-4. cPCI-DIO6400 Output Port External Wiring (HEADER40PIN)]

[Figure 5-4] shows the output port connection using a 40-pin header connector.

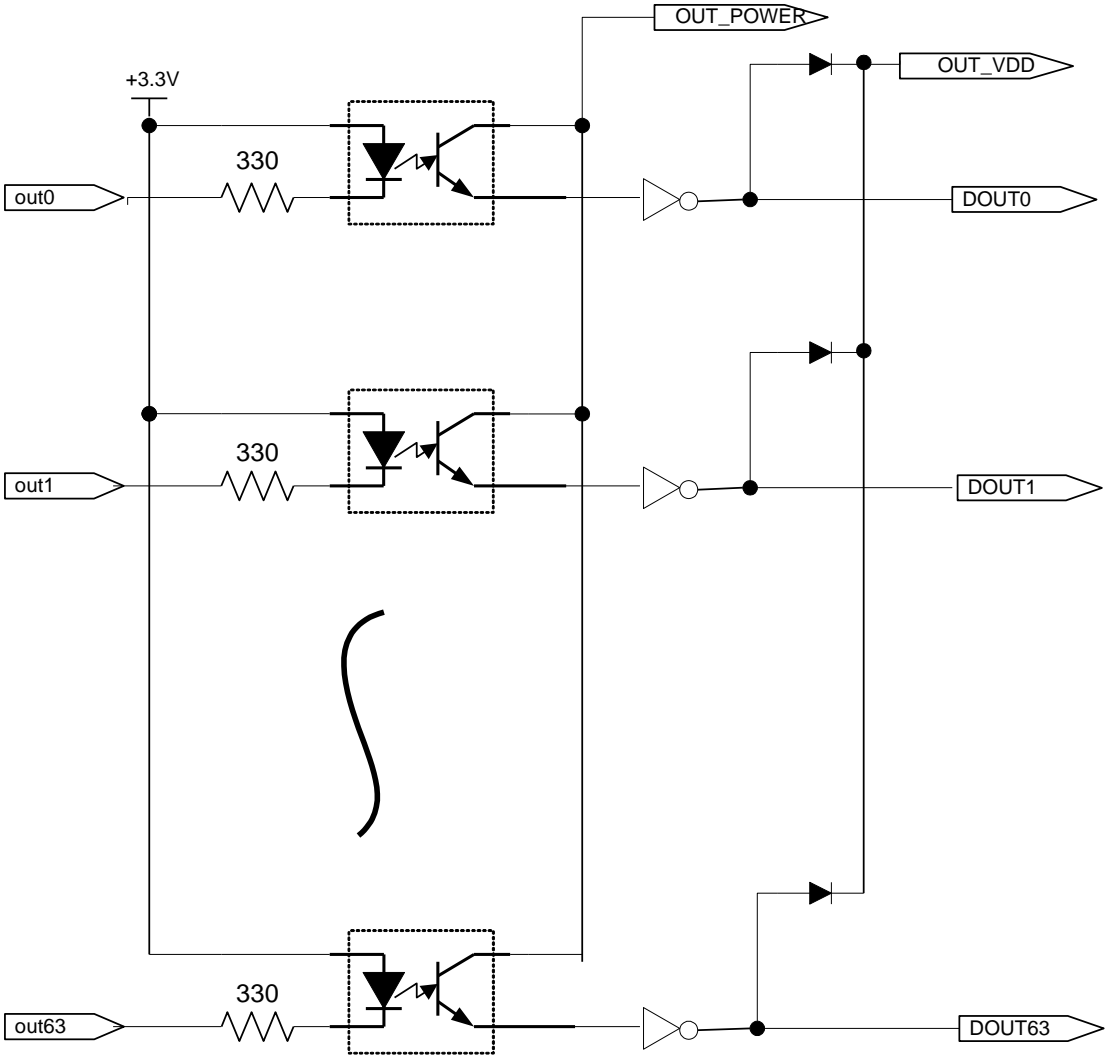
5-2 PCI-DIO6400, cPCI-DIO6400 Output Circuit



[Figure 5-5. PCI-DIO6400, cPCI-DIO6400 Digital Output Circuit]

In the figure above, the digital output circuit is insulated by a port coupler. "OUT_POWER" and "OUT_VDD" are commonly connected to the output circuit. "OUT_POWER" becomes external power or 5V PCI or ISO 5V (DC-DC output power) inside the board according to the jumper setting of connector J2. "OUT_VDD" is connected to the anode of the clamp diode for the purpose of protecting the circuit in the board. In general, an external power supply of 5V can be used.

