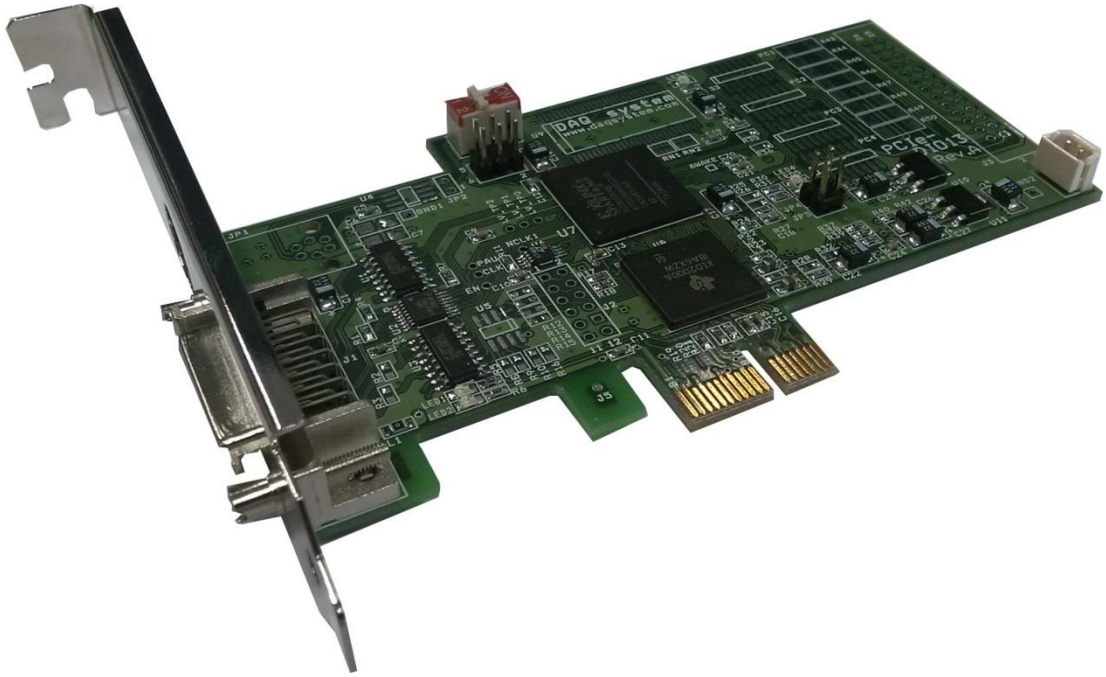
PCIe-DIO13

User Manual

Version 0.3



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Contents

1. Introduction

The PCIe-DIO13 is a Data Transfer Interface Board to save external FIFO memory. With based PCI Express x1, it supports a LVDS high speed Data Transfer through the Direct Memory Access(DMA).

According to the Camera Link Interface Standard for a Digital Camera and Frame Grabber, a MDR 26-pin connector for Camera Link (Camera Link) cable is used. A data and control signals are assigned by the Camera Connector pin map of Base Configuration. In the received data side, the signal must be connected by the Frame Grabber Connector pin map. Refer to chapter 2.3 connector Pin-Out.

1-1 Product Features

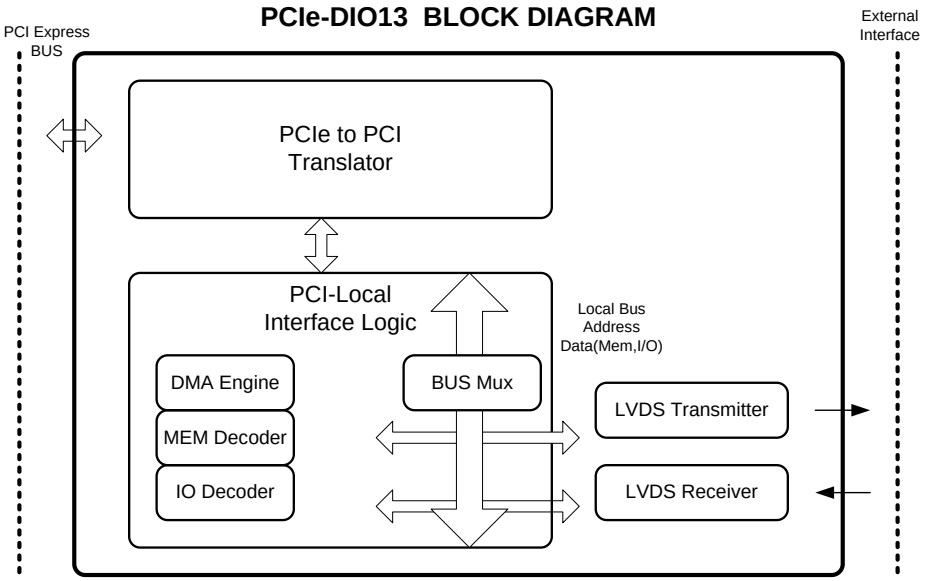
Items	Description	Remark
Hardware		
PC Interface	PCI Express x1	
Operation Power	+5VDC/ Max 1A	
I/O Port	Camera Link	
Feature	66Mhz 8-bit FIFO Signal and LVDS interface Sustained 50MB/s Max.	
Simultaneous use of boards	Max. 4	
Operating temperature range	0 ~ 60℃	
Storage temperature range	-20 ~ 80℃	
Humidity range	5 ~ 95%	Non-condensing
Board size	120.8mm X 68mm	PCB Board Size
Software		
OS	Windows 2000/XP/7/8/10 (32/64bit)	
API	Windows Client DLL API	
Development	Windows Application by User	
Support	Sample Program	VC++

