DVP-7421BE

4 Channel Triplex
MPEG-1/2/4
Video/Audio Codec Card

Copyright

This documentation and the software included with this product are copyrighted 2007 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in the products described in this manual at any time without notice. No part of this manual may be reproduced, copied, translated or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. Information provided in this manual is intended to be accurate and reliable. However, ADVANTECH CO., LTD. assumes no responsibility for its use, nor for any infringements of the rights of third parties, which may result from its use.

Acknowledgments

IBM and PC are trademarks of International Business Machines Corporation. MS-DOS, Windows, Microsoft Visual C++ and Visual BASIC are trademarks of Microsoft Corporation. Intel and Pentium are trademarks of Intel Corporation. Delphi and C++ Builder are trademarks of Inprise Corporation.

CE notification

The DVP-7421BE, developed by ADVANTECH CO., LTD., has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information

On-line Technical Support

For technical support and service, please visit our support website at:

http://www.advantech.com/support

Part No. 2066742100 1st Edition
Printed in Taiwan July. 2007
Rev. 0.1

Contents

CHAPTER 1 GENERAL INFORMATION 5

1.1 INTRODUCTION 6
1.2 PRODUCTION FEATURE 7
1.3 PRODUCT SPEC 10
1.3.1 Hardware Requirements 11
1.3.2 Software Requirement 11
1.3.3 Block Diagram 11
1.3.4 Packing List 12
1.3.5 Dimensions 12
1.3.6 OVERVIEW 14
1.3.7 CONNECTOR AND PIN DEFINITION 15

CHAPTER 2 PRODUCT INSTALLATION 19

2.1. INSTALL DRIVER & UTILITY CD 21
2.2. HARDWARE INSTALLATION 26
2.3. INSTALL DRIVER FOR CAPTURE CARD 27
2.4. DEMO PROGRAM FUNCTIONALITY 34
2.4.1 Channel Select 34
2.4.2 Video Standard 35
2.4.3 Encoding Format 35
2.4.4 Resolution 36
2.4.5 Encoding Mode 36
2.4.6 Playback Mode 37
2.4.7 Preview Mode 39
2.4.8 Snapshot 40
2.4.9 Motion Detect 41
2.4.10 Setting → Save 43
2.4.11 Sensor Control 44
2.4.12 GPIO control 46
2.4.13 ENC control 47
2.4.14 EE Control 48
2.4.15 Convert Function 49
2.4.16 Multi-Board ID Reorganization 50

CHAPTER 3 DVP-7421BE TRIPLEX EXPERIMENT 52

3.1 PLATFORM：P4 PLATFORM..... 52
3.2 APPENDIX：MPEG4 SOFTWARE DECODER 54

CHAPTER 1

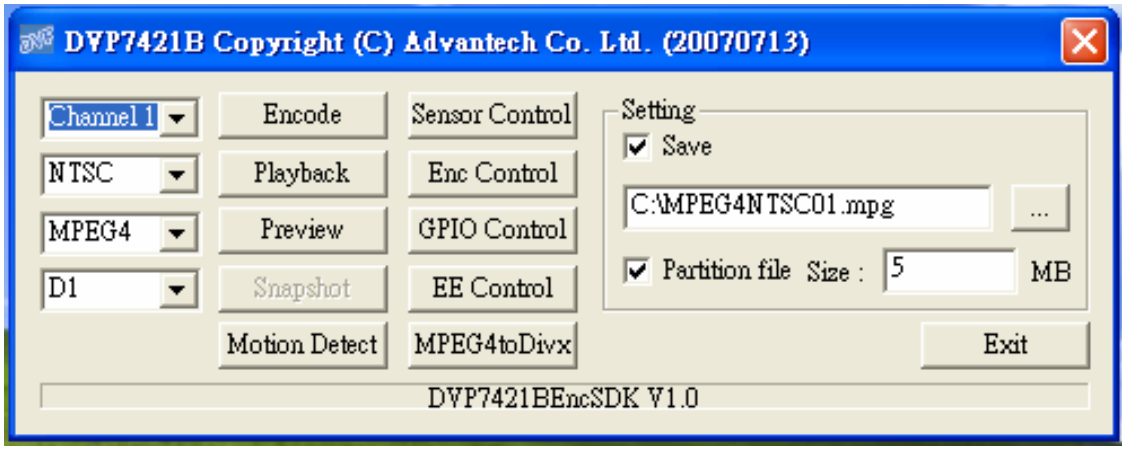
General Information

Chapter 1 General Information

1.1 Introduction

The DVP-7421BE is a high-end video capture board with a hardware codec (simultaneous compression/ decompression, or encode/decode) engine. It supports 4-channel live preview, video/audio compression and playback at D1 resolution and 120/100 fps. Up to four DVP-7421BE boards can installed in one PC for concurrent live viewing, compression and playback of up to 16 channels at D1 resolution and 480/400 fps. The programmer can use the comprehensive SDK to load protection code or system parameters into the on-board 128-byte EEPROM. The SDK comes with sample code for reference. The hardware codec engine makes the DVP-7421BE the ideal platform for applications like network video servers, Video conferencing and high-end digital video recorders.

1.2 Production Feature



The photo is the main interface of DVP-7421BE sample program. The DVP-7421BE feature is like below：

A. EEPROM function ready product

Customer can write the value in EEPROM and check the value before surveillance software boot up. System Integrator can design protection to protect software system. Valid offset values are between 0-127,Valid output values are in the range of 0 and 255.

B. Full D1,real time,MPEG1/2/4,Video and Stereo Audio Hardware Encode

The DVP-7421BE support the full D1 resolution, real time (encode frame rate 30 fps). Moreover, the DVP-7421BE can encode the stereo audio input to MPEG1-LayerII format.

C. Full D1,real time,MPEG1/2/4,Video and Stereo Audio Hardware Decode

Like encode model, the DVP-7421BE can decode D1 resolution, real time, and stereo audio out. The user can easily playback the compression by the

DVP-7421BE hardware capability.

D. Software Decoder to AVI

The DVP-7421BE support software decode that can convert compression MPEG file to AVI format (*.Divx).It is convenient for customer integrate the function to their software system.

E. GPIO access control

User can integrate the DI/DO device, like warning alarm or IR sensor. The demo program can show and feedback the signal information connection or not. It’s a function good for SI combine various device to establish powerful surveillance system.

F. Smart Quad Real-time Raw Data Preview

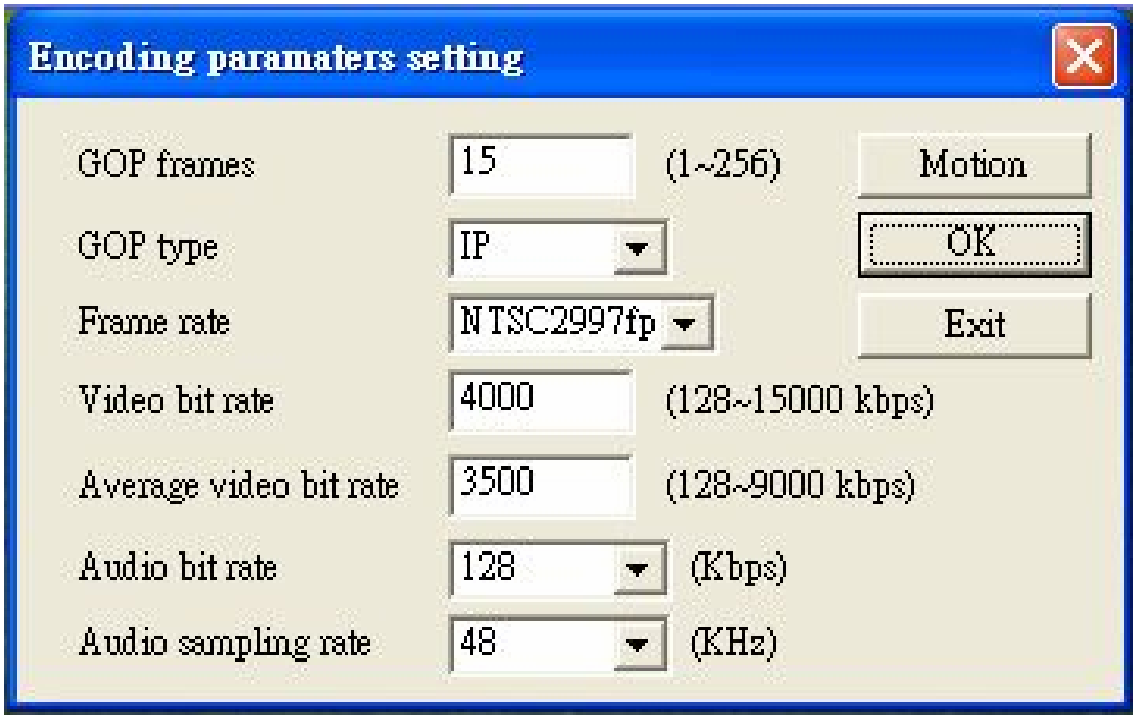
This special characteristic function can support the user raw data to further advantage. For example, one can use the function in the domain of intelligent analysis, image comparison and optical Inspection, etc. The Smart Quad raw data can provide the 4CIF video files that combined in D1 resolution block. The customer also can choices one of Quad to advance operation.

G. Hardware Motion Detection

The DVP-7421BE hardware support motion detection. User can set nine areas to monitor the video changes. The degree of changes could set by library code. It is a benefit for software develops less effort on motion function.

H. Video Configuration

The DVP-7421BE can configure the most feature of video. User can set GOP frames, GOP type, Video Format, Frame rate, Video Bit rate, Average Video Bit Rate, Audio Bit rate, Audio Sampling rate, etc.



1.3 Product Spec

Video	Video Standard	Composite for NTSC/PAL
	Video Input	4 x BNC connectors
	Capture Resolution	D1 (NTSC: 720 x 480; PAL: 720 x 576)
	Frame Rate	30/25 fps (NTSC/PAL) for each channel (total 120/100 fps @ D1 resolution)
	Image Processing	Hardware adjustment of hue, contrast, saturation, and brightness
	Video Encoding/Decoding	MPEG-1/2/4 (CBR/VBR 128 kbps to 15 Mbps)
	Video Output	PCI preview/playback stream Analog video out from Smart Quad
	Video Loop-through	4 X BNC Connectors
Audio	Audio Input	4 x stereo inputs (8 x BNC connectors)
	Audio Output	4 x stereo outputs from decoder
	Audio Encoding	Supports MPEG1-Layer II
Software Development Kit	Operating System	Supports Microsoft Windows XP and Windows 2000
	DirectX Required	Version 9 or above
	Demo Program	Complete demo program with VC++ sample code for reference
Hardware	Host Interface	PCI bus
	Max. Card	4
	DIO	TTL/CMOS level 3.3 V, 4 DI/4 DO
	Power Consumption	5 V DC @ 3 A , 12 V DC @ 0.5 A
Environment	Temperature	-10 ~ 60° C, Operating -20 ~ 70° C, Non-operating
	Dimensions (W x L)	182.6 x 106.9 mm (7.2" x 4.2")

Table 1.1 Product spec

1.3.1 Hardware Requirements

- CPU：Intel Pentium III 800MGHz or above
- RAM：256 MB SD RAM or above
- PCI slot：One PCI Slot or above
- VGA：AGP 4X above

1.3.2 Software Requirement

- Support Microsoft DirectX 9 or above
- Microsoft Windows 2000/XP
- Support Complete demo program with VC++ Builder programming language sample code for reference

1.3.3 Block Diagram

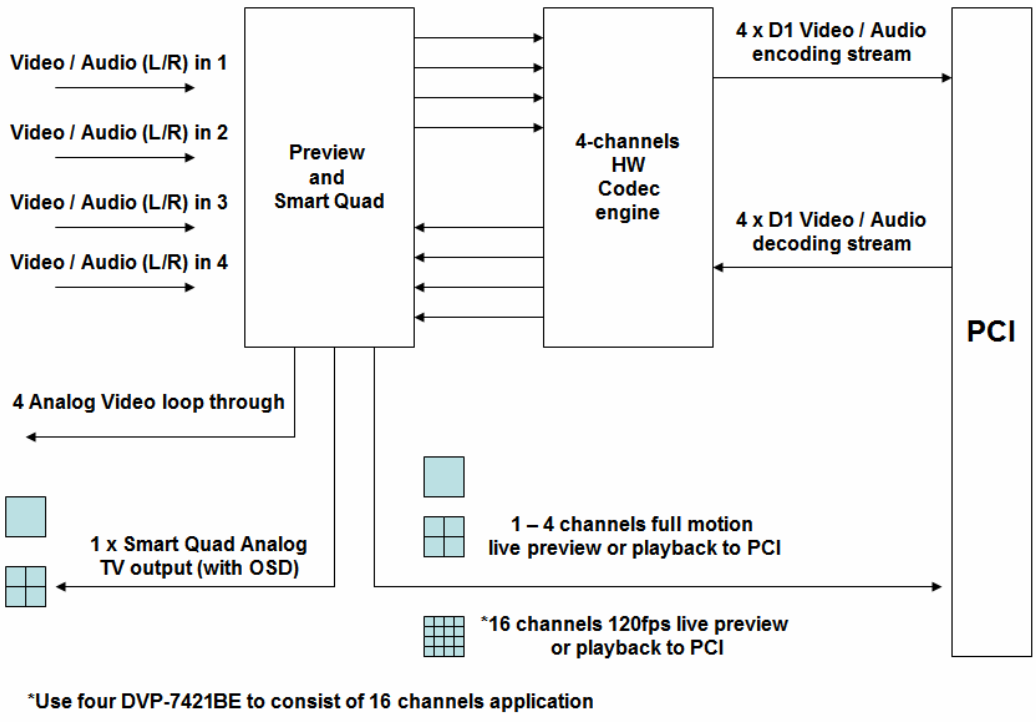


Figure 1.1 Block diagram

1.3.4 Packing List

- 1 x DVP-7421BE video codec card P/N：9692742100E

- 1 x Drive & Utility CD P/N：2066742100
- 2 x 30 cm Dsub-15 to 8 x BNC connector P/N：1700001618