5-3 PCI-DIO6402 Output Circuit



[Figure 5-6. PCI-DIO6402 Digital Output Circuit]

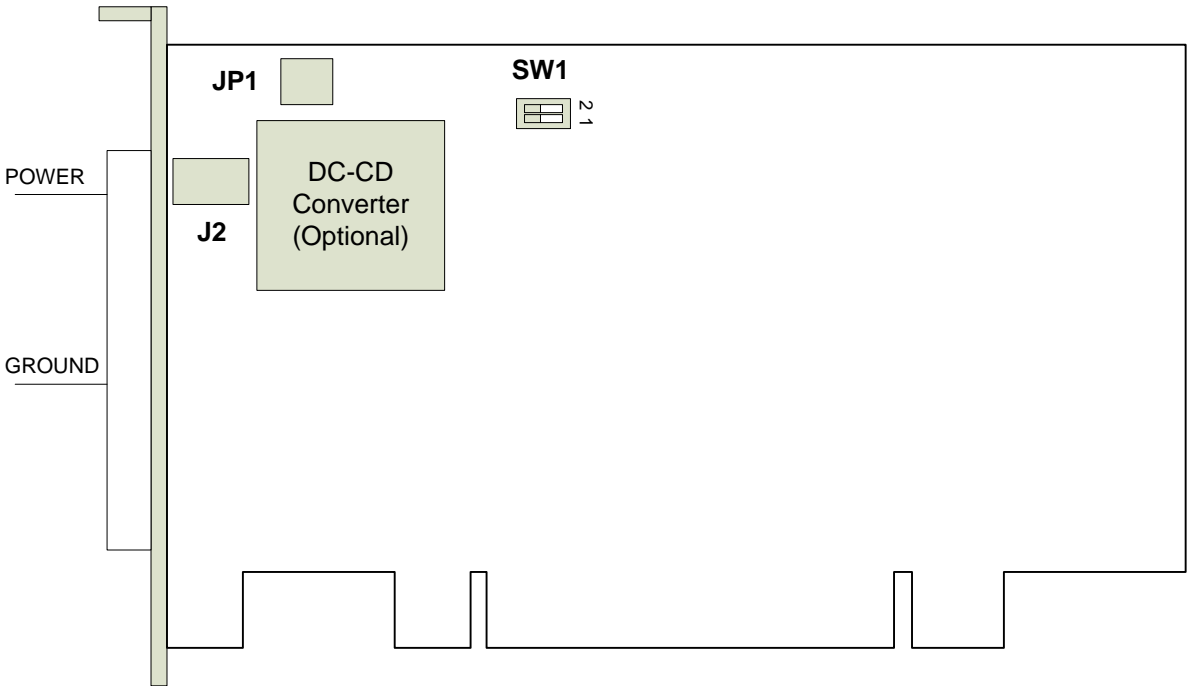
In the figure above, the digital output circuit is insulated by a port coupler. "OUT_POWER" and "OUT_VDD" are commonly connected to the output circuit. "OUT_POWER" becomes external power or 5V PCI or ISO 5V (DC-DC output power) inside the board according to the jumper setting of connector J2. "OUT_VDD" is connected to the anode of the clamp diode for the purpose of protecting the circuit in the board. In general, an external power supply of 5V can be used.