2. PCIe-DIO13 Function

2-1 Board Block Diagram

The PCIe-DIO13 internal function of the configuration is shown in Figure 2-1.

The PC interface access the board local bus by the PCI bus standard through the exchange transform "PCI Express – PCI Translator". DMA, data output, output control, is performed on the FPGA, and is controlled by the API command from PC, the state monitoring.

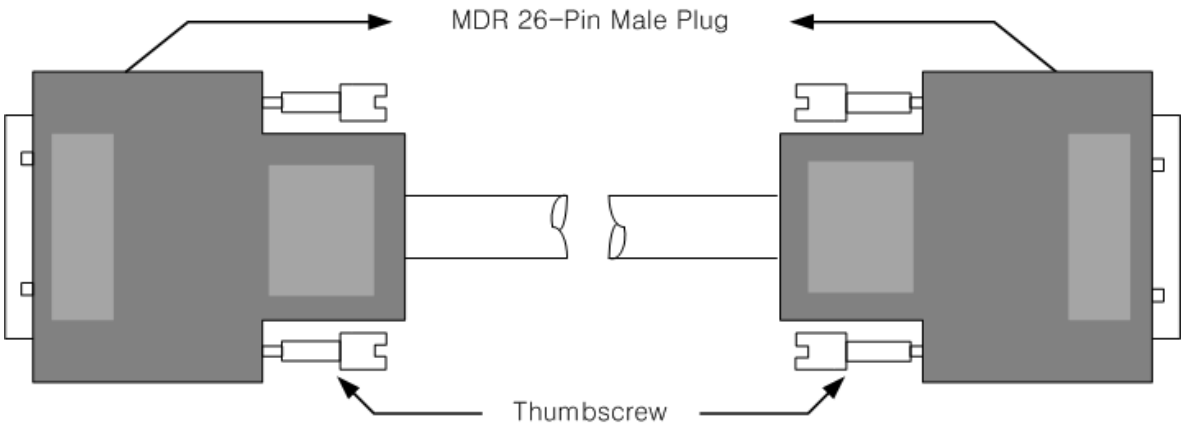


[Figure 2-1. PCIe-DIO13 Block Diagram]

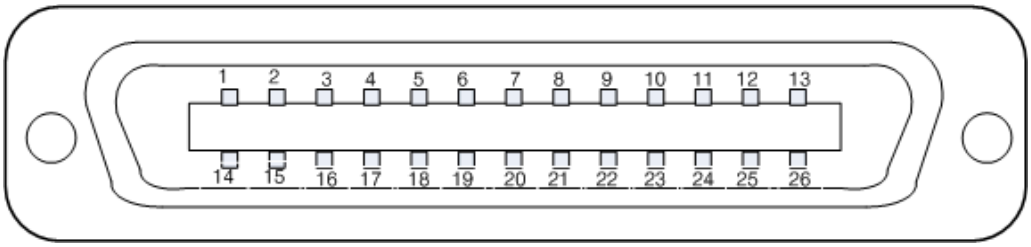
2-2 Camera Link Cable and Connector

The connection between the camera link cameras and PCIe-DIO13 board uses the 26 Pin MDR cable. The Camera Link cable consists of twin-axial shielded cable and 2 Mini MDR 26-male plug. The bottom of Figure 2-2 Camera Link cable is typically used.

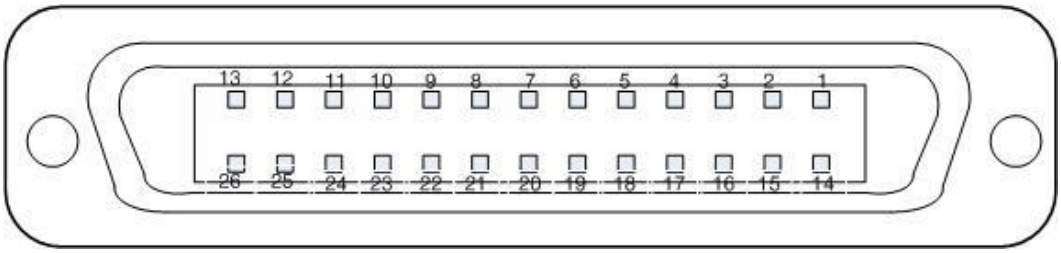
The 26-Pin MDR Connecter is located at the end of the cable as like Figure 2-3, Figure 2-4 is 26-Pin MDR Connecter, placed at the Camera or Frame Grabber. As shown in the figure, the pin numbers are cross-linked to each other, Transmitter and Receiver of Camera and Frame Grabber signals are connected cross each other.



