# PCIe-HDMI01

## User Manual

**Version 1.0**



DAQ SYSTEM
Measurement & Automation

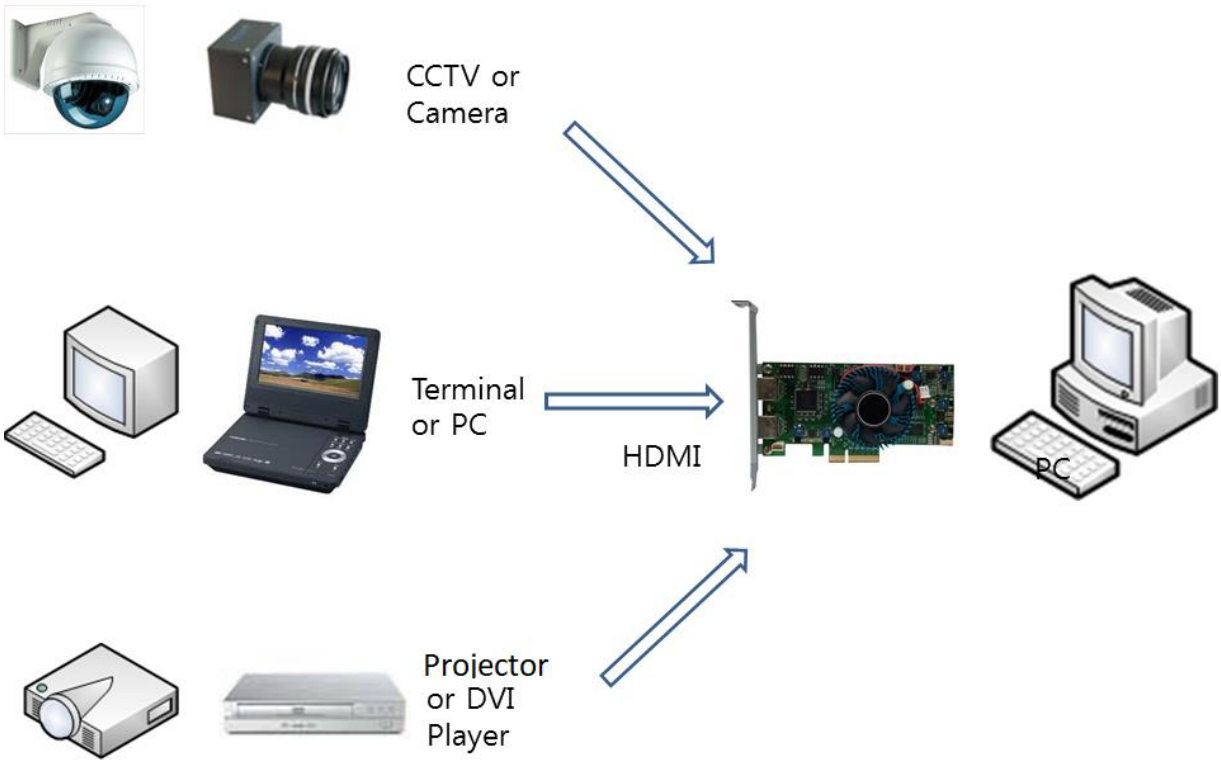
# Contents

# 1. Introduction

PCIe-HDMI01 is a multi-purpose frame grabber board that can capture high-definition video signals by receiving HDMI (High-Definition Multimedia Interface) signal and transmitting it to a PC using the PCI Express 4x interface method.

It supports up to 4k x 2k 3840x2160 and can automatically detect and process HDMI signals.

The operation of the board is controlled by the program API, and the figure below shows the interlocking operation of the board.




[Figure 1-1. PCIe-HDMI01 Board Usage]

[Figure 1-1] shows an example of using the PCIe-HDMI01 board by connecting the board to the PCI Express slot of the right PC. Screens of various devices on the left can be transmitted to the HDMI port, and can also be output through an application program.