6. Option Setup

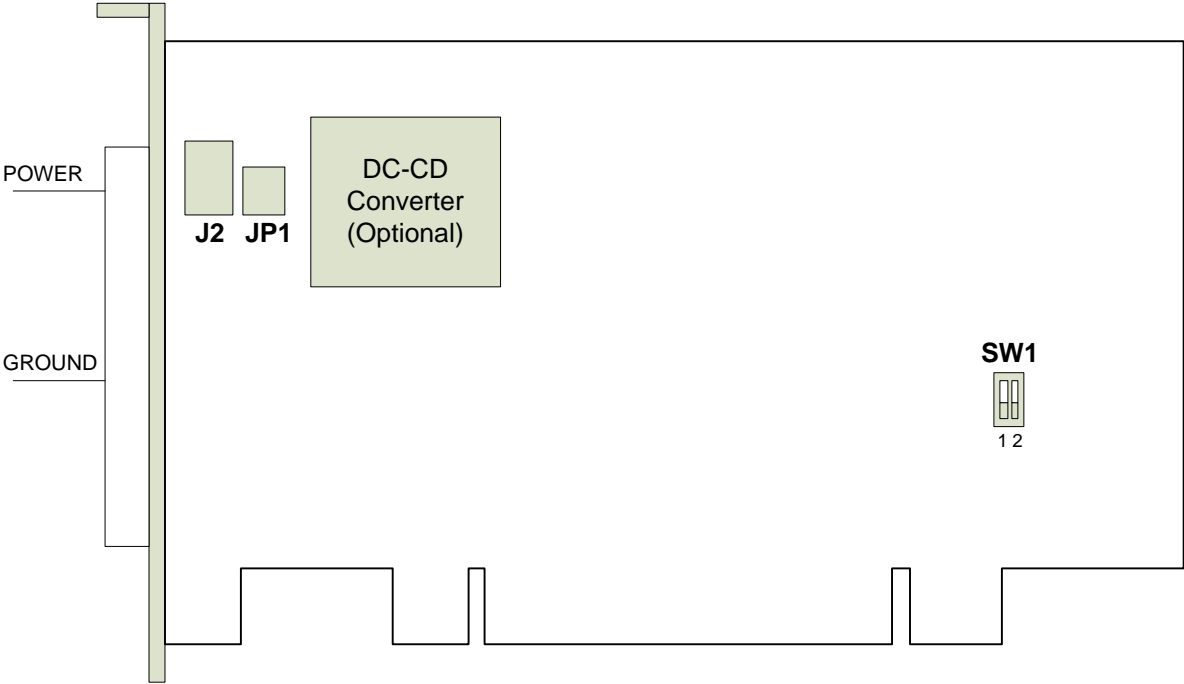
If it is not possible to use external power, it can be used by outputting power from the board. At this time, it is possible to set whether to output the power of the DC-DC Converter (optional) isolated on the board or whether to output the PC internal power (+5V) with a jumper.

GROUND can also select whether to output the DC-DC Converter (optional) GROUND or the internal PC GROUND. When using the PC's internal power supply, it must be set to PC GROUND.

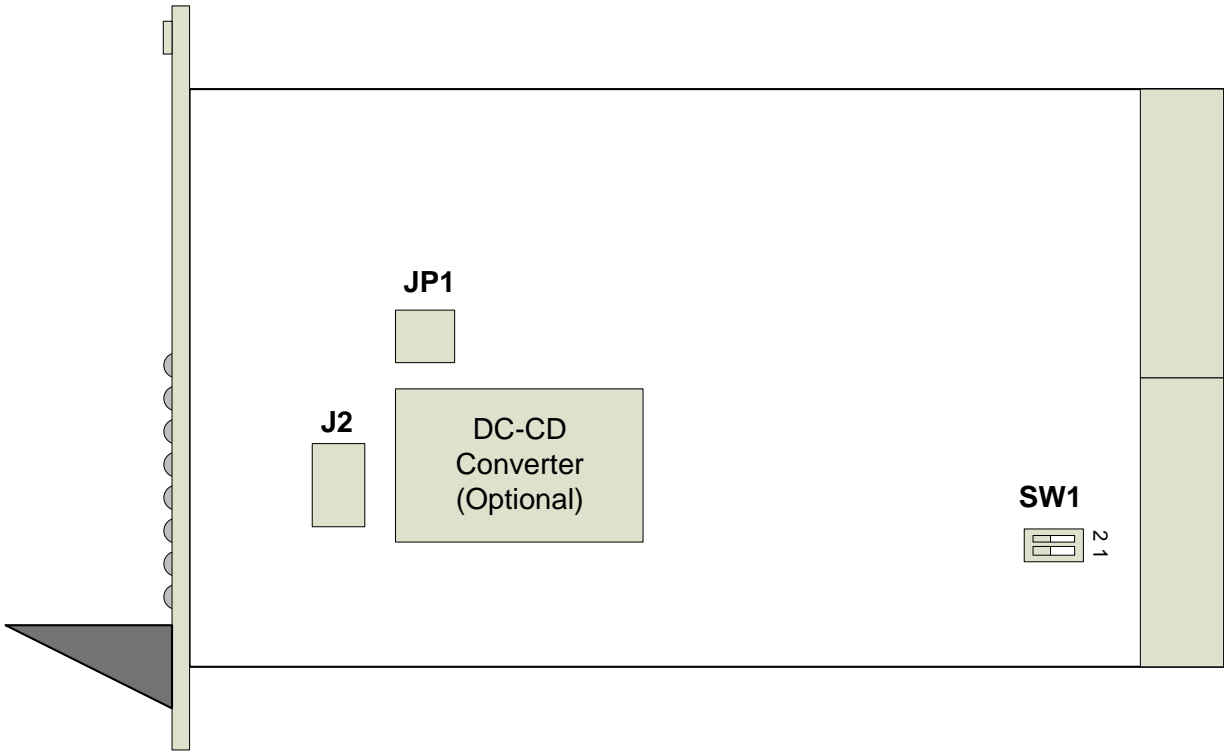
(Note) The basic option does not include DC-DC Converter.