[Figure 2-2. MDR-26 Camera Link Straight Cable]



[Figure 2-3. MDR-26 Cable(Male) Pin Out]



[Figure 2-4. MDR-26 Connector(Female) Pin Out]

Cable Specification (Standard)

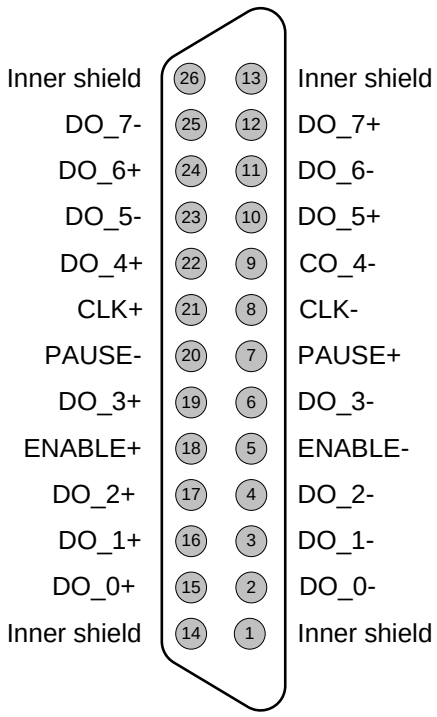
- Characteristic Impedance : 100 ±10 ohms
- Propagation Delay : 1.5 NS/ft
- Mutual Capacitance : 17 pF/ft nominal
- Conductor Resistance : 72 Ohms / 1k
- Velocity of Propagation : 78% maximum
- Voltage Rating : 30V
- Temperature : -20 ~ +80℃
- Length (m) : 1 / 2 / 3 / 4.5 / 5 / 7 / 10

2-3 Camera Link and PCIe-DIO13

The MDR-26 connector of PCIe-DIO13 is used by specifying the signal required for memory access according to the Camera Connector pin map of Base Configuration.

It consists of 8 data signals and 1 Write Enable, Clock, and Pause signals, a total of 11 signals. The LVDS signal, which replaces the camera link standard channel link signal with a signal as shown in [Figure 2-5], is transmitted through the MDR cable.

The receiving device (module) that receives data from PCIe-DIO13 must receive the signal replaced by the Frame Grabber Connector pin map of Base Configuration according to the cross connection of the camera link cable. For example, the PCIe-DIO13 connector pin 2 (DO_0-) is connected to the receiving device connector pin 25.



[Figure 2-5. MDR-26 Connector(Female) Pin Map]

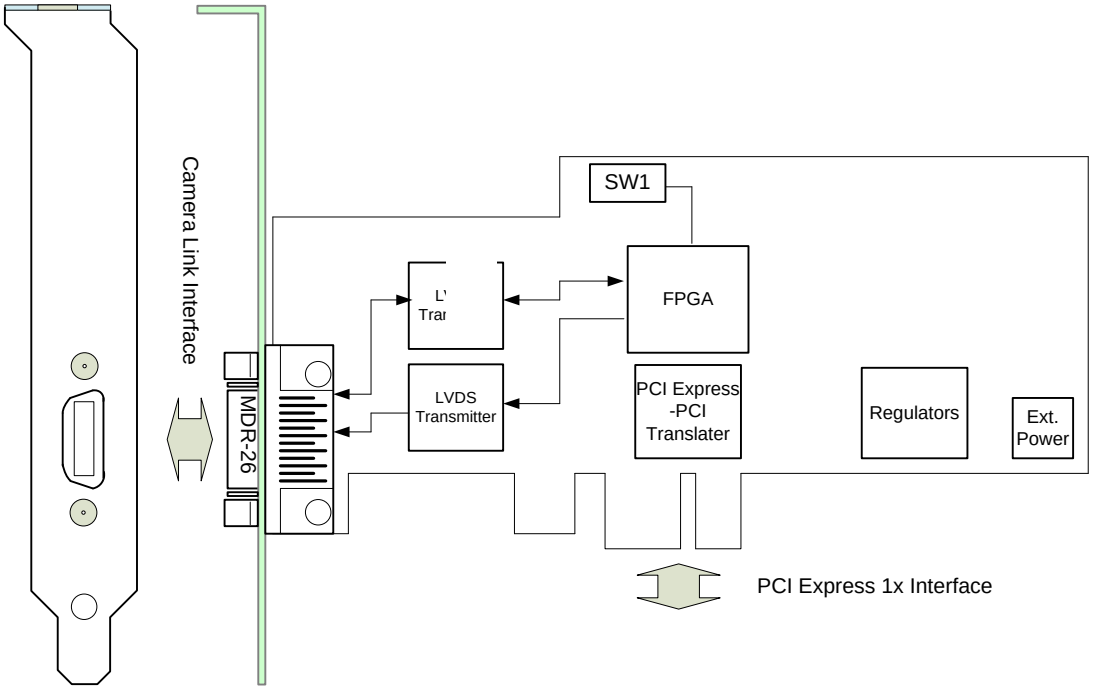
[Table 1. MDR-26 Connector(J1)]