## 1-1 Product Features

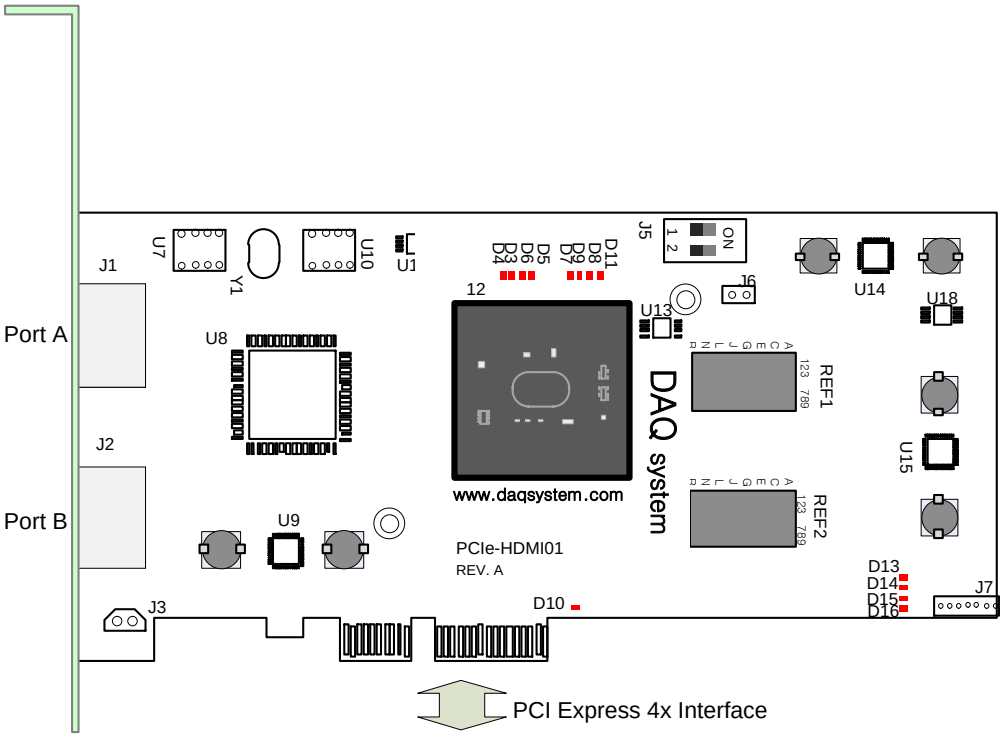
| Items | Description | Remark |
|---|---|---|
| **Hardware** | | |
| PC Interface | PCI Express 4x | |
| Operation Power | PCI Express 12V | |
| Video Interface | HDMI (High-Definition Multimedia Interface) | 2 Channel (Two ports support optional 1 channel use)<br>3GHz Receiver |
| Display Resolution | 480i, 576i, 480p, 576p, 720p, 1080i, 1080p<br><br>Max. 4k x 2k (3840 x 2160 at 30Hz) | 24bit RGB 444, 24bit YCbCr 422, 24bit YCbCr 444, 36bit RGB 444, 36bit YCbCr 444,<br>2x24bit 4:4:4 RGB/YCrCb<br>2x24bit 4:2:2 RGB/YCrCb |
| On-board Memory | 256MB (DDR3) x2 | |
| Communication | | |
| Simultaneous use of boards | Max. 4 | |
| **Software** | | |
| OS | Windows 2000/XP/7/8/10 (32/64bit) | |
| API | Windows Client DLL API | |
| Development | Windows Application by User<br>Custom USB Device Firmware<br>Custom Windows Client DLL | |
| Support | Sample Program | VC++ |
| **Environmental conditions** | | |
| Operating temperature range | 0 ~ 60℃ | |
| Storage temperature range | -20 ~ 80℃ | |
| Humidity range | | Non-condensing |
| Board size | 132mm X 68mm | PCB Board Size |

## 1-2 Product Applications

- Image recognition (Pattern, particle, etc.)
- Inspection equipment (Sensor, Semiconductor, Device etc.)
- Security Solution
- Medical Image Capture
- BLU-RAY
- Game Console

# 2. PCIe-HDMI01 Board Function

## 2-1 PCIe-HDMI01 Board Layout




[Figure 2-1. PCIe-HDMI01 Layout]

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

**D10** : Lights up when the board finishes configuration and ready for operation.

**D3 ~ D6** : Test purpose

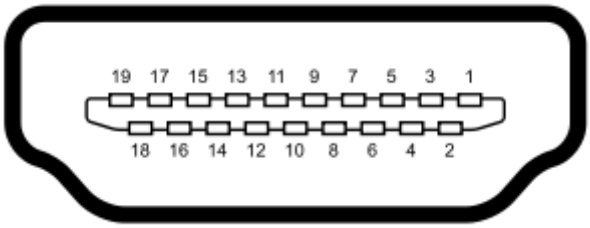
**D7 ~D9, D11** : Test purpose

**D13 ~ D16** : Test purpose

## 2-2 Connector Pin MAp

### 2-2-1 HDMI Connector : J1(Port A), J2(Port B)

The connector is an HDMI signal connector and the pin map is as shown below.




[Figure 2-2. HDMI pin-out]

[Table 1. HDMI 커넥터 J1, J2]

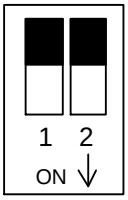
| Pin No | Name | Description | Remark |
|---|---|---|---|
| 1 | H_RX2+ | TMDS Data2+ | |
| 2 | GND | Green Signal | |
| 3 | H_RX2- | TMDS Data2- | |
| 4 | H_RX1+ | TMDS Data1+ | |
| 5 | GND | Ground | |
| 6 | H_RX1- | TMDS Data1- | |
| 7 | H_RX0+ | TMDS Data0+ | |
| 8 | GND | Ground | |
| 9 | H_RX0- | TMDS Data0- | |
| 10 | H_RXC+ | TMDS Clock+ | |
| 11 | GND | No Connected | |
| 12 | H_RXC- | TMDS Clock- | |
| 13 | HDMI_CEC | Consumer Electronics Control | |
| 14 | N.C | No Connected | |
| 15 | DDC_SCL | I2C Clock for DDC | |
| 16 | DDC_SDA | I2C Data for DDC | |
| 17 | GND | Ground | |
| 18 | 5V_HDMI | +5V DC | |
| 19 | 5V_HDMI | +5V DC | HDMI Detect |

### 2-2-2 J3 Connector

It is an external input 12V power connector.

### 2-2-3 J5 Connector

PCIE-HDMI01 board is designed to use up to 4 PCIe-DHMI01 boards simultaneously in one system (PC). Each board classification can be set through the 4-pin DIP switch in the board.