[Figure 6-1. PCI-DIO6400]

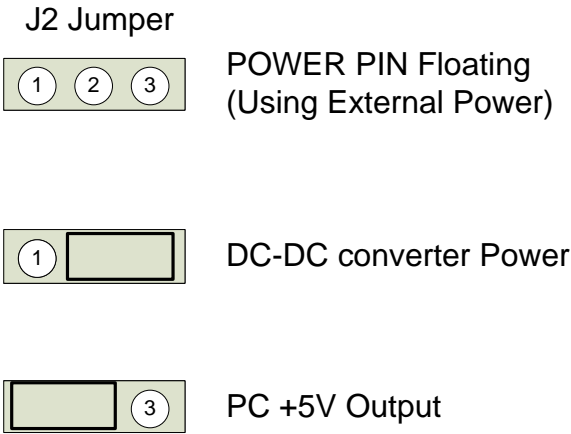


[Figure 6-2. PCI-DIO6402]



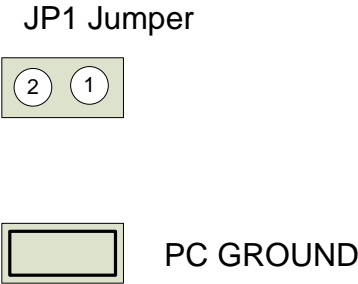
[Figure 6-3. cPCI-DIO6400]

6-1 J2 Jumper Setup



(Note) Refer to [Figure 6-1] [Figure 6-2]

6-2 JP1 Jumper Setup



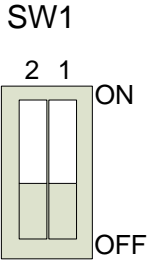
(Note) Refer to [Figure 6-1] [Figure 6-2]

(Note) In the basic option, the jumper is not set at the time of shipment.

6-3 Board Address Setup

In a system that requires many I/O ports, if several DIO6400 series boards are installed in one system, each board address must be used separately. At this time, each board is classified using the dip switch (SW1) on the board.

The total number of boards installed in one system is four.



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

7. Installation

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

7-1 Hardware Installation

7-1-1 Product Contents

1. (c)PCI-DIO64xx Board
2. CD (Driver/Manual/API/Sample Source etc.)

7-1-2 Installation Process

- ① Turn off the computer.
- ② Remove the computer cover according to the computer manual.
- ③ Insert the product into an empty PCI slot. If possible, insert the boards in the order closest to the CPU.
- ④ Remove the blocked part at the back of the computer case of the slot where the board is inserted. Tighten the screws between the bracket of the board and the connection part of the case.
- ⑤ In case of multi-board, repeat from step 3.