Pin No.	Name	Description	Remark
1	**Inner Shield**	Cable shield	
2	**DO_0-**	Data Out 0-	
3	**DO_1-**	Data Out 1-	
4	**DO_2-**	Data Out 2-	
5	**ENABLE-**	Write Enable Out-	
6	**DO_3-**	Data Out 3-	
7	**PAUSE+**	Data Transfer Pause In+	
8	**CLK-**	Clock Out-	
9	**DO_4-**	Data Out 4-	
10	**DO_5+**	Data Out 5+	
11	**DO_6-**	Data Out 6-	
12	**DO_7+**	Data Out 7+	
13	**Inner Shield**	Cable shield	
14	**Inner Shield**	Cable shield	
15	**DO_0+**	Data Out 0+	
16	**DO_1+**	Data Out 1+	
17	**DO_2+**	Data Out 2+	
18	**ENABLE+**	Write Enable Out+	
19	**DO_3+**	Data Out 3+	
20	**PAUSE-**	Data Transfer Pause In-	
21	**CLK+**	Clock Out+	
22	**DO_4+**	Data Out 4+	
23	**DO_5-**	Data Out 5-	
24	**DO_6+**	Data Out 6+	
25	**DO_7-**	Data Out 7-	
26	**Inner Shield**	Cable shield	

3. PCIe-DIO13 Board Description

In this chapter, the primary functions of the PCIe-DIO13 board are described briefly. For more information, refer to the device specification.

3-1 Board Layout



[Figure 3-1. PCIe-DIO13 Layout]

3-2 Device Features

(1) **LVDS Transceiver**

LVDS Input, Output Signal Transceiver

(2) **LVDS Transmitter**

LVDS Output Signal Transmitter

(3) **SW1**

Board Selection Switch

(4) **FPGA**

All of the board functions are controlled by the Logic program.

(5) **PCI Express-PCI Translator**

PCI Express Bridge

(6) **Regulator**

Supply the power.

(7) **Ext. Power**

Connector for external power (+3.3VDC).

(8) **MDR-26**

Camera Link Connector for a Data Transfer

4. Installation

After unpacking, inspect the board to make sure there are no damages on the package

4-1 Product Contents

1. PCIe-DIO13 Board
2. CD (Driver/Manual/API/Sample Source etc.)

4-2 Driver Installation

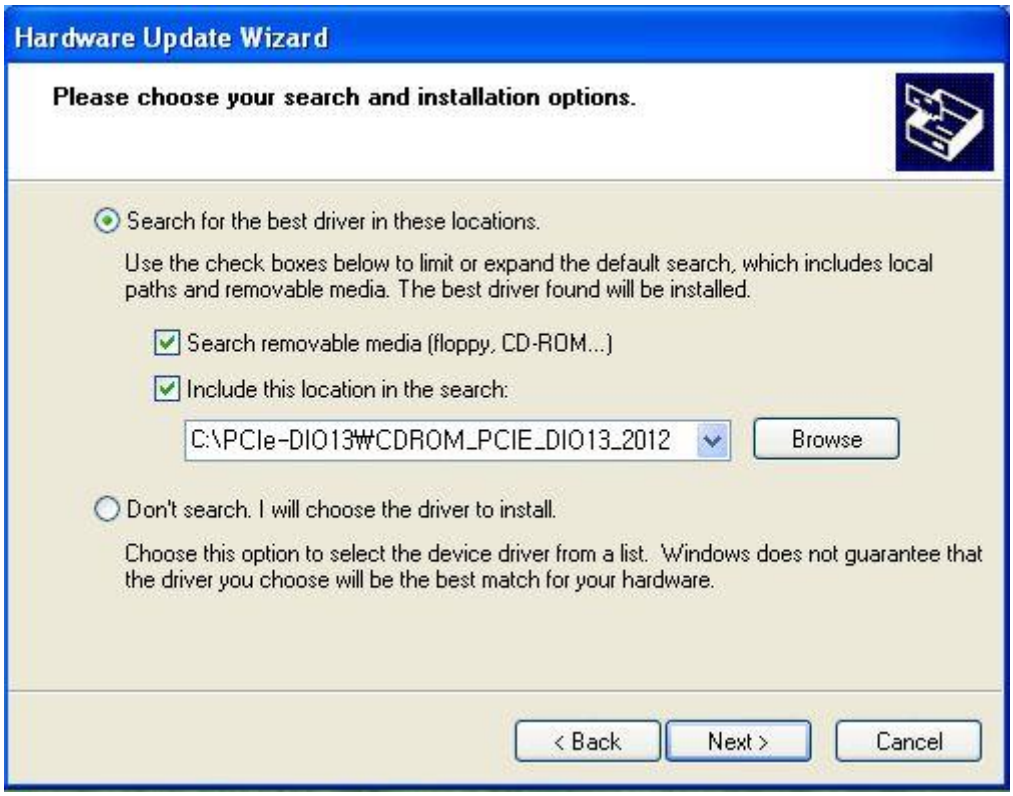
The PCIe-dio13 board is completely Plug & Play. There are no switches or jumpers to set. Therefore you can install it easily.