[Figure 2-3. J5 Connector (Top View)]

[Table 2. J5 Connector PIN-OUT]

| 1 | 2 | Description |
|---|---|---|
| OFF | OFF | Board No. 0 |
| ON | OFF | Board No. 1 |
| OFF | ON | Board No. 2 |
| ON | ON | Board No. 3 |

### 2-2-4 J6 Connector

It is a fan control 12V power connector.

# 3. Installation

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

## 3-1. Hardware Installation

### 3-1-1 Product Contents

① PCIe-HDMI01 Board

② CD (Driver/Manual/API/Sample Source etc.)

- Document Folder : Manual and Catalog
- Driver Folder : pci_hdmi01.sys pci-hdmi01.inf
- Sample Folder : Sample Application and DLL
- TestApp Folder : FrmTest.exe

### 3-1-2 Installation Process

① Turn off the PC power.

② Remove the computer cover using the instructions from the computer manual.

③ Insert the board empty PCI Express slot as soon as possible to close the CPU.

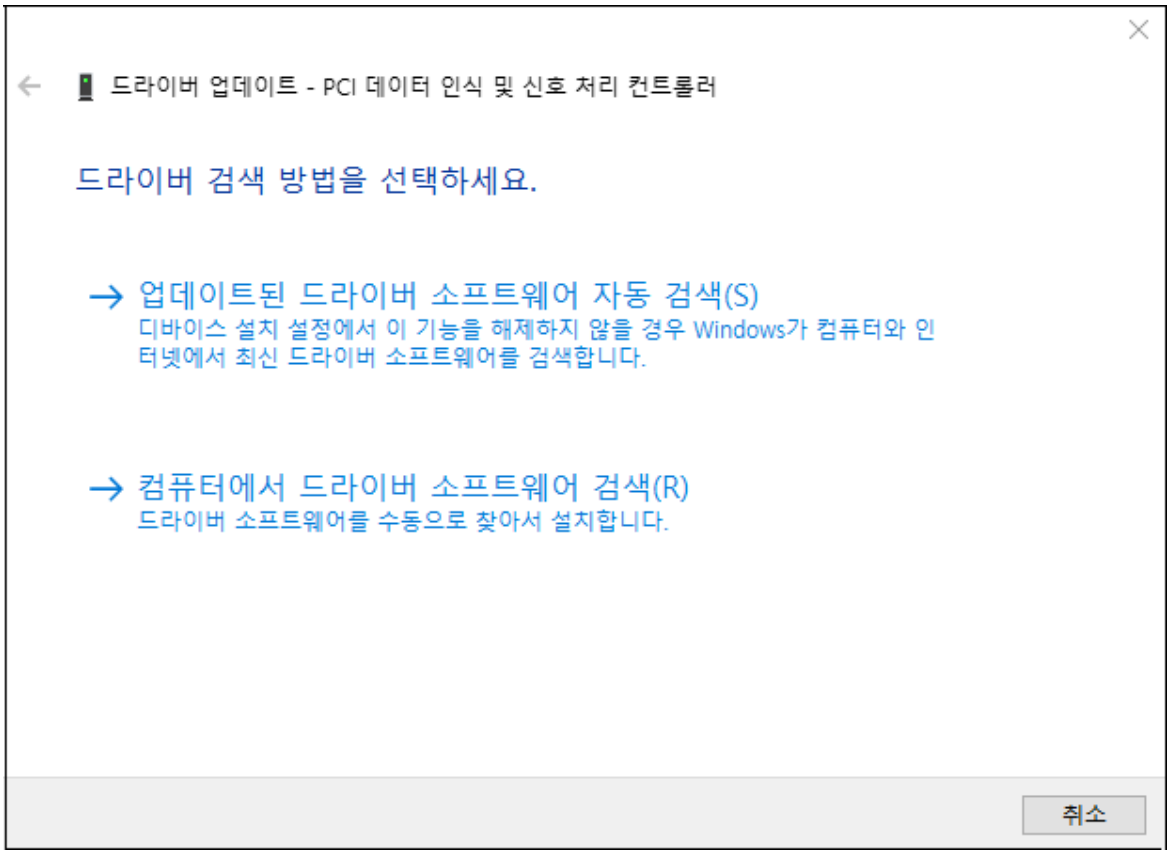
④ Remove the blank metal plate located at the back of the selected slot. Keep the removed screw to fasten the board after installation.

⑤ You should try number 3 in case of multi-board.