- Board product warranty card P/N：2190000902

1.3.5 Dimensions

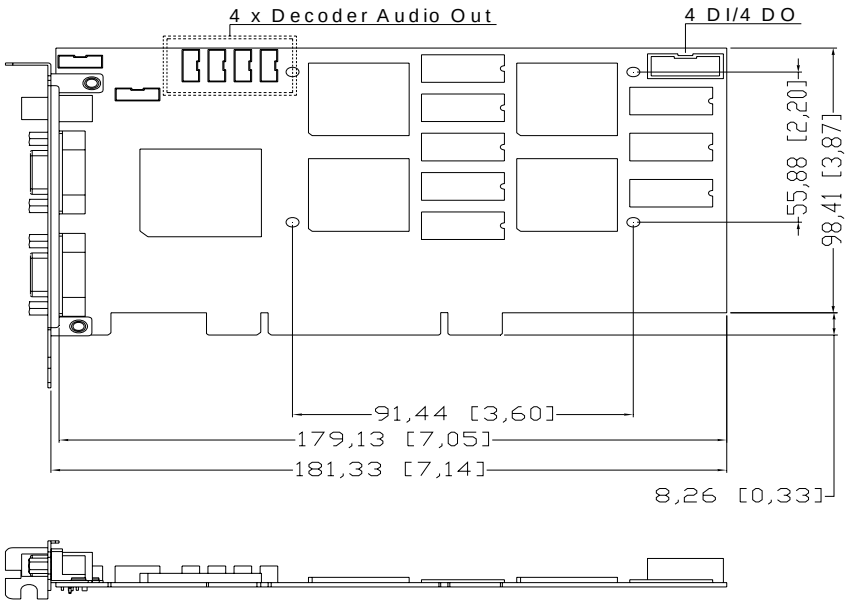
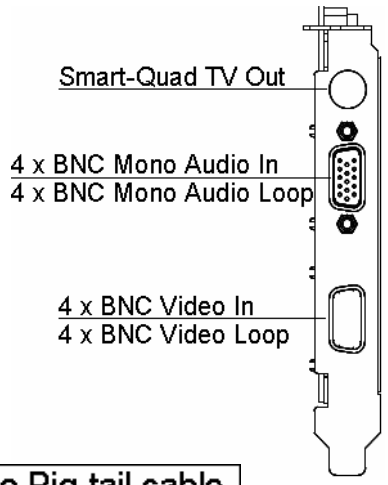


Figure 1.2 Dimensions

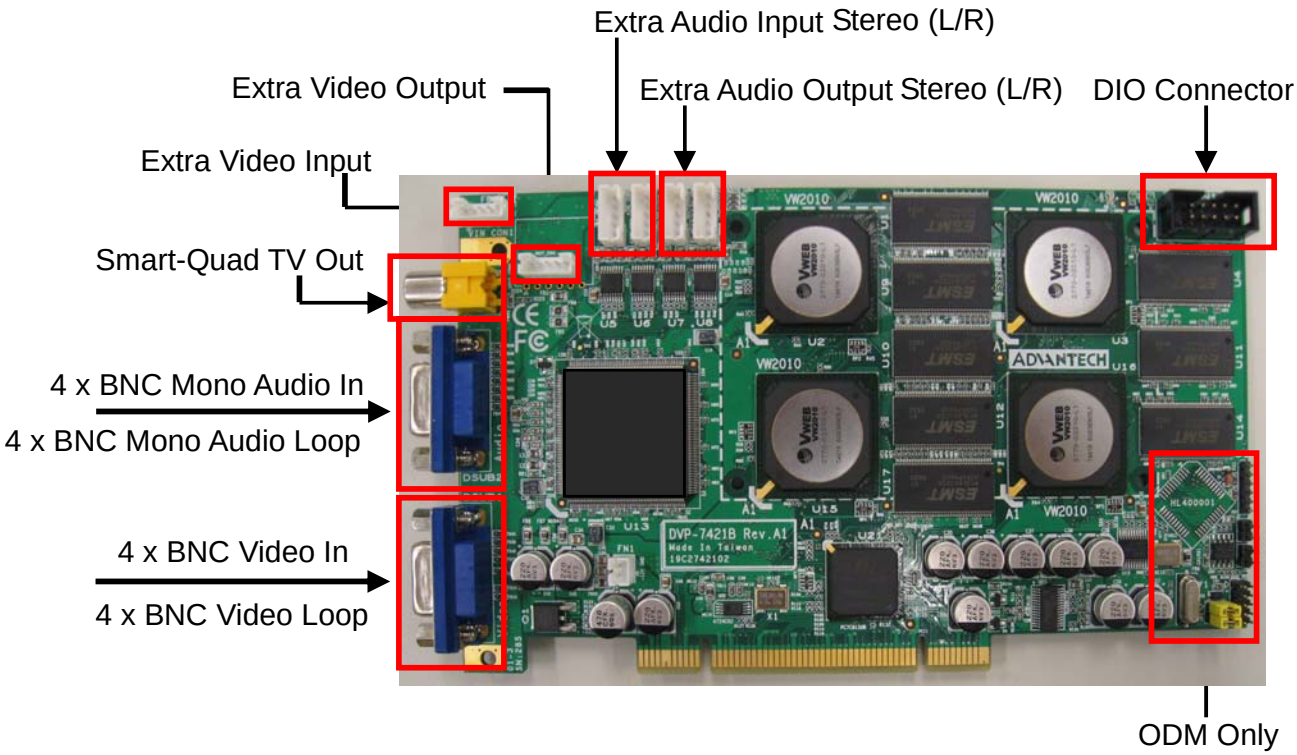
Audio Pig-tail cable
No1: Ch1 Audio In
No2: Ch2 Audio In
No3: Ch3 Audio In
No4: Ch4 Audio In
No5: Ch1 Audio Loop out
No6: Ch2 Audio Loop out
No7: Ch3 Audio Loop out
No8: Ch4 Audio Loop out



Video Pig-tail cable
No1: Ch1 Video In
No2: Ch2 Video In
No3: Ch3 Video In
No4: Ch4 Video In
No5: Ch1 Video Loop out
No6: Ch2 Video Loop out
No7: Ch3 Video Loop out
No8: Ch4 Video Loop out

Figure 1.3 Bracket I/O definition

1.3.6 Overview



Smart-Quad TV Out

Audio Pig-tail cable
No1: Ch1 Audio In
No2: Ch2 Audio In
No3: Ch3 Audio In
No4: Ch4 Audio In
No5: Ch1 Audio Loop out
No6: Ch2 Audio Loop out
No7: Ch3 Audio Loop out
No8: Ch4 Audio Loop out

4 x BNC Mono Audio In

4 x BNC Mono Audio Loop

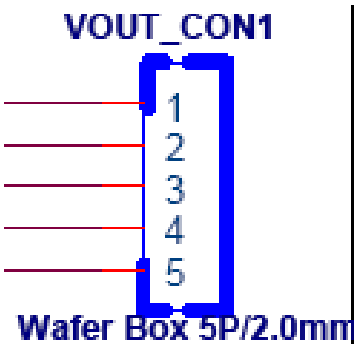
Video Pig-tail cable
No1: Ch1 Video In
No2: Ch2 Video In
No3: Ch3 Video In
No4: Ch4 Video In
No5: Ch1 Video Loop out
No6: Ch2 Video Loop out
No7: Ch3 Video Loop out
No8: Ch4 Video Loop out

4 x BNC Video In

4 x BNC Video Loop

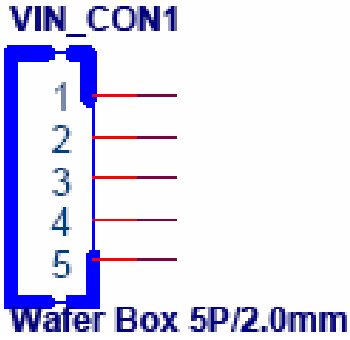
1.3.7 Connector and Pin Definition

A. Extra Video Output



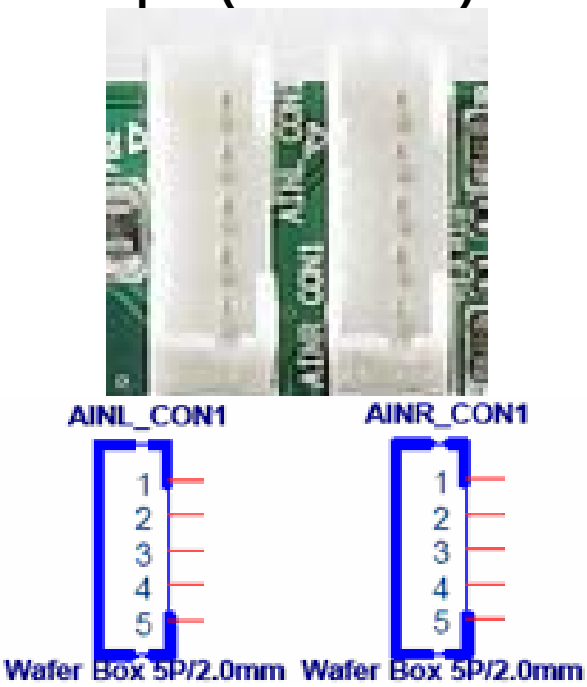
Pin	Type	Def
1	Out	Video 1 Out
2	Out	Video 2 Out
3	Out	Video 3 Out
4	Out	Video 4 Out
5	-	GND

B. Extra Video Input



Pin	Type	Def
1	In	Video 1 In
2	In	Video 2 In
3	In	Video 3 In
4	In	Video 4 In
5	-	GND

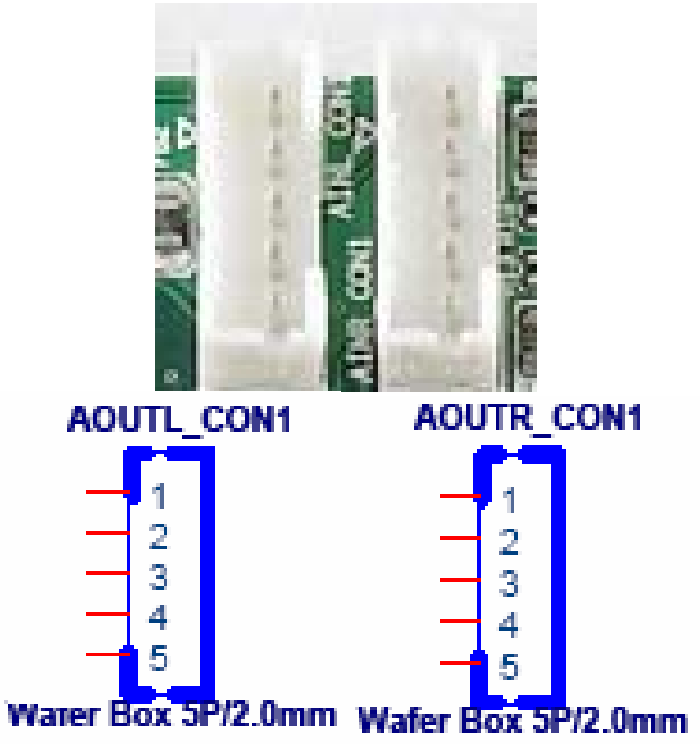
C. Extra Audio Input (Stereo L/R)



Audio Left Channel Input CON		
Pin	Type	Def
1	In	Audio L1
2	In	Audio L2
3	In	Audio L3
4	In	Audio L4
5	-	GND

Audio Right Channel Input CON		
Pin	Type	Def
1	In	Audio R1
2	In	Audio R2
3	In	Audio R3
4	In	Audio R4
5	-	GND

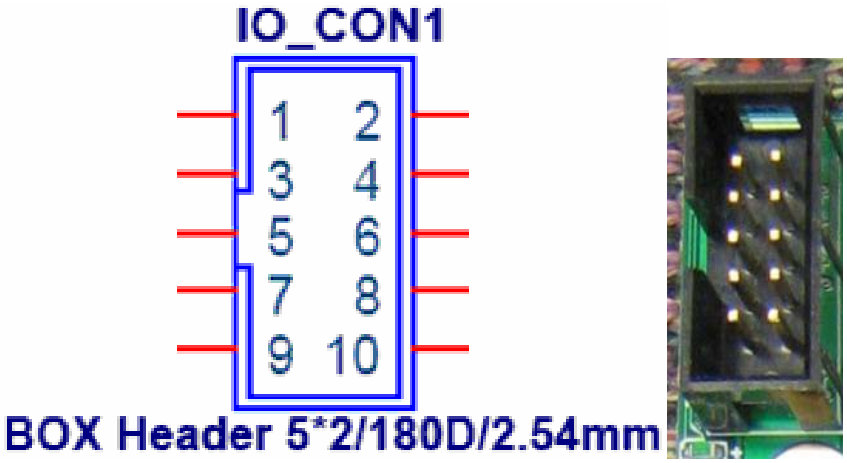
D. Extra Audio Output (Stereo L/R)



Audio Left Channel Output CON		
Pin	Type	Def
1	Out	Audio L1
2	Out	Audio L2
3	Out	Audio L3
4	Out	Audio L4
5	-	GND

Audio Right Channel Output CON		
Pin	Type	Def
1	Out	Audio R1
2	Out	Audio R2
3	Out	Audio R3
4	Out	Audio R4
5	-	GND

E. DI/O connector



Pin	Type	Def
1	Out	GPIO 4
2	Out	GPIO 5
3	Out	GPIO 6
4	Out	GPIO 7
5	In	GPIO 0
6	In	GPIO 1
7	In	GPIO 2
8	In	GPIO 3
9	-	VCC
10	-	GND

CHAPTER 2

Product Installation

Chapter 2 Product Installation

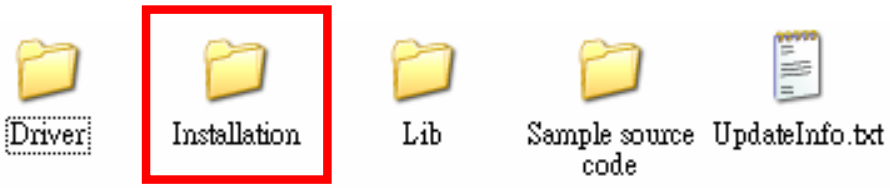
To facilitate the installation of the DVP-7421BE device drivers and utility software, you should read the instructions in this chapter carefully before you attempt installation. The device drivers and demo program for the DVP-7421BE board are located on the 「Driver & Utility CD」.

Please install Driver & Utility software before install hardware into PCI slot.

2.1. Install Driver & Utility CD

Step 1:

Open CD-ROM folder from「My Computer \ CD \ DVP-7421BE_Software_Develop_Kit \ Installation」on windows desktop.