Your OS requirements are Windows 2000 SP4 or Windows XP SP1 above, Windows 7.

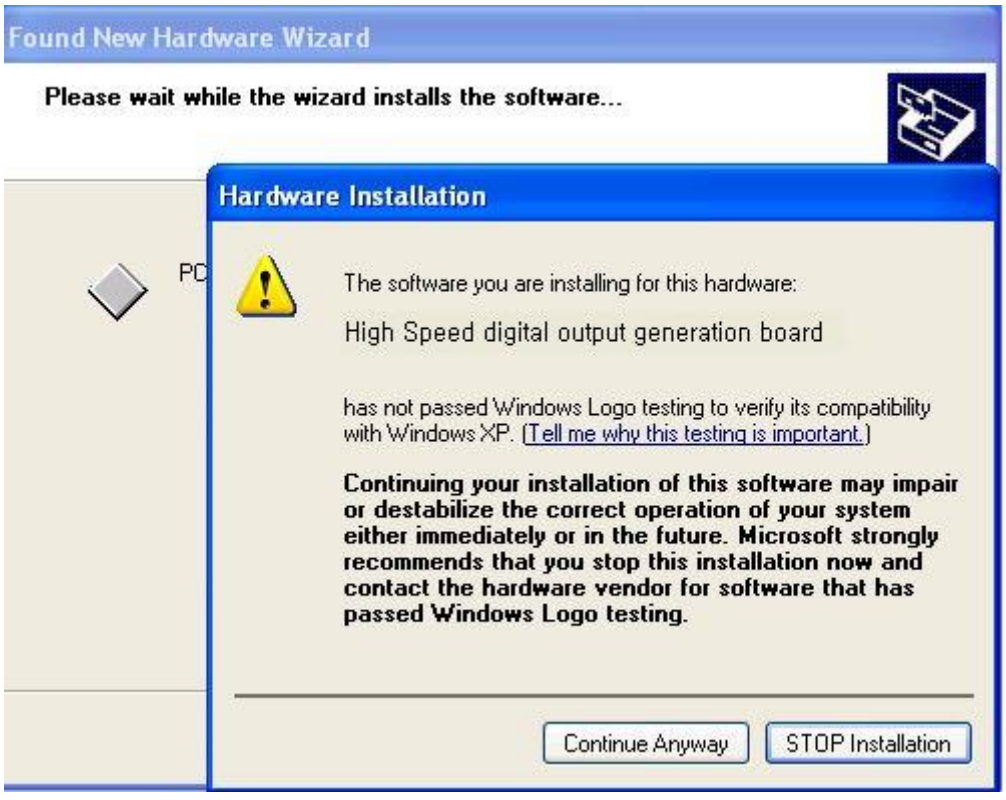
The PCIe-dio13 connects to Express Card Port. After that you can show the below picture of "New Hardware Search Wizard" window.

Click "Next" as in the figure.