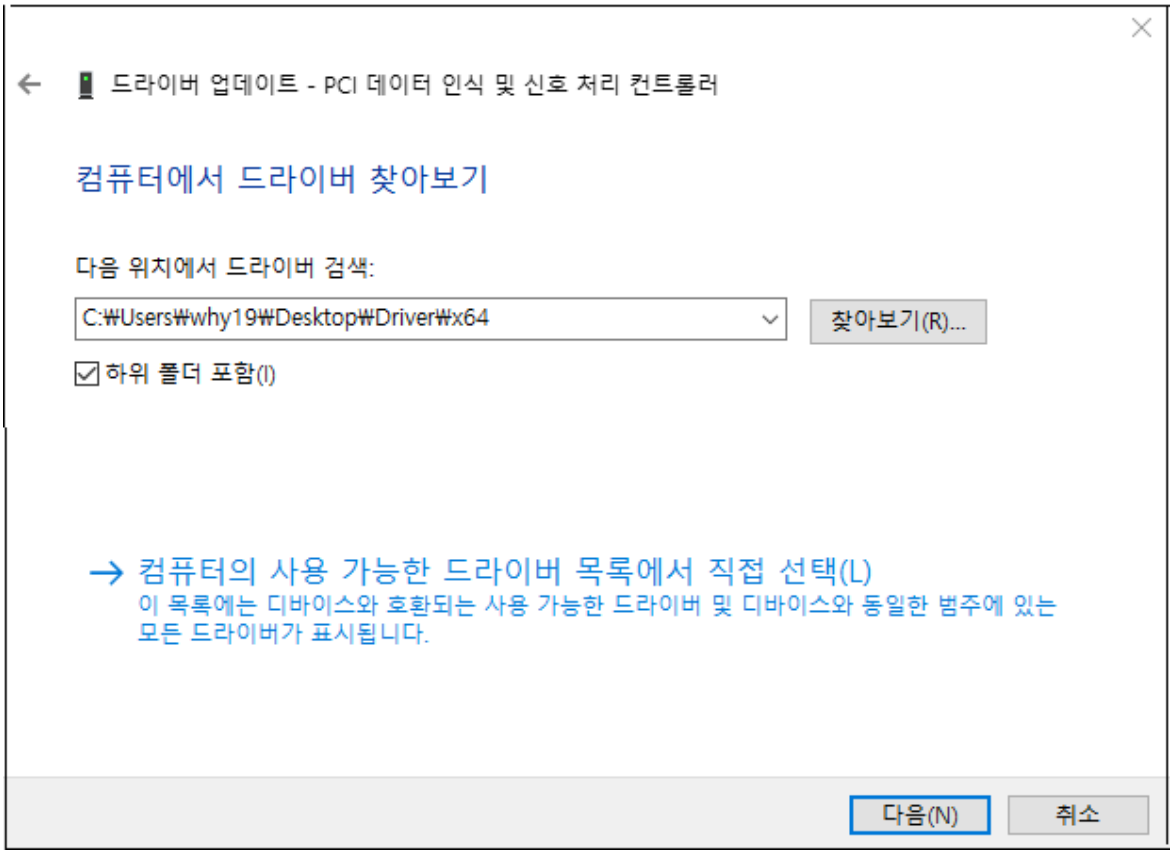
## 3-2 Driver Installation

The board environment should be used in Windows 2000 SP4 or higher and Windows XP SP1 or higher. First, power off the PC, plug the PCIe-HDMI01 board into the PCI Express Slot, and turn on the PC. When the "Start New Hardware Search Wizard" window opens as shown below, select it as shown below and click the Next button.

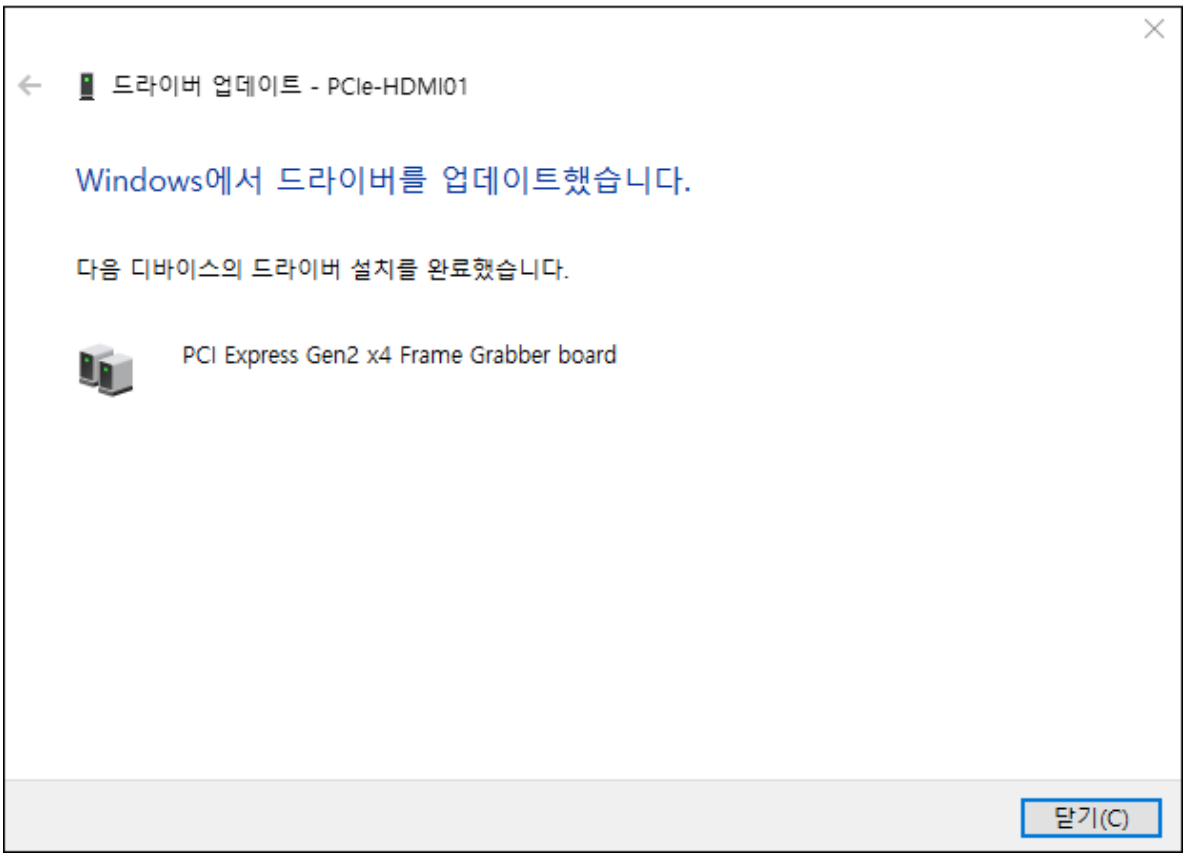
1. Select **"Search for driver software on my computer (R)"** as shown below and click the Next button