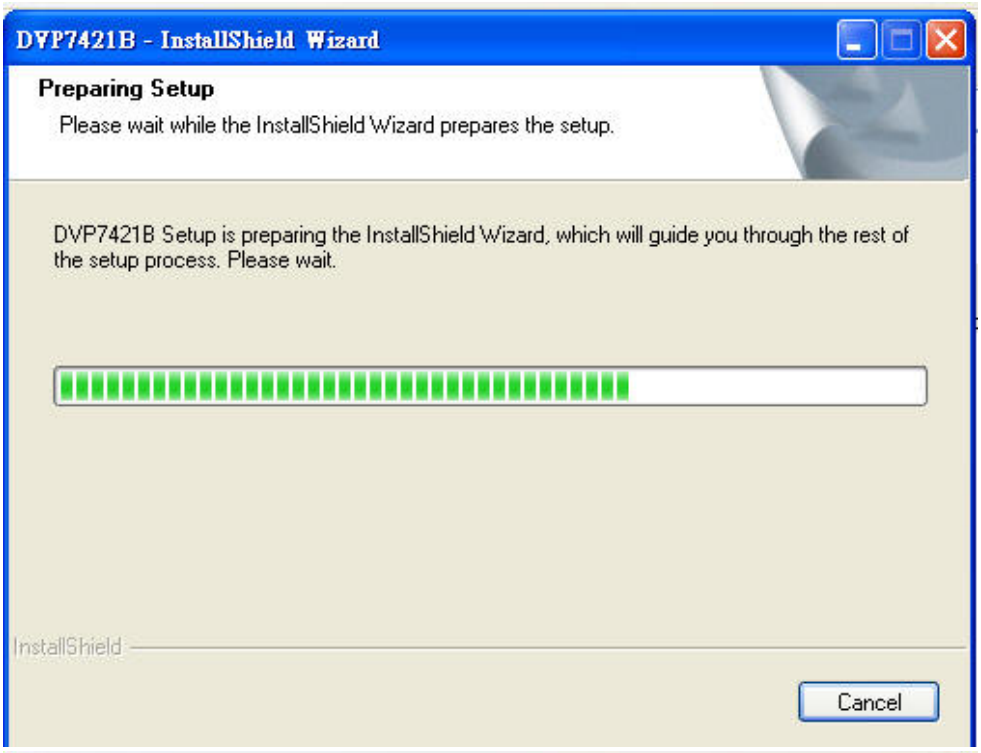
Step 2:

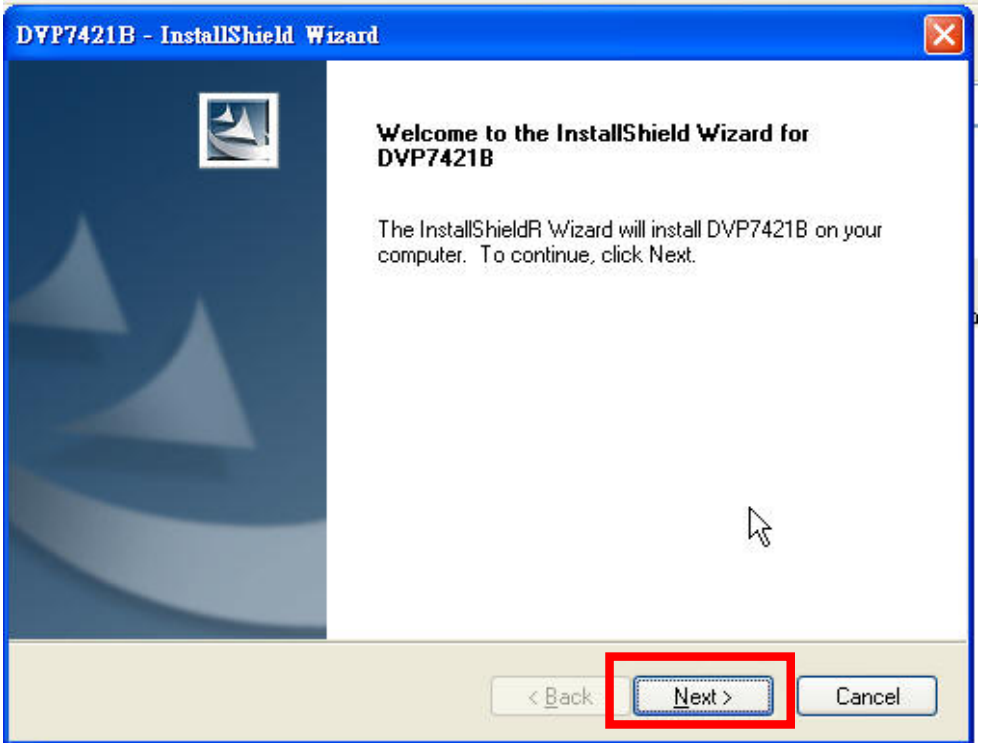
Open「Installation」folder and double click 「Setup.exe」to install driver and demo program for DVP-7421BE.

Step 3:

Program start prepares files for installation.

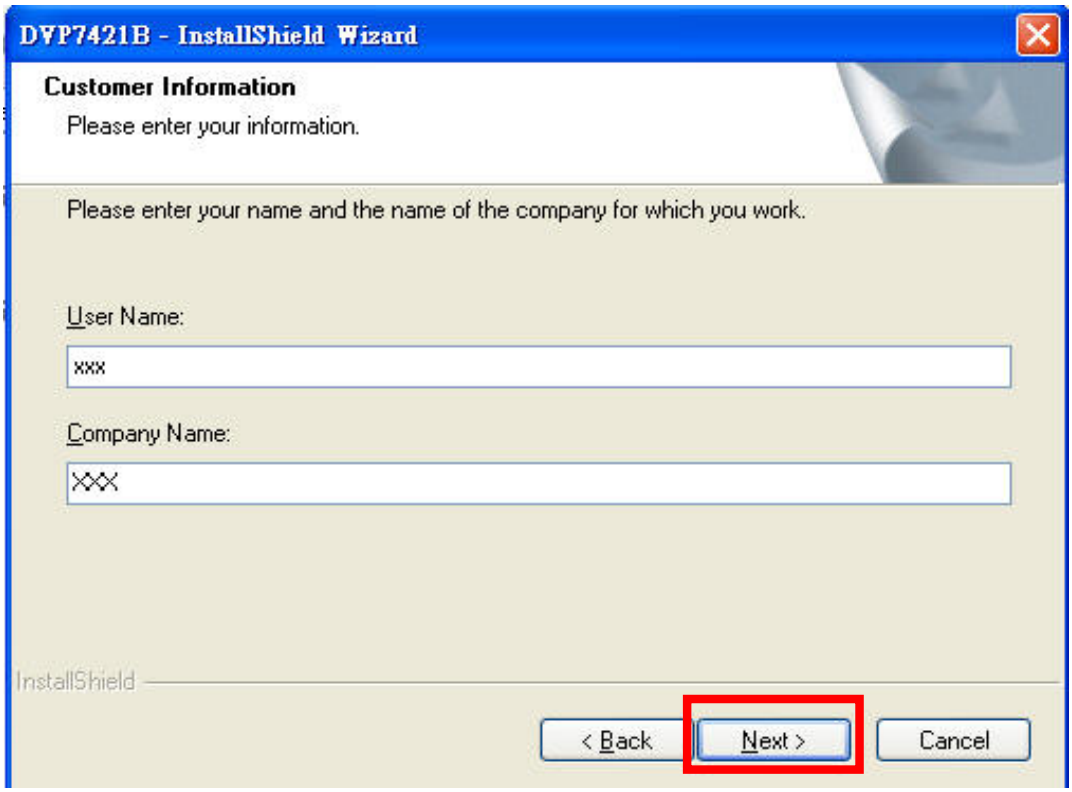
Click 「Next」bottom to continue





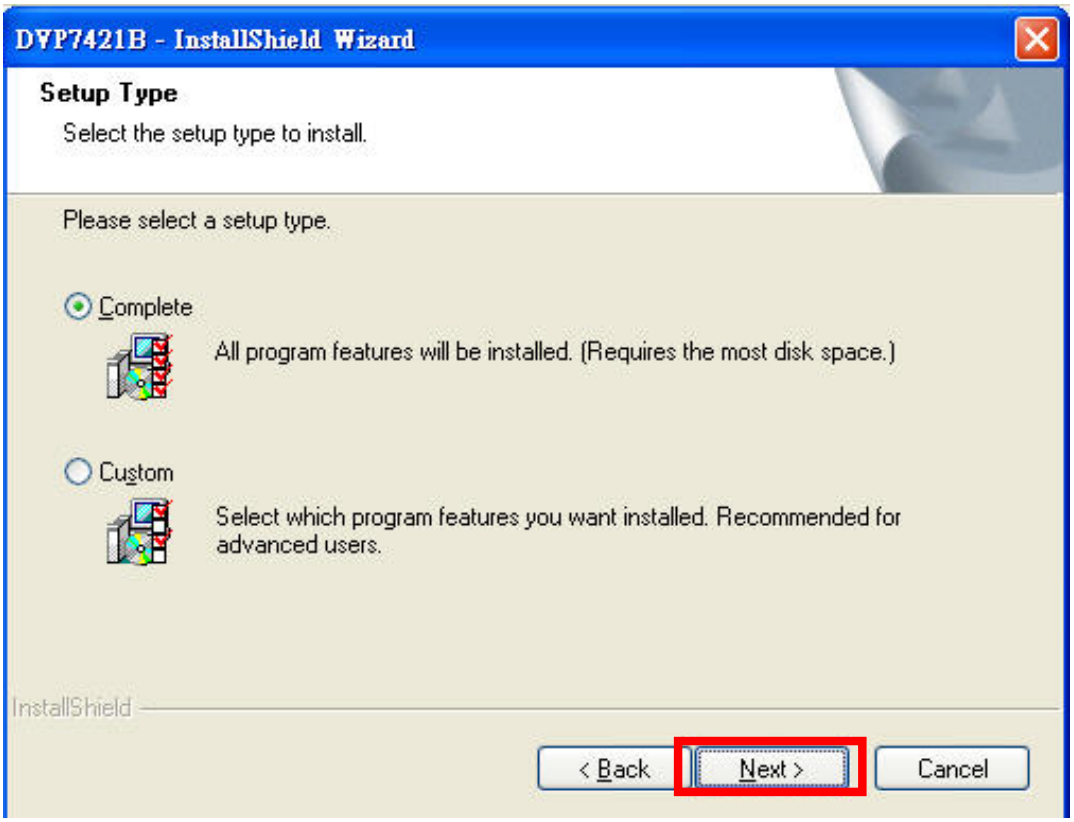
Step 4:

Input user name and company name and click「Next」bottom.



Step 5:

Select「Complete」to install driver & demo program in default folder 「**c:\program files\advantech**」, otherwise select 「Custom」to choose different folder. Click 「Next」bottom.



Step 6:

Program starts install drivers and demo program.

User can find demo program from [Start] →[Advantech] →[DVP7421B]

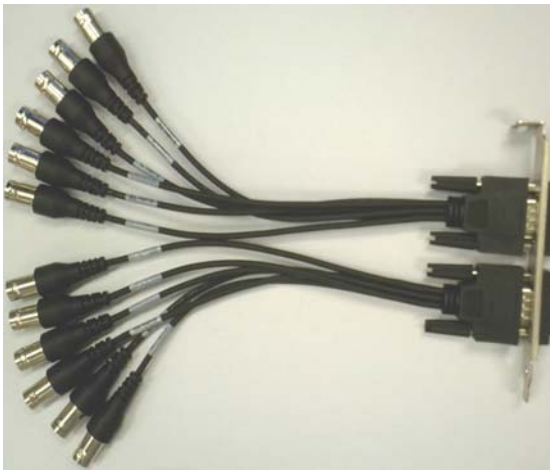
2.2. Hardware Installation

1 Turn off your computer and unplug the power cord.

2 Remove the cover of your computer.

3 Touch the metal part on the surface of your computer to neutralize any static electricity that might be on your body.

4 Place the DVP-7421BE into the Motherboard's PCI slot and connect corresponding pigtail cable to the back bracket of DVP-7421BE.



5 Replace the cover of your computer chassis.

6 Plug in the power cord and turn on the computer.

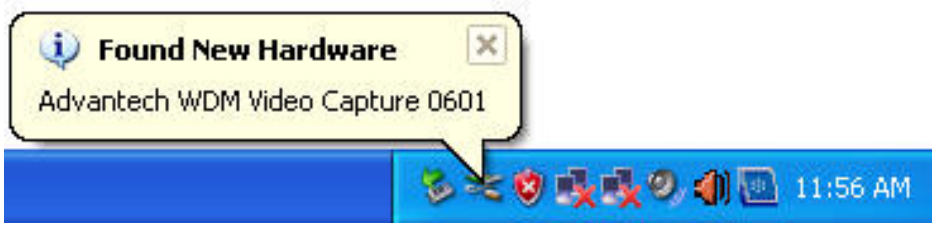
Note: Keep the anti-static bag for future use. You might need the original bag to store the Module if you have to remove the card from the PC or transport it elsewhere.

Install 4 x DVP-7421BE codec card into one system can establish of 16 channels hardware compression DVR platform.