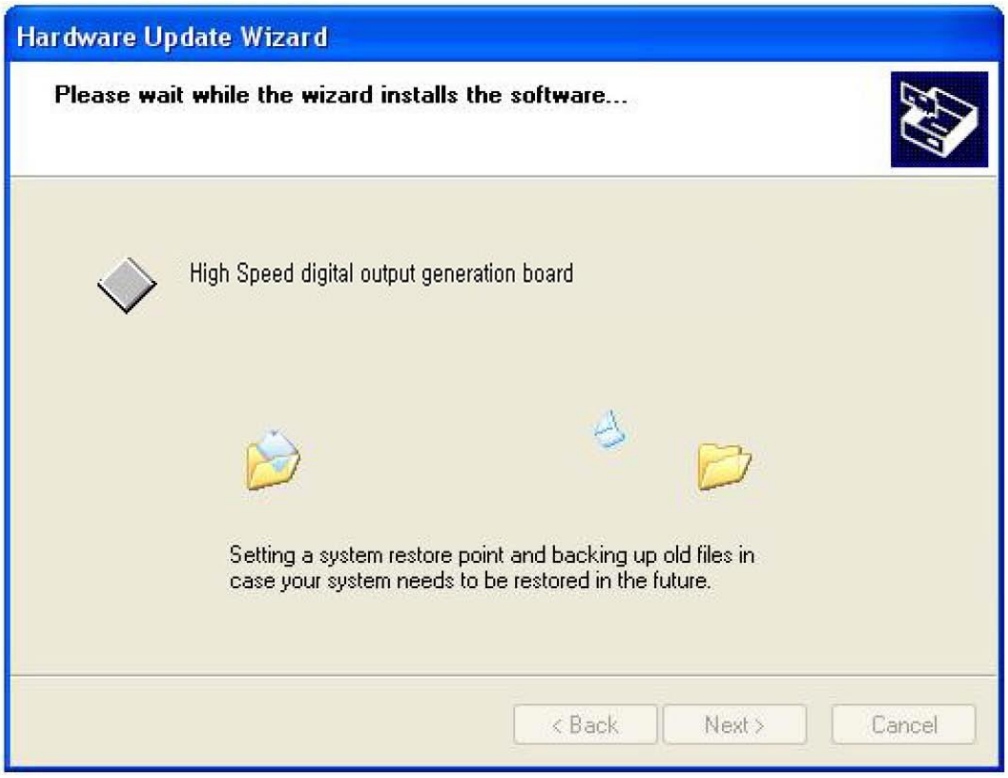
Click "Next" after selecting the PCIe-DIO13 board Driver in CD.



In the middle of the installation, "Windows XP Compatibility" Check to inquire about, click the Continue button.



The installation process proceeds is as follows.