7-2 Driver Installation

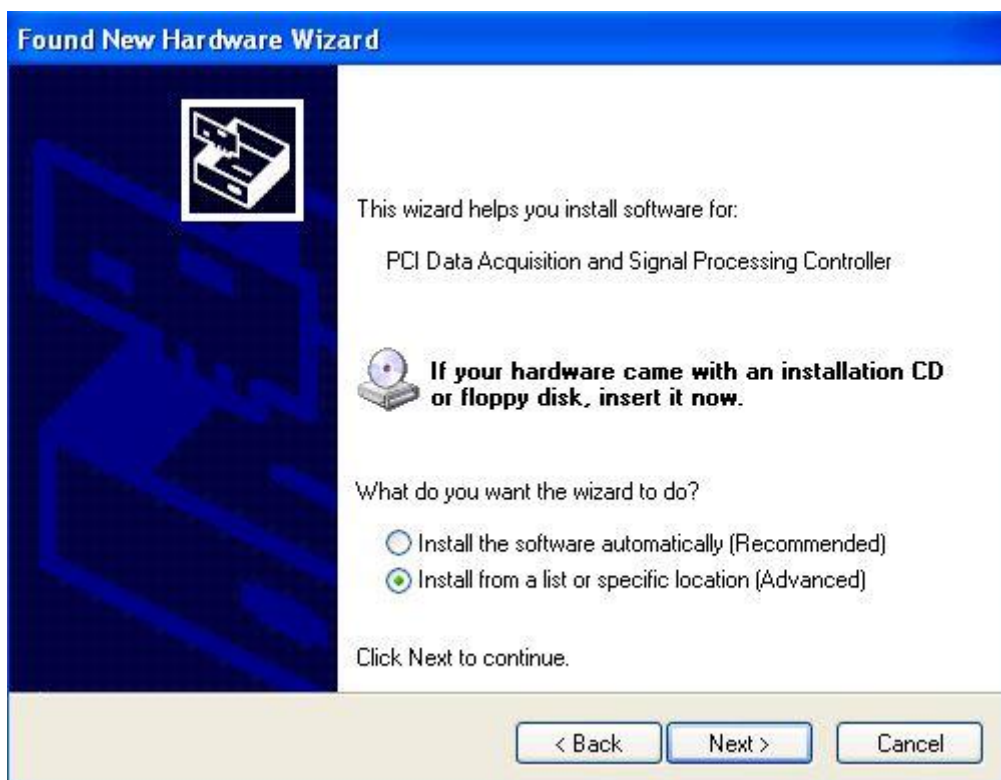
After installing the board, install the driver and sample application to run the board on your PC. For installation, use the supplied CD.

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 (c)PCI-DIO64xx boards into the PCI Slot or Compact PCI Back Plane, and turn on the PC's power. When the "Start New Hardware Wizard" window opens as shown below, select it as shown below and click the Next button.

The (c)PCI-DIO64xx Series boards connect to PCI Card Port or Compact PCI Back Plane. After that you can show the below picture of "Found New Hardware Wizard" window.

- (1) If new hardware is found, Wizard will ask you to install the corresponding driver. For installation of the driver, select the item "Install from a list or specific location (Advanced)" and click "Next" as in the below figure.



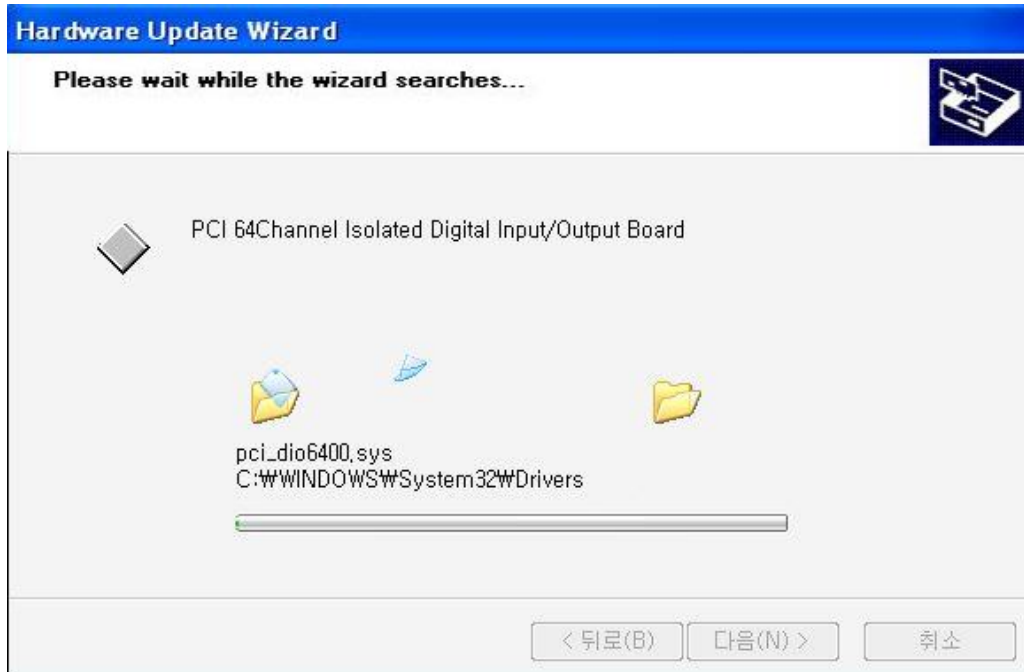
[Figure 7-1. PCI-DIO64xx Search Window]

(2) After find a driver folder of the CD, press "next" button.

ex) F:\WPCI-DIO6400\driver

The driver folder includes a file of "**pci_dio6400.inf**" and "**pci_dio6400.sys**" that it is necessary for driver installation.