2.3. install driver for capture card

Step 1:

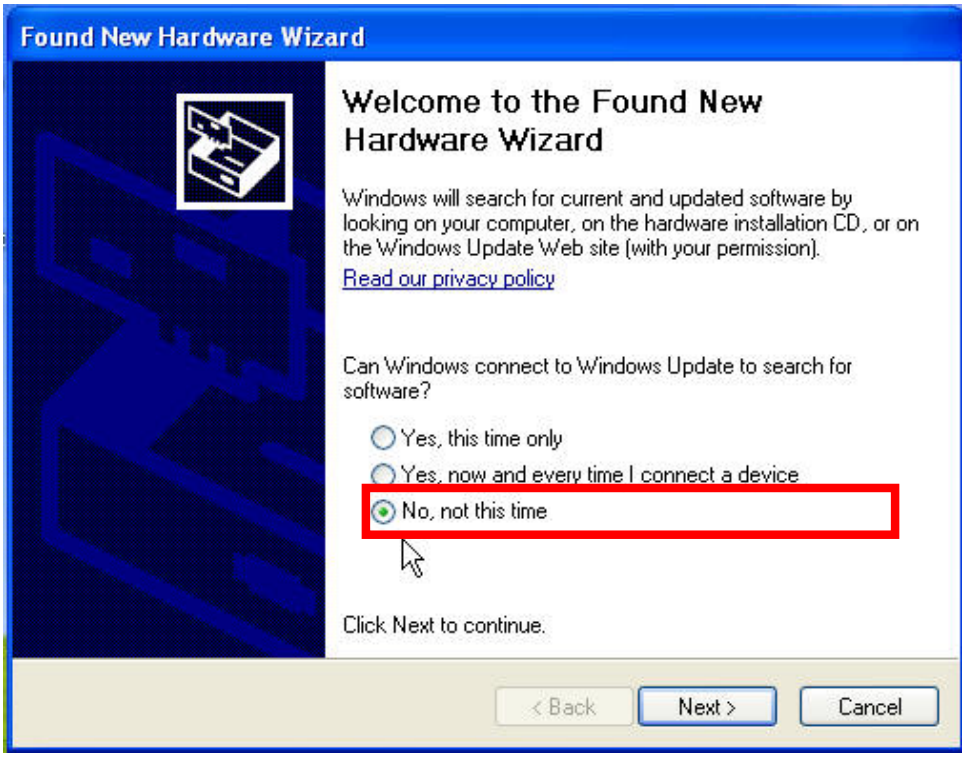
When computer boot into windows system, it will found new hardware and request user assign the driver location



Step 2:

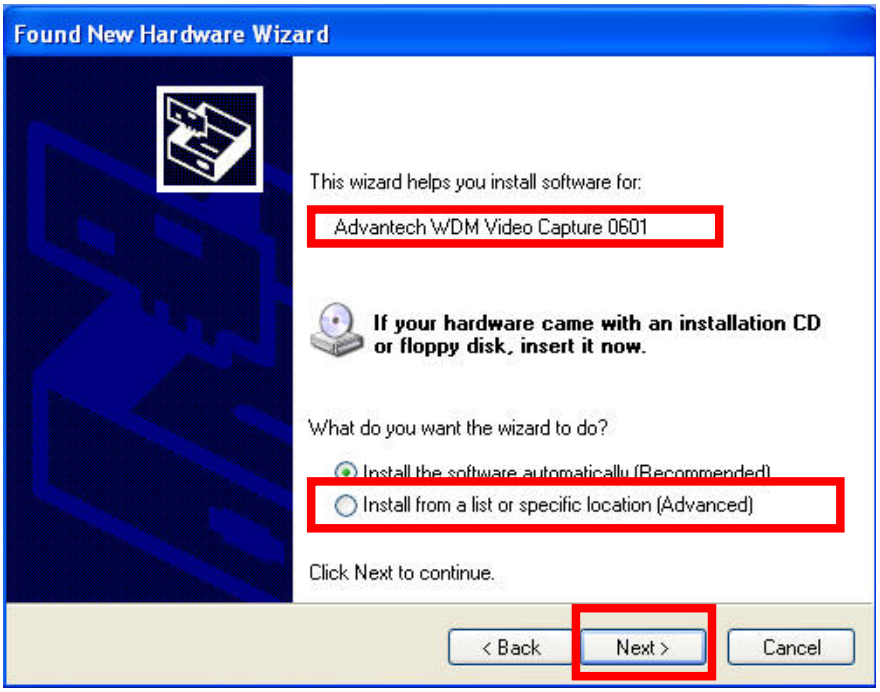
Because we already install the driver into hard disk (default folder c:\Program Files\Advantech\DVP7421B\Driver) therefore user will not download from internet.

Please select [No, not this time] and click 「Next」bottom.



Step 3:

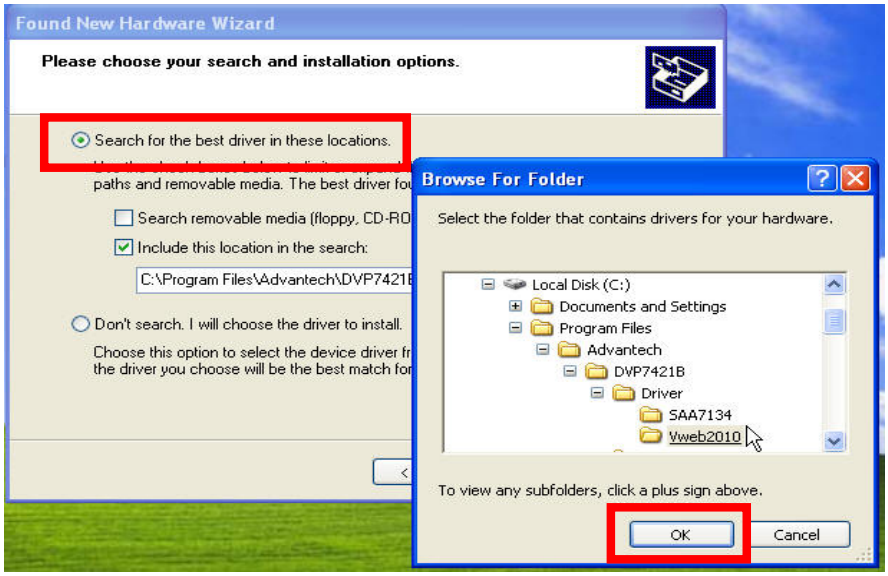
Select [install from a list or specific location] and click next



Step 4:

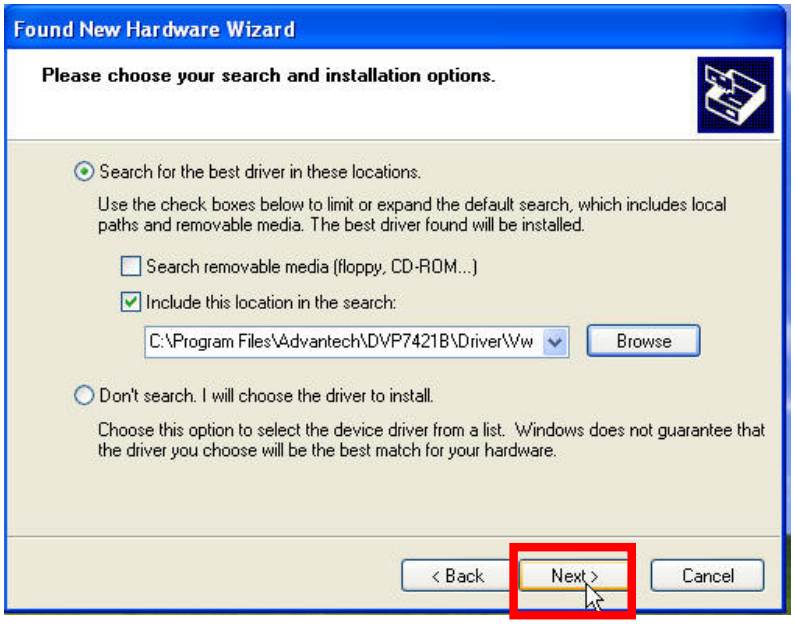
Select [Search for the best driver in these locations]

Click 「Browse」bottom to choose folder [C:\Program Files\Advantech\DVP7421B\Driver\SAA7134 and click 「OK」



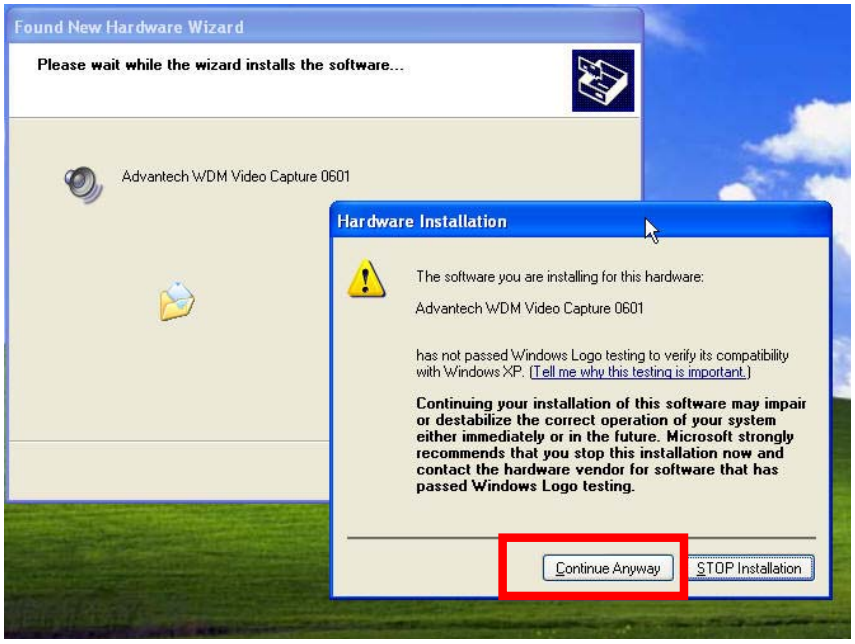
Step 5:

Click 「Next」bottom. Window start search and install driver for device [Advantech WDM Video Capture 0601]



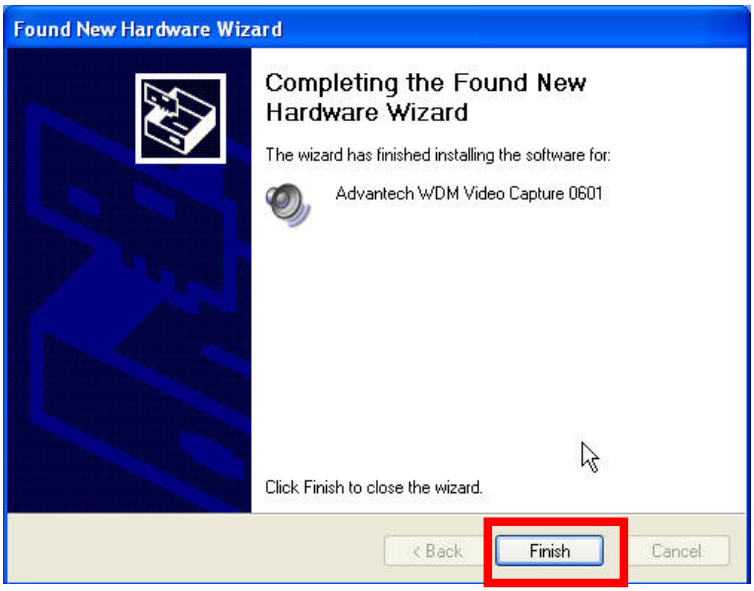
Step 6:

Click 「Continue Anyway」to install driver



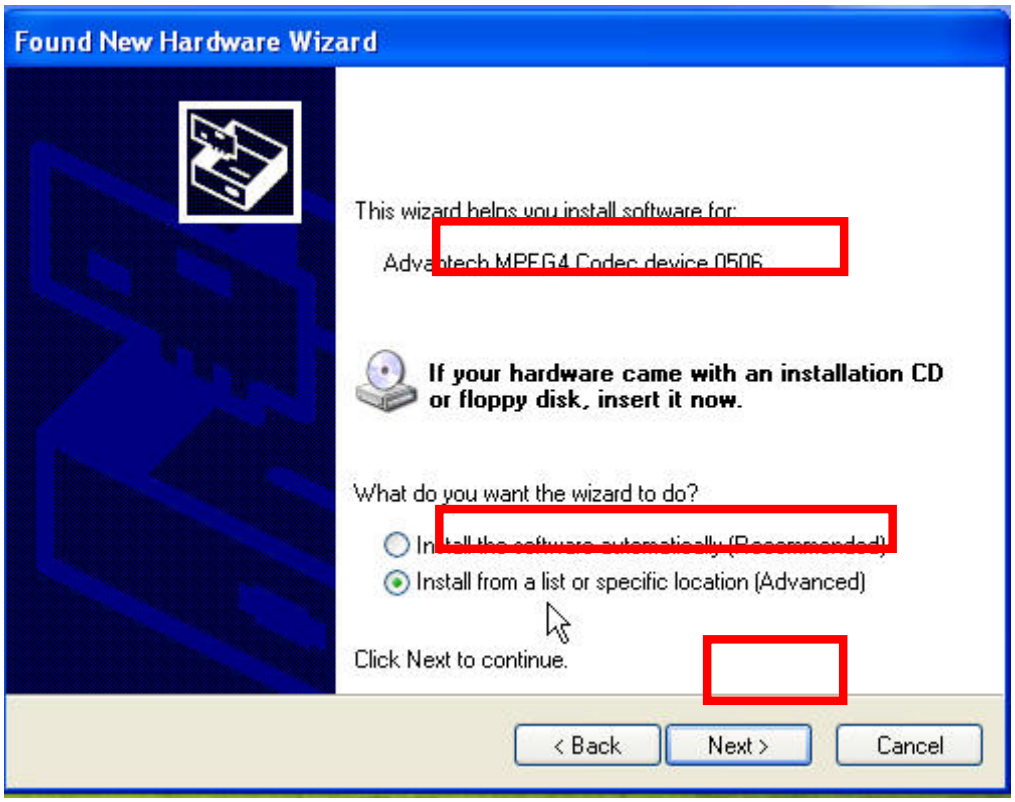
Step 7:

Click 「Finish」bottom to complete the driver instillation.