2. Select the Driver folder that is suitable for O.S (32/64bit) and click the Next button.

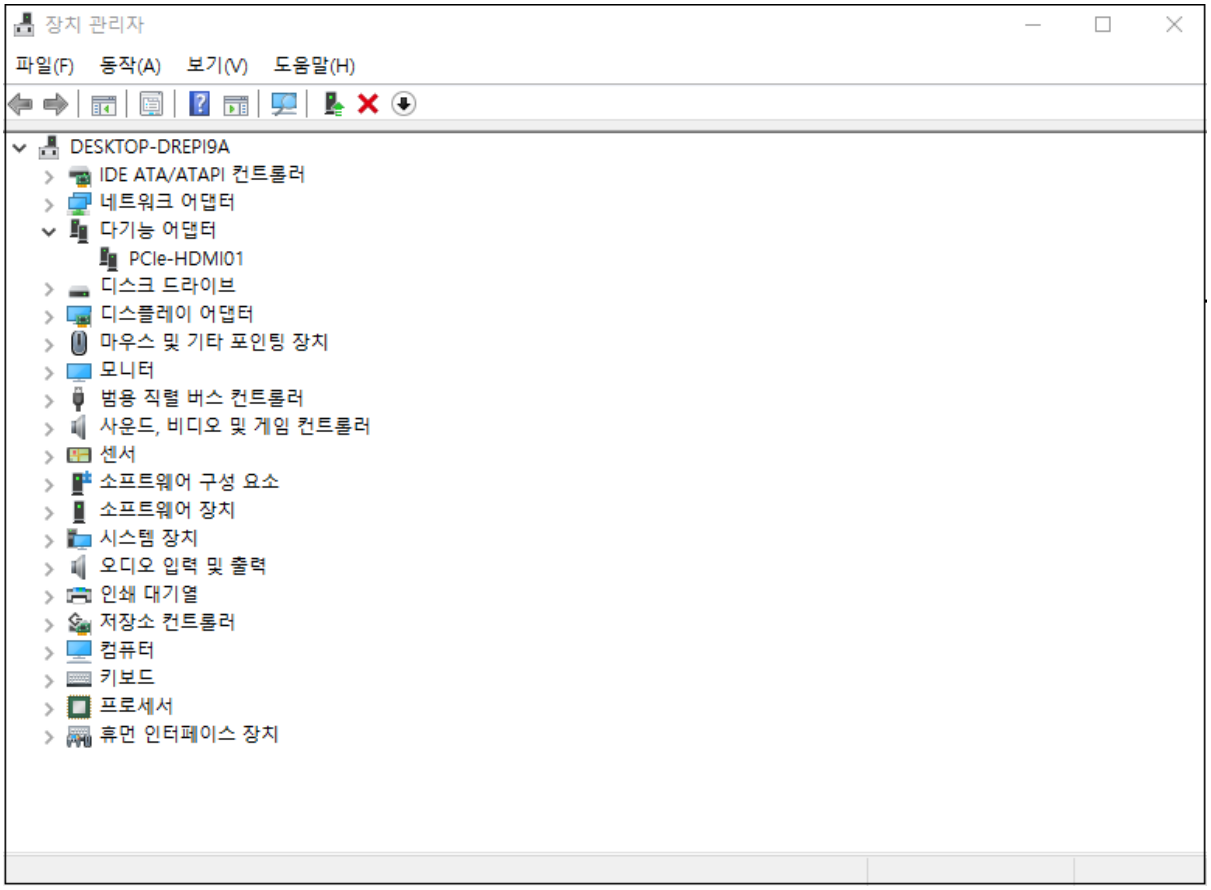



3. Click the Next button. Check if the driver is installed normally.



4. Check if **DAQSystem -> "PCIe-HDMI01"** is installed in My Computer -> Properties -> Hardware -> Device Manager.

5. If it appears as shown in the picture below, the installation has been completed normally.

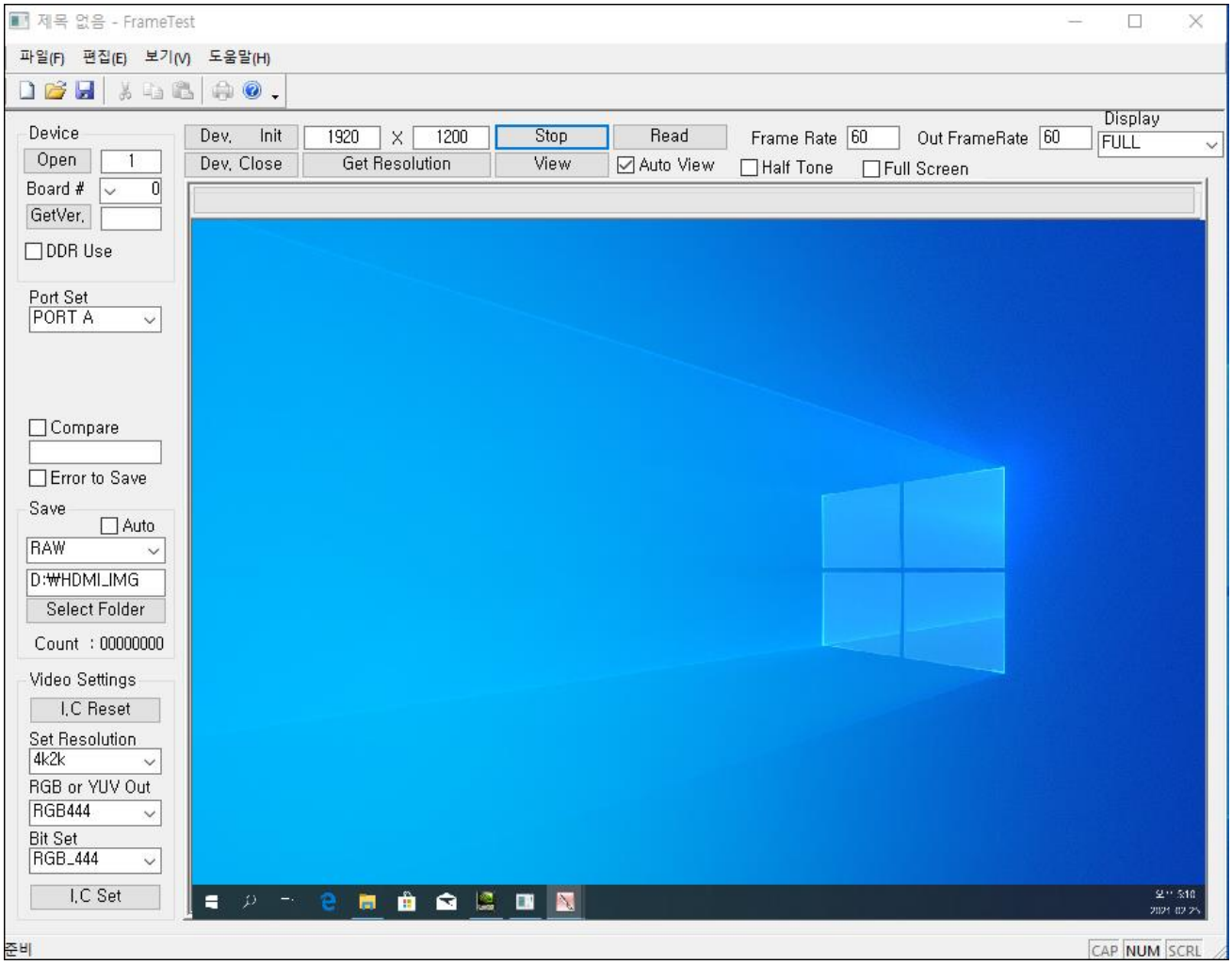



The picture above shows the screen where the PCIe-HDMI01 board is normally installed in the PC.

**Note: After initial installation, you must reboot your PC for normal operation.**

# 4. Sample Program

A sample program is provided on the CDROM provided with the board so that the board can be used easily. 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 briefly tested, so users can modify and use it.




[Figure 4-1. Sample Program Execution Screen]

In order to use the above sample program, API (Application Programming Interface) is required. API is provided in the form of "DLL", and import library and header file are required to compile.

All files specified above are included on the supplied CDROM. To run the sample program normally, the API DLL (PCI_HDMI01.DLL) must be in the folder of the executable file, or in the Windows system folder or the folder designated by the Path environment variable.

The program execution sequence to view the image is as follows.

① **"Open" click**

② **Select from PORT A/B**

③ **After click Set Resolution / RGB or YUV Out / Bit Set. I.C Set click**

④ **"Dev. Init" click**

⑤ **Check the resolution with "Get Resolution"**

⑥ **Click the "Start/Stop" toggle button click to start or stop the video.**

**(1) "Open" button**

Start the device of the selected board.

**(2) "Board#" selection**

In case of multiple PCI Express boards, 4 board numbers (0 ~ 3) are assigned.

**(3) "GetVer." button**

Here comes the FPGA version of the board.

**(4) "DDR Use" toggle**

Check when using DDR Memory.

**(5) "Port Set" Selection**

Select when selecting **Port A/B. (Default: Port A)**

**(6) "Device Init" button**

Initialize the device. Performed only once when first power is applied.

**(7) "Dev. Close" button**

Called when the use of the board is complete and the program is ended.