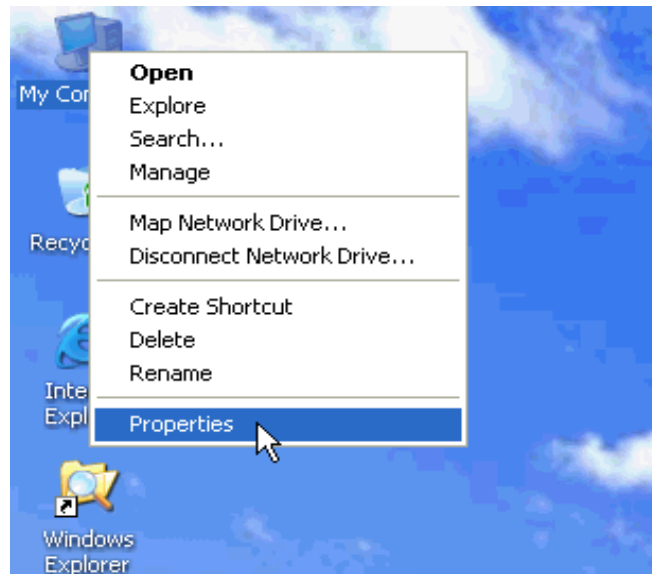
(3) When you click Next, the driver files are installed.



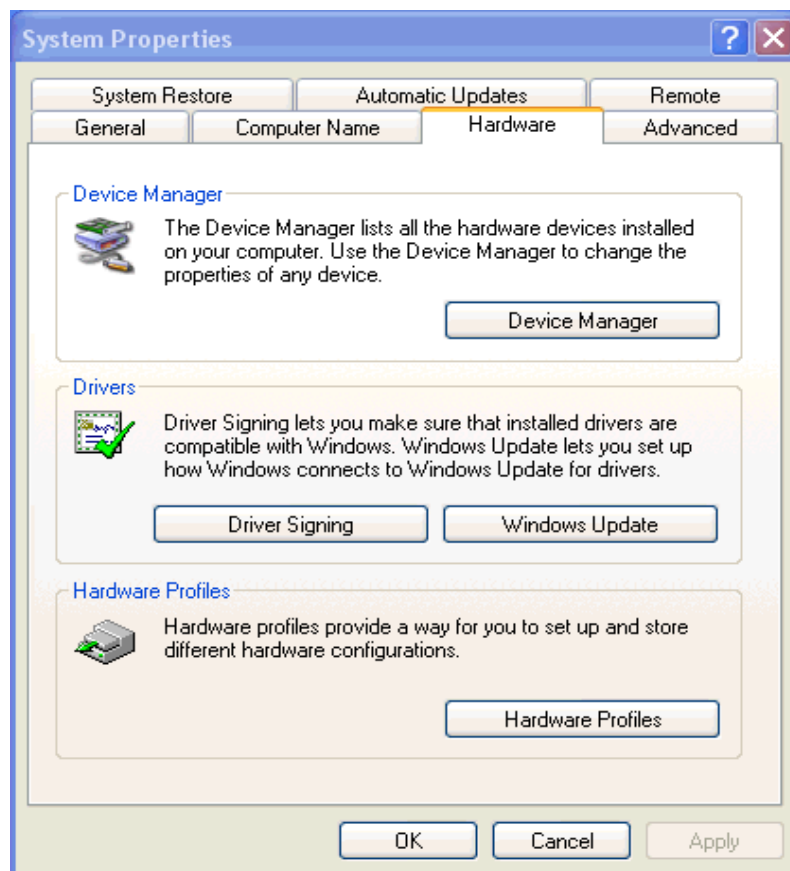
(4) When the installation is complete, normally same as the picture below.