Step 8:

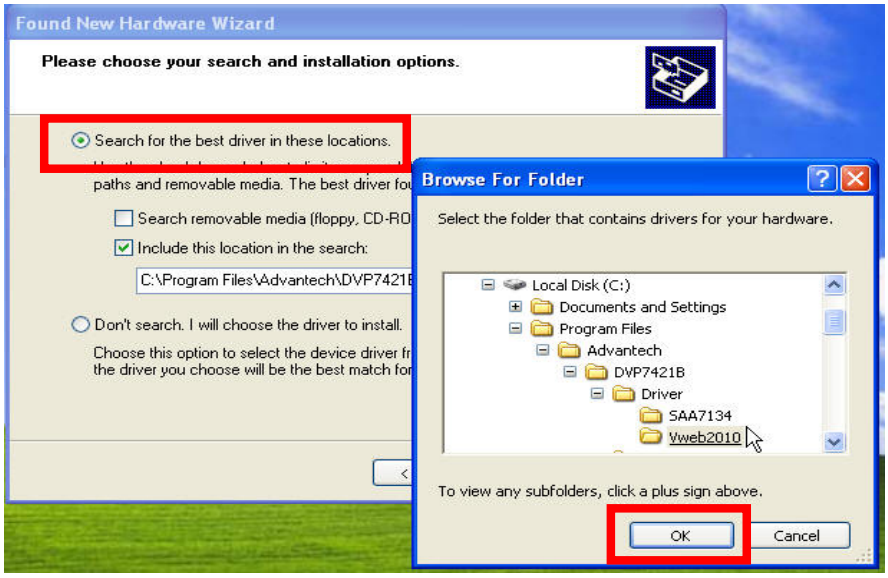
Install driver for [Advantech MPEG4 Codec device 0506](User must install four copy of driver for each DVP-7421BE capture card)

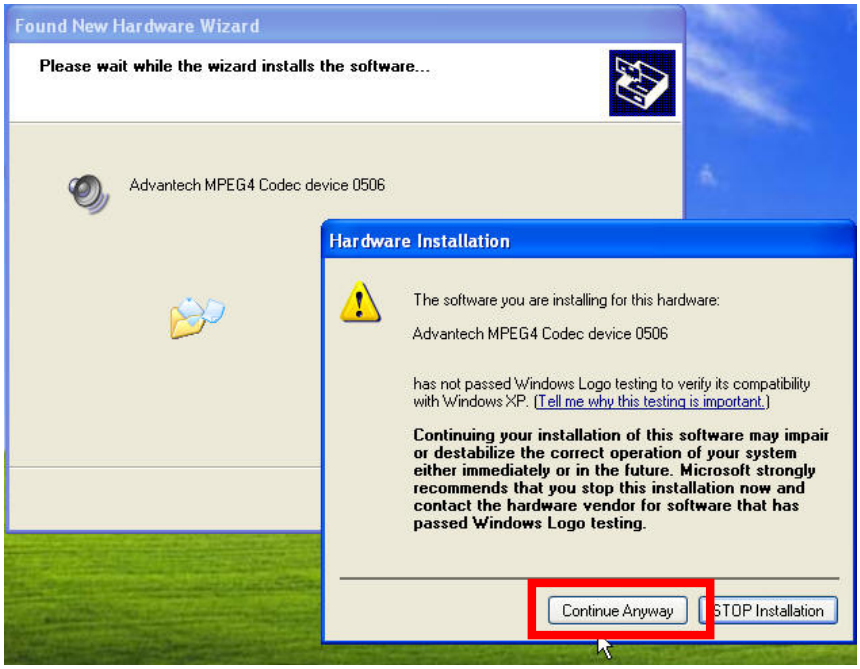


Step 9:

Select [Search for the best driver in these locations]

Click 「Browse」bottom to choose folder [C:\Program Files\Advantech\DVP7421B\Driver\Vweb2010 and click 「OK」bottom.





Step 10:

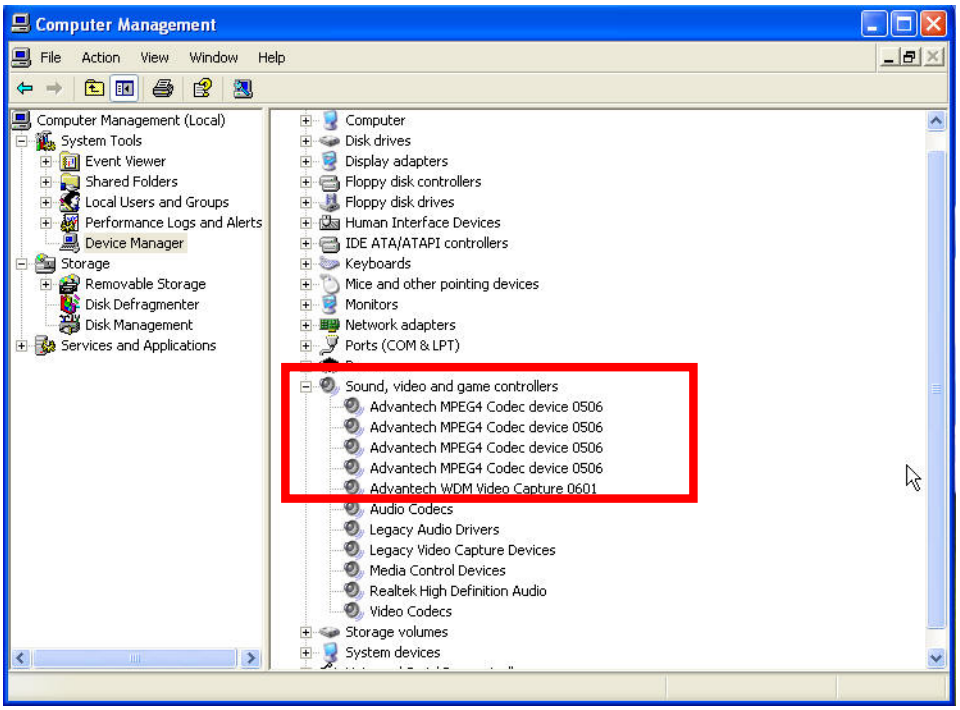
Right click on [My computer] on window desktop and select [Management] from pop-up menu.

Click [Device Manger]→[Sound, video and game controller]

User can find five devices from Advantech.

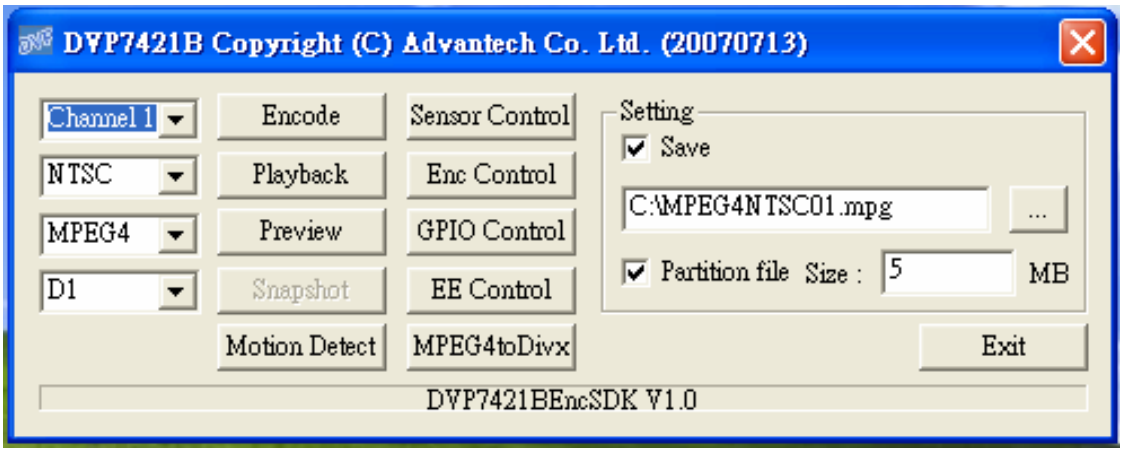
Advantech MPEG-4 Codec device 0506 x 4

Advantech WDM Video Capture 0601 x 1



2.4. Demo Program Functionality

Start demo program from 「Start」→「Advantech」→ 「DVP7421B」
Following is demo program window.



2.4.1 Channel Select

Each “Channel” is representative of one codec chip. There are four channels for each DVP-7421BE. User can set different parameters to different channel.

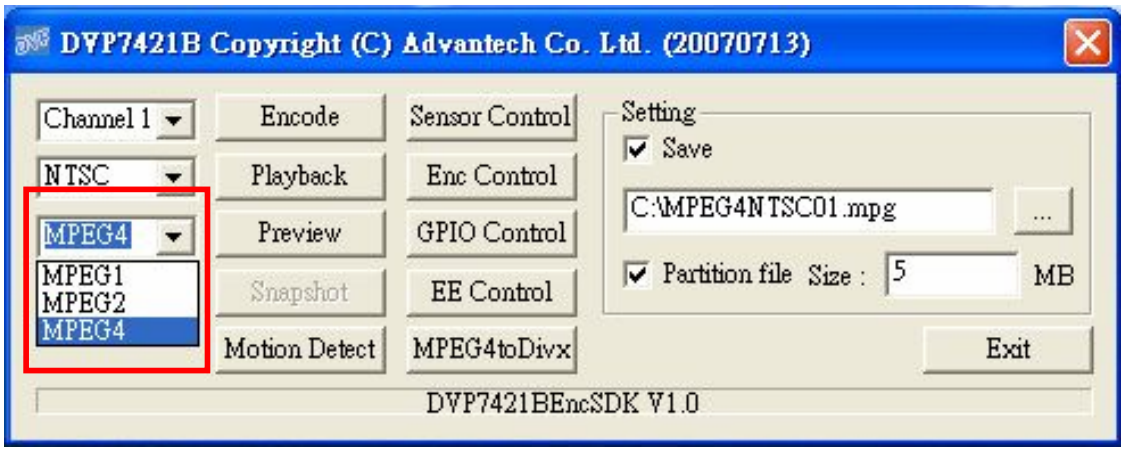
2.4.2 Video Standard

Set the video standard of your camera and display.

Set the video and audio codec broadcast television systems.

2.4.3 Encoding Format

Set the encoding format for customize needs.



2.4.4 Resolution

Set the video encoding resolution.

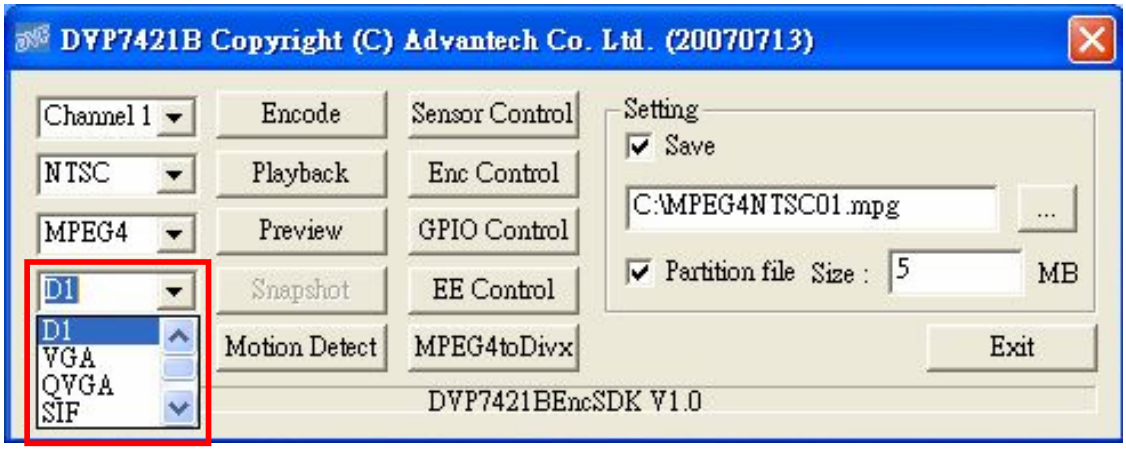
D1 (NTSC：720 x 480；PAL：720 x 576)

VGA(NTSC：640 x 480；PAL：640 x 576)

QVGA(NTSC：320 x 240；PAL：320 x 288)

SIF (NTSC：352 x 240；PAL：352 x 288)

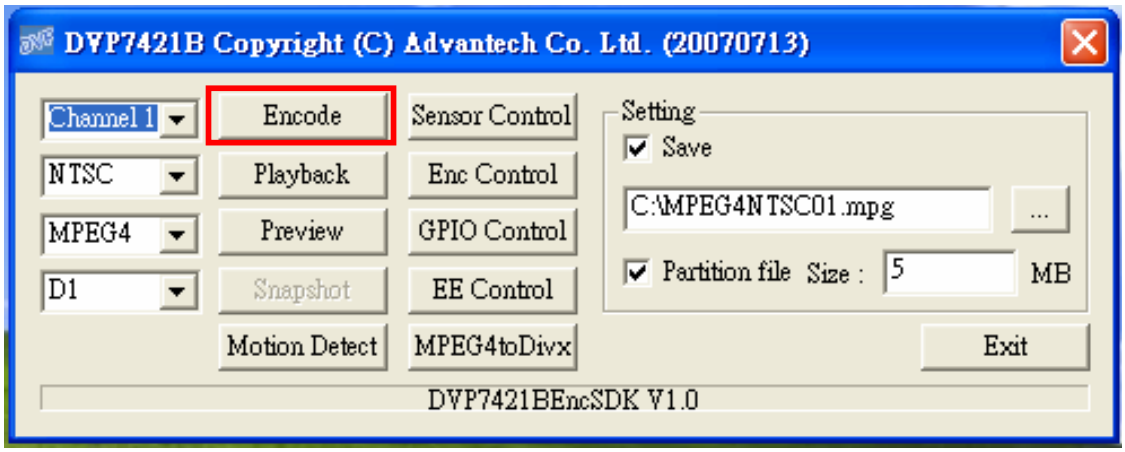
QCIF (NTSC：176 x 120；PAL：176 x 144)

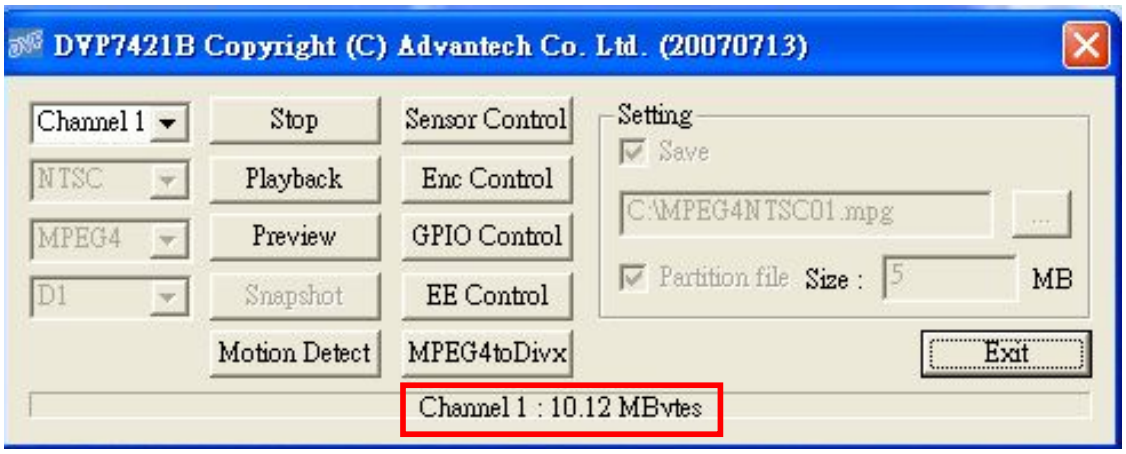


2.4.5 Encoding Mode

Click 「Encode」start encode video.

The bottom of the windows will show the file size of the encode file if the encode function is proceed.