**(8) "Get Res." button**

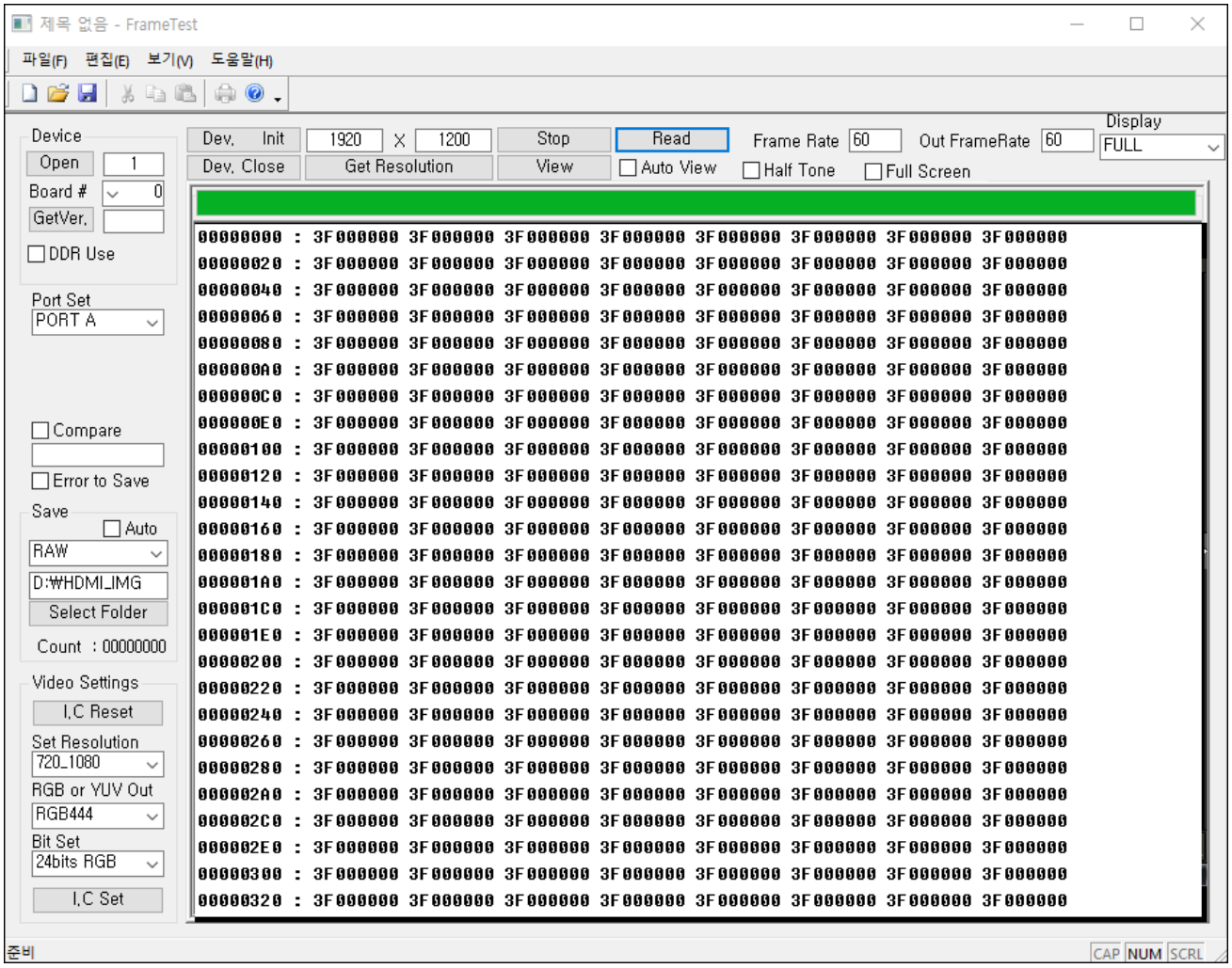
Shows the image resolution.

**(9) "Start/Stop" toggle button**

The camera transmits or stops the image frame.

**(10) "Read" button**

The image frame saved on the board is read to the PC (Hexa value). If the image frame is not saved on the board, you have to wait until the saving is complete. Use after freeze the screen.




**(11) "View" button**

When selected, it shows one screen at a time.

**Auto View** : When selected, the playback screen is displayed continuously.

**(12) "Frame Rate"** : It shows the frame rate per second processed by software.

**"Out FrameRate"** : It shows the actual frame rate per second.

**"Half Tone" :** Select the half tone mode.

**"Full Screen " :** Shows the screen at its actual resolution size.

**(13) "Display" selection**

**"FULL"** : It shows the screen at the actual resolution, and the rest of the selected part shows an enlarged image of the designated location **(Top Left/Top Right/Bot. Left/Bot. Right).**

**(14) "Compare" selection**

When selected, the original file and the saved file are compared, and the Compare folder is created and saved in the execution folder. **(₩Release₩Compare₩Original.bin)**

**(15) "Error to Save" selection**

When Compare is selected, error files are saved in **₩Release₩Compare₩₩Err%d.bin** in the wrong byte order.

**(16) "Auto" selection** : It is used to save frame image data read into PC as binary or BMP file.

**Select Folder** : Select a folder to save. By default, it is saved in d:₩HDMI_IMG.

**Count** : Shows the number of saves.

**(17) "I.C Reset" button**

Initialize the ADV7619(HDMI Receiver) chip.

**(18) "I.C Set" button**

After initializing the HDMI Receiver, set the ADV7619(HDMI Receiver) chip according to the conditions below.