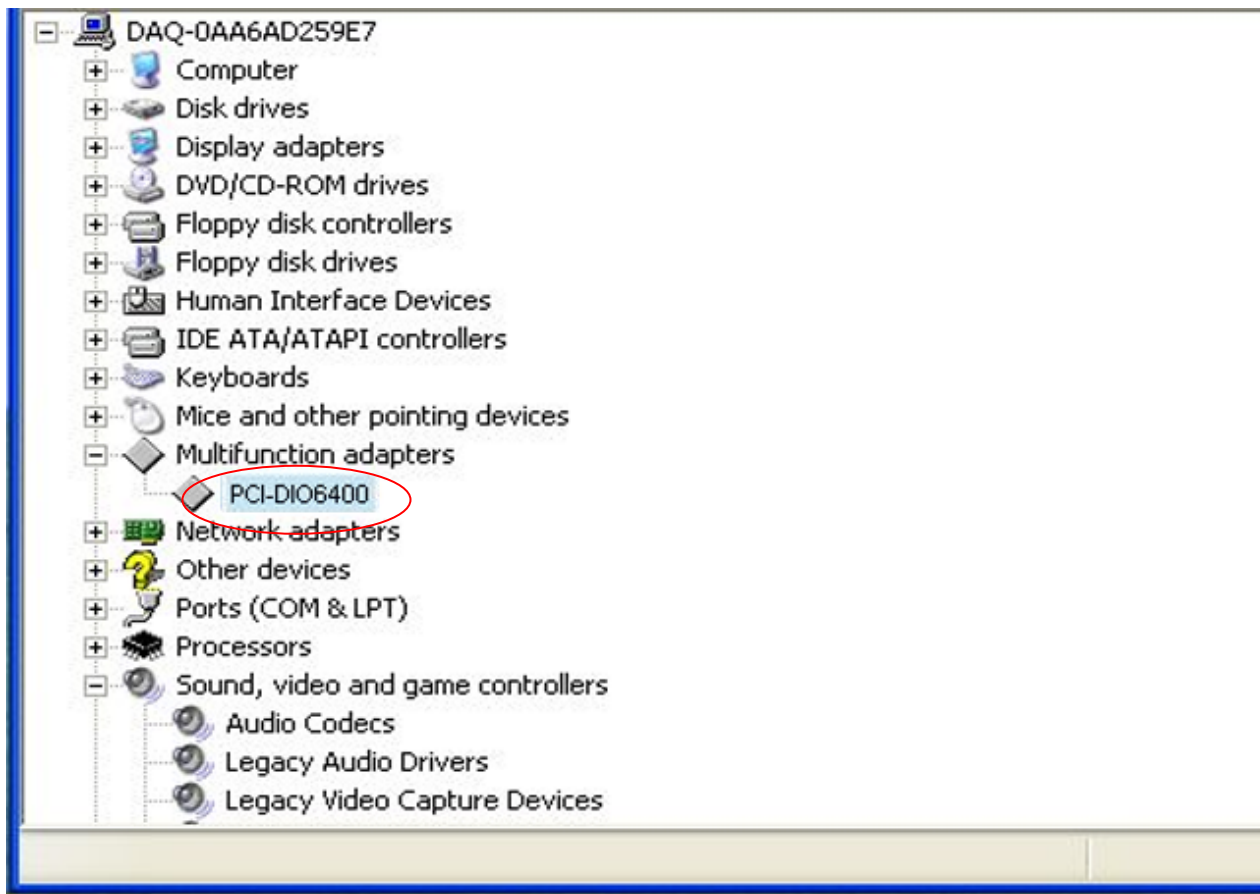
- (5) If the installation is completely finished, you confirm it in the following ways. Do the following steps to show up the "Device Manager" window. [My Computer -> properties -> Hardware -> Device Manager -> **Multifunction Adaptors** -> **PCI-DIO6400**]



[Figure 7-2. "Select "My computer"->"Properties"]



[Figure 7-3. "System Properties" window-"Hardware" Tab]



[Figure 7-4. "Device Manager" window]

If you can see the "PCI-DIO6400" at Multifunction Adaptors, the driver installation is to have been over. (Check the red circle)