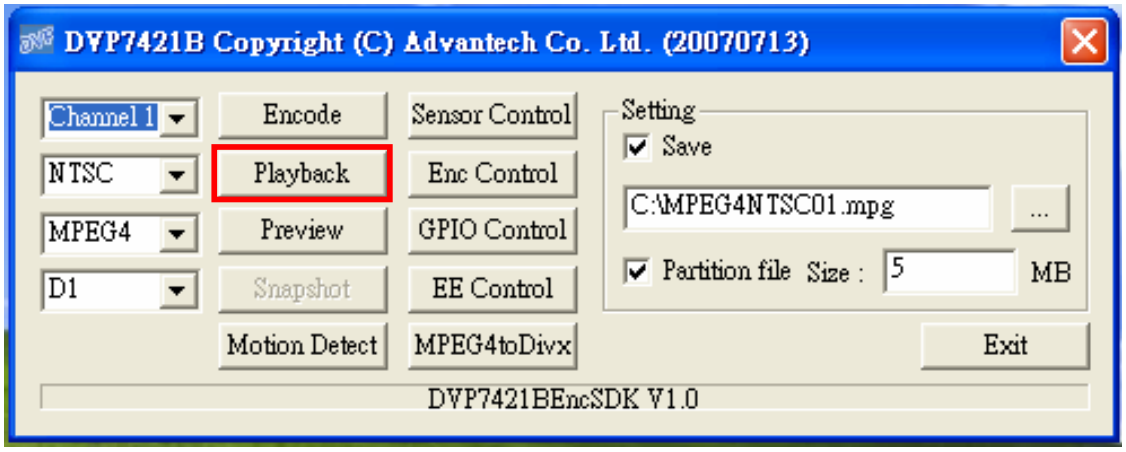


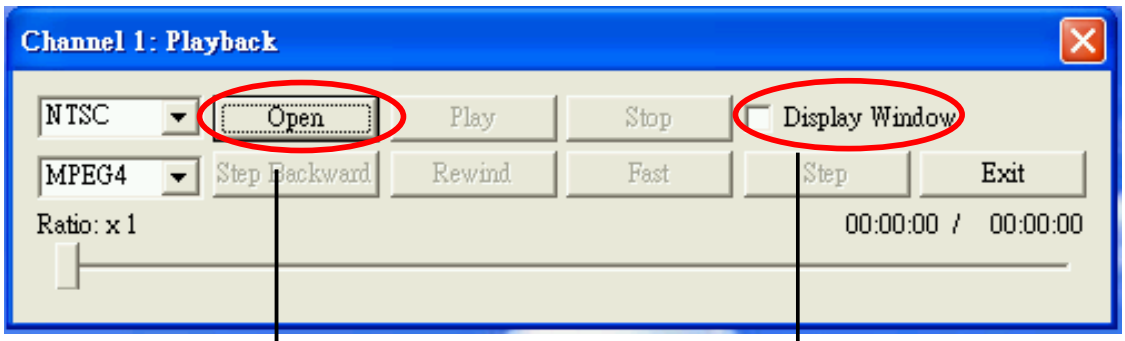
2.4.6 Playback Mode

There are two way to show the result of playback.

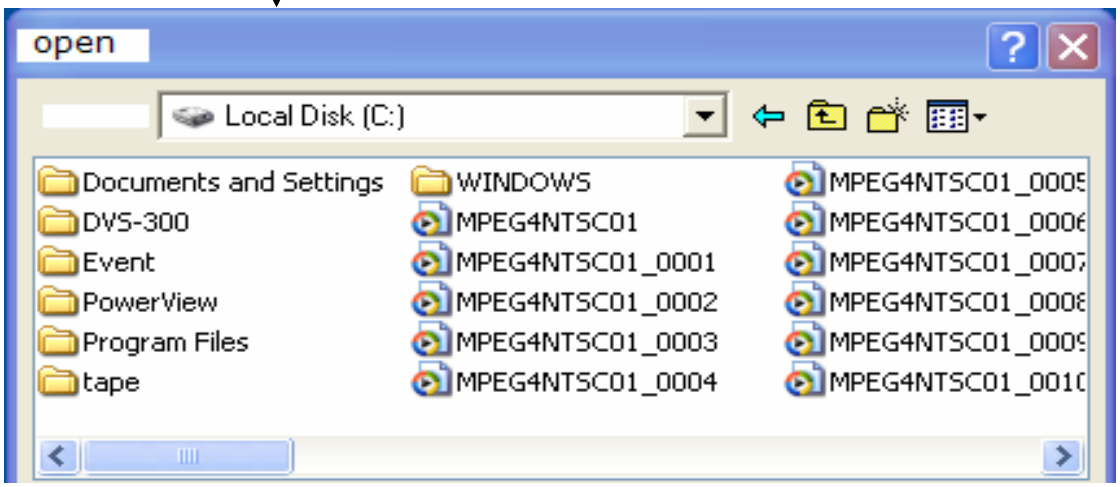
1.Enable 「Display Windows」 watch the result in the display of host PC.

2. Connect the BNC cable out to the external display.

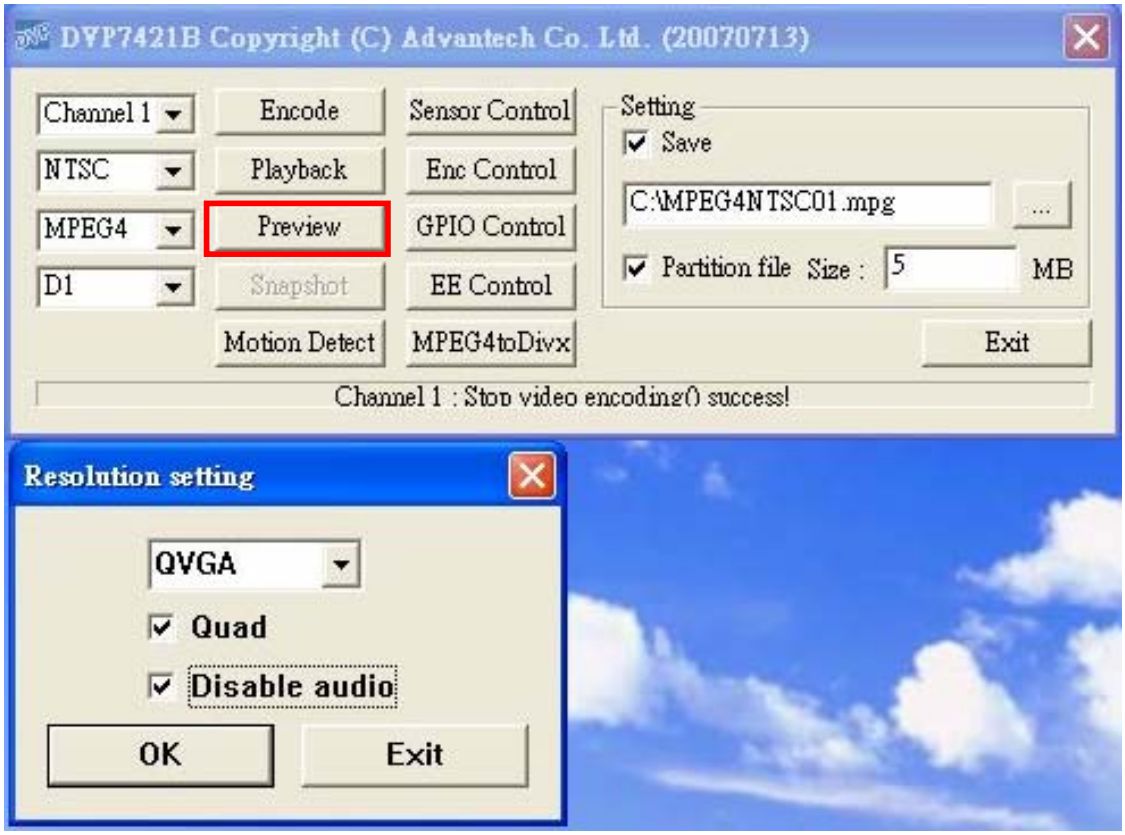




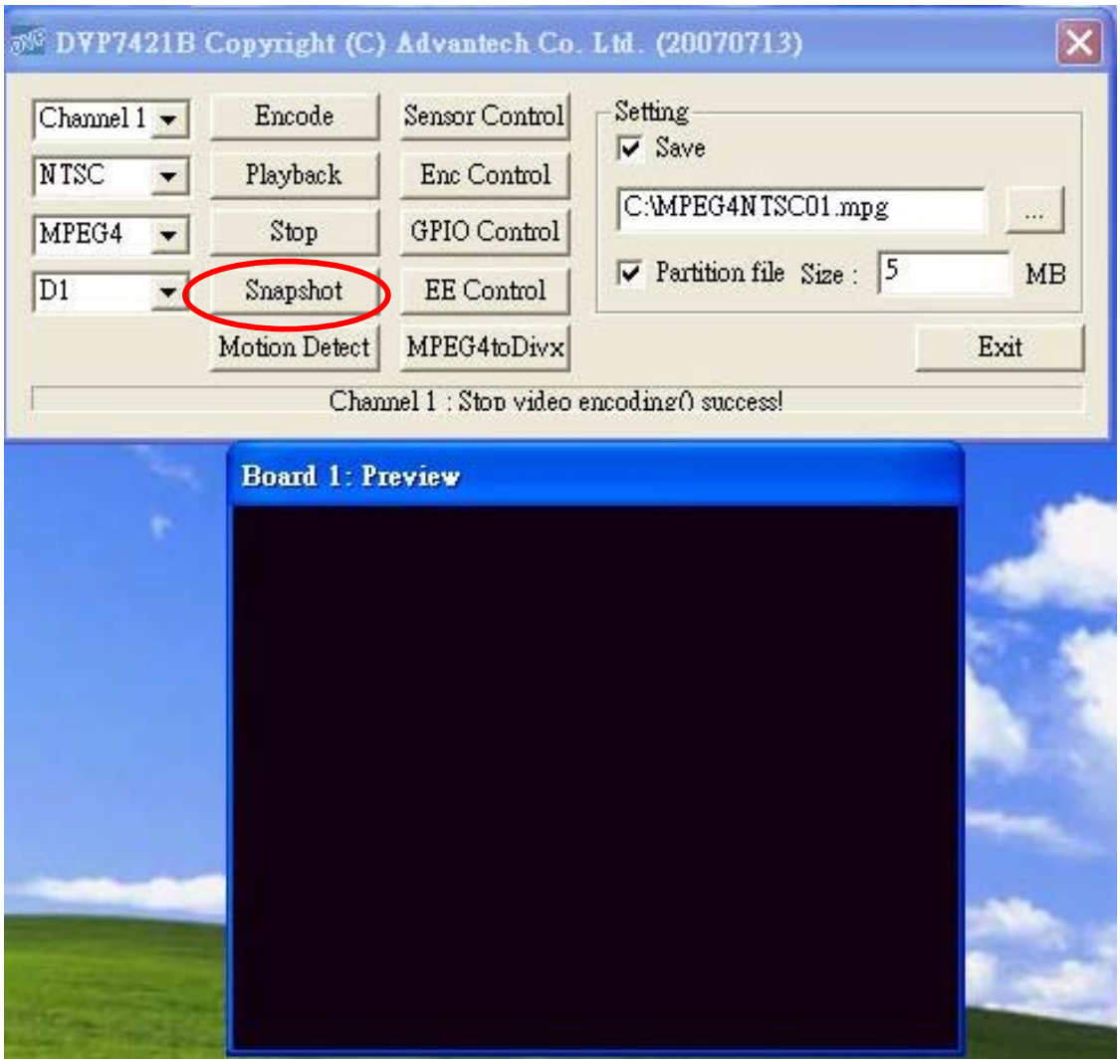
enable will shown on the host PC display



2.4.7 Preview Mode



The User can preview on host PC using 「Preview Mode」demo program. First select the button，「Preview」; there will show the preview resolution setting windows. Ones choice the preview resolution，Quad in a D1 preview windows and switch audio on/off. Then user can preview the video on screen.



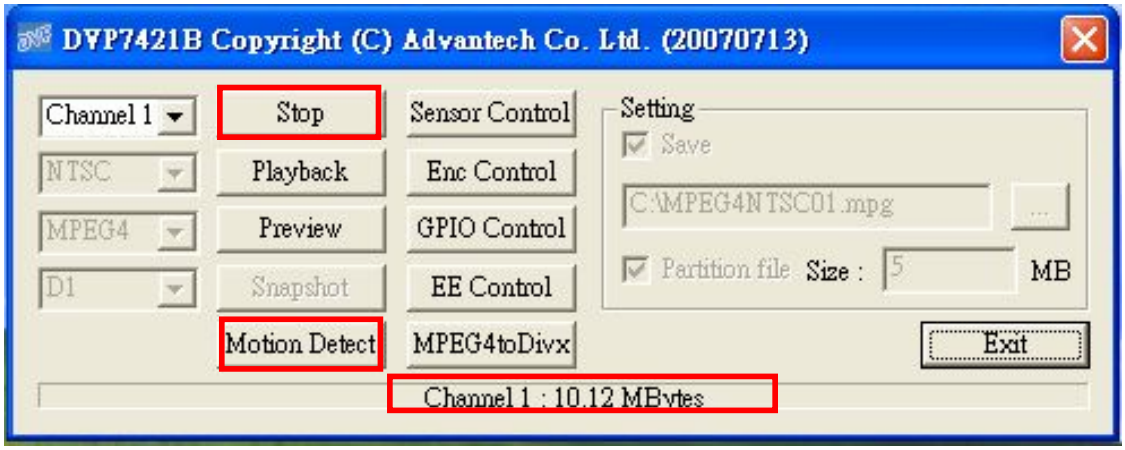
2.4.8 Snapshot

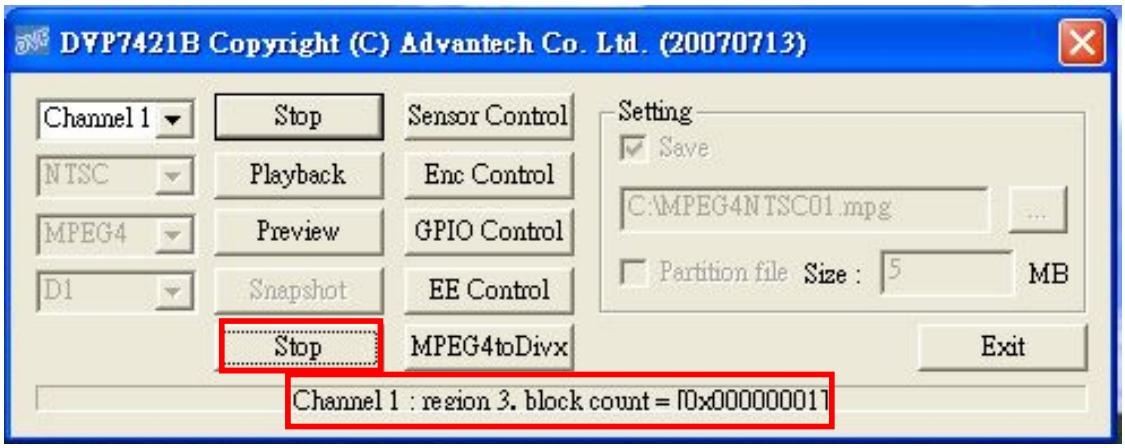
Only on「Preview Mode」effect that can enable「Snapshot」function. Like the above figure ,press the「Snapshot」to get the image data of specific channel video input. The snap image will be show on the up panel.