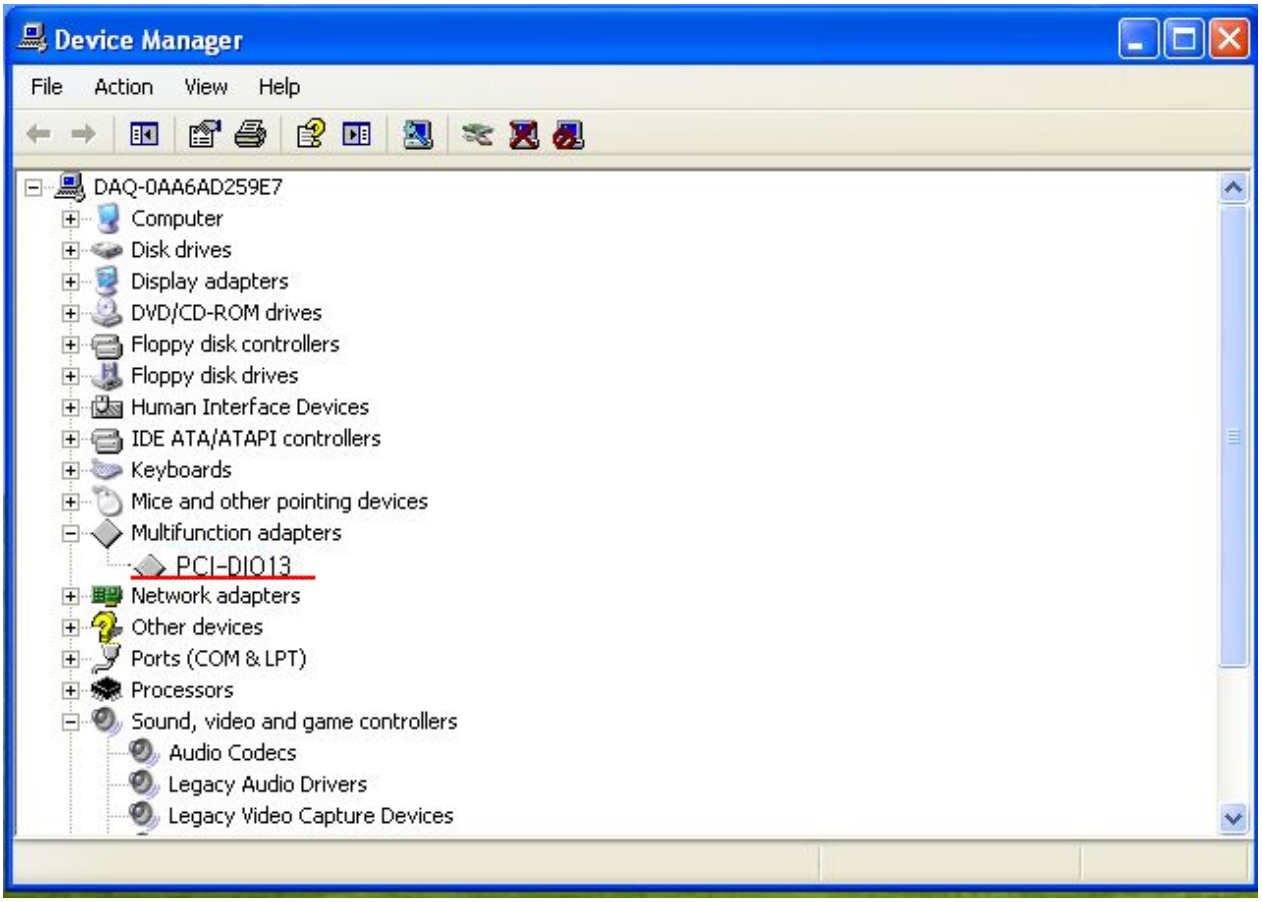


If the installation is completely finished, Click "Finish".

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-DIO13**]



If you can see the "PCIe-DIO13" at Multifunction Adaptors, the driver installation is to have been over. (Check the red circle)

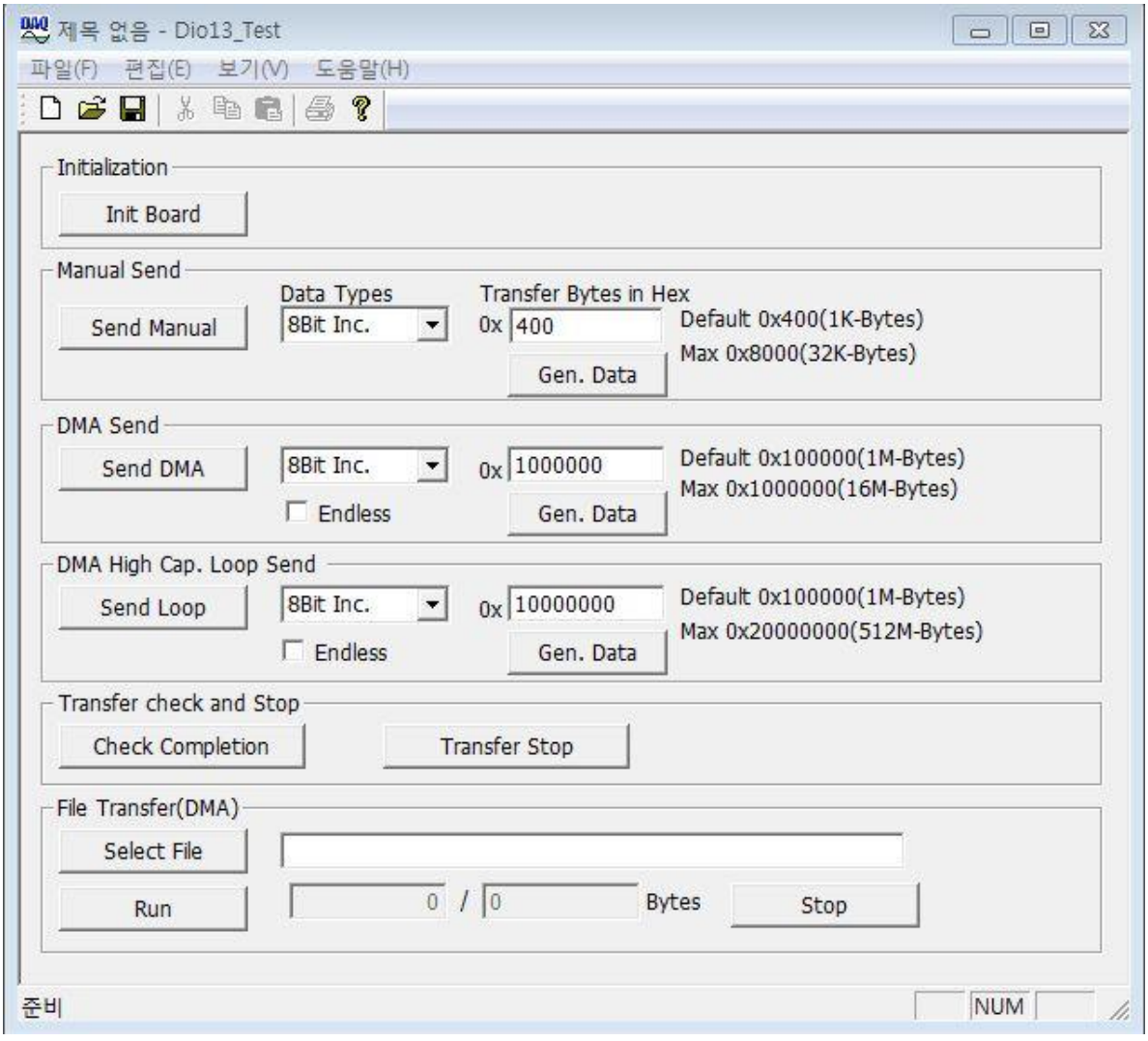
Important Notice : After installation, you should re-boot the system for the proper operation.