**Set Resolution** : 480_570, 720_1080, 4k2k

**RGB or YUV Out** : YCbCr444_422, RGB444

**Bit Set** : When the set Resolution is 4k_2k, 0: YCbCr444_422, 1: RGB444

Whe the set Resolution is 480_570, 720_1080,

"0" : 24bits RGB, "1" : 30bits RGB, "2" : 16bits YUV,

"3" : 20bits YUV, "4 ": 24bits YUV

[Table 3. Parameter Selection Table]

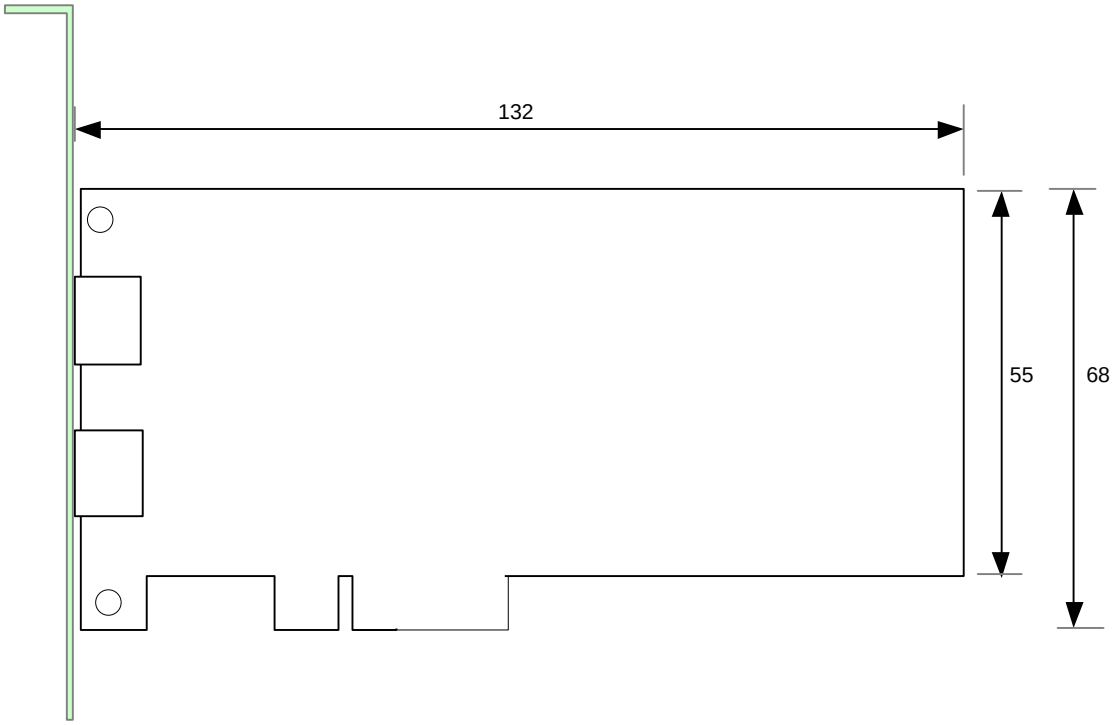
| Item | Selection | | | | | |
|---|---|---|---|---|---|---|
| Set Resolution | 480_570 | | 720_1080 | | 4K_2K | |
| RGB or YUV Out | YCbCr422 | RGB_444 | YCbCr422 | RGB_444 | YCbCr422 | RGB_444 |
| Bit Set | 24bits RGB | 24bits RGB | 24bits RGB | 24bits RGB | YCbCr444_422 | YCbCr444_422 |
| | 30bits RGB | 30bits RGB | 30bits RGB | 30bits RGB | RGB_444 | RGB_444 |
| | 16bits YUV, | 16bits YUV, | 16bits YUV, | 16bits YUV, | | |
| | 20bits YUV | 20bits YUV | 20bits YUV | 20bits YUV | | |
| | 24bits YUV | 24bits YUV | 24bits YUV | 24bits YUV | | |

# Appendix

## A-1 Board Size

The external sizes of the board are as follows.

For detailed dimensions, please contact the person in charge.



## A-2 Repair Regulations

Thank you for purchasing a DAQSYSTEM product. Please refer to the following regarding Customer Service regulated by DAQSYSTEM.

(1) Read the user manual and follow the instructions before using the DAQSYSTEM product.

(2) When returning the product to be repaired, please write down the symptoms of the failure and send it to the head office.

(3) All DAQSYSTEM products have a 1-year warranty.
- -. Warranty period counts from the date the product is shipped from DAQSYSTEM.
- -. Peripherals and third-party products not manufactured by DAQSYSTEM are covered by the manufacturer's warranty..
- -. If you need repairs, please contact the Contact Point below..

(4) Even during the warranty period, repairs are charged in the following cases..
- ① Failure or damage caused by use without following the user's manual
- ② Failure or damage caused by customer's negligence during product transportation after purchase
- ③ Failure or damage caused by natural phenomena such as fire, earthquake, flood, lightning, pollution, or power supply exceeding the recommended range
- ④ Failure or damage caused by inappropriate storage environment (e.g. high temperature, high humidity, volatile chemicals, etc.)
- ⑤ Breakdown or damage due to unreasonable repair or modification
- ⑥ Products whose serial number has been changed or removed intentionally
- ⑦ If DAQSYSTEM determines that it is the customer's fault for other reasons

(5) Shipping costs for returning the repaired product to DAQSYSTEM are the responsibility of the customer.

(6) The manufacturer is not responsible for any problems caused by misuse, regardless of our warranty terms.

# MEMO

## Contact Point

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

Email : postmaster@daqsystem.com

DAQ SYSTEM
Measurement & Automation