The snapshot saves in C:\Program Files\Advantech\DVP7421B

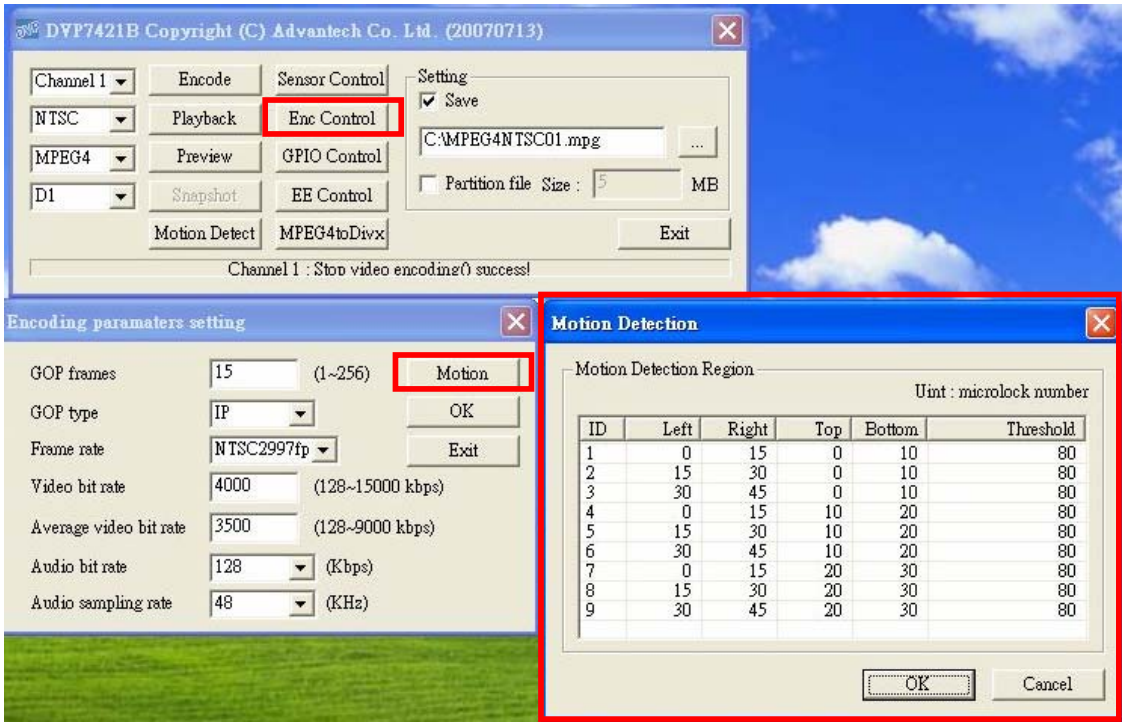
2.4.9 Motion Detect

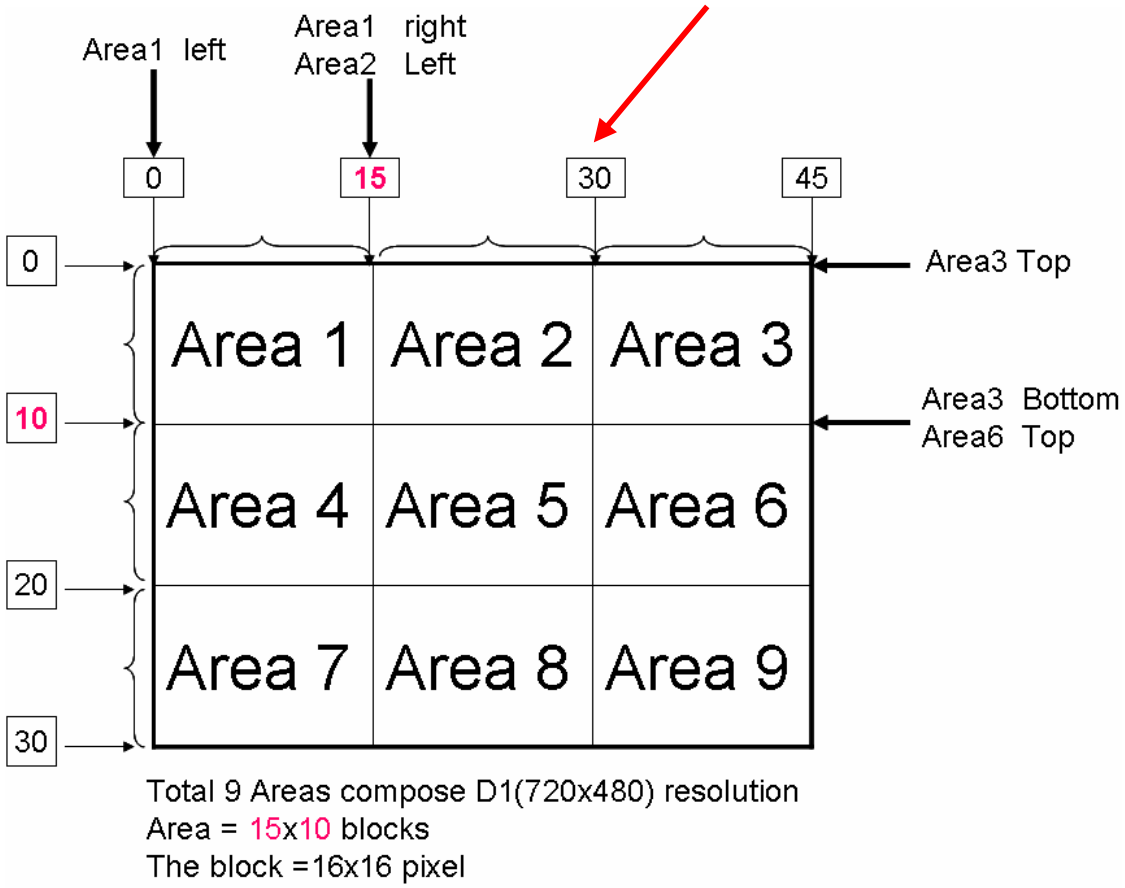
Only on 「Encoding Mode」 enforce, then press the 「Motion Detect」 to enable the function that「the movement」of object will be connect the assigned command.





The detail 「Motion Detect」parameter can refer the below figure.

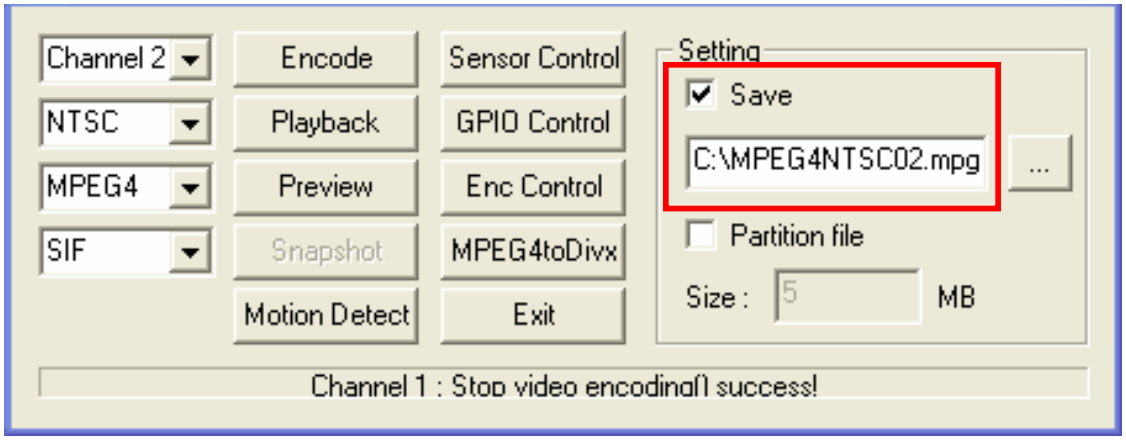




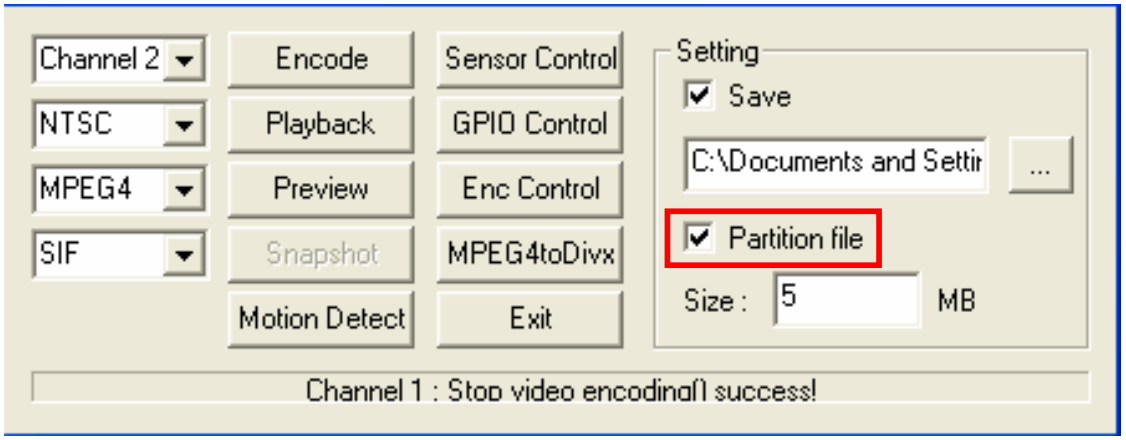
The motion detect configure please refer the graph above.

2.4.10 Setting→ Save

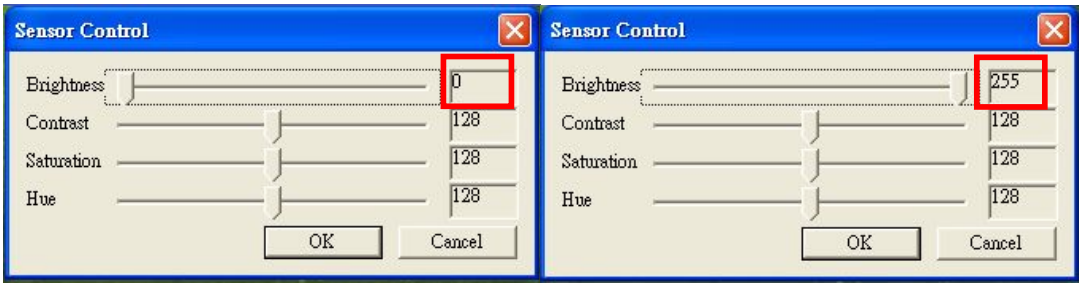
Specify the path and filename for encode data.



Separate encode data into specify size.



2.4.11 Sensor Control



To set the brightness, contrast, hue and saturation of specific channel. Please refer to Chapter 2, 「DVP-7421BE Functions Library Summary」:

DVP7421B_SetBrightness

DVP7421B_GetBrightness

DVP7421B_SetContrast

DVP7421B_GetContrast

DVP7421B_SetSaturation

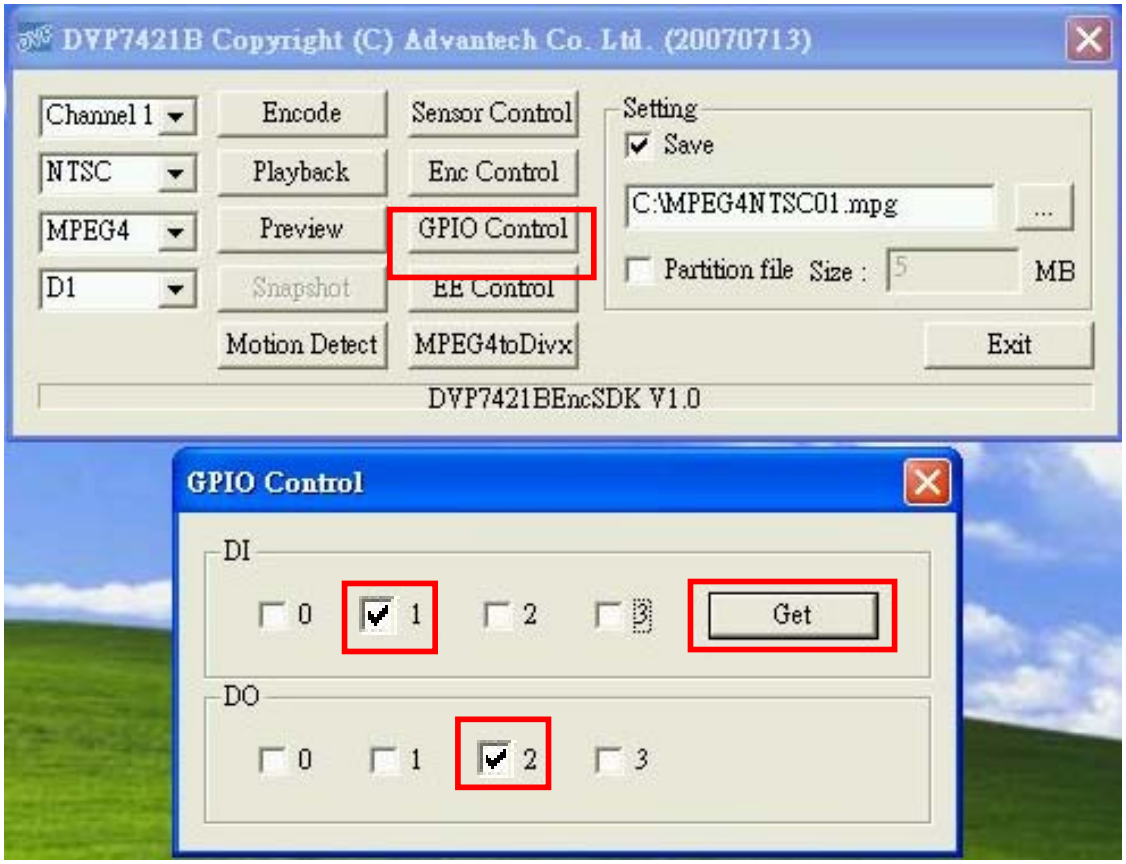
DVP7421B_GetSaturation

DVP7421B_SetHue

DVP7421B_GetHueDVP-2420E_GetBrightness

2.4.12 GPIO control

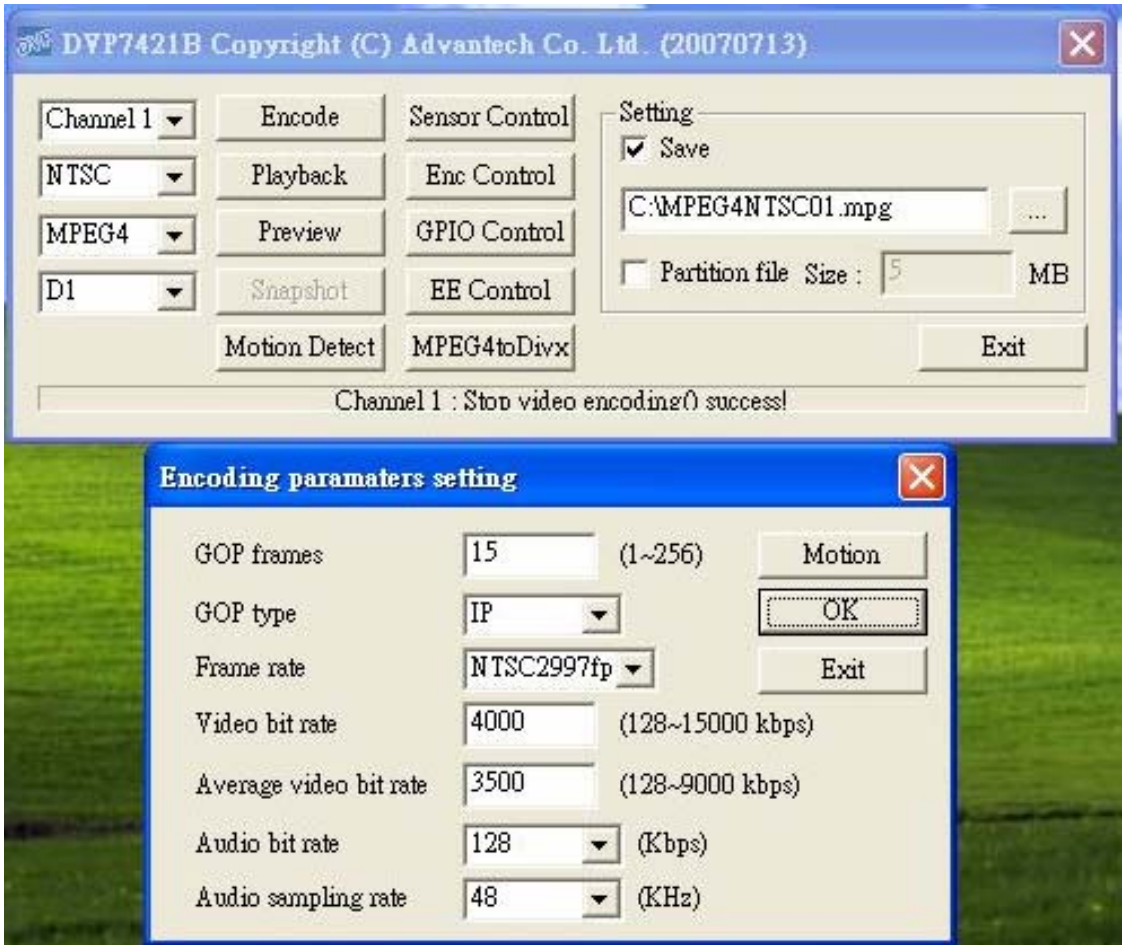
To get a specified 4 DI value or to set a specified 4 DO value.



The user can connect the GPIO device. For example, ones connect DI 1 and DO 2.When user push「Get」button, the blank will show the hook. The GPIO can confirm connection.

2.4.13 ENC control

The encode parameter are tuned more detail to tune in this item.



GOP frame：Set the value of Group Of Pictures between 1~256.

GOP type：Set type of mpeg I.P.B frame sequence.

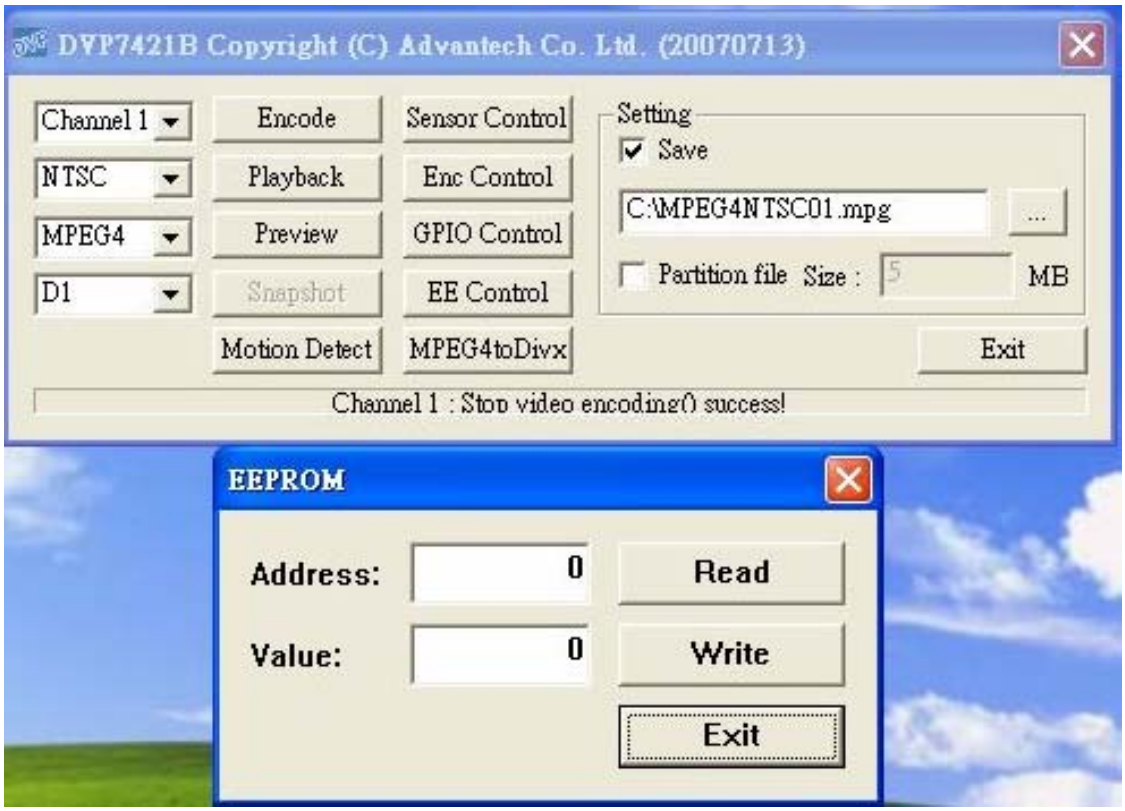
Frame rate：Set the NTSC/PAL and the encode frame rate per second.

Video bit rate：Set the encode video compression rate between 128~15000kbps

Average Video bit rate：Set the average encode video compression rate between 128~9000kbps

Audio bit rate：Set the encode audio compression rate

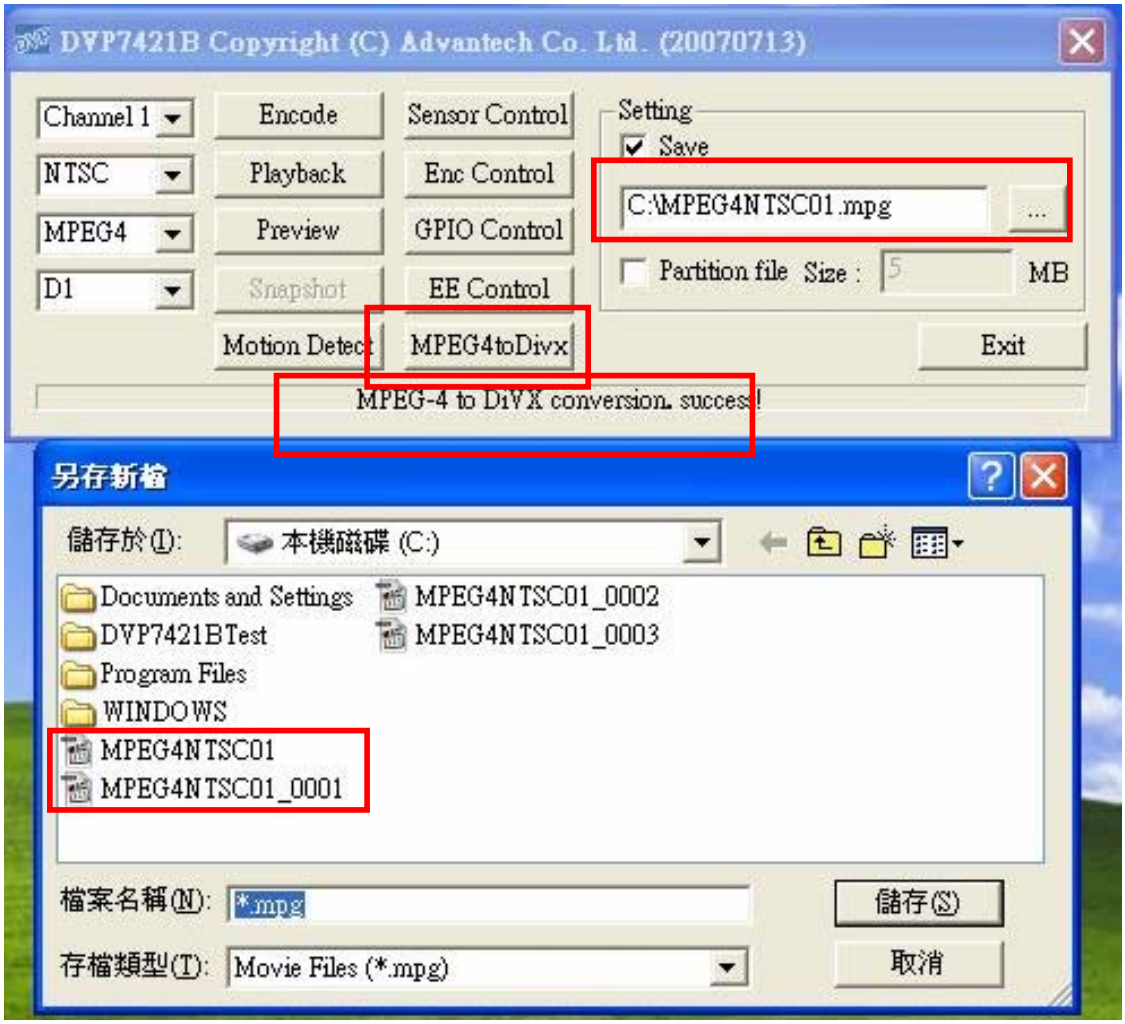
2.4.14 EE Control



Press the button「EE control」,the user can write two fields to EEPROM. When system shut down, the value will store. The user can write the key to protect the rights of the software. The numeric range of Address are 0~127, and the numeric range of Value are 0~255.

2.4.15 Convert Function

press the button” Mpeg4 to Divx” could convert the movie format from mpeg to Divx format video file.



2.4.16 Multi-Board ID Reorganization

Maximum performance Triplex example：The DVP-7421BE could preview、encode and playback simultaneously with four codec chip.

One system can install four DVP-7421BE capacities; it is notice below to recognize the board ID of multi-card.

The driver of the video capture device in the DVP-7421B is a DirectShow source filter. In the DirectShow，the device source filters are enumerated by the System Device Enumerator.

Because enumerate sequence is not by PCI Slot in proper ordering, there cannot know the video capture filter that is belong to which capture card owns. We use the below way to mapping video capture filter and capture card.

In the driver of the video codec chip，the instance of the video codec chip can be got corresponding to the order of the PCI slot.

We use the first codec chip to set the board ID (Refer to the SDK manual, DVP7421B_SetBoardID function.)
After setting the board ID, the board LED will show the board ID.
Next step, the video capture device filter will read the board ID (Refer to the SDK manual, DVP7421B_GetBoardID function),so the video capture device filter is belong to corresponding capture card.

CHAPTER 3

DVP-7421BE
Triplex Function Experiment

Chapter 3 DVP-7421BE

Triplex Function Experiment

3.1 Platform：P4 Platform

Motherboard：Advantech AIMB-741E2-00A1 Motherboard

(Intel 845E+ICH4)

CPU：Intel Pentium 4，2.4 GHz

Memory：KINGMAX DDR-433/400，256MB

PCI bus：PCI 32-bit/33 MHz, 5 slots

VGA：Nvidia Geforce2 MX 400，AGP，64MB

OS：XP professional，SP2

HDD：WD，40G

Experiment Parameter：

Video Standard：NTSC

Capture Frame Rate：real time，30/25 fps for NTSC/PAL

Full D1(NTSC：720 x 480)， QVGA(320 x 240)

Input Video Channel	Function Setting	Each Capture Resolution	Average CPU load (%)
16	Preview	Full D1	30%
16	Encode	Full D1	10%
16	Decode	Full D1	10%
16	Host PC Display	Full D1	30%
16	Preview+ Encode	FullD1 (Preview QVGA*)	40%
16	Decode+ Host PC Display	FullD1 (Preview QVGA*)	40%
16	Preview+ Encode+ Decode	FullD1 (Preview QVGA*)	50%
4	Preview	Full D1	15%
4	Encode	Full D1	0~5%
4	Decode	Full D1	0~5%
4	Host PC Display	Full D1	15%
4	Preview+ Encode	Full D1	15%
4	Decode+ Host PC Display	Full D1	15%
4	Preview+ Encode+ Decode	Full D1	20%

*Depends on user’s MB design, PCI bandwidth consideration.

3.2 Appendix：Mpeg4 Software Decoder

The Document File,"MPEG4 Software Decoder",include two files.

First,"mpgviddec.ax"：Vweb MPEG4 Decoder Filter

Second,"VwebDemuxFilter2R.ax"：Vweb MPEG4 Demux Filter

(this file is a "Filter" separate the Video and Audio)

(File name can change by user)

User Guide Line:

In command line execute "command"

regsvr32 mpgviddec.ax → install

regsvr32 /u mpgviddec.ax → uninstall

regsvr32 VwebDemuxFilter2R.ax → install

regsvr32 /u VwebDemuxFilter2R.ax → uninstall