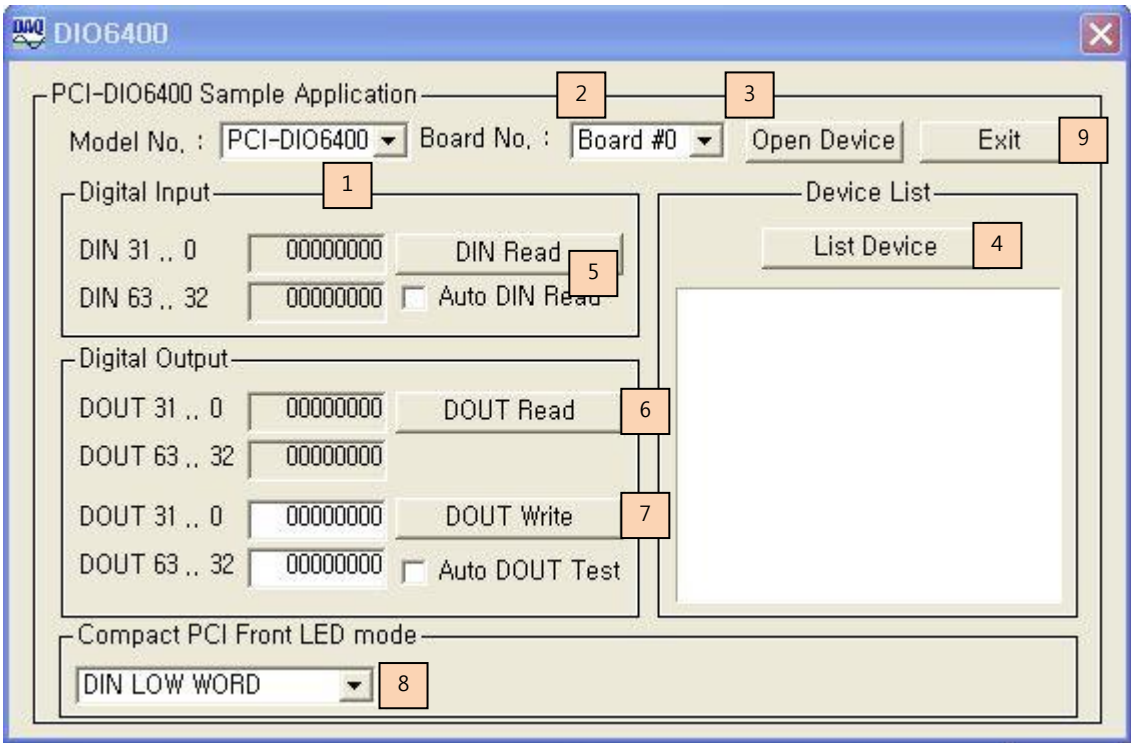
Notice : After installation, you should re-boot the system for the proper operation.

8. Sample Program

8-1 Program Interface

In the APP folder of the CDROM provided with the board, a sample program "DIO6400.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 source form so that the API provided to use the board can be tested briefly, so the user can modify it and use it.



[Figure 8-1. Sample Program "DIO6400.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 for compilation. In order to run the sample program normally, the API DLL (PCI_DIO6400.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.

8-2 Function Description

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

Select the Model Name.

(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**

It shows the PCI-DIO64xx (PCI-DIO6400, PCI-DIO6401, PCI-DIO6402) series boards installed in the system.

(5) **'DIN Read' Button**

When the button is clicked, the value that reads the input port is displayed in Hex on the window next to "DIN 31..0".

Ex) If it reads "0008001", No. 15 and No. 0 are On.

* DIN 63..32 is for USB-DIO6401.

When **'Auto DIN Read'** is checked, it is automatically displayed on the window next to "DIN 31..0".

(6) **'DOUT Read' Button**

When the button is clicked, the value that reads the output port is displayed in Hex on the window next to "DOUT 31..0".

* DOUT 63..32 is for USB-DIO6402.

(7) **'DOUT Write' Button**

In the window next to "DOUT 31..0", input the value you want to write to the output port in Hex and press this button to output the value corresponding to each bit.

Ex) If you write "0008001", No. 15 and No. 0 are On

* DOUT 63..32 is for USB-DIO6402.

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

(8) **'Compact PCI Front LED Mode'**

Used in cPCI-DIO6400.

(9) **'Exit' Button**

Quit the application.

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-DIO64xx Series API Programming -- DAQ system

MEMO

Contact Point

Web sit : <https://www.daqsystem.com>

Email : postmaster@daqsystem.com