5. Sample Program

DAQ system provides a sample program to make the user be familiar with the board operation and to make the program development easier. You can find the sample program in the CDROM accompanying with the board.

Board to develop a program that uses functions provided for users Windows API (Application Programming Interface) is available in the standard C library, Java, Delphi, Visual Basic, such as support for multiple programming languages, there is no difficulty. Sample program is provided in source form in order to show the usage of API of the board and may be modified for customer's own usage.

5-1 Dio13_Test Program



[Figure 5-1. Sample Program "FrmTest.exe"]

To run the sample application program, you need to use API, it is a form of client DLL. To compile the sample source to make its executable file, you have to use Import Library files and header files. You can find them in the CDROM. To run the .exe file, the API DLL file **(PCI_DIO13.DLL)** must be in the same directory with the .exe file or Windows system folder. Another method is to add the directory of API DLL file to PATH environmental variable.

(1) **Init Board**

Press this button to initialize the Logic Variable, DMA engine, Data buffer.

(2) **Data Types**

Select the output data values. Incremental data of 32/16/8-bit, Fill data of 0xFF/0x00.

(3) **Transfer Bytes in Hex**

Choose the amount of output data. It is the number of bytes, the maximum bytes differ from depending on the manual transmission or DMA transfer.

(4) **Send Manual**

Up to max. 32-KB data store in the buffer memory. Saved data automatically output depending on the control pin state. Button on the right side of the data type, select the number of bytes, is set.

(5) **Send DMA**

To move data through DMA between logic and system, automatically output according to the external control signals. Button on the right side of the data type, select the number of bytes, is set. There is no limit to the number of output data.

(6) **Check Completion**

Check again to verify the data transfer to DMA memory. When the data transfer is complete, the data transfer is possible.

(7) **Select File**

Select the file to be transferred.

(8) **Run**

The selected file output to the DMA. The number of bytes output and the total size of the data is displayed on the right.

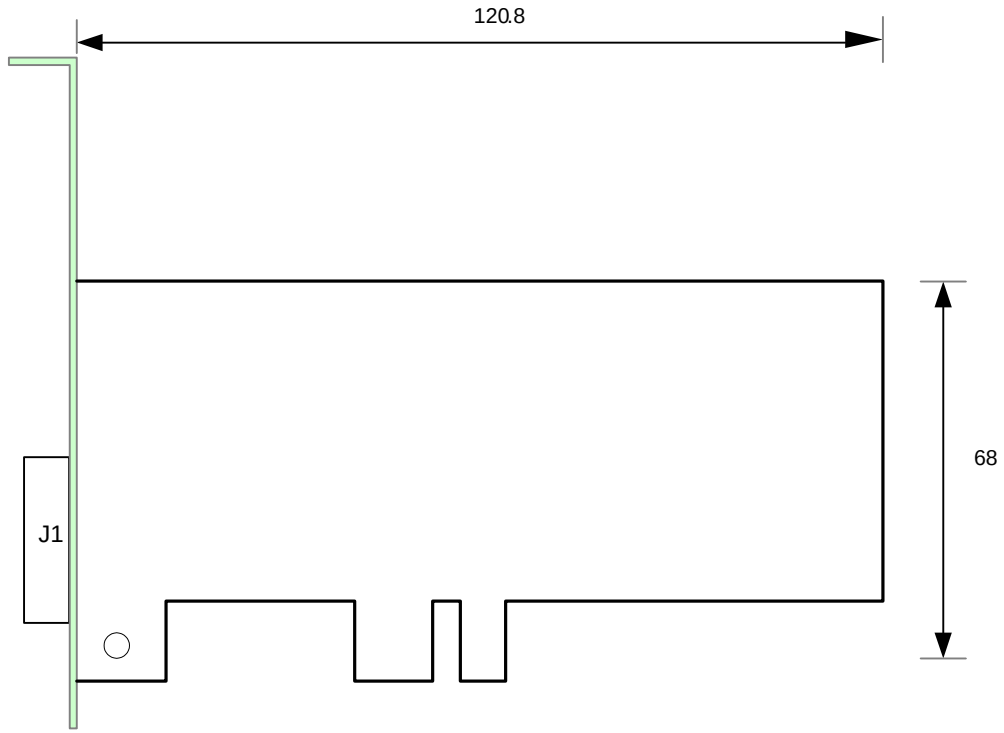
(9) **Stop**

Stop the file data output.

Appendix

A-1 Board Size

The external dimensions of the board are as follows.



A-2 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. Specification of Camera Link Interface Standard for Digital Cameras and Frame Grabbers
-- Camera Link committee
2. PCI Local Bus Specification Revision2.1
-- PCI Special Interest Group
3. AN201 How to build application using API
-- DAQ system
4. AN312 PCIe-DIO13 API Programming
-- DAQ system

MEMO

Contact Point